AMERICAN COLLEGE of NURSE-MIDWIVES

The Midwife as Surgical First Assistant

Third Edition

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DISCLAIMER

This publication is designed to provide an accurate overview of the subject matter covered. While the editors strive to ensure the text reflects the current literature and best practices, we acknowledge that there are multiple accepted practices and first assistant practice will be governed by the facility or practice in which it occurs.

The publication by ACNM of texts on expanded practice procedures is intended to assist experienced midwives when they choose to incorporate new skills and procedures. When a midwife chooses to expand practice to act as the first assistant for OB/GYN surgery, this text can serve as a guide as the midwife plans and documents a didactic and clinical education program consistent with the Standards for the Practice of Nurse-Midwifery, and the requirements of the jurisdiction and facility in which such practice occurs.

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INTRODUCTION

The purpose of this text is to provide guidance to the CNM/CM who is expanding clinical practice to include first assistant services for cesarean or gynecologic surgery. The content and curriculum provide guidance for development of the knowledge and skills required of the first assistant regardless of the educational modality by which midwives expand their clinical practices.[1] The overarching goal of the handbook is to support excellence in expanded midwifery practice with a particular focus on perioperative patient care and outcomes.

The term midwife as used throughout this document refers to certified nurse-midwives (CNMs) and certified midwives (CMs) certified by the American College of Nurse-Midwives (ACNM) or the American Midwifery Certification Board, Inc. (AMCB), formerly the American College of Nurse-Midwives Certification Council, Inc. (ACC).

When expanding practice, it is the responsibility of the individual midwife or women's health professional to ensure that the education and development of clinical competence for the new skill meets the standards or expectations established by the certifying and regulatory agencies, and clinical practice facilities.[2] This includes women's health professionals who are not midwives, such as registered nurses (RNs), advanced practice registered nurses (APRNs), nurse practitioners (NPs), or physician's assistants (PAs) who may use this text when expanding practice to include surgical first assistant activities.

While much of the knowledge and skills necessary to function safely as a novice first assistant are included in core midwifery education for management of birth, serving as surgical first assistant is beyond the ACNM core competencies for midwifery. Functioning as first assistant is considered *expanded midwifery practice*, defined by ACNM as "a procedure, skill, or component of practice that may be acquired beyond basic midwifery education, and therefore requires additional documented didactic and clinical education."[3]

The midwife who serves as first assistant in surgery functions as a women's and reproductive health, perinatal and birth professional in the perioperative setting. Depending on the individual's education, experience, and credentials, the surgical first assistant can perform immediate pre-op preparation of the client for surgery, and during surgery provide optimal surgical exposure, participate in tissue dissection, ensure hemostasis, perform or facilitate wound closure, and perform other intraoperative functions to assist the surgeon in carrying out a safe operation that optimizes outcomes, given the specific condition and indications for surgery.[1-4] The surgical first assistant who is a licensed independent practitioner performs these functions in *collaboration* with the surgeon, or under the *direction or supervision* of the surgeon as unlicensed assistive personnel or a dependent practitioner, in accordance with hospital policy and consistent with applicable state laws and regulations and delineated privileges.[5-6]

HOW TO USE THIS TEXT

This text is intended as a comprehensive guide for midwives who participate as the first assistant during cesarean. It also offers core information for the subset of midwives who act as the first assistant during other obstetric or gynecologic procedures, such as bilateral tubal ligation. The content includes didactic learning, clinical suggestions for best practice, and recommendations for the development of knowledge and skill as the clinician expands or refines practice to include the knowledge and skills of the first assistant and apply them during the perioperative care of clients and their infants.

The text can be used as a self-study guide, the basis for a facility-based first assistant program, a prerequisite for hands-on first assistant workshops, or as a companion text for a formal didactic and skills course for the first assistant during cesarean or gynecologic surgery.

The text provides a comprehensive exploration of the first assistant role and skills, and provides an overview of cesarean and common gynecologic surgical procedures. Each chapter has a discrete focus that addresses the topic from a professional,

technical or clinical perspective. Serving as a surgical first assistant occurs within the context of midwifery practice, and woman-, client-, and family-centered care are compatible with most evidence-based recommendations for surgery. Topics are presented through the lens of midwifery practice to ensure that the intent of being *with woman* (allowing for and including gender variation) is retained in the highly clinical surgical setting.

A note on language: The role descriptors, "surgical first assistant," "first assistant," and "midwife first assistant" are used throughout this volume with variation due to context. Generally, these all reference the same role.

EXPERIENTIAL LEARNING ACTIVITIES AND CHECKLISTS

Each focus area includes experiential learning activities. These activities are designed to support the transition from learned theory to appropriate clinical practice and critical thinking as an active first assistant on the surgical team. In addition, activities provide an opportunity for each learner to assess personal progress and develop a dynamic learning plan while building competency and professional relationships in the perioperative setting.

The checklists are provided to support methodical progression through skill development and the addition of first assistant activities to privileges; the checklists delineate minimum standards for education, experience, and associated documentation. Checklists are included in the appendices.

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CONTENTS

THE FIRST ASSISTANT ROLE AND MIDWIFERY PRACTICE

1

Midwifery care is person-centered care; care that helps to maintain or foster the health, well-being, and autonomy of all clients. Midwifery is distinct from the disciplines of medicine or nursing yet includes some characteristics and functions of each. In an acute obstetric emergency, every effort is made by the interdisciplinary maternity care team to facilitate birth as quickly as possible. The presence of a skilled midwife at the bedside who can identify and triage complications and move seamlessly to the operating room (OR) as a surgical first assistant can facilitate timely intervention and preserve critical continuity of care.[1] In the case of nonemergent or scheduled cesarean birth, the midwife as surgical first assistant (first assistant) has an opportunity to remain actively engaged in the care of the client, thus enhancing the therapeutic relationship as well as adding value to the revenue stream of the practice.

HISTORICAL US MIDWIFERY CONTEXT

Certified nurse-midwives began functioning as first assistants in 1995 with the formal development of a first assistant program for midwives by Frances Thatcher at New York Presbyterian Hospital.[1] Didactic and hands-on workshops have periodically been offered at American College of Nurse-Midwives (ACNM) annual meetings beginning in 1997. In 1998, the ACNM Board of Directors approved the position statement *The Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery*.[2] Since the formal introduction of midwives as first assistants during surgery, many CNMs and CMs have been educated to provide this skill.

For the purposes of this publication, the terms midwife and midwifery refer to midwives and midwifery care as practiced by certified nurse-midwives (CNMs) and certified midwives (CMs) in the United States. CNMs and CMs have completed graduate level education in a program accredited by the Accreditation Council for Midwifery Education and have been certified through the American Midwifery Certification Board. CNMs have an education in nursing and midwifery while CMs directly enter the midwifery profession without a nursing education. CNMs and CMs are recognized and licensed independent practitioners in all 50 states and many US territories. The American College of Nurse-Midwives (ACNM) is the professional association representing CNMs and CMs. ACNM has determined that serving as first assistant during obstetric or gynecologic surgery is within the scope of practice of the CNM and CM and supports flexibility in education and clinical skill development to incorporate this advanced role into midwifery practice.[2]

Explanatory Definitions and Scope of Practice

Scope of Practice describes the professional activities and role of a midwife. Full scope of practice based on the ACNM *Core Competencies for Basic Midwifery Practice* is advocated by ACNM but unfortunately scope of practice for midwives may be limited by state or local regulatory agencies, facility policies, or tradition.

Hospital privileges delineate the authorized procedures and functions for providers working in that institution or health system.

Credentialing is the process carried out by the institution to assure that the provider requesting privileges has the appropriate education and experience to carry out the privileges. This process can involve multidisciplinary committee review.

CNM and CM education is based on the ACNM *Core Competencies for Basic Midwifery Practice* and other ACNM standards-setting documents including the *Standards for the Practice of Midwifery*.[3,4] The role of surgical first assistant is not a core competency but instead an advanced role requiring specialized knowledge and skills. Standard VIII of the ACNM *Standards for the Practice of Midwifery* details the expectations for the incorporation of advanced knowledge and skills into midwifery practice. These expectations will be discussed later in this chapter.

State regulatory agencies, hospital credentialing committees, and third-party payers often require validation that the CNM/CM who includes first assistant activities as part of their practice does so appropriately under their midwifery certification. The ACNM position statement *The Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery* was developed to provide guidance to these entities.[2] Documentation of adherence to Standard VIII of the *Standards for the Practice of Midwifery*, along with the ACNM position statement provides professional support for the incorporation of this advanced skill into midwifery practice. Each midwife is held accountable

for understanding the scope of midwifery practice as defined by state statute or regulations, and by facility-specific bylaws or policies.[4]

Depending on the practice environment, the role of the midwife as first assistant may be impacted by other disciplines. The Association of periOperative Registered Nurses (AORN) is a professional organization that represents the interests of more than 43,000 perioperative nurses in the United States.[5] In many states, midwives are licensed and regulated by boards of nursing and these boards may reference standards set by the AORN. Operating room staff, hospital credentials committees, and third-party payers are typically familiar with AORN recommendations, and recognize the Registered Nurse First Assistant (RNFA) and Certified Registered Nurse First Assistant (CRNFA) credentials. The RNFA/CRNFA is a perioperative registered nurse who functions in an expanded role or an Advanced Practice Registered Nurse (APRN) functioning as a first assistant. The RNFA/CRNFA role is recognized within the scope of nursing practice by the Nurse Practice Act in all 50 states. It is important for the midwife practicing in the perioperative setting to be familiar with AORN standards and recognize the organization as a valuable resource for multidisciplinary educational programs in foundational perioperative practices.

AORN Periop 101: A Core Curriculum

The Association of periOperative Registered Nurses (AORN) Periop 101 course provides core education in asepsis and safe surgical practice for health professionals to safely observe and participate during invasive procedures. Midwives, advanced practice nurses, physician assistants, medical students, interns, and other health professionals new to the perioperative environment can benefit from the discussion of clinical behaviors provided in the course. For more information go to https://www.aorn.org/education/facility-solutions/periop-101/med-students

ACNM has partnered with AORN to align relevant position statements that address CNMs and APRNs who practice in the perioperative setting. The AORN position statement on *Advanced Practice Registered Nurses in the Perioperative Environment*[6] clearly acknowledges ACNM as the professional organization that sets standards for midwives, including in the perioperative setting:

> "AORN supports the American College of Nurse-Midwives position statement: *The Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery* as the guidance for appropriate regulation, education, training, and credentialing for all midwives certified by the American Midwifery Certification Board, including those who are licensed in states as APRNs."

The midwife who includes first assistant activities in their practice can do so based on their midwifery certification, license, and privileges.

The American College of Obstetricians and Gynecologists (ACOG) and the American College of Surgeons (ACS) recognize the value of competent surgical first assistants from a variety of clinical backgrounds. In a position statement on surgical assistants published in 2016 and reaffirmed in 2018, ACOG concluded that: "Competent surgical assistants, such as other physicians and non-physician surgical assistants, should be available for all major obstetric and gynecologic operations."[7] In their Statements on Principles (2016), the ACS stated:

> "The first assistant during a surgical operation should be a trained individual who is able to participate in and actively assist the surgeon in completing the operation safely and expeditiously by helping to provide exposure, maintain hemostasis, and serve other technical functions. The qualifications of the person in this role may vary with the nature of the operation, the surgical specialty, and the type of hospital or ambulatory surgical facility."[8]

In the eighth edition of *Physicians as Assistants at Surgery* 2018 update, the ACS together with many specialty surgical organizations reviewed all procedures listed in the "Surgery" section of 2018 American Medical Association's Current Procedural Terminology (CPT TM) and reached consensus on which cases required surgical assistants.[9] While the group specifically sought to clarify when physicians were indicated as surgical first assistants, they acknowledged that "local

resources and patient characteristics can have an impact on the type of professional who may be asked to serve as an assistant at surgery." They further acknowledged that the inclusion of any particular surgery in which physicians were indicated as surgical first assistants should not be interpreted as meaning that qualified surgical assistants other than physicians may not also be appropriate as surgical first assistants based on the specific circumstances. This has important implications for insurance payments for first assistant activities performed by midwives.

Formal certification of first assistants is a growing trend. For those midwives who choose to attain an additional credential external to the midwifery profession, or when certification is requested by regulatory agencies or by the credentialing body of an institution or organization, there are several certification options: Certified Registered Nurse First Assistant, Certified Surgical Assistant, and Certified Surgical First Assistant. For more information about certification options and requirements, the reader is encouraged to contact the appropriate certification organization.

ACNM describes the surgical first assistant scope of practice for CNMs and CMs as including only participation in obstetric and gynecologic procedures.[2] Some states or practice settings may limit the role exclusively to first assistant at cesarean birth. A specific credential external to the midwifery profession is indicated when the midwife chooses to participate as a first assistant in surgery beyond the midwife scope of practice as defined by ACNM.

Midwifery First

ACNM advocates for midwifery care using a human rights framework that recognizes the power and strength of individuals and the importance of family and community health.[10] There is an undue burden of health risk that occurs for women in general, especially people of color and gender diverse individuals.[11-13] As reflected in the *Hallmarks of Midwifery Practice*, ACNM believes that the overall quality of care can be improved by providing care within the context of client preferences, open discussions, including the client as a full partner in health care decisions, recommending interventions only when clearly indicated, and supporting physiologic processes.[3]

Cesarean birth is the most common surgical procedure performed in US hospitals, and cesarean birth rates among hospitals in the United States range from 7.1% to 69.9% depending on the facility.[14] In 2018, the national US cesarean birth rate was 31.9% and ranged from a low of 22.4% (Alaska) to a high of 38.3% (Mississippi).[15] Liberal use of cesarean birth is associated with excess morbidity in women and infants and increases costs compared with vaginal birth.[16] Since January 2019, The Joint Commission requires accredited birthing hospitals to report on 6 specific core perinatal outcomes, including the rates of primary cesarean birth to low-risk women.[17]

Reducing the primary cesarean birth rate is recommended by the World Health Organization (WHO), ACOG, and the Society for Maternal and Fetal Medicine.[16-19] WHO acknowledges that while an ideal cesarean birth rate cannot be determined, intentional and thoughtful reduction of cesarean birth rates below 20% to 30% can improve maternal and neonatal outcomes.[16]

Support for physiologic birth, which is an inherent component of midwifery practice, can be instrumental in decreasing the cesarean birth rate while providing high quality, family-centered care.[18-20] Quality and safety bundles targeting reduction in the rates of primary cesarean births such as those supported through the Alliance for Innovation on Maternal Health (AIM) and ACNM's Reducing Primary Cesareans Project have been developed and advocate for the creation of a birth culture that values, promotes, and supports physiologic birth.[20,21] Every midwife is encouraged to implement and teach physiologic birth practices and actively work to reduce the rate of preventable cesarean birth using evidence-informed practice.

Expansion of birth-related midwifery care to include functioning as first assistant during cesarean birth is a natural segue for midwives to provide continuity of care and maintain trusting relationships with clients who require cesarean birth. This also facilitates rapid access to perioperative services when emergencies occur, and makes the best use of available resources. In home and birth center settings, transfer to a hospital can be very stressful. The ability of the midwife to seamlessly arrange admission, coordinate care, and assume the role of first assistant when needed provides support and continuity to families during the transfer and subsequent

birth.[22] Many parents appreciate the continued, active role of the midwife in overseeing their baby's birth when an unexpected cesarean birth occurs. The continued presence of a trusted midwife as the surgical first assistant in the highly structured environment of the operating room can reduce the client's anxiety and enhance their sense of control.[22-27] By assuming the role of first assistant, the midwife will find new opportunities to advocate for and improve the perioperative experience, care, and outcomes for clients.

Midwives have worked hard to gain recognition and autonomy and take pride in providing culturally sensitive care to clients. Midwifery practice requires skill in bridging the gap between the needs and beliefs of some clients for holistic, person-centered care and the highly technical medical environment in which surgery occurs. In many ways, the operating room is the epitome of the culture, language, behaviors, and beliefs of the technical model of medical care. **Each midwife who participates in perioperative care is challenged to simultaneously and effectively integrate into the highly structured team environment of the operating room, bring a safe, family-centered approach to the surgical environment, and retain the integrity of their midwifery philosophy of care.**

Midwives who provide surgical first assistant services can foster a person-centered approach to care in the surgical setting, ensuring the individual is acknowledged and heard. In many locations, midwives have been instrumental in initiating adoption of physiologic practices in the perioperative setting, including ambulation to the operating room for ambulatory clients, use of a clear drape for cesarean birth so parents can see their baby emerge, delayed cord clamping, early skin-to-skin contact, and early infant feeding after cesarean birth. Partnering with clients to ensure a family-centered approach to individuals undergoing cesarean birth and promoting practices that support physiologic transitions for newborns and parents immediately after cesarean birth can provide the same benefits enjoyed by birthing parents and their newborns following vaginal birth.[26,27] Prevention of primary cesarean birth and support of women who desire to give birth vaginally after cesarean birth are primary foci of the midwifery profession.

Midwives who provide reproductive health services for clients outside of the childbearing year can consider offering first assistant services for an array of open and laparoscopic obstetric and gynecological procedures, including bilateral tubal ligation, surgical management of ectopic pregnancy, hysterectomy, and repair of cystocele and rectocele.

EXPANDED MIDWIFERY PRACTICE

As previously discussed, the role of surgical first assistant is considered an expanded role beyond the ACNM *Core Competencies for Basic Midwifery Practice*. Standard VIII of the ACNM *Standards for the Practice of Midwifery* addresses the process by which a CNM and CM incorporates expanded competencies (also see Appendix 2). The Standard VIII describes the following process:

- Identifying the need;
- Assuring there are no regulatory or administrative barriers;
- Acquisition of the knowledge and skills; and
- Maintaining documentation of the process and plan for ongoing competency.

The following sections of this publication clarify how to address the components of this standard. An associated checklist to assist in developing a customized learning plan is provided (See Appendices 1 and 3).

Identifying the Need for the Midwife as Surgical First Assistant

A midwife can identify the need to expand their midwifery practice to include the surgical first assistant role in several ways. There may be a need already identified by the community or institution for appropriately trained and qualified personnel to ensure the provision of timely and safe health care. The immediate availability of a midwife who can assist with, or initiate, emergency cesarean birth can shorten decision to incision time. This is especially true in areas with health provider shortages or limited resources such as small or rural community hospitals or when staff needs unexpectedly change. Client requests for continuity may be a driver of role incorporation. Alternately, the primary driving force may be a logistical or financial issue. For example, the midwife is already present; calling in another professional becomes redundant and costly. The midwife as first assistant can bill for the service and contribute to the revenue stream of the practice or institution. Utilizing the midwife can be a convenience asset

ACNM Standards for the Practice of Midwifery

STANDARD VIII: *Midwifery Practice May Be Expanded Beyond the ACNM Core Competencies to Incorporate New Procedures that Improve Care for Women and Their Families*

The midwife:

1. Identifies the need for a new procedure, taking into consideration consumer demand, standards for safe practice, and availability of other qualified personnel.
2. Ensures that there are no institutional, state, or federal statutes, regulations, or bylaws that would constrain the midwife from incorporation of the procedure into practice.
3. Demonstrates knowledge and competency, including:
   a. Knowledge of risks, benefits, and client selection criteria
   b. Process for acquisition of required skills
   c. Identification and management of complications
   d. Process to evaluate outcomes and maintain competency
4. Identifies a mechanism for obtaining medical consultation, collaboration, and referral related to this procedure.
5. Maintains documentation of the process used to achieve the necessary knowledge, skills and ongoing competency of the expanded or new procedures.[4]

for physicians who prefer to work consistently with the same first assistant and the midwife may have greater flexibility in scheduling than another surgeon.

In some facilities, the need for appropriate and skilled professionals to serve as first assistants is sufficient so that CNM/CM first assistant preparation has become a requirement of employment. The midwife who includes first assistant activities within their scope of practice can further demonstrate the value of midwives as part of the perinatal team, enhance continuity of care, and increase revenue to the midwifery service or practice. As a side benefit, the first assistant skill set, with its emphasis on superior suturing techniques can help to improve and maintain skills used during vaginal birth and perineal repair. Acting as the first assistant can also provide an opportunity to build mutually beneficial collegial relationships with the surgeons.

Ensuring No Constraints to the Surgical First Assistant Role

The midwife is responsible for understanding and assembling accurate information related to the surgical first assistant role and scope of practice in their specific geographic and practice setting. Obtaining the necessary documents to support the first assistant role as part of midwifery practice can be a relatively quick and simple process or can be confusing and time consuming. Some states address the issue clearly, and supporting documentation is readily available. Other states do not specifically address the first assistant role as part of midwifery practice. Documents can typically be obtained through a search of the scope of practice section of a relevant regulatory agency web page (eg, Board of Midwifery, Health, Nursing, or Medicine). Documents that support midwives in the first assistant role may include a combination of the following:

- ACNM standards and position statements;
- Applicable state statutes;
- Regulatory agency rules, regulations, and opinions;
- Institutional bylaws and medical staff rules and regulations; and
- Facility policies, procedures, and job descriptions.

Each midwife is encouraged to obtain these documents and maintain copies in a readily accessible file. Copies of these documents can be useful in many instances, such as:

- Updating the midwife's delineation of privileges or job description to include first assistant activities;
- Amending clinical practice agreements;
- Changing hospital bylaws to permit midwives as first assistants;
- Adding first assistant services as covered services for liability purposes; and
- Obtaining reimbursement for services from health care payers.

A checklist to assist the midwife in identifying and collecting the appropriate documents is provided in Appendix 1, with additional information found in Appendix 2. More information about developing and documenting the skills to participate in surgery and add first assistant credentials to a midwife's practice will be discussed in Chapter 4.

DEMONSTRATING KNOWLEDGE AND COMPETENCY

ACNM clearly identifies first assistant activities as an expanded practice area for the CNM and CM.[2] In order to assure that midwives who serve as first assistants do so safely within their midwifery scope of practice, ACNM requires that midwives who have not been educated and trained as first assistants prior to or during their midwifery education undergo education and training in first assistant skills. This includes didactic education, clinical experience, and assessment of competency.[2] A guide to assist the midwife in organizing the learning plan to meet training expectations is provided in (Appendices 1, 2, and 3). This section addresses essential requirements and a variety of methods for obtaining and documenting appropriate didactic and clinical education and experience as a first assistant.

A midwife seeking to incorporate the role of surgical first assistant as part of their practice should aim to obtain high-quality didactic and clinical education related specifically to surgical practice that focuses on first assistant activities for the specific procedures in which the midwife will participate. This text provides information essential to the role of first assistant in general as well as specific to cesarean birth and gynecologic surgery. It is intended to complement the development of required clinical skills and be a resource for clinical experience. Didactic and clinical learning modalities should be tailored to individual learning styles and can include self-study, on-line courses, journal articles, videos, workshops, skills labs, simulation, observation, and live hands-on clinical experiences. Simulation allows the midwife to understand and practice foundational and procedure-specific skills before applying them in the clinical setting. This fosters optimal client safety while preparing the midwife for intraoperative practice. Each midwife must determine what style of education and training best meets their learning needs and the requirements of their practice setting. Experience has shown that optimal learning occurs when the didactic component is completed concurrently with mentored simulation and surgical procedures. Checklists to aid in documentation of education and skills can be found in Appendices 4 and 5.

Mentored clinical education and experiences are essential to becoming a confident, competent, and skilled surgical first assistant. A structured clinical experience provides the midwife with an opportunity to learn how to perform common first assistant activities in the surgical setting. The novice first assistant is supported while developing skills, asking questions, and becoming familiar with operating room routines and surgical procedures as well as receiving mentoring and feedback about performance. (See Appendices 6 and 7).

Demonstration and documentation of clinical competency are required by *Standards for the Practice of Midwifery* Standard VIII for all aspects of practice and are necessary for institutional credentialing, privileging, and competency review processes. Evaluation of competency using objective criteria prevents inadvertent or deliberate prejudice or bias and supports appropriate privileging. The learning needs of each midwife will vary based on previous experience in a surgical setting, the number and frequency of opportunities for mentored clinical experience, innate manual dexterity and coordination, and quality of mentoring received. Many facilities and a few states require a minimum number of cases to be performed under supervision before institutional credentialing and privileging can occur. Midwives who are seeking to attain beginning competency as a first assistant must continue with clinical mentoring and targeted remediation even past minimum case numbers until competency is attained.

Validation of Developing Proficiency

Whether the midwife first assistant is in independent practice, employed by a physician practice, or is employed within a hospital, a mechanism for evaluating competency is an expectation. At the close of each case during the learning period, it is suggested that the midwife and surgeon or preceptor/mentor meet briefly to complete an objective case evaluation form. (See Appendix 6). Objective criteria such as those included in the case evaluation form are used to identify current skill levels, activities performed, and comments for directing further study. Case evaluations validate the level of competency demonstrated. Midwives should advocate to be part of the development, revision, or approval of any process

related to their role including evaluation tools and policies. The first assistant case evaluation tool can be adapted as needed to meet facility specifications.

Maintaining Documentation of the Process and Plan for Ongoing Competency

Documentation of ongoing education, training, and experience is essential for adhering to Standard VIII of the ACNM *Standards for the Practice of Midwifery* as well as fulfilling the expectations of institutional credentialing and privileging processes. The length of the clinical experience is individualized to ensure that specific state, facility, and professional organization requirements for numbers of cases, hours of practice, and demonstrated competency have all been met. Maintaining a clinical case log is strongly recommended. This is used to document every surgical case in which the midwife participates as the first assistant and can be integrated into the midwife's birth and practice log. The log is a permanent record of the midwife's experience as first assistant and is invaluable to providing evidence of the midwife's range of experience.

The midwife should review applicable policies, procedures, and job descriptions that address the expected scope of practice of the midwife first assistant in their practice setting. Often the first midwife in a facility who expands practice to include the first assistant role assumes the responsibility for developing these documents and participates in the process. The defined scope of practice should be consistent with ACNM requirements and should clearly identify educational expectations and required behaviors to demonstrate competency.[3,4] Description of midwife responsibilities during the perioperative period, including expectations for preoperative, intraoperative, and postoperative care allows for objective identification of first assistant behaviors or activities, uniform expectations for practice, and criteria for evaluation.

PROFESSIONAL ISSUES

First Assistant Activities Within Midwifery Privileges

CNMs and CMs who perform the functions of the surgical first assistant must have this function included or added to their

Clinical Case Log

The clinical case log is a record of the midwife's clinical experience as a first assistant. The log can be used as documentation to support application for first assistant privileges, whether as a novice applying for initial first assistant privileges or as a seasoned first assistant applying for a new position. Case notes or comments can be helpful when used as a reference for peer review. The case log typically includes the following categories:

- Date of service.
- Location of service, which identifies the hospital, clinic, or office where the procedure was performed. This is particularly helpful for the CNM/CM with privileges at more than 1 institution, or who changes practice locations.
- Time for case completion, which includes time when the CNM/CM was involved with the client during the surgical procedure itself. Time is usually indicated in 15-minute increments.
- The procedure is described using standard medical terminology and should include primary and secondary procedures. For example: "Procedure: planned repeat cesarean, lysis of adhesions, bilateral tubal ligation."
- Comments that relate to any unusual occurrences during the procedure, such as injuries, excessive blood loss, or significant contamination. Comments regarding a particularly successful case are also appropriate. Succinct comments can be helpful in refreshing your memory about a particular case for peer review or litigation purposes.
- Surgeon, which identifies the primary surgeon by initials or a numerical code. This is helpful when performing an annual review, reapplying for privileges, asking for a reference when transferring to a new clinical location, or if the midwife is requested to provide information for case-related peer review or litigation.

midwifery privileges. As the experts in the midwifery scope of practice, midwives are expected to be knowledgeable about and participate in the development of privileging language and formulation of policies that outline the steps for adding the first assistant role to midwifery practice privileges. First assistant activities can be included in general midwifery privileges or they may require submission of a request to expand privileges. A facility policy or standard procedure typically describes the range of first assistant activities, expected education and experience, method of attesting to competency, documentation required, and approval process to add first assistant activities to the midwife's privileges. Such a policy can aid in creating a shared vision of the process for midwives, operating room leaders and staff, obstetrician-gynecologists, and other physicians on the medical staff.

Language for the addition of first assistant activities to the privileges form can be guided by the ACNM position statement *The Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery* in the context of any relevant state regulations. Once committee approval of the privileging language has been obtained, the recommended language is moved through the standard medical staff approval process. Midwives should be prepared to discuss the expected change in practice and present information and supporting documents along the way should any questions arise during the approval process.

Risk Management

In most instances, the benefits to the client and facility of having the midwife serve as first assistant are apparent. The risks for the client associated with midwives as first assistants are few and are primarily related to the first assistant's skill level, complexity of the case, or health condition of client. Consideration of benefits, potential harm, and client selection criteria that determine whether the midwife is the optimal first assistant are part of managing potential risk for the client. Potential adverse outcomes can be mitigated by creating a quality learning process, participating in thoughtful evaluation of competency, consideration of other job expectations, and prudent case selection. Whether a midwife is the appropriate first assistant for a specific case is the jurisdiction of the surgeon.[7,8] However, the midwife or surgeon can request the presence of another physician or more skilled first assistant based on the client's clinical condition or the first assistant's range of skills. In some facilities, guidelines are provided that define cases that require a second surgeon, based on criteria such as the anticipated complexity of the procedure, the indication(s) for the procedure, the client's health history or condition, or other issues that affect client safety or performance of the procedure.

Benefits of including first assistant activities as part of midwifery care can include:

- Shortened time from decision to incision;
- Rapid availability of qualified surgical first assistant;
- Continuity of care;
- Improved client satisfaction;
- Improved collaboration with physicians;
- Opportunity to maintain and improve hand skills; and
- Improved midwifery service value or revenue.

Potential risks when including first assistant activities as part of midwifery care can include:

- Unmet needs of other clients when the midwife is occupied in the operating room;
- Increased exposure to liability;
- Risk of injury from sharps;
- Exposure to blood-borne pathogens;
- Increased latex exposure;
- Mechanical injury related to procedure or technique; and
- Outcomes related to limits of midwife experience or skill.

Every midwife who functions as a first assistant is expected to be aware of potential intraoperative hazards and related complications that can require action. Hazards and complications can result in injury to the client or a member of the perioperative team. The midwife first assistant is expected to be competent, professional, and accountable for their actions at all times, including when complications arise. While the surgeon directs the performance of the surgical procedure, all members of the operative team are expected to function to the full extent of their respective roles on behalf of the client. Each member is expected to maintain vigilance to avoid preventable complications and ensure optimal client outcomes. Every member of the operating room team is responsible for maintaining awareness and acting to decrease the potential for an accident or injury. Specific intraoperative hazards and complications are addressed later in the text.

Professional Liability

The midwife who includes first assistant activities must ensure that their professional liability insurance policy is updated to include expanded practice activities. Any necessary change in liability coverage should be investigated and initiated prior to participation in surgical procedures. While the level of coverage needed to attend clients during vaginal birth is generally equivalent to the coverage required for surgical first assistant activities, notifying the liability insurance company regarding the change in practice privileges keeps them up-to-date and safeguards the midwife against an inadvertent gap in coverage. Confirmation of liability coverage that includes first assistant activities may be required before approval to expand the midwife's delineation of privileges is granted.

Quality Management

Quality management is a mechanism by which the quality of care provided is intentionally assessed and evaluated. Operative procedure outcome statistics are frequently reviewed by the quality management team and are generally categorized by provider. Other quality indicators, such as cesarean birth rates, informed consent processes, use of safe surgery checklists, adequate perioperative staffing, surgical time and processes, breaches in technique, and client satisfaction can provide a basis for quality improvement projects.[28]

Client satisfaction with midwife first assistant services can be documented by adding midwife first assistant services to routine client satisfaction surveys. Internal customer satisfaction (such as labor and delivery staff, surgical staff, midwives, and surgeons) can be evaluated at the outset of a new midwife first assistant program and periodically thereafter. Feedback allows for identification of issues, exploration of opportunities for improvement, and initiation of change in practice through quality improvement and clinical mechanisms.

CODING AND BILLING FOR FIRST ASSISTANT SERVICES

Midwives provide first assistant services in a wide range of settings for an array of reasons. Every setting should have mechanisms to identify, record, and assign value to the services provided. In many practice settings, first assistant services are billed as fee-for-service. That is, the client or health insurance carrier is billed a fee for the midwife's first assistant services using the midwife's National Provider Identification (NPI) number. First assistant services can be billed separately from the global fee for maternity care services. In settings where the midwife is a hospital employee, billing for first assistant services can be included in the professional fees charged. In every instance, there should be a mechanism for the midwife and practice director to review the value of a midwife's first assistant services to determine their relative value to the practice. This value is important when negotiating contracts, midwifery coverage, and salary parameters. In some settings, the value of first assistant services is captured using productivity measures rather than billing statistics.

Like statutes and regulations that govern scope of practice, regulations regarding insurance and reimbursement vary considerably from state to state. In addition, internal policies of commercial payers (HMOs, PPOs, etc.) vary regarding reimbursement for first assistant services when performed by midwives or APRNs. Medicare authorizes coverage of services that the CNM is legally authorized and qualified to furnish.[29]

Medicare is the federal government insurance program for the elderly and disabled. Medicare sets the standard for reimbursement, so regardless of whether a midwife provides services to clients covered under Medicare, knowing what is covered can be critical for negotiating third-party payer reimbursement for first assistant services. Medicaid provides coverage for low-income families. Most health insurance companies reimburse a professional fee for midwives who provide first assistant services.

When considering whether to integrate first assistant services within an institution, it can be worth investigating the reimbursement experiences of midwife colleagues in the state or region as part of the planning process. When questions about reimbursement are noted, it can be useful to make inquiries with the carriers common to the practice prior to the substantial investment of time, money, and energy that is required to complete the education and training necessary to gain privileges as a first assistant.

For midwives credentialed as CNMs, it can be more effective to inquire about reimbursement as an APRN or Nurse Practitioner (NP). Many insurance company personnel are

not familiar with CNMs and CMs or their authorized scopes of practice, but they may be familiar with processing reimbursement for services provided by APRNs and NPs.[30] Currently in New York State, CMs bill as CMs or as Licensed Midwives (as do CNMs). Most CMs in hospital-based practices are in New York.

Communicating with Health Insurers

Ask clear, directed questions that require specific answers. Plan your questions in advance. It can be helpful to supply the desired answer within the question. For example, rather than asking whether credentialing is required by a certain health insurance company ask: "I am a certified nurse-midwife/certified midwife with privileges to provide first assistant services. Can you please send me the appropriate application materials so I may become credentialed for these activities with your company? My practice will be billing under my NPI number and I plan to use the modifier -80." This allows the insurance company to acknowledge if credentialing is required, identify any other documentation necessary, and request the use of a different modifier if necessary.

Some commercial insurance payers cover first assistant services provided by CNMs and CMs, while others limit payments exclusively to physicians, APRNs, or physician assistants.[30] The process of becoming credentialed with the insurance company includes negotiating precisely which services will be reimbursed, including first assistant services. When the midwife is already credentialed with the insurance company, documentation is provided to support adding first assistant to the midwife's reimbursable services. For the midwife who is not an approved provider with a health insurance carrier, the reimbursement rate is usually dropped to the out-of-network rate and the remainder can be billed to the patient.

The standard billing procedure varies from state to state, with most first assistants billing 15% to 20% of the surgeon's fee for the surgical procedure (ie, cesarean birth only). Medicare rates pay 16% of the surgeon's fee to physicians and to CNMs and CMs who assist with surgery. Nurse practitioners and physician assistants are paid 85% of the 16% physician allowance (or 13.6%), and some commercial carriers include midwives in this category. These rates are further reduced by any contractual allowances or agreements.

CPT codes are used to identify the exact procedure performed, while modifiers are used to delineate the type of service rendered by a specific provider. Occasionally, the insurance carrier will request a copy of the dictated operative record to verify the first assistant of record. It is helpful when the surgeon correctly identifies the midwife's name and credentials and describes the first assistant's activities in the operative note. Professional midwifery services are identified through use of the CNM's or CM's NPI number on the claim.[31] Services billed using physician NPI numbers are likely to be rejected as the surgeon cannot function as both the primary surgeon and the first assistant, but this depends on the insurer.[3]

Common Code Modifiers for Surgical Assistants[29]

(80) Assistant Surgeon (100% of physician rate)
(81) Minimum Assistant Surgery (65% of physician rate)
(82) Assistant Surgeon when qualified resident is not available (100% of physician rate)
(AS) Non-Physician Assistant at Surgery (85% of physician rate)

Billing for first assistant services provided by midwives should use the code for the cesarean procedure (or other procedure) outside of global care, the modifier specified by the payer for first assistant services and the usual method of billing. Surgical first assistant claims must use the identical CPT code that is used on the surgeon's claims to be accepted. The midwife or billing office can check with the health care insurer to confirm acceptance and interpretation of modifiers. When billing Medicare, midwives are entitled to receive 100% of the physician reimbursement rate and therefore use modifiers -80 or -82; however, commercial insurers generally use modifier –AS for reimbursement of non-physician first assistants and pay the lower rate of 85%.

When billing claims for first assistant services are rejected, reaching out to the local ACNM State Affiliate can be helpful to learn how your colleagues bill and determine if rejection of this type of claim is a statewide occurrence. The information

will aid in the development of a plan to address the issue. It is generally more effective to address the matter as a cohesive group rather than as an individual. Reaching out to obstetrics and gynecology colleagues and the local ACOG chapter for support can also be effective when negotiating with insurance companies. Often there is a lack of knowledge about the education, training, and scope of midwifery which may need to be addressed, particularly in states where CM practice is new. Some states have addressed billing limitations through insurance regulation mandating payment for services within the midwife's scope of practice. Such regulations may need to be updated to include CM practice.

Compensation for first assistant activities is often included in the midwife's salary. Alternately, additional payments may be made to the midwife based on productivity, an incentive to come in on-call, or used as a bonus system. Billing information shows the value of the services provided and can be instrumental in setting compensation for midwives who include first assistant activities as part of their practice.

Common Information Required for First Assistant Billing

Client information to collect (from hospital face sheet or surgeon's office)

- Full name, address, and phone
- Date of birth
- Social security number
- Employer address and phone number
- Name and address of insurance company
- Insurance policy ID number
- Policy holder's name
- Policy holder employer name and ID number
- Secondary insurance information, when applicable

Procedure information to collect (from medical record or surgeon's office)

- ICD Diagnosis code(s)
  - » CPT Procedure codes
  - » Surgeon's name and/or provider number
  - » Surgical procedure as dictated on the Operative Note
  - » Copy of the Operative Note documenting the midwife as first assistant
  - » Surgeon's fee for procedure
  - » Patient status as inpatient or outpatient
  - » Name of facility where procedure performed

CNM/CM information to collect

- CNM/CM National Provider Identification (NPI) number
- Fee schedule for procedures (unless percentage of surgeon's fee is used)
- First assistant modifier(s) for insurance companies

SUMMARY

ACNM supports midwives incorporating the role of surgical first assistants in obstetric and gynecologic procedures as part of their midwifery practice. Evidence of education, training, and competency are required to add this expanded practice skill to midwifery privileges. Various methods of education, training, and competency evaluation mechanisms can be individualized to each midwife to assure competence in the acquisition of the first assistant skill set. Each CNM and CM is responsible and accountable for understanding and meeting the requirements for expanded practice set forth by Standard VIII of the *ACNM Standards for Midwifery Practice* in compliance with relevant state, regulatory agency, facility, statutes, rules and regulations, bylaws and/or official opinions. Professional responsibilities include participation in appropriate risk management training, assuring appropriate reimbursement for services within the midwifery scope of practice, and advocating for the midwife as first assistant role. Midwives wanting to expand their practice to include the ability to serve as first assistant should gain a full understanding about the necessary education, training, and certificationrequired to serve in this role. The following professional and clinical activities can assist a midwife through this journey.

Clinical Activities

- Identify one or more perioperative mentors and begin formulating personal goals and strategies for first assistant education and training.
- Meet with the operating room supervisor and plan an orientation to the perioperative areas and surgical practices.
- Meet with the midwifery practice director and/or representative from the billing department to determine how billing for your services occurs.
- Determine whether your name and NPI number are used in the billing process and discuss how to access provider-specific reports of billable services and reimbursement.

Professional Activities

- Create a file for credentialing and privileging information. Review state rules, regulations, or statutes regarding midwifery practice for references to ACNM scope of practice. Note any mention of expanded midwifery practice or clear prohibitions that might restrict first assistant practice. Keep copies in your file. Review hospital or medical staff bylaws for any rules related to the surgical first assistant role.
- Review obstetrics and gynecology department and midwifery policies, procedures, or guidelines for references to the first assistant role and midwifery practice. Identify potential revisions necessary to include first assistant activities in the midwifery scope of practice.
- Follow Standard VIII of the *Standards for the Practice of Midwifery* for incorporation of new procedures.
- Outline a personal vision of the role of midwife as first assistant as it relates to your practice and compare it to those of area midwives and those of the obstetric team.
- Contact your professional liability insurer and initiate discussion regarding coverage of the midwife as first assistant.
- Network with peers and connect with midwives in your state or region who function as surgical first assistants to discuss topics such as education, experience, scope of practice, learning resources, and billing.

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PRINCIPLES OF SURGICAL PRACTICE

2

This chapter addresses core principles of surgical practice. Quality surgical practice and optimal outcomes occur when each individual in the perioperative team is attentive to the details of the procedure and keeps the best interest of the client in mind at all times. For those midwives who are new to the perioperative setting, seeking out a basic surgical text such as *Alexander's Care of the Patient in Surgery* (Rothrock, 2019, Elsevier) or taking a course such as the Association of periOperative Registered Nurses (AORN) Preop 101 mentioned in Chapter 1, can provide the broad context needed to function effectively in an operating room (OR).

PERIOPERATIVE OVERVIEW

Surgical Aseptic Technique (Sterile Technique)

Surgical asepsis is the core practice that allows for safe surgery. It is defined as the use of sterile technique. Sterile technique consists of specific intentional behaviors, processes, and procedures to eliminate all microorganisms, including pathogens, resident flora, and spores from defined areas, objects, and/or surfaces.[1,2] Sterile technique is utilized whenever the body's integumentary system is breached in an effort to decrease the incidence of surgical site infections and optimize client outcomes.[3] Sterilization is the process by which all microbes, including pathogenic and non-pathogenic bacteria, viruses, and spores are killed. Sterilization is accomplished using moist heat, dry heat, radiation, or gas.[1,2] The type of sterilization process varies depending on the item to be sterilized and the modalities available at the facility. Surgical asepsis is designed to minimize client exposure to exogenous organisms such as bacteria, viruses, and spores from the environment, operating room personnel, surgical instruments, and equipment. Application of surgical asepsis requires adherence to the current recommended practices of the Association of periOperative Registered Nurses. *Guidelines for Perioperative Practice*, published annually by AORN, is the reference for up-to-date operating room practice in the United States. AORN provides clear evidence-based standards to guide every member of the perioperative team. A copy should be available in every surgical service for review. AORN recommends specific practices that are essential for the midwife first assistant including those pertaining to:

- Surgical attire;
- Electrosurgery;
- Hand hygiene;
- Client skin antisepsis;
- Prevention of transmissible infection;
- Sterile technique; and
- Safe environment of care.

The Perioperative Environment

The perioperative environment is designed to minimize the negative effects of environmental factors on clients and personnel. Perioperative spaces are constructed to meet functional needs and to promote minimal traffic, enhance safety, and prevent infection.[4] The surgical suite is generally divided into areas that are considered restricted, semi-restricted, and unrestricted. There may be a central core or single corridor that is semi-restricted to allow for movement of necessary personnel with areas for scrub sinks, instrument processing, and storage for equipment and supplies. Scrub sinks are typically located adjacent to the OR and easily accessible to surgical staff for use immediately prior to entering the OR.[4]

Each surgery room is expected to have positive flow of filtered air, with at least 20 air changes per hour. When the door to the room is closed, a positive pressure gradient occurs that minimizes airborne contamination from outside the room. The room humidity is maintained between 20% to 60% to prevent static electricity and reduce the incidence of bacterial growth. Room temperature is maintained at a level designed to avoid chilling the client or cause undue distress to the surgical staff. The recommended room temperature range is between 68° to 75°F (20° to 24°C).4 Maintaining warmth for a newborn is critical, especially for preterm neonates, and can be attained through regulation of room temperature, avoiding heat loss by covering the neonate, and monitoring newborn temperatures. Placement of the healthy term newborn skin-to-skin with the parent (whose temperature naturally adjusts to maintain optimal newborn thermoregulation), warming of intravenous fluids, and use of a heating device on the parent such as a forced-air warming blanket can reduce the incidence of maternal and neonatal hypothermia and related morbidity.[5,6]

Communication in the Surgical Setting

The *Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery* (time-out process)

was developed by The Joint Commission to reduce client harm through implementation of a protocol for systematic and deliberate communication of critical information by the surgical team in the presence of an awake client immediately before surgery.[7,8] The surgical time-out is the final step of preoperative client preparation.

The time-out consists of a standardized preanesthesia briefing or "huddle" during which the client's identity, the planned procedure, and the surgical site are clearly identified and confirmed with the client. The surgical site must be marked with a marker that is durable enough to persist and remain visible throughout the surgical prep and draping. During the time-out, all members of the surgical team must agree on the client's identity, the correct site of the procedure, and the procedure to be performed. Due to the success of the time-out in reducing surgical errors, many facilities now use an extended time-out huddle, during which additional information is reviewed, including client allergies, administration of preoperative antibiotics or other medications, technical or anesthesia details, and expectations for any non-standard equipment or supplies.[8] This enhanced communication strategy engages the client and all surgical team members in assuring client safety and also offers an opportunity to obtain necessary supplies, equipment, or medications prior to the onset of the procedure.

During the extended time-out, all surgical team members are also introduced to the client by name, and the surgeon invites all members of the surgical team to raise safety issues at any time during the procedure. The preanesthesia surgical time-out has been demonstrated to improve team performance, communication, and confidence.[7,8]

Integrating into the surgical team requires an understanding of the roles of each member of the perioperative team and the communication conventions that have been adopted to enhance client safety. AORN stresses the need for a controlled OR environment in which distractions, noise, and interruptions are minimized. During surgery, conversation is kept to a minimum.[9] Conversation should be pertinent to the client and the procedure, address issues as they occur, and foster a multidisciplinary team approach. During critical periods (such as the time-out; sponge, needle, and instrument counts; challenging dissection; or emergence from anesthesia), a quiet, no interruption period is initiated.[9] Personal conversations serve as a distraction and can be heard by clients, especially when they are awake and aware, such as during cesarean birth. Preventable distractions and interruptions can result from non-essential conversation, staff entering or exiting the room, mechanical systems, or electronic or medical devices. Personal electronic devices should be silenced whenever possible with calls answered by the circulating nurse; equipment alarms should be turned to the lowest effective yet audible setting.

It is critical for client safety to keep distractions and interruptions to a minimum. Yet, it is essential that each member of the perioperative team has a voice to freely advocate for the client and address any issues that could contribute to avoidable medical errors.[10] Creating a culture of safety occurs through the development of effective communication skills coupled with the willingness and a safe space in which to speak up and discuss topics as concerns arise.

Common issues of concern include team member inattention to possible breaches of aseptic technique, variations from standards of practice, and disrespectful behavior toward others.[10] Many facilities have structured communication strategies to foster a culture of safety in which individuals who know of, or strongly suspect behaviors or actions that can increase risks, are encouraged to speak up to protect clients and their colleagues from harm. Issues are raised using objective and non-judgmental language that feels safe for all participants, with a goal of effective problem identification and shared efforts at resolution. Polite, professional persistence in the face of resistance is most effective when accompanied by sharing of pertinent evidence-based recommendations, factual presentation of the perceived risk, and efforts to respectfully support optimal practice. Documentation of events and actions is recommended.

Roles of the Perioperative Professionals

The surgical team is comprised of professionals with specific roles and functions to perform during the course of a procedure. Because care is provided as a team, with overlap of expectations, clear delineation of roles is recommended. Some of the actions of each perioperative team member are listed in Table 2-1.

TABLE 2-1. Perioperative Team Roles				
Activity	Circulating Nurse	First Assistant	Surgeon	Scrub Nurse or Assistant
Prepare room and set up sterile instruments	May assist scrub personnel with set up	May assist when needed to set up in an emergency	N/A	Pulls supplies based on the surgery and the surgeon's preferences
Performs sponge, needle and instrument counts	Done with scrub personnel before surgery and before closure of each major layer	May acknowledge final count if first assistant performs final closure	Acknowledges correct count information	Performs count
Time-out and documentation	May initiate time-out; documents time-out and other information	Participates in time-out; may document participation as first assistant	May initiate time-out; documents surgery in operative note	Participates in time-out
Instrument management	Provides scrub personnel with additional sterile instruments, suture, and supplies as needed	Receives instruments from scrub personnel and uses them to provide exposure and assist the surgeon	Receives instruments from scrub personnel and uses them to perform the procedure	Primary duty during the surgery; organizes instruments; verbally acknowledges any extra instruments, needles, or supplies used
Provides retraction	N/A	Core responsibility to ensure adequate access to the surgical site	May perform for the first assistant when needed	May provide as needed when the surgeon and first assistant are fully occupied
Performs sharp dissection	N/A	Permitted and occurs based on individual expertise and surgeon preference	Performs majority using scalpel, electrosurgery, or scissors	N/A
Ensures hemostasis	Collects sponges for EBL, measures and reports fluid in suction cannister	Blots, suctions to identify bleeding sites, may assist with free ties and cautery	Applies clamps, cautery, isolates and ligates vessels, uses hemostatic agents	Passes instruments and hemostatic agents
Wound closure	N/A	Retracts to provide access to site; follows suture; cuts or tags suture ends. May perform closure per surgeon preference	Selects suture as appropriate, performs or delegates wound closures	Preps suture for each closure

The surgical first assistant is expected to acquire the specific knowledge, understanding of their role, and the skills necessary to effectively participate in the procedure(s) with which they assist. The first assistant is expected to function as an active participant in the surgery. As such, a clear understanding of the expectations of each perioperative role is necessary. While there may be some overlap in professional responsibilities during any specific case, each perioperative professional is primarily accountable for fulfilling the expectations of their role.

CLIENT SAFETY AND PREPARATION

Client Positioning

Positioning of the client during surgery is performed to provide optimum functioning of body systems and avoid preventable stress or injury during the course of the procedure. This requires attention to body habitus, potential pressure points, and the effects of positioning on the cardiopulmonary, musculoskeletal, and neurologic systems.[11]

Client positioning is the responsibility of the entire surgical team and is intended to provide adequate exposure to the surgical site and to maintain client dignity as well as ensuring safety.[11,12] While the surgeon's selection of position is based on the planned procedure and approach and the need for adequate exposure of the surgical site, decisions regarding positioning are collaborative efforts among the entire perioperative team, including anesthesia personnel, perioperative nurses, and the first assistant. Immobility and positioning can contribute to difficulties with ventilation and circulation, including deep vein thrombosis.[11,12] Preventive measures such as intermittent pneumatic leg compression devices and use of low-molecular weight heparin can be used prior to surgery and continued into the postoperative period.

An anesthetized client is unable to alert the team of the limits of their normal range of motion or when there is undue pressure on an area. Injuries that can occur related to positioning include generalized injury secondary to pressure, tissue or organ hypoxia, or direct nerve injury due to compression or moving beyond the usual range of motion.[12] The client can sustain lower back strain in the supine position or when the legs are lifted into lithotomy. Clients at increased risk of injury related to surgical positioning include those with a significantly low or elevated body mass index (BMI), with diabetes, or peripheral vascular disease. Positioning should optimize cardiopulmonary status and allow necessary intravenous (IV) access as well as access to monitoring equipment.[11,12]

The most common positions used during obstetric and gynecologic surgery are supine with left lateral tilt (cesarean birth), supine (abdominal or laparoscopic cases without a need for vaginal access), and lithotomy (vaginal, abdominal, or laparoscopic cases with a vaginal component). Mild Trendelenburg position is added as needed to lift the viscera out of the pelvis. During most obstetric and gynecologic surgeries, clients' arms are secured on padded armboards placed at less than 90 degrees abduction with the forearms in a neutral or supinated (palm up) position.[11]

Prevention of injury to client or staff engaged in client positioning occurs through engagement with the client to determine any limitations prior to anesthesia, and having adequate staff to support the client. Use of rollers and adequate staff for transfer, padding, careful anatomic positioning, assessment of pressure points, and gentle, symmetric placement of limbs, especially for lithotomy position can aid in safe positioning of the client and avoidance of perioperative team injury.[11]

Client Preparation and Safety

Many of the microorganisms responsible for surgical site infections are resident flora on the client's own skin. Preoperative skin preparation serves as a front-line defense against surgical site infections. The primary goal is to decrease the superficial microorganism count prior to any procedure and to minimize damage to skin or mucous membranes.[13] Preoperative cleansing with bactericidal solutions such as chlorhexidine gluconate can be recommended the evening before and the morning of planned surgery as an adjunct to the surgical prep to reduce resident skin flora.[14] The skin is rinsed clear of soap or shampoo, and a broad margin around and including the entire surgical site is cleansed with the solution. The skin is dried and lotions are avoided as they can reduce bactericidal efficacy. Hair at the surgical site is left intact unless it will interfere with the procedure. Excessive hair is removed, when necessary, by clipping of the hair outside of the surgical suite shortly prior to the surgery.[13-15] Clipping involves cutting the hair above the skin, which leaves the

skin intact and results in a short stubble. Vaginal cleansing with povidone-iodine can be considered for women in labor, with non-intact membranes, and prior to some obstetric and gynecologic surgeries.[15]

Prophylactic Antibiotics

Antibiotics are used to reduce the incidence of endometritis and surgical site infections, and administration prior to the procedure allows adequate tissue concentrations to be reached before the incision is made.[16,17] This reduces the incidence of maternal infectious morbidity, improves outcomes, and reduces hospital costs associated with additional antibiotic use or readmission to treat postoperative infections. Current recommendations include administering the antibiotic 30 to 60 minutes prior to the surgical incision using the antibiotic appropriate for the type of case, providing additional doses for long cases and clients with significantly elevated body mass indices, and discontinuing routine antibiotic prophylaxis after a single preoperative dose.[14] Antibiotic administration is timed to ensure peak efficacy during the time of maximum contamination during the procedure. Therefore, antibiotics ideally are administered on call to the OR, or as soon as the client arrives in the operating room rather than just prior to the onset of the procedure.[16] Brubaker et al, found that as many as 40% of women undergoing cesarean birth in the United States did not receive prophylactic antibiotics prior to their procedure.[18] A single 1 to 2 gm dose of cefazolin is frequently the antibiotic of choice for uncomplicated cesarean birth or abdominal hysterectomy.[17] In addition, a dose of azithromycin has been found to decrease the rate of wound infections in women undergoing cesarean birth when administered in conjunction with standard prophylactic antibiotics.[19] For women who weigh more than 120 kg, a 3 gm dose of cefazolin can be considered.[14] Preoperative antibiotic administration should be verified during the presurgical time-out.[13]

Thromboembolism Prophylaxis

Venous thromboembolism preventive therapies are routine for cesarean birth and for many gynecologic cases.[20,21] Individual factors, such as BMI, age, immobility, current chemotherapy, and a hypercoagulable state such as occurs during pregnancy, increase the risk of development of thromboembolism. Perioperative prevention measures include use of mechanical prophylaxis such as sequential compression devices and prophylactic anticoagulant therapy.[21] Therapy continues at least until the client is ambulatory and may continue for a longer duration based on the client's diagnosis, procedure, and condition.[20,21]

PERIOPERATIVE RISK REDUCTION

Sterile Fields

A sterile field is a defined area kept free of microorganisms for the safety of the client undergoing an invasive procedure. All sterile fields in the OR are defined by their edges or other commonly accepted and clearly defined parameters.[1] Sterile fields can include defined areas and surfaces on the client and scrubbed personnel, the top surface of the draped instrument stand or table, and clearly identified segments of equipment used within the sterile field, such as suction or cautery.[1]

Basic Principals of Surgical Sterile Technique

Maintaining an aseptic environment and preventing surgical site infection in the operating room is the primary goal of the surgical team, and all activities performed by the team support this goal. Some of these activities include:

- A sterile object remains sterile only if touched by other sterile objects.
- Only sterile objects may be placed on a sterile field.
- A sterile object or field should be covered with a sterile drape or monitored continuously for contamination.
- The sterile object or field can become contaminated due to capillary action when a sterile surface comes in contact with a wet contaminated surface.
- The edges of a sterile field or container are considered contaminated.[1,2]

Sterile fields are most commonly demarcated by the horizontal surfaces of sterile drapes and by the operator's surgical gown.[1,3] When an individual is scrubbed and gowned, the front of the surgical gown is considered sterile from upper chest to the level of the sterile field, (eg, the draped client or approximately the waist of the scrubbed individual). Gloved hands are maintained in front of and above the hip. Double

gloving is recommended. Sleeves are considered sterile from the fingertip to 2 inches above the elbow, excluding the gown cuff, which is considered contaminated. The cuffs of the sterile gloves should completely cover the cuff of the gown. The back, sides, underarm area of the gown, and below the level of surgical sterile fields (eg, the area of the gown below the flat surface of the draped client and instrument stand) are considered unsterile. To maintain sterility, gloves are held at the level of the sterile field at all times, and gloves that are suspected or actually contaminated are changed immediately.[1,3]

When passing a sterile field, the scrubbed individual is expected to face the sterile field. When passing another scrubbed individual, both should pass front-to-front (sterile to sterile) or back-to-back (unsterile to unsterile). Conscious awareness of all sterile fields is maintained throughout the case and sterile fields are passed in a manner to avoid inadvertent contamination.[1,3] The top surface of a sterile, draped table is considered sterile, while the edges and sides of the drape that extend below the table level are considered unsterile. Any instrument, equipment, or supplies that drop below the level of the sterile field are considered contaminated and are left below the level of the sterile field and replaced with sterile supplies. Sterile fields may be covered from the side with sterile drapes that overlap in the center. This allows the covering to be removed without contamination.[1]

Occasionally during surgery, an instrument is dropped below the level of the sterile field and becomes contaminated. In this instance, the instrument can be replaced, or undergo immediate-use steam sterilization to allow for its continued use.[8,22] Immediate-use steam sterilization requires that an instrument be cleaned, then steam sterilized in an open tray or flash pack for a specified period of time before being brought back to the field.[22]

Surgical drapes provide a mechanical barrier to the passage of bacteria. Drapes and gowns are typically manufactured of nonwoven materials that are fluid resistant, but not impervious to fluids or bacteria. Therefore, maintenance of the sterile field is necessary to limit the transmission of bacteria between sterile and unsterile areas.[1] The principles of confine and contain require that the spread of blood or body fluids during a surgical case is deliberately limited. For example, during cesarean birth, blood and amniotic fluid are actively prevented from overflowing the surgical field, saturating the drape, or pooling on the OR floor; these fluids are suctioned or soaked up on the field. The surgical field is kept as dry as possible with the use of suction, laparotomy sponges, and sterile towels in order to avoid compromise of the integrity of sterile surfaces (surgical gowns, drapes) by fluid strike-through. Strike-through is the soaking of fluid through sterile layers to unsterile layers, which augments the transmission of organisms, resulting in cross contamination which can result in increased rates of surgical site infection.[23]

The term surgical consciousness refers to professional behavior that demonstrates understanding and application of principles of surgical asepsis. Surgical consciousness requires that each member of the surgical team monitor aseptic technique continuously and immediately addresses all possible breaches to optimize client outcomes.[23,24] Every perioperative professional in the operating room has a legal, ethical, and moral responsibility to observe for any breaks in aseptic technique during a surgical procedure by any team members. Each OR team is accountable for identifying known or potential breaks in technique to ensure client safety. When a breach in technique is observed, the perioperative professional's surgical conscience requires that action is taken to identify and correct the breach.[1,23,24] Every member of the team is authorized and accountable to address another team member, such as the surgeon, first assistant, scrub nurse, or surgical technologist, when a break in aseptic technique occurs. The circulating nurse is advised whether additional sterile supplies are needed. Identification of techniques that contribute to preventable contamination is a client safety measure; this creates a safe environment where correction of a break in technique occurs without chastisement or disciplinary action. Of course, remedial education is necessary in the event of repeated breaks in aseptic technique.

Exposure to Bloodborne Pathogens

Perioperative personnel are at risk for exposure to bloodborne pathogens through numerous mechanisms, including handling of tissue and equipment, splashing of blood and body fluids, and sharps injury. Effective precautions place a reliable barrier between the health care professional or client and the potential

source of pathogens.[25,26] While personal protective equipment (PPE) is standard in the OR, exposure is still possible. A surgical gown might soak through, amniotic fluid might overflow into the first assistant's footwear, a needle-stick injury might occur, or an artery might spurt blood onto the operator or surgical team member's neck or face. Periodic review and deliberate application of universal precautions and sharps handling recommendations are expected of every professional who functions in the perioperative setting.

Surgical Attire

The purpose of surgical attire is to limit human microbial contamination within the surgical suite, while providing the health care professional with appropriate personal protective equipment to meet standard precautions.[23,27] Surgical attire for the first assistant includes scrubs, head cover, mask, protective eyewear, surgical gown, gloves, and can include shoe covers. Rings are removed. Watches, necklaces, and bracelets are also removed or fully contained within the surgical attire. Scrubs must be clean, hospital-laundered scrubs. Scrubs are changed when they become wet, soiled, or otherwise contaminated. The midwife who has attended a birth where splashing occurred or who has been sleeping in scrubs should don fresh scrubs before entering the surgical suite as first assistant.

The surgical hat or hood is intended to cover the scalp and hair as well as any facial hair.[28] Head covers worn in the OR that confine the hair minimize microbial shedding from the hair and scalp (eg, dandruff), onto the sterile field. Earrings can be removed or completely covered by the surgical hat or hood. Cloth scrub caps are popular in many facilities and should adequately confine the hair. Cloth caps should be laundered after use or when visibly soiled.[28-30] Health care facilities are encouraged to have internal policies that outline the specifics of scrub attire and head covering requirements including any accommodations for religious head coverings.[28,31,32]

Masks are designed to limit surgical site or sterile field contamination from respiratory vapors and droplets and to protect the wearer from any spray of blood or body fluid. A surgical mask is always worn in the presence of open sterile equipment, and a fresh mask should be donned before entering the surgical suite. Masks come in a variety of styles. Some include foam on the nose-piece to improve anti-fogging; others include a fluid shield to eliminate the need for additional protective eyewear. To prevent venting of respiratory vapors, masks should cover the mouth and nose and be secured at the back of the head and neck. The operator may step back from the sterile field when a sneeze is imminent to reduce inadvertent contamination of the sterile field. Sneezing or coughing that results in a wet or soiled mask necessitates breaking scrub. The individual must apply a new mask, rescrub, and don a fresh sterile gown and gloves.[27,33] Used surgical masks are considered contaminated and at the close of each case should be removed by the ties and discarded prior to routine postoperative hand hygiene.[25]

Protective eyewear is designed to protect the wearer from the splashing or spraying of blood or body fluids. Eye protection is mandated by the Occupational Safety and Health Administration and recommended by the Centers for Disease Control and Prevention (CDC) as part of standard precautions.[34] Ordinary eyeglasses are not considered protective eyewear. Protective eyewear can include protective glasses, masks with face shields, and helmet-style face shields.[34] When occupational exposure is likely, the employer must provide protective equipment for all health care personnel with the expectation that it is worn for all surgical cases.[26,34] To effectively mitigate exposure to blood or body fluids, protective eyewear should fit snugly across the brow, protect from any splashing from the side, and include anti-fogging and indirect ventilation properties. Eye protection is applied before the sterile scrub and should be cleaned whenever visibly soiled.[25] Adequate visibility is essential to the first assistant, and experimentation with different protective eyewear may be necessary to find the optimum eyewear for each individual.

Surgical gowns are designed to provide a sterile, fluid-resistant barrier to protect the client and the health care professional from cross-contamination with blood, body fluid, or other potentially infectious material. Surgical gowns are moisture resistant to reduce contamination by strike through from blood and other body fluids. Most disposable surgical gowns are made from nonwoven materials that will withstand significant exposure to moisture. Reusable fabric gowns are most often made from tightly woven materials that are treated to prevent passage of fluids.[27] These protective coatings can deteriorate with repeated laundering and sterilization. No matter what the material, most gowns will soak through when exposed to fluids

for a prolonged period of time, allowing cross-contamination of the client and surgical personnel. Avoid pooling of fluids against the gown which can occur when the first assistant stands belly to belly with the pregnant client during cesarean birth. Use of fluid-capture systems and suctioning or blotting of excess fluid reduce opportunities for the gown or drapes to become saturated. This intentional prevention of gown saturation by intraoperative fluids can prevent fluid wicking and the resultant cross-contamination of the operator's scrubs and undergarments.

Gloves are the essential barrier between the clinician's hands and the client. Nonlatex, unpowdered, sterile gloves are recommended.[25,27] Sterile gloves must cover the cuffs of the sterile gown. Gown cuffs are considered contaminated and can be kept over the hand to the first knuckle when gloving to ensure that cuffs are fully encased within the glove. Use of correctly sized gloves results in a snug fit at the fingertips and allows for full sensation. Double gloving is recommended by AORN and is performed in many settings.[25] This practice has advantages and disadvantages; double gloving reduces exposure from microscopic perforations in the gloves or punctures related to handling of instruments or sharps which can decrease the potential for exposure to blood and body fluids. However, double gloving is less cost-effective than use of single gloves, and unless care is taken to assure a good fit, can result in decreased sensation or numbness of the fingers during the procedure.[1] Many facilities have specific undergloves that can show when the overglove has been compromised. The usual size or one-half size larger undergloves are typically worn. Experimentation outside of the OR may be necessary to find the glove combination that allows full tactile sensation, with snug fit at the fingertips and full hand sensation.

Surgical Scrub, Gowning, and Gloving

The surgical hand scrub begins after donning mask and eye protection and verifying that there are no further preoperative client preparation tasks for the first assistant. The purpose of the surgical scrub is to remove loose debris from the hands and decrease surface skin bacteria counts by the use of effective antimicrobial solutions.[35] The two types of surgical scrubs are the traditional water-based scrub and the alcohol-based surgical hand-rub solutions. They are considered equally effective in reducing surgical site infections.[35]

To reduce the number of organisms on the hands, surgical personnel should maintain fingernails that are short (no longer than 2 mm) and natural. Nail polish should be avoided. Prior to the surgical scrub, any rings, watches, or jewelry are removed from the hands or wrists, and a surgical mask is donned. The surgical hand scrub is performed before any surgical or invasive procedure and prior to donning the sterile gown or gloves.[35]

Specific alcohol-based surgical hand-rub products with demonstrated persistence and cumulative activity are more effective at reducing organisms on the hands than the traditional water-based surgical scrub.[35-37] The alcohol-based rub is preceded by routine handwashing with soap and water, cleaning of the nails with a nail pick, and thorough rinsing and drying of the hands. The alcohol-based solution is then applied using the manufacturer's instructions.[35,36] Typically, the clinician dips the fingernails into a pool of solution cupped in each hand before applying the product to the hands and forearms. The hands are then rubbed until they are thoroughly dry before gowning or gloving.

The water-based scrub optimally takes place using a gentle flow of warm water, as it allows the antimicrobial scrub solution to work more effectively. Very hot water is discouraged as it removes the protective oils from the skin. Scrubbing the hands, wrists, and forearms with an antibacterial scrub solution and sponge for at least 3 to 5 minutes (per manufacturer's recommendations) allows adequate time to remove, inhibit, and kill as many microorganisms as possible.[35,36] Most facilities have specific protocols for the surgical scrub. The hands, more than any other part of the arms, must be as clean as possible. During rinsing, hands are held above the level of the elbow to allow the water to flow from the hands to the forearms and prevent splashing that may dampen surgical attire. Scrubbed hands are elevated and held out from the body while entering the OR. A sterile towel is provided to dry the hands. To avoid cross-contamination, separate ends of the towel are used to carefully blot dry each hand, wrist, and forearm from fingertips to elbows. The soiled towel is then placed in the appropriate receptacle before turning to the scrub nurse or surgical technologist for gowning.

In most settings, the first assistant is gowned and gloved by the scrub nurse or surgical technologist. The gown can

be placed securely on the shoulders or placed just over the hands and forearms. In the latter case, the first assistant will need to carefully shrug the gown up to their shoulders. Only the tips of the fingers are exposed before gloving, which allows the gown's cuff to remain well within the glove's cuff. The cuff of the gown is always considered contaminated and should be kept covered to prevent wicking of fluids by the cuff material and resultant cross-contamination.[27, 38] Once the first hand is gloved, the first assistant may gently pull back the sleeve of the second hand to expose the fingertips. The sterile gloved hand is then used to hook the cuff of the second glove to open the second glove widely as the hand is inserted. Dry hands and firm insertion of the hand deeply into the glove can assist in maintaining the gown cuff at the level of the palm of the hand.

Figure 2-1. Gowning. Gown cuffs are completely covered by the glove.

Surgical Instruments, Sutures, Needles, and Other Equipment

Surgical instruments are used in every surgical case. Each procedure will have an associated set of commonly used instruments. All instruments are sterilized before use and come either in a pack or kit (ie, a cesarean instrument kit) or are individually wrapped.

Each sterile package will have an indicator that demonstrates that sterility has occurred during processing. All instruments are set up and maintained in a sterile fashion from the time the first pack is opened until the wound is closed and the case is completed. The scrub and circulating nurse will perform sponge, needle, and instrument counts before and during each case.

Many surgical instruments have similar appearances, and only minor variations that differentiate them. Instruments are identified through procedure-specific instrument checklists and surgeon's preference cards. The broad categories of instruments commonly used during obstetric and gynecologic surgery include retractors, clamps, tissue forceps, needle holders, scissors, and scalpel blades.

Retractors are designed to hold tissue away from the surgical field, to lift layers to improve visibility or to protect delicate structures from injury. Retractors are one of the most commonly used instruments in obstetric and gynecologic surgery and include the Balfour, Richardson, Goulet, Deaver, Army-Navy, and others. Some retractors are fixed (self-retracting), and others are handheld. While the Balfour is a fixed-type retractor, the Balfour bladder blade is frequently used as a hand-held retractor during cesarean birth.

Disposable abdominal ring retractors can also be used to provide exposure. These retractors are especially useful in the presence of a thick abdominal wall. The abdominal wall must be fully dissected and the abdominal cavity entered before the flexible inner ring of the disposable retractors can be inserted into the abdominal cavity. This ring acts as an anchor as the outer ring is rolled, which results in the sleeve between the two rings becoming taut against the abdominal wall. The tension of the retractor material between the rings effectively holds the incision open in an atraumatic circular position while protecting the tissue from desiccation or trauma. The first assistant is encouraged to review the manufacturer's recommendations for insertion, correct placement, and removal.

Clamps are designed to hold tissue firmly. Some clamps have the potential to crush tissue, such as a Kelly clamp, while others hold them gently, such as the Babcock clamp. Kocher clamps have both serrations and a toothed tip and are designed to hold durable tissue like the fascia firmly. Clamps come in straight, curved, or right-angled and short, medium, long, or extra-long forms. Common clamps used in obstetric and gynecologic surgery also include Heaney, Crile, Mosquito, Ring or sponge forceps, Allis, and Allis-Adair.

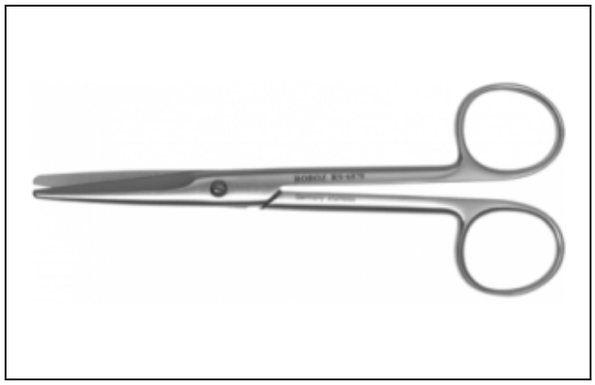


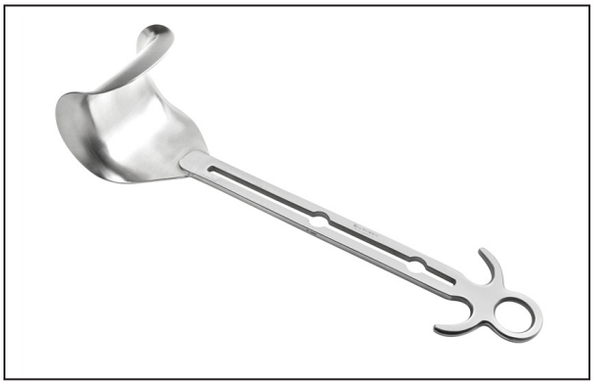
Figure 2-2. Scissors - Mayo.

Metzenbaum.

Bandage.

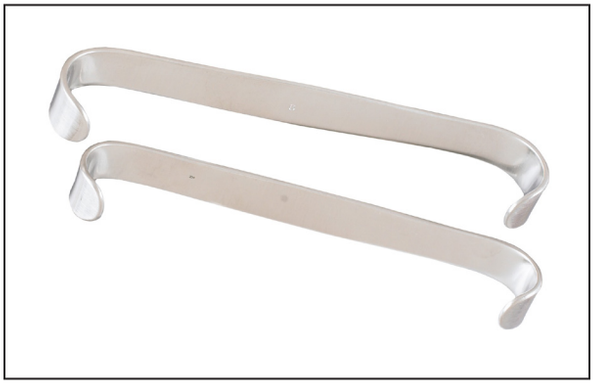
Figure 2-3. Needle holders can be short or long.

Figure 2-4. Retractors - Army-Navy.



Balfour.

Richardson.

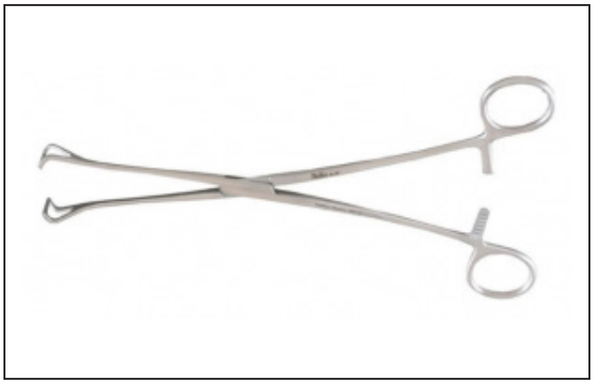


Parker.

Figure 2-5. Forceps -Kelly.

Mosquito.

Allis.



Babcock.

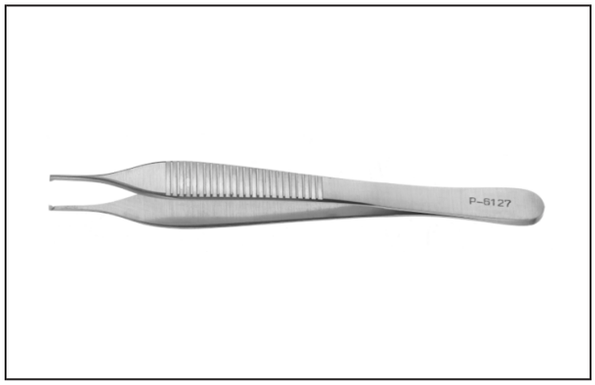
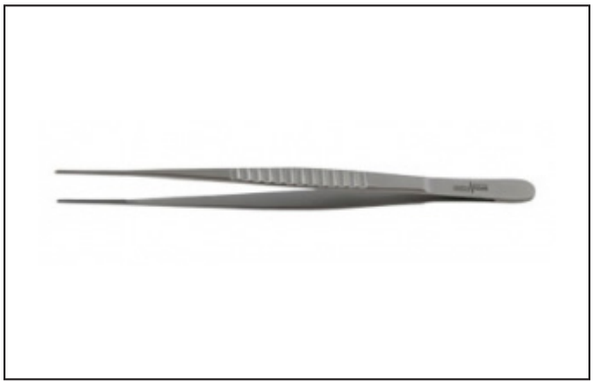


Figure 2-6. Smooth and toothed tissue forceps - Adsons.



DeBakey forceps.

Tissue forceps function as an extension of the fingers and are used to grasp and manipulate tissue and needles. Tissue forceps used in obstetric and gynecologic surgery include Adson's, DeBakey, Rat-tooth, and Russians. Some have smooth (serrated but no teeth) grips, while others have interlocking teeth. Tissue forceps come in lengths from short to long and range from delicate to robust. During suturing, tissue forceps are used to stabilize the tissue during placement of the stitch, to pull the needle from the tissue, and to manipulate the needle when positioning it in the needle holder. The suture needle is grasped firmly between the arms of the tissue forceps.

Sutures are sterile strands that are used to approximate tissue or ligate (tie off) vessels. Sutures come in varying types and sizes, most with a surgical needle attached. Each suture packet shows the suture type, suture size, needle size and shape, and needle tip. Sutures are packaged in individual or multi suture sterile packs. The packaging is designed for ease of loading the suture needle into the needle holder and allows for easy removal of the suture from the pack.

Sutures are selected for a procedure based on the suture characteristics, the tissue to be sutured, tissue integrity, the type of procedure, and surgeon preference. Most sutures used in obstetric and gynecological surgery are absorbable sutures, meaning that over time they will dissolve or be broken down by the body. Table 2-2 describes the characteristics of commonly used sutures.

Sutures come in different materials, sizes, and textures. Braided suture (ie, Vicryl, Dexon, Polysorb) has multiple strands braided together, which leads to greater tensile strength, flexibility, and knot-holding ability. Some of these sutures are coated to decrease resistance of the suture as it passes through the tissue.[39] Monofilament suture (ie, Monocryl, PDS, Monoderm) is formed as a single strand which allows the suture to move smoothly through the tissue. Many monofilament sutures have memory, that is, they tend to revert to their original coiled shape, which can be challenging when using these sutures. Monofilament sutures also require more tension to tie secure knots. Natural absorbable sutures are manufactured from purified connective tissue from sheep or bovine intestines and come in plain or chromic. Chromic gut is treated to resist body enzymes and slow the absorption process allowing it to support the wound for longer than plain gut suture.[39]

Suture size designates the diameter of the suture material. Suture size is designated numerically, with whole numbers being larger suture (0 or 1) and smaller sutures being identified by the number of zeros in the suture number. The tensile strength of the suture is based on the amount of force it takes to break the suture. Tensile strength diminishes over time as the suture degrades within tissue. Suture absorption time and tissue reactivity vary based on suture type.[39]

TABLE 2-2. Suture Characteristics

Suture	Type	Tensile Strength	Absorption Rate	Tissue Reaction
Surgical Gut	Plain	Tensile strength loss varies, based on client characteristics	Absorbed by proteolytic enzyme digestion	Moderate
Surgical Gut	Chromic	Tensile strength loss varies, based on client characteristics	Absorbed by proteolytic enzyme digestion	Moderate
Coated Vicryl	Braided	75% at 2 weeks; 50% at 3 weeks	Absorbed by hydrolysis in 56-70 days	Minimal to Moderate
Monocryl	Monofilament	60% at 1 week; 30% at 2 weeks	Absorbed by hydrolysis in 90-120 days	Minimal
PDS	Monofilament	70% at 2 weeks; 50% at 4 weeks	Minimal absorption until 90 days; full absorption within 6 months	Slight

Adapted from: Ethicon. Wound closure manual. 1999.39

Sutures are used to close tissue layers to support healing. Examples of sutures commonly used in obstetric and gynecologic surgery include:

- 0 Chromic, Dexon, Vicryl, or Monocryl for uterine closure
- 2-0 Vicryl or Dexon for ligation of small vessels
- 2-0 Plain (gut) or 3-0 Dexon or Vicryl for bladder repair
- 2-0 Plain (gut) or 0 Dexon or Vicryl for tubes in tubal ligation
- 0 or 3-0 Vicryl or Dexon for peritoneum
- 0 Vicryl, Dexon, or PDS for fascia
- 2-0 and/or 3-0 Vicryl or Dexon for subcutaneous tissue
- 4-0 Vicryl, Dexon or 2-0 Prolene for subcuticular skin closure
- Percutaneous metal or absorbable subcuticular skin staples for skin closure.

Surgical needles are designed to be held securely in the jaws of a needle holder and carry the suture through the tissue with minimal trauma. They need to be sharp enough to pass though the tissue and strong enough to resist bending. Surgical needles come in varying curves and with blunt, taper, or cutting tips. The needle is grasped by the operator on the body of the needle, avoiding the end of the needle where the suture enters and is crimped for retention. When pulling the needle from the tissue, the tip is avoided to avoid dulling or weakening it. Safe surgical practice requires mechanisms to prevent needlestick injuries, and it is recommended that all needles are passed using a hands-free technique and protected or removed before tying of surgical knots.[39]

Electrosurgery is frequently used during obstetric and gynecologic surgery for hemostasis or dissection, and use varies substantially from surgeon to surgeon. The first assistant must be familiar with the manufacturer's recommendations for use of the electrosurgical unit (ESU), client safety measures, the surgeon's preferred ESU settings, and general unit operation. The ESU may also be known as the Bovie or cautery.

Electrocautery is covered in more detail in Chapter 3. Endoscopic equipment or scopes used during obstetric and gynecologic surgical procedures include the laparoscope, the hysteroscope, and the cystoscope. Scopes come in various sizes, with 5 mm and 10 mm common for laparoscopy. The angle of the scope affects visualization and can range from 0 degrees to 45 degrees.

Laparoscopic instruments are designed to fit through ports that range from 2 mm to 12 mm in size. These long instruments are similar to larger instruments but have been engineered specifically for laparoscopic use. Laparoscopic instruments include various graspers, scissors, blunt probes, monopolar and bipolar cautery instruments, stapling devices, and specimen retrieval systems. Laparoscopic instruments can be used during conventional laparoscopic or minimally invasive robotic procedures. Robotic surgery can provide the surgeon greater precision and control and allow greater visualization and instrument flexibility than open or conventional laparoscopic procedures. However, in many instances traditional open or laparoscopic approaches can decrease operative and anesthesia time with equal or superior short and long-term clinical outcomes.[40]

A hysteroscope is a thin endoscope that is inserted into the uterus to perform direct examination of the endometrial cavity. It can be used during evaluation and treatment of uterine bleeding.

A cystoscope is a narrow endoscope that is used to visualize the interior walls and structures of the urinary bladder. It is most commonly used in the OR for diagnosis and treatment during urogynecologic procedures, validation of urine flow from the ureters following gynecological procedures, and direct observation of suprapubic urinary catheter placement.

Surgical grafts are materials used to repair a damaged part of the body or an anatomic defect. Grafts can be used during procedures for pelvic prolapse and urogynecologic conditions, although their use is controversial. Graft materials include natural grafts taken from the woman's own tissue (fascia) and xenografts (porcine or bovine). Synthetic mesh, tape (polypropylene), or sheets (Gortex or Marlex) are used less frequently.[41]

Additional equipment that may be used during obstetric and gynecologic surgical procedures includes items such as the cautery smoke evacuation system, vacuum extractor, the harmonic scalpel, insufflation equipment for use with the laparoscope, fluid and tubing for use with the hysteroscope or cystoscope, monitor screens and cables, suction/irrigation systems, laparoscopic specimen collection devices, and hemostatic stapling devices.

Hands-Free Sharps Transfer

According to the Centers for Disease Control and Prevention, more than 385,000 needlesticks and sharps injuries take place in health care settings annually, and approximately 30% of these injuries occur in the OR.[42] The use of safety-engineered devices, blunt tipped needles, and hands-free methods of sharps transfer are now considered the standard for prevention of sharps injury.[43,44] Sharps can be passed by the scrub nurse or technologist using a kidney basin or other designated container or through placement on a designated sharps-resistant safe zone on the sterile field. The scrub nurse or technologist then indicates to the provider that the instrument is available in the kidney basin or safe zone. The provider picks up the instrument, uses it, and returns it to the basin or safe zone and tells the scrub nurse or technologist that the instrument is in the kidney basin or safe zone with an accepted phrase, such as "needle up" or "knife down." All unprotected sharps are passed so that the surgeon, first assistant, and scrub personnel never touch the sharp at the same time, which is referred to as a hands-free technique.[43,44]

Sharps Injury Mitigation Measures [44]

The safe use of sharps is one of the most critical health and safety issues health care professionals face in operating room procedures. The following are examples of actions that can help mitigate the risks of sharp-related injuries:

- Use of double glove technique
- Provision of adequate lighting
- Tidy and organized workspace
- Use of a neutral zone or hands-free sharps passing technique for sharps transfer
- Suture needle is protected or removed before tying
- Immediate activation of sharps safety devices following use.

Perioperative Hazards and Complications

Vigilant observation by the perioperative team for potential complications allows for early identification and initiation of treatment. Treatment or intervention is a team process that may include the surgeon, anesthesia personnel, nursing staff, and the first assistant depending on the practice setting, type and severity of the complication, and collaborative practice parameters.

The entire perioperative team engages in active problem-solving during surgery using a cohesive team approach to identifying complications and implementing solutions that are within the confines of safe practice. Interventions are directed at achieving the best clinical outcome based on the specific situation, the unique characteristics and health conditions of the client, and the skill and expertise of the perioperative team.

Recognizing potential hazards and complications is the first step in the prevention of client injury. Injury can occur preoperatively, intraoperatively, or postoperatively. Hazards and their resultant injuries fall into 4 basic areas.[4]

1. Chemical

Chemical injuries result from exposure to solutions or materials used in the perioperative setting. Chemical injury can cause skin or tissue trauma, airway irritation, and allergic or other local or systemic reactions. Prevention includes inquiring about previous reactions to prep solutions, iodine, adhesive tape, etc. Care used in the application of these materials can prevent splashing or exposure to nonessential areas. For example, absorbent pads used to catch excess prep solutions are removed prior to draping to avoid prolonged skin contact with the solution.

2. Physical

Physical injuries can be caused by falls or injuries related to client positioning, such as pressure injury or joint trauma. Careful attention to details during positioning minimizes risk of physical injuries. Padding of pressure points and care when moving and positioning clients, especially when sedated or under anesthesia, aids in prevention of physical injury. Safety restraints are used when necessary (eg, safety strap on the operating room table), and the client is never left unattended on the OR table. Examples of physical injuries are back or hip trauma due to manipulation of the client under anesthesia, or pressure injury of the bony prominences of the elbows where they rest on the armboards.

3. Mechanical

Mechanical injury occurs when tissue is damaged through crushing, pinching, or shearing forces. Prevention of mechanical injuries requires familiarity with instruments and equipment used in the OR. Self-retaining retractor blades are padded (eg, with moist lap sponges) to protect tissue from trauma. Use of sharps is minimized, and when sharps are used, they are handled safely through the use of a hands-free method. Surgical bed attachments such as stirrups are applied correctly and securely to prevent accident or injury. Example of a mechanical injury is skin shearing as a result of sliding a client without a roller board, or the crushing of a nerve by inaccurate placement of a clamp.

4. Electrical

Electrical injuries can occur when electrical equipment, especially cautery, is used during surgery. Electrical current can cause cardiac dysrhythmias, burns, and tissue damage. All electrical equipment used in the OR is tested prior to use for proper functioning and routinely inspected for damage. Skin and tissue burns can occur remote from the cautery site. Skin integrity should be assessed after the case.[4]

Physiologic shock is a life-threatening complication characterized by destabilization evidenced by cardiopulmonary distress, poor perfusion, confusion, and collapse. Prompt attention to the cause of shock is necessary to decrease sequelae. Shock is divided into 5 basic categories: hypovolemic, septic, cardiogenic, neurogenic, and anaphylactic.[45]

Hypovolemic

Hypovolemic shock is due to excess loss of blood or bodily fluids through bleeding or intravascular depletion. It can occur with bleeding, disseminated intravascular coagulation, or as a result of severe pregnancy-induced hypertension. Hypovolemic shock can occur in the volume-depleted person after the initiation of regional anesthesia. It is treated by addressing the underlying cause and by providing appropriate blood products, fluid resuscitation, and medications.

Septic

Septic shock occurs as a result of overwhelming infection. Its onset is most often recognized by the sudden appearance of fever and shaking chills. Treatment typically occurs in the intensive care setting and consists of fluid resuscitation, aggressive antibiotic treatment, and ventilatory support. The origin of the infection must be determined and when indicated, drained (eg, an abscess), debrided, or excised. Postoperative septic shock can progress rapidly to include acute respiratory distress syndrome and cardiopulmonary failure.

Cardiogenic

Cardiogenic shock occurs secondary to pregnancy-related cardiac dysfunction or cardiomyopathy. Treatment varies by cause but can include chest compressions, ventilatory support, medications, placement of a temporary or permanent pacemaker, revascularization, and anticoagulation.[46] Training in advanced cardiac life support is a requirement for most perioperative professionals. Cardiac dysfunction can occur without warning, particularly in clients as they age, in the presence of multifetal gestation, or in association with other obstetric or medical emergencies. Evaluation of cardiac status is part of the routine labor admission or preoperative work-up. Preoperative clearance by the client's primary care provider, internist, or cardiologist may be indicated to determine the necessary support or treatment in the perioperative period.

Neurogenic

Neurogenic shock results in profound vasodilation hypotension and can occur secondary to regional anesthetics, drug overdose, or traumatic spinal cord injury. Neurogenic shock is treated based on its origin with surgery, fluid maintenance, ventilatory support, and medications such as ephedrine or phenylephrine for the vasodilation hypotension associated with regional anesthetics.[46,47]

Anaphylactic

Anaphylactic shock occurs as a result of acute allergic reaction, such as a reaction to latex, antibiotics, or succinylcholine. Due to the slow venous return in pregnancy, anaphylaxis can present as persistent hypotension and cardiac collapse, with hives or other skin reactions appearing after stabilization of maternal perfusion. First line treatment of anaphylactic shock is epinephrine, titrated to hemodynamic response and followed by a bolus of IV crystalloids, airway management, and for pregnant clients, rapid birth by cesarean.[48]

Latex exposure presents a particular hazard in the perioperative environment. Latex refers to products made from the sap of the Brazilian rubber tree. Exposure to latex, (eg, through use of products used in the home, work, or perioperative setting), has been shown to increase the risk of developing latex allergies in clients and in health professionals.[49,50] Latex allergy can pose a serious health risk for clients and health care workers and can result in local reactions such as contact dermatitis, or in systemic reactions such as anaphylaxis. For this reason, many health care settings now use non-latex gloves and products.

SKILLS DEVELOPMENT: Latex Allergy Tips and Pearls

- Learn to recognize the symptoms of latex allergy: skin rash, hives, flushing, itching, nasal, eye, sinus symptoms, asthma, and (rarely) shock.
- If symptoms of latex allergy develop in a client, avoid all direct contact with any latex-containing products until evaluation for latex allergy is performed. Follow recommended latex precautions.
- Wear a medical alert bracelet and inform all personal health care providers of latex allergy.[49,50]
- Latex allergy resources:
  a. Asthma and Allergy Foundation of America: https://www.aafa.org/latex-allergy/
  b. American Association of Nurse Anesthetists: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/latex-allergy-management.pdf?sfvrsn=9c0049b1_8
  c. Allergy and Asthma Network: https://www.youtube.com/watch?v=smTC06pPNDU

ANESTHESIA

Anesthesia for Obstetric-Gynecologic Surgery

Preoperative planning for anesthesia care is based upon the findings of the preanesthesia assessment, which includes a client interview and a focused physical examination. The client is assessed for their general health status; body mass index; previous exposure and response to anesthetic agents; current medication and supplement use; drug, alcohol, or tobacco use; allergies; pregnancy status; and a general review of systems. The anesthesia examination is limited to pertinent systems, including cardiopulmonary status, neurologic function, and airway assessment. The airway assessment includes close attention to neck, mouth, and temporomandibular joint mobility; condition, configuration and presence of teeth; and the ability to visualize the uvula. The size and configuration of the airway can be affected by the woman's height, weight, and/or effects of pregnancy and labor.[51]

Laboratory and other diagnostic tests are also reviewed. Informed consent for anesthesia is obtained, and any concerns from the client or family are addressed. Informed consent involves providing information in layman's terms about the planned route of anesthesia, the benefits and risks of the planned anesthesia, and alternative types of anesthesia when available.

Preoperative fasting is no longer recommended. A light meal may be eaten up to 6 hours before surgery, with clear fluids continued until 2 hours before the procedure. For clients with normal glucose metabolism, preoperative supplementation with oral carbohydrate fluids can be offered 2 hours before surgery.[52] When a client is scheduled after the first case of the day or surgery is delayed, these recommendations can provide comfort and necessary nutrition during the interval between the last meal and surgery. The midwife should explore current literature and facility protocols regarding nutrient restriction during labor which may precede unplanned cesarean birth.

Anesthetic technique is determined by the client's overall condition, indications for surgery, weight, body habitus, and the planned procedure. During pregnancy, the anesthesia provider must take into consideration the effects of anesthetic agents on both the client and the fetus. Pregnancy affects the airway with resulting edema of the glottis; the airway is narrower than it would be in the same person when not pregnant. When general anesthesia is indicated in pregnant clients, smaller endotracheal tubes are often required. The stomach contents during pregnancy are more acidic and more caustic than in a non-pregnant state, and the effects of relaxin on the esophageal sphincter tone makes gastroesophageal reflux more common, especially when the client is supine.[53] When the pregnant person is supine, the weight of the large globe of the pregnant uterus can cause compression on the vena cava and result in diminished blood return to the heart.

For these reasons and others, regional anesthesia is typically preferred over general anesthesia for clients who require surgery in advanced pregnancy.

The choice of anesthesia can be influenced by the preference of the client, surgeon, or anesthetist.[53] The ASA Physical Status Classification System from the American Society of Anesthesiologists ranges from ASA I through ASA VI and is used to identify overall health status from an anesthesia point of view. An "E" is added to the classification to denote emergency surgery.[51]

Perioperative Pharmacology

The medications used during anesthesia have the potential for side effects. Familiarity with the medications commonly administered in the perioperative period can aid the perioperative team in early recognition of adverse effects and prompt intervention to minimize risk to the client, and during pregnancy to the fetus or infant. Medications fall into categories based on their use before, during, or following surgery. Most clients are given a combination of medications tailored to meet their specific needs. During pregnancy, the number and type of medications used is limited to minimize effects on the fetus. While regional anesthesia is preferred for cesarean birth, general anesthesia during pregnancy for non-pregnancy conditions is generally safe and reliable and can offer distinct advantages in select circumstances.[53]

Premedication can be used to provide sedation and reduce anxiety related to administration or induction of regional or general anesthesia, for infection prophylaxis, or to manage physiologic or pathologic processes. Midazolam (Versed) is commonly given preoperatively to reduce anxiety and foster relaxation prior to gynecologic surgery. It is used occasionally during cesarean birth to reduce the incidence of preoperative anxiety and intraoperative nausea and vomiting.[20] Midazolam, however, can have an amnesiac effect so its use as a preoperative medication for cesarean birth is avoided when possible.

Multimodal approaches to prevention and treatment of intraoperative nausea and vomiting are recommended.[20] Antacids, such as sodium citrate, are frequently used prior to cesarean birth or gynecologic surgery to reduce the acidity of stomach contents. Ranitidine (Zantac) or famotidine (Pepcid), and H2 blockers are used as well. Cholinergic medications such as metoclopramide (Reglan) increase gastric motility without stimulating secretions. The overall goal is to reduce the potential for inhalation, aspiration, and other associated risks.[53]

As previously described, a single dose of antibiotics can be administered 30 to 60 minutes prior to the procedure for infection. Prophylaxis of antithrombotic agents may be given to prevent deep vein thrombosis. Bowel preparation is no longer recommended prior to cesarean birth or abdominal gynecologic cases.

Regional Anesthesia

Long-acting local anesthetics such as bupivacaine (Marcaine, Sensorcaine) with or without epinephrine can be administered prior to the initial incision to block nerve conduction at the site of the incision(s). This can be helpful in reducing postoperative pain at the incision site.

Spinal or epidural anesthesia is the preferred method of anesthesia for cesarean birth.[14] Use of regional anesthesia allows the client to be awake and alert during their birth, watch the baby emerge, and speak with their partner and anesthesia personnel. Benefits of regional anesthesia include reduced risk of aspiration and decreased use of medications that can depress maternal or neonatal respiratory drive. Regional anesthesia is used less often during gynecologic surgery. Its use is based on the client preference, presence of contraindications to general anesthesia, as an adjunct to general anesthesia, postoperative pain control, and for those who require extensive surgery.

As with any medication, there are risks associated with regional anesthesia. A marked hypotensive effect is common and can dramatically affect placental perfusion and fetal oxygenation. Hypotension secondary to venodilation can result in decreased renal perfusion and diminished urine output, which increase the potential for fluid overload, especially following oxytocin infusion.[54] The level of anesthesia affects the client's ability to feel the intercostal muscles, which can result in feelings of suffocation and anxiety. In some instances, temporary paralysis of these muscles occurs and results in a limited ability to effectively clear secretions or vomit by coughing. Lastly, a postdural puncture headache or spinal headache can occur following spinal anesthesia.

Common regional anesthetic agents include a long-acting anesthetic such as bupivacaine, with or without a narcotic such as fentanyl or morphine. The long-acting anesthetic provides the operative level anesthesia while the narcotic diminishes pain response and reduces immediate postop pain. This technique allows a lower dose of the anesthetic to be administered. When a long-acting narcotic is added, it can provide pain relief for up to 24 hours postoperatively. Women with severe pregnancy-induced hypertension, acute hemorrhage, and hypovolemia are at increased risk during administration of anesthesia. Decreased circulating blood volume, vasodilation, and unstable blood pressure (hypertension or hypotension) increase the risk of complications associated with regional or general anesthesia. In these instances, the determination of the type of anesthesia is based on the client's condition and the anesthetist or anesthesiologist's clinical judgment.[55]

General Anesthesia

General anesthesia is preferred for most gynecologic surgery and for the truly emergent birth of the neonate by cesarean. General anesthesia is given via volatile inhalation agents or intravenous medications. Premedication with a drug such as midazolam is commonly used to relax the client prior to arrival in the surgical holding area and can result in some amnesiac effect after the surgery.[21]

General anesthetics include induction agents, inhalation agents, and neuromuscular blockers. Each agent has a specific function in the provision of anesthesia and can interact with other medications. For example, magnesium sulfate (MgSo4) enhances neuromuscular blockers, and therefore a smaller dose is administered to clients receiving treatment with MgSo4.

Administration of general anesthesia for cesarean birth can increase maternal plasma catecholamines and result in reduced uteroplacental blood flow and fetal compromise. In women with pregnancy induced hypertension, an exaggerated cardiovascular response can occur following administration of general anesthesia and tracheal intubation, which can lead to cerebral hemorrhage and edema, cardiovascular decompensation, and pulmonary edema.[55]

Intraoperative Warming

Fear, tension, and the effects of anesthesia can all result in hypothermia. Heat loss can occur through convection, conduction, and evaporation. Monitoring of client temperature and routine use of methods to prevent hypothermia is the standard of care. Prevention of hypothermia using forced air warming devices or intravenous fluid warming are recommended. In addition, routine monitoring and adjustment of the temperature of the OR to meet the AORN recommendations of 68 to 75 degrees Fahrenheit, further reduces the risk of client hypothermia.[56] The temperature can temporarily be adjusted outside of this range, for example, to prevent hypothermia of the preterm neonate. Operating room humidity is maintained in the range of 20% to 60%.

SUMMARY

Surgical asepsis is the basis for infection control and client safety in the OR. Sterile fields are uniformly delineated and consistently maintained throughout the surgical procedure. As a key member of the surgical team, the first assistant must be familiar with the safe functioning of the perioperative team in the operating room, the surgical instruments, and usual methods of anesthesia. Effective interprofessional communication is essential for client safety and the smooth progression of the surgical case. Integrating into the surgical team and applying accepted principles of safe surgical practice are the primary foci of the novice first assistant. Taking clinical and professional steps to enhance your knowledge and skills, such as those outlined here are key to being successful in the OR and making a positive, meaningful impact in a client's well-being.

Clinical Activities

- Observe application of aseptic technique during a case from set-up through close;
- Review AORN recommended practices pertaining to sterile fields, surgical attire, and other intraoperative topics related to first assistant practice;
- Observe the difference between sterile and clean technique in the OR, the birth room, and office during development of surgical conscience;

- Try the various types of protective eyewear available at the facility to determine which allows greatest comfort and visibility;
- Evaluate the fit of various types of surgical masks available in the OR. Wear often enough to get used to the mask;
- Practice a thorough surgical scrub before births and office procedures as well as the OR;
- Practice drying hands from fingertips to elbow, using half of a sterile towel per arm; and
- Practice gowning and being gowned using sterile technique.

Professional Activities

Meet with anesthesia care providers to discuss:

- The ASA classification system;
- The effect of physiologic changes of pregnancy on anesthesia care, and any concerns of the providers in your setting; and
- Key components of the history and physical examination for optimal anesthesia care.

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THE MIDWIFE AS FIRST ASSISTANT: ROLE AND FUNCTIONS

3

The surgical first assistant is expected to acquire the specific knowledge, understanding, and skills necessary to effectively participate in a surgical procedure while also having the ability to function both independently and collaboratively as an active participant in the surgery.[1] This chapter is devoted to the fine motor skills and knowledge acquisition that are essential to becoming a first assistant and aid the clinician's understanding of the scope of first assistant practice. The material is presented in order of the three phases of a surgical procedure: preoperative period, intraoperative period, and postoperative period.

BACKGROUND

Surgery is the deliberate invasive instrumentation of a person for the purpose of prevention or treatment of disease, malformation, or injury.[2] It is, by definition, included in the practice of medicine: the branch of science concerned with the diagnosis, prevention, and treatment of disease. In our cost-conscious health care environment, many advanced practice health professionals now fill the role of surgical first assistant that was previously filled by physicians.[3,4]

While first assistant activities can be thought of simply as technical skills, providing optimal care requires technical expertise to be coupled with comprehensive knowledge related to the procedure which is then applied in partnership with the surgeon.[4] Knowledge and critical appraisal of the planned procedure and possible variations are necessary to effectively respond as the first assistant during surgical procedures. Each facility and surgeon defines the expected role of the first assistant and the specific perioperative activities to be performed.

Core midwifery education addresses basic knowledge and competencies useful to the midwife first assistant including client assessment, anatomy and physiology, and principles and performance of wound repair.[5] Midwifery education also includes the development of basic aseptic technique and surgical skills needed to perform minor procedures and suturing. However, as addressed in detail in Chapter 1, the role and skills of the surgical first assistant require additional role-specific education and skill development beyond core competencies.[6]

The traditional midwifery focus on client education and participation encourages shared decision-making and can improve the informed consent process and overall satisfaction of clients who undergo surgical procedures.[7-10] In addition to acting as the first assistant during the surgery itself, many midwives provide comprehensive pre- and postoperative assessment and care. When the midwife first assistant includes comprehensive pre- and postoperative care as part of their midwifery practice, a clear mechanism is needed for consultation and collaboration when evolving complications are suspected or identified.[6]

Cesarean birth is the surgery midwives most frequently participate in as a surgical first assistant. Participating during cesarean birth allows midwives to follow their clients from pregnancy though birth and into the postpartum period, regardless of the route of the baby's birth. In some settings, midwives act as hospital laborists and assist with the cesarean births that occur on their shift. Midwives in some settings also routinely assist with cesarean births of physician clients, thus optimizing available resources and improving unit efficiency. Midwives may also assist with gynecologic procedures. Participating in gynecologic surgery allows for continuity of care for clients receiving reproductive health care who require surgery. This is particularly useful in resource limited or low volume settings where staffing challenges often exist. Participation in gynecologic procedures can aid in maintaining the first assistant skill set in settings with a low volume of cesarean birth, while contributing to the effective functioning of the obstetrics and gynecology unit or practice.

THE FIRST ASSISTANT SKILL SET

In order to become a competent surgical first assistant, the clinician must master the skills of the first assistant and know how to apply them in their specific practice setting (see Appendix 5). The initial focus of the novice first assistant is the development of the behavioral and motor skills necessary to provide fundamental assistance to the surgeon. As these skills improve, they are coupled with professional judgment, and the role of the first assistant becomes broader and more active depending on the surgeon, type of case, clinical setting, and the needs of the client. The skilled first assistant builds a repertoire of effective, efficient, and ergonomic surgical skills over time that can be applied with confidence and without hesitation or wasted motion.

The first assistant role includes the following skills and activities:[1]

- Positioning, preparing, and draping the client;
- Applying surgical aseptic technique;
- Using surgical instruments, supplies, and devices;
- Providing exposure and visualization of the active surgical site;
- Handling and cutting of tissue during dissection and closures;
- Assessing blood loss and providing hemostasis;
- Suturing, knot tying and following suture (managing the suture while the surgeon performs the closure); and
- Initiating emergency actions as needed.

Although all midwives acquire basic theoretical knowledge of aseptic technique and skills such as suturing during midwifery education, prior perioperative experience can be of benefit to the midwife learning the role of first assistant. While many midwives come into practice with experience in the operating room, others are entirely new to the perioperative setting. Recommendations for attaining competency are based on skill assessment rather than a number of cases or hours. However, in order to provide practical guidance for midwives and credentialing bodies, the following minimum recommendations for clinical experience are provided:

- Orientation to the operating room, including but not limited to observation of 5 cases, each with a distinct focus area:
  - » Aseptic technique
  - » Instruments
  - » Anatomy
  - » Sequence of procedure
  - » Role of the first assistant
- Participation in 5 to 10 mentored cases in the first assistant role under the mentorship of a qualified first assistant, or as many cases as needed to develop and demonstrate competency at the novice level.
- Participation in 10 cases related to postoperative care, assessment and triage of complications, or as many cases as needed to develop and demonstrate competency.

Midwives with limited or no experience in the operating room are expected to plan an orientation to the operating room, arrange for skills practice sessions for standard surgical asepsis practices, and demonstrate competency in these core surgical practices before moving forward with first assistant activities.

The educational process for becoming an effective midwife first assistant includes didactic and clinical education on:

- The planned surgical procedure, common surgical techniques, and variations;
- Relevant surgical anatomy and appropriate tissue handling techniques;
- Potential complications of the procedure with preventive and corrective measures;
- Standard and specialized instrumentation, sutures, and equipment;
- Effective perioperative communication with the client and perioperative team; and
- Pathophysiology of existing disease processes and their potential effect on the surgical procedure and the healing process.

Immersion in simultaneous didactic and clinical education to gain experience as a first assistant is recommended.[1] This provides the context for the midwife to develop a strong foundation in perioperative practice and to demonstrate understanding of critical elements of care learned through study, simulation, and discussion.

Knowledge of the sequence of the procedure allows for integration of surgical skills and didactic knowledge which allows coordination of the first assistant's clinical actions with those of the surgeon. The first assistant's ability to actively anticipate the surgeon's actions and perform the corresponding first assistant activities are essential components of the advancing first assistant role. At any given point in the surgery, the first assistant must know the following:

- Planned sequence of the procedure to anticipate the surgeon's actions;
- Timing of when each step of the procedure is performed and the usual actions of the first assistant;
- Purpose of each step and potential associated complications of each action;
- Instruments or supplies needed at each stage of the procedure;
- Why, when, and how to use surgical instrument or supplies; and
- Alternate solutions for when the desired result is not obtained.

Mentored clinical education is designed to provide the novice first assistant experience in the clinical setting under the guidance of experienced surgeons and first assistants. This is an opportunity to apply what has been learned through formal didactic study and hands-on simulation. Inclusion of multidisciplinary surgical staff is recommended during the learning process, as each professional has role-specific experience, expertise, and point of view. The learning process can include one or more mentors skilled as first assistants, such as CNMs and CMs, physicians, physician's assistants, registered nurses, or certified surgical technologists. Other professionals, such as scrub personnel, circulating nurses, and anesthesia personnel, can provide guidance on other important aspects of care that are within their areas of expertise. The role of clinical mentors is to assist the midwife in attaining competence through the acquisition of relevant knowledge, development of manual dexterity and skills, and systematic evaluation of progress. Mentors are expected to teach, guide, and evaluate knowledge, clinical performance, and competency during the training period. Mentors can use the case evaluation form to document the acquisition of first assistant skills and development of competencies (see Appendices 6 and 7).

First assistant activities can be categorized as either core activities or advanced activities based on the clinical expertise needed to provide them. Keep in mind that each facility or practice may group these activities differently to reflect the needs of clients, unit functioning, or surgeon preference. While some physicians prefer to direct every step of the first assistant's actions, the first assistant's professional responsibility is to acquire the skills and knowledge necessary to function effectively in conjunction with the surgeon and the perioperative team to safeguard the client's best interests.

The first assistant maintains professional responsibility to acquire the skills and knowledge to assist in a surgical procedure. First assistant activities can be categorized as either core activities or advanced activities and include:

First Assistant Core Activities

- Preop history and physical, education and consent, and preop orders
- Role identification of perioperative professionals
- Effective interdisciplinary communication
- Surgical aseptic technique (scrub, gowning, gloving, maintaining sterility)
- Patient positioning, prep, and draping
- Instrument names, uses, and handling techniques
- Recognition of anatomy and landmarks
- Steps of procedure (from draping to application of sterile dressing)
- Anticipation of surgeon's actions and accompanying assistant role
- Retraction and exposure
- Participation in hemostasis: cautery, free-ties, application of clamps, estimated blood loss (EBL)
- Knot-tying, following suture, application of staples
- Demonstration of clinical judgment and collaborative practice
- Documentation and recordkeeping

First Assistant Advanced Activities

- Ability to function autonomously as first assistant
- Participation in dissection (blunt and sharp) and tissue manipulation
- Delivery of neonate (including initiation of neonatal resuscitation)
- Delivery of placenta and cord management
- Facilitation of early skin-to-skin and infant feeding
- Visual recognition of anatomy to guide first assistant and surgeon's actions
- Performing abdominal closures
- Assessment and management of intraoperative complications including identifying need for attendance of second surgeon
- Provision of postop rounds and orders (inpatient and outpatient)

Formulation of clinical learning goals planned by the midwife for each experience and shared with the surgical team prior to the case enhances learning and ensures that clinical mentors have the information they need to be effective mentors. Learning goals and activities are based on the midwife's current level of perioperative experience and the anticipated first assistant activities. Each midwife is expected to clearly identify specific learning goals and strategies for meeting them and evaluate personal progress toward attaining those goals. Identifying personal, case-specific goals before each clinical experience narrows one's focus and cultivates optimal learning while providing the mentor with a specific teaching focus. Goals should pertain to individual learning needs and be consistent with quality perioperative care. They can be related to a specific skill (eg, providing retraction to expose the fascia as it is sharply dissected), or they can be related to demonstration of knowledge and understanding such as verbal identification of anatomic landmarks and layers during dissection and wound closure.

Goals can focus on a sequence of events or a continuum. For example, as part of the learning process, the midwife may attend a cesarean birth to intentionally observe the role of the first assistant during the procedure in order to identify the expected behaviors of the first assistant. The next phase of learning might include acting as the first assistant with support and direction from a qualified first assistant to demonstrate understanding of role expectations while moving along the practice continuum of skill development from novice toward competency.

While expanding practice and developing new technical skills, a perioperative learning journal is recommended to record the midwife's personal growth and development experience as it pertains to clinical perioperative practice (also see Appendix 1 for additional information). This useful tool is a place to describe learning as it occurs, make observations, raise questions, reflect on how the process of becoming a surgical first assistant affects the learner, and guide the midwife when planning next steps for learning. Its focus is on the clinician's experience of learning. For risk management purposes, all dates, protected health information related to the client or case, and identification of the surgeon are excluded from the learning journal.

It can be used to note areas in need of additional attention, exercises used for skill development, questions about surgical techniques or anatomy, and self-evaluation of progress. It can also be used to identify clinical strengths and successes and determine areas requiring additional focus during simulation or clinical experience. Reviewing the journal can be helpful in demonstrating skill growth and development, and it can bolster confidence when the learning process plateaus. The study guide in Appendix 8 may be another useful tool to guide learning.

The Informed Consent Process and Shared Decision-Making

The informed consent process includes an interactive dialogue between the client and health care provider(s) that occurs using appropriate layman's terms and language and that results in the client making decisions on their care. Clients are provided with situation-specific information upon which to base a decision. At all times, clients retain their autonomy to make an informed decision regarding their care, which may include deferring to the provider's recommendations.[7-9]

Education and advocacy are the first steps in fostering true informed consent and are part of ongoing client dialogue that begins at the onset of care. With the identification of a potential problem, discussions should begin with the client regarding potential treatment options. By the time the informed consent document is signed, the client has been provided information on treatment options, encouraged to ask questions, expressed understanding of the indication for treatment and the recommended treatment, and participated in the decision-making process.

Information is provided in the client's own language, directly or via an interpreter, and using words that are age, education, and developmentally appropriate.[7] The client is expected to indicate their understanding of the planned procedure, for example, "You and the doctor are going to deliver my baby through a cut in my belly" (client demonstrates transverse abdominal incision). In addition to the surgical consent, separate consents may be obtained to address the provision of anesthesia, administration of blood products, disposition of tissue, permission to allow students to observe or participate, or other activities.

When the potential for a medical intervention becomes apparent, the informed consent process requires that a conversation occurs with the client about the indication for the intervention, anticipated benefits of recommended treatment, the potential harms of the intervention, and alternatives to the intervention. Informed consent is a conversation that by definition includes the client and culminates in the documentation of a health care decision in the absence of coercion.[7-9]

Informed consent as a process has come under critical review and is changing as health care decision-making increasingly involves partnering with clients to optimize health outcomes.[10] Meaningful dialogue occurs when the client is able to take in, process, and reflect back to the clinician their understanding of the rationale for the planned procedure, what will occur during the procedure, alternate options for care, and the expected outcomes. Clients with a low level of health literacy may need extra time on the part of the midwife when talking about available options and may need active encouraging, a visual depiction of the procedure, or an infographic showing the numbers or data mentioned when discussing "risk" in order to actively participate in decision-making process.[11]

Incorporating discussions about practice and facility vaginal birth rates, common indications for cesarean birth, and birth preferences into routine prenatal care can provide an opportunity to share with clients how the maternity team functions, how unexpected events are handled, and how the process of shared decision-making occurs. Incorporating shared decision-making into all aspects of client care can help clients feel more confident when the time comes that a decision must be made. This also allows time for discussions to occur before the onset of labor or before reproductive health issues arise, offering an opportunity for the midwife to assess client adaptability and expectations. This client-centered understanding is especially valuable to the midwife in the event of an acute situation when there is very little time for the client to reflect on a recommended intervention. Clients who undergo unexpected emergency surgery can benefit from follow-up discussions in the postop period to debrief about events, ask questions, and receive information and support.[12]

For scheduled surgeries, the operative consent is often signed during the preoperative history and physical. In some settings, consent for birth includes vaginal birth, cesarean birth, and other interventions as needed.

> A broad consent is designed to ensure that an informed consent document is on file in case of an emergency, however, it does not remove the obligation to provide situation-specific information to the client.

Collection of the informed consent signature varies based on institutional mandate. In some settings, the surgeon must obtain the informed consent while in others, qualified health professionals such as a midwife are authorized to obtain consent. The midwife who functions as the surgical first assistant is in an appropriate position to engage with a client, provide information and education, and to actively participate in the shared decision-making and informed consent process.[7]

Diagnostic Skills and the Preoperative Evaluation

The midwife's diagnostic skills facilitate the exploration and characterization of health problems with the goal of alleviating symptoms, facilitating treatment, and fostering health-promoting behaviors. Thorough understanding of "normal" provides the basis for understanding of variations from normal, while familiarity with pathophysiology and pathologic conditions allows for early recognition of signs and symptoms that signal deviations from the client's normal that require further evaluation and treatment.

Evaluation of all body systems during the preoperative physical exam broadens the range of differential diagnoses under consideration when evaluating clients. Diagnostic skills require that a wide range of knowledge and clinical skills are applied to identify the primary and secondary causes of specific problems.[13,14]

Within the context of the operating room, the solutions to clinical problems may be medical as well as surgical. In the perioperative setting, application of the critical thinking and clinical problem-solving methods that form the mainstay of quality midwifery care are applied as part of a team approach to ensure optimal client care.

Thorough knowledge of the relevant anatomy and its relationship to the planned procedure is essential. Careful preoperative assessment of the client is performed or reviewed by the midwife first assistant to identify any variations that may impact the procedure; pertinent information is shared with the team.

The Preoperative History and Physical

The preoperative history and physical (H&P) is designed to provide a summary of the client's condition and reason for surgery, including relevant history, physical findings, and results of diagnostic testing. The H&P should provide a comprehensive overview of the clinician's findings, critical thinking, recommended treatment plans, and anticipated actions based on the client's condition.[13]

During admission of a client to a birth facility, or for planned reproductive health surgery, a standard admission history and physical examination is performed. When cesarean birth is recommended in labor, the admission H&P typically becomes the preoperative H&P. Midwives who function in collaborative practice with obstetricians and gynecologists may also perform preop history and physicals for select clients scheduled for gynecological procedures. A thorough understanding of the evaluation of general medical and problem-specific conditions is necessary. The preoperative evaluation also requires that the midwife develop and maintain the ability to recognize common disease processes and conditions that may be relevant to anesthesia providers.

During the preoperative assessment, the clinician evaluates the client to determine the status of their airway, current cardiac and respiratory status, and general health and well-being.[15] The client's health history includes assessment for bleeding problems, risk factors associated with development of deep vein thrombosis, reproductive health conditions, complications, and outcomes; hypertension or heart disease; spinal deformity or surgery; elevated body mass index, and other chronic diseases. Identification of social, emotional, sexual, or medical concerns that can affect the planned procedure or client response are addressed preoperatively with the client and are included during individualized preoperative care and postoperative discharge planning.[16]

The preoperative history and physical exam is the time to engage with the client and generally includes the following components:[12]

- Admission diagnosis and planned procedure or outcome
- History of present condition or illness
  - » Course of pregnancy or health condition
  - » Results of diagnostic testing
  - » Previous procedures
  - » Client's goals for admission, intervention, or treatment
- Current medication, herbal, or supplement use
- Tobacco, alcohol, or substance use
- Allergies and drug sensitivities
- History
  - » Reproductive and sexual health
  - » Medical/surgical health
  - » Social/cultural factors
  - » Family health
- Review of systems
- Focused physical exam, based on
  - » Diagnosis and planned or potential procedure
  - » Evaluation for general medical conditions
  - » Potential for regional or general anesthesia
- Consults as indicated by findings, such as
  - » Obstetrics-gynecological service
  - » Anesthesia service
  - » Pediatric service
  - » Medical service
- Informed consent discussion and signature
- Plan for continued care, including
  - » Admission
  - » Diagnostic testing
  - » Initiation of preop meds or treatments
  - » Client education and discussion
  - » Anticipated course of care
  - » Timing of follow-up care

While the preoperative history and physical for a planned surgery is primarily a time for gathering data, this does not preclude providing on-going information and support. Knowledge of the client's mental or emotional status, social support systems, cultural beliefs, and attitude affect health outcomes and can be as significant as knowledge about the client's physical condition or disease processes.[7,8]

CASE STUDY: Informed Consent

R. is a 32-year-old G0, P0 who has been having pelvic pain since adolescence. R. has been on hormonal contraception until 20 months ago, when R. stopped birth control in hopes of starting a family. R. now has severe pain with menses and has been unable to conceive. Fertility testing for R's partner was normal. R. has seen the obstetrician-gynecologist in the midwife's collaborative practice and was given a working diagnosis of infertility related to endometriosis. R. is scheduled for diagnostic laparoscopy to confirm the diagnosis. During the preop H&P with the midwife, R. expresses fear that they will never be able to have a child.

R. begins to cry as the midwife talks about the possible benefits and risks of the procedure. R. reveals that she has heard that endometriosis cannot be treated and does not really understand the point of the surgery. R. fears that they will never have the family they want. R.'s concerns are reflected back using active listening techniques, and R. is advised that endometriosis can be effectively managed, improving the chances of conceiving.[17] In addition, the surgery provides an opportunity to examine the reproductive system for other causes of infertility. Lastly, the potential for R. and R.'s partner to take advantage of other methods for treatment of infertility can be addressed should this procedure prove ineffective.

Providing specific answers to R.'s concerns seems to ease her anxiety. R. is now able to state: "So the reason for the surgery is to look and see if I have endometriosis. If the doctor sees endometriosis, she will burn it off, and that may help me to get pregnant." R. is offered a follow-up visit with the physician who is scheduled to perform the surgery. R. declines the visit with the physician. The H&P reflects R.'s medical history and physical exam results, as well as a brief summary of the discussion, and potential referrals. R.'s understanding of the procedure and authorization to proceed with the planned procedure are documented by R.'s signature on the informed consent form.

Client Positioning, Surgical Prep, and Draping

Clients may walk to the surgical suite or arrive via bed or stretcher. Ambulation, prior to administration of preoperative sedatives or anxiolytics, fosters a sense of well-being and autonomy and is suitable for clients who are undergoing elective or non-emergent procedures. When the client arrives in the OR, they are positioned on the OR table. Client positioning is the responsibility of the entire team.[18] Care is taken to avoid injury, especially when positioning the anesthetized client who is unable to note stress or strain on joints or muscles. Bony prominences are padded to avoid pressure injury. Armboards are fixed at a less than 90-degree angle to prevent stretching of the brachial plexus. Care is taken to maintain correct body alignment at all times and avoid injury of the client or clinician during positioning.[18,19] Common positions for obstetric and gynecological surgery include the supine and lithotomy positions. The surgical first assistant most commonly stands to the client's left, while the surgeon stands on the right. This can change based on surgeon preference, the need to access specific areas during the procedure, and the number and type of other perioperative team members.

The Supine Position

The supine position is used for most abdominal and many laparoscopic obstetric-gynecological cases. The client lays on their back on the OR table, with arms either tucked at the side, or on armboards placed at a less than 90-degree angle. A pillow or roll, placed to slightly flex the knees, can be used to avoid lumbar strain.[18,19]

Placing arms alongside the body is most feasible with small individuals, and when anesthesia does not require direct access to a peripheral IV site during the procedure. Tucking eliminates the restriction of working within the angle of the armboards, or inadvertently shifting them to a greater than 90-degree angle during the case. Tucking can be very helpful during laparoscopic cases, when additional equipment can restrict the work space.

For cesarean birth, the supine position is modified by adding a left lateral tilt. This is done by placing a positioning device under the client's left hip and flank. This results in displacement of the enlarged uterus off the great vessels and can increase maternal and fetal perfusion. This position can also increase the potential for gross spillage of fluids toward the surgical first assistant, who is frequently on the client's left side.

The Lithotomy Position

The lithotomy position is a supine position with legs separated, flexed and supported in raised stirrups or leg rests. The lithotomy position is used for many gynecological procedures. When placing the legs of the anesthetized client into footrests, care must be taken to avoid undue strain on the client's lumbar spine. To prevent injury, both legs are raised and lowered simultaneously. Extreme flexion of the hips is avoided, especially in the older client. The diminished muscle tension in the anesthetized client can allow joint hyperflexion which can result in joint injury. Observe for hemodynamic changes following raising or lowering of the legs.[18,19] Significant hemodynamic changes can occur with the client in lithotomy position, especially when it is combined with Trendelenburg's position, which is often used to displace pelvic organs cephalad during laparoscopic cases.

Trendelenburg's Position

In Trendelenburg's position, the client lays supine, or flat on the back on a 15-30 degree incline with the feet elevated above the head. Trendelenburg's position is used during gynecological surgery to displace the pelvic contents cephalad to allow for optimal visualization of the pelvic viscera and the operative field. During open cases, the bowel may be packed in the upper abdomen to prevent accidental injury to the bowel and/or obstruction of the surgical field. During laparoscopic cases, positioning and the effects of abdominal insufflation are generally sufficient to displace the bowel from the pelvis. During abdominal-vaginal cases, lithotomy is combined with Trendelenburg's position.

Surgeons' Preference Cards

Most surgical services have 'preference cards' for surgeries performed by the surgeons on staff. Preference cards outline the individual surgeon's preferences for instruments, sutures, glove size(s), client positioning, dressings, surgical equipment and supplies and other information important to ensure a smooth procedure.[20]

Preference cards are used by the scrub and/or circulating nurse to 'pull' the case; that is, to select the items to bring into the operating room or place on the sterile field. Preference cards are a valuable resource for the surgical first assistant; they identify details such as which suture, on which needles, are used on each layer. The surgical first assistant is expected to be familiar with the preferences of each surgeon that they assist.

Development of preference cards specific to the surgical first assistant's role can provide the surgical first assistant with a quick-reference guide for each surgeon's preferences and expectations of the surgical first assistant. This is especially helpful when the surgical first assistant works with multiple surgeons or first assists on an infrequent basis. Creating the cards requires careful observation of the surgical first assistant's role with each surgeon and capturing this information in a brief standardized format. Notation is made of the surgeon's expectations for surgical first assistant involvement in specific intraoperative activities or tasks, such as:

- Anesthesia administration
- Client positioning
- Skin prep, draping, and equipment set up (cautery, suction, and lights)
- Maintaining visualization of the surgical field
- Participation in sharp and blunt dissection
- Birth of the baby
- Collection of cord blood
- Delivery of the placenta
- Participation in sponge, needle and instrument counts
- Suturing, knot-tying and closures

Surgical Prep and Draping

Surgical site preparation consists of preoperative hair removal, if indicated, and antimicrobial treatment of the surgical site and surrounding area.[21] The perioperative team members responsible for performing the preoperative surgical prep, intraoperative client prep, and draping varies from facility to facility and surgeon to surgeon. Hair may be left intact or removed by depilatory or clipping. Maintaining skin integrity during hair removal decreases the incidence of surgical site infection. Hair removal, when performed, ideally takes place outside of the operating room to avoid loose hairs around the operative site.[22]

Immediately prior to draping, an antimicrobial solution is applied to the skin surface from the site of the planned incision to the periphery. The prepped area must be large enough to accommodate changes in the surgical procedure, such as enlarging the incision, or performing a laparotomy when a laparoscopic or vaginal case is planned. Alcohol-based prep solutions are commonly used as they offer prolonged antimicrobial activity when left on the skin following the procedure.[21] The alcohol in prep solutions can be irritating to the skin when pooled and can also present a fire hazard, therefore, underpads that become saturated during the prep are removed prior to draping. Alcohol-based solutions must dry completely before the drapes are applied to reduce the risk of fire. As a safety precaution, the drying period (usually 3 minutes) is timed and documented in many facilities and is noted as part of the time-out process. The surgical site preparation may be performed by the surgical first assistant.

After the client is appropriately prepped, sterile drapes are applied from the planned incision site to the periphery. The purpose of sterile drapes is to define the surgical site and sterile fields, and to decrease transmission of potential pathogens, organisms, and debris. The drape fenestration or opening should be the appropriate size for the anticipated surgical incision(s), including any drain sites. The abdominal surgical site may first be squared off with sterile towels before being covered with the fenestrated drape. Most drapes include an adhesive-backed edge to the opening which secures the drape in place. The drape is held at the incision site while it is unfolded to prevent shifting and potential contamination of the surgical site. The drape covers the client from above their head to below the toes, with an ample margin on the sides to prevent contamination of the perioperative team. Drapes with a clear film at the client's head are now available to allow for visualization of the birth during cesarean without lowering the drape, thus reducing the potential for contamination of the sterile field while improving family engagement during the procedure.

During vaginal surgery, an under buttocks drape is placed in sterile fashion. The rectum can then be isolated with a disposable, self-adhesive towel. The drape leggings are placed in sterile fashion and a sterile abdominal drape is placed over the mons pubis. The upper body is covered with a sterile sheet or drape to the level of the head. When the surgical first assistant is working from the client's side, drapes should be large enough to prevent gaping at the bend of the hip and contamination of the surgical first assistant's gown.

During combined vaginal and abdominal surgery, such as a laparoscopic-assisted vaginal hysterectomy, a combination of the draping methods just discussed are used. There are commercially available vaginal/laparoscopic drapes that have two fenestrations to allow for access to both the abdomen and the vagina. During these types of cases, the risk of cross-contamination is especially high, and the surgical first assistant must be observant for gaps in the drapes and in sterile technique. Sterile half-sheets are used to cover a gap when it is identified.

Following draping the surgical first assistant commonly secures suction tubing and cautery cords to the drapes and applies light handles or light handle covers to the surgical spotlights in preparation for the surgery. A holster can be used to securely contain the cautery pencil and suction tip when not in use, and a puncture resistant pad can be applied as the designated hands-free sharps transfer zone.

SKILLS DEVELOPMENT: Preperative Procedures

- Use surgeon's preference cards to identify which client prep procedures and solutions are commonly used.
- Explore what preoperative teaching services and programs are available to surgical clients.
- Review and practice correct methods of client positioning to prevent injury.
- Observe and practice draping and equipment set-up.

Before the surgery begins, the time-out occurs with all members of the perioperative team present to verify the client's name, the planned procedure, the correct surgical site or side, and any other information that is pertinent to the client's intraoperative care, such as allergies, medications administered, and planned secondary procedures.[23] The preprocedure time-out is initiated as a client safety measure and sets the stage for all members of the perioperative team to voice concerns as they occur during the case. For more information on the time-out process, see Chapter 2 Principles of Surgical Practice.

Communication Skills for the Perioperative Setting

Excellent communication skills are essential for the surgical first assistant and every member of the perioperative team. Communication can be verbal or nonverbal, such as body language or eye contact. Effective communication occurs when actions, tone of voice, and spoken messages align.[24] Trust develops from effective, consistent communication during client education and interactions among the client, family, and surgical team.

When distraction deflects the focus from the client's care, the first assistant's ability to redirect and refocus team members' attention on the client's care is invaluable and is in alignment with the ACNM *Standards for the Practice of Midwifery*.[6,25] As in other aspects of midwifery care, the midwife who expands practice as a first assistant can act as a role model for other health professionals. The midwife first assistant acts as an active member of the perioperative team to facilitate the safest surgical procedure possible for each individual within the context of their life and health circumstances, and the practice setting.

Interpersonal communication skills are integral to maintaining a safe surgical environment and collaboratively addressing issues as they arise, while simultaneously striving to provide care that is satisfying to the client.

Like any other skill, communication skills are learned behaviors. They are acquired through building language skills, applying active listening techniques, and using feedback mechanisms to ensure clarity of messages sent and received. Taking time to note one's personal communication style can provide insight into learning opportunities. Negative patterns of communication can be overcome with time and through deliberate, intentional practice. Awareness of one's body language and facial expressions, and the ability to maintain emotional control in stressful situations are the first steps toward being able to modify negative responses and transform them into neutral or positive responses. When the client is the source of the conflict, focus on the clinical problem to be solved rather than client or health professional behavior or attributes.[23,24]

Excess conversation during a surgical procedure can be distracting to all members of the surgical team. Conversation with the client, or among members of the surgical team related to the client, the client's care, and the procedure is appropriate.[25] Clients may overhear or be aware of the conversation, thus avoiding conversations of a personal nature is recommended. By asking a question about the technique, anatomy, or next steps, the midwife first assistant can be effective at redirecting conversation. Surgery can be stressful, and the first assistant requires the ability to maintain a calm and focused atmosphere in the operating room.[24,25]

SURGICAL TECHNIQUES AND THE FIRST ASSISTANT SKILL SET

The first assistant must develop knowledge and technical skills to perform effectively in surgery, including core hand skills and an understanding of the surgical procedure. The topics addressed in this section include the following:

- Cricoid pressure and providing assistance with intubation;
- Ergonomic and safe instrument handling;
- Obstetric-gynecologic surgical anatomy;
- Methods for providing exposure and visualization of the active surgical site;
- Safe handling and dissection of tissue; and
- Techniques for ensuring hemostasis.

Cricoid Pressure and Providing Assistance with Intubation

Cricoid pressure is sometimes needed during general endotracheal intubation to prevent gastroesophageal reflux and resultant aspiration of gastric contents, or to enhance exposure of the vocal cords. The cricoid cartilage is identified in the midline and is displaced by applying gentle pressure

from the moment the client loses consciousness until the endotracheal tube has been placed and the cuff inflated.[26] The direction of the displacement is determined by the indication for the pressure and is performed under the direction of the anesthesia professional who then verifies placement of the endotracheal tube. The client can feel pressure on the throat, especially during awake intubation, which is occasionally performed during late pregnancy. Letting the client know what to expect can reduce anxiety associated with cricoid pressure.

When performing cricoid pressure to prevent gastric reflux, which can occur during pregnancy or emergency surgery when the client may have ingested food in the previous 6 hours, it is essential that cricoid pressure is maintained until the cuff of the endotracheal tube has been inflated or as directed by the anesthetist or anesthesiologist.[26]

Ergonomic and Safe Instrument Handling

Appropriate and efficient use of instruments in the surgical setting requires the midwife to learn new instruments and handling techniques. Handling instruments in new and unfamiliar ways can be challenging, and the first assistant may initially feel awkward or tentative. With methodical practice of correct technique, muscle strength and dexterity are acquired and kinesthetic memory develops, which allows the hands to function automatically without thought. Developing such muscle memory and manual dexterity takes time, persistence, and intentional practice on the part of the midwife.

Technical skills, such as knot-tying or using instruments with the non-dominant hand, are practiced through simulation with the support of a mentor outside of the operating room until the midwife demonstrates beginning proficiency.[1,27] During a surgical case, the primary focus is on the client and their surgery, rather than on skill development. Skills improve with experience when attention is paid to using the most efficient technique and methodically addressing areas of difficulty.

Being a novice in the perioperative setting, especially when one is at the same time a seasoned midwife, can create feelings of discomfort. Feelings of discomfort can be used as cues to identify areas requiring additional focus or attention. Enthusiasm about learning during simulated experience creates a positive association with new skills that can be brought into the surgical suite. The behavioral skills used during surgery are extensions of those used during office practice and when assisting with birth. Using these skills in the operating room can help maintain infrequently used clinical skills. The learning journal serves to capture the education experience and provides a place and time for reflection during this time of intense learning and transition to expanded practice.

The midwife first assistant is expected to know which instrument to use and when to use it, and be able to ask for and employ, the instrument in a manner that is safe and effective for the client and the practitioner. The surgeon will provide direction regarding which instrument or technique to use when working with a novice first assistant. The expert first assistant anticipates the surgeon's next actions and asks for instruments in a way that results in seamless coordination of their actions with those of the surgeon. Midwife first assistants who are in the OR infrequently will benefit from regular skills practice and simulation to develop and maintain their expertise.

SETTING UP FOR SUCCESS: Instrument Handling Skills

The manual dexterity, strength, and fine motor control of both hands is necessary for effective instrument handling.[27] This requires training of the muscles, especially the muscles of the non-dominant hand. While some activities of the first assistant are almost universally performed with the dominant hand (eg, suturing), many are performed with the hand that is on the appropriate side of the surgical field. In order to maximize the view of the active surgical site, every effort is made to maintain the hands or arms on their respective side of the surgical field. The actions that the first assistant is expected to perform with confidence, using either hand, include:

- Applying, manipulating, and holding retractors
- Applying, manipulating, and releasing clamps
- Using tissue (thumb) forceps to manipulate tissue or suture needles
- Blotting, suctioning, and ensuring hemostasis
- Following and cutting suture
- Directing the laparoscope.

The initial development of hand skills for the novice first assistant takes place through practice and simulation, ideally with a mentor providing feedback so optimal instrument handling techniques are learned.[27] Use of physical aids, such

as a soft squeeze ball or strength training equipment, can aid in development of muscle strength, control, and stamina. Practice and simulation outside of the operating room is recommended as it provides a safe place to experiment and learn from mistakes without distraction or affecting client outcomes.[27] The novice first assistant can then further develop their hand skills with the support of a mentor during participation in surgery, which provides the opportunity to refine coordination and technique in the perioperative setting. The goal is smooth and efficient handling of instruments that minimizes tissue trauma.

Surgical hand skills are primarily behavioral skills. Behavioral skill development involves training the muscles of the hands through repetition. Skills exercises are about the ability to recreate specific actions and have the muscles respond reliably.

Initially, cognitive learning is applied until one can consistently perform the desired action or behavior accurately and with precision.[27,28] Thinking about how to move the muscles leads to hand motions feeling very awkward. Sequential learning activities-learning one small part of the whole before moving to the next, permit the learner to practice part of the behavioral skill until the muscles become familiar with what is expected.[28] This avoids too many new actions at the same time, which can inhibit development of muscle memory.

This method begins with learning the last step of the process first, or each step separately. This way, as the muscles of the hands tire performing the entire task, the learner moves toward the most familiar aspects of the behavior; those in which muscle memory, strength, and dexterity are already well developed. Practicing behavioral skills in this fashion builds muscle memory deliberately and results in repeated success and skill proficiency; this proficiency leads to competence and confidence.[28] Steps to build muscle memory include:

1. Break each skill into 3-4 discrete actions (A, B, C, D);
2. Learn each action individually, beginning with the final action (learn D first, then learn C, etc.);
3. Learn the final action (D) thoroughly;
4. Once you are confident in the final action, learn the next to last action thoroughly. Do not combine it with the final action at this time.
5. Once you have successfully mastered both actions independently, combine the 2 actions learned in the order you expect to perform them (combine C and D);
6. Learn the next action thoroughly (learn B);
7. Combine the third action learned with the previously learned sequence (combine B with C and D);
8. Learn the next action thoroughly (learn A); and
9. Combine the fourth action learned with the previously learned sequence (combine A with B, C, and D).

In this same manner, when you practice, order the skills from last used to first used. That way at the end of a sequence of events, you can perform the necessary skill with confidence. For example, when suturing, the final step is cutting the suture, preceded by tying the knot, placing the suture, grasping the tissue, etc.[28]

Obstetric-Gynecologic Surgical Anatomy

While the basic approach followed during each specific surgical procedure remains relatively consistent, surgery is an active and dynamic process that requires constant modification to best meet the needs of the individual receiving care. The skilled first assistant must be knowledgeable about the surgical anatomy, the planned procedure, possible variations that may be required, and also able to anticipate and be proactive in providing assistance to the surgeon in ways that protect the client.

The first assistant must be able to identify the surgical anatomy relevant to the procedure and understand its normal function and physiology. This knowledge forms the basis for identifying anatomic or pathophysiologic deviations with the potential to affect the surgical procedure. Pathophysiologic processes can be associated with discrete obstetric or gynecologic conditions or related to medical conditions such as hypertension or diabetes.

Learning the anatomy relevant to each case is basic to anticipating the surgeon's next step during the surgical procedure. The ability to identify key layers, organs, and structures (such as the ureter or large uterine vessels) is essential to enhance the smooth flow of the procedure, avoid client injury, and effectively institute appropriate action in the event of an emergency. A quality anatomy text and online resources are valuable references that can be used to expand knowledge of the anatomy and anatomic terminology over

time. More information about the anatomy encountered during cesarean birth can be found in Chapter 4.

The abdominal and pelvic tissue, layers, and organs commonly encountered during obstetric and gynecologic surgery include the following:

- The skin: epidermis and dermis;
- Subcutaneous tissue: adipose and Scarpa's fascia;
- Fascia: anterior rectus sheath, linea alba, and transversalis fascia;
- Abdominal muscles: rectus, pyramidalis, and transversalis;
- Peritoneum: parietal and visceral, including serosa;
- Uterus, vagina, fallopian tubes, and ovaries;
- Uterine ligaments: broad (mesosalpinx) and round;
- Bladder, urethra, and ureters;
- Omentum;
- Small bowel and mesentery; and
- Rectum, sigmoid colon, descending colon.

The appearance of surgical anatomy can vary depending on the point of reference, the unique characteristics of the individual, the planned procedure, and the techniques used. For example, the surgical approach to the broad ligament during an abdominal case is quite different than during a laparoscopic or vaginal case.

Skin, fascia, and cartilage are relatively durable tissue. This tissue holds securely when clamped or grasped. Smooth or toothed instruments can be used to hold this tissue firmly without crushing. Gentle to firm traction may be used. Muscle, fat, and most organs are delicate and can easily be lacerated or crushed when excessive traction or force is applied. Therefore, smooth or atraumatic instruments are preferred, and gentle traction is used. Specialized instruments have been developed for certain tissue, such as the Babcock clamp, which can hold the fallopian tube in an atraumatic grasp.

The ligaments of the reproductive tract and muscle tissue frequently protect blood vessels, and atraumatic technique is necessary when grasping or retracting this tissue. Nerves are often protected within the muscle as well. Nerves appear as thin white strands and can cause the muscle to contract, twitch, or move when the nerve is grasped. Care is taken to avoid transecting or trapping nerves. Transection of the nerve results in an area of numbness, while trapping can result in chronic pain.

The pelvic viscera includes the ureters, bladder, uterus with tubes and ovaries, uterine ligaments and vessels, and the sigmoid colon. When performing pelvic surgery, injury to adjacent structures can occur. When working in proximity to the bladder, the ureters must be clearly identified, and every effort is made to use extreme gentleness when manipulating these structures.

The bladder is encountered during cesarean birth. It may be left adherent to the lower uterine segment or be dissected off the lower uterine segment during creation of a bladder flap. The bladder exposes the lower uterine segment for incision and delivery of the infant. The ureters are most often seen during gynecological surgery when they must be clearly identified to avoid injury or occlusion. Ureters appear as raised ridges that run along the pelvic sidewall from flank to bladder. They are retroperitoneal (behind the parietal peritoneum) and are identified by their distinct peristalsis as they move urine from the kidney to the bladder. When manipulating the bladder or ureters, gentle touch with smooth instruments is used to avoid tissue trauma. Care is taken to avoid undue force or abrasive action when using surgical sponges in this area.

The uterus is comprised of strong muscle tissue, which allows moderate traction to be used. The uterus is commonly manipulated during cesarean birth and gynecologic procedures. The non-pregnant uterus is remarkably tough and durable. Toothed instruments are used when indicated. However, this can result in tissue trauma and bleeding as the uterus is also highly vascular.

The uterus is supported by the round, broad, and uterosacral ligaments. Folds of visceral peritoneum cover and form portions of these ligaments and help protect the major vessels of the uterus. Care is taken to avoid excessive traction on the ligaments and adjacent vessels, which can sometimes be difficult while performing gynecological surgery in the confined space of the pelvis or during cesarean birth when bringing an infant through the uterine incision.

The fallopian tubes and ovaries are delicate structures, and gentle touch using smooth or atraumatic instruments is indicated. Minimal traction is used to avoid tearing or injuring this delicate and highly vascular tissue. The fallopian tubes and ovaries are frequently assessed during cesarean birth, prior to abdominal wall closure, and during bilateral tubal ligation.

Methods for Providing Exposure and Visualization of the Active Surgical Site

Ensuring exposure to the active surgical site is a primary responsibility of the first assistant.[1] Adequate exposure is critical to the surgeon's ability to perform the surgery. The first assistant provides the surgeon with adequate exposure to the active and intended surgical sites through the use of retraction, lighting, and maintaining the field clear of blood. The first assistant must learn the skillful use of instruments, adjustment of lighting, and other techniques to ensure adequate exposure and visualization of the surgical field.[3]

The goal of exposure is to optimize the surgical field from the surgeon's point of view. Exposure during dissection, performance of the surgical procedure, and closure is provided using self-retaining or hand-held instruments, manual exposure, or by viewing the operative site via laparoscope. Each method has distinct advantages and disadvantages. Not all methods are available or indicated for a particular surgery. In many instances, the first assistant doesn't have a clear, direct view of the operative site. Clear communication between the surgeon and the first assistant is necessary to assure exposure in this circumstance. In addition to retraction, the use of suction, packing, and client positioning can also be used to enhance exposure of the surgical site.

Obstacles to exposure include client body habitus and positioning, location and size of incision, presence of active bleeding, poor client muscle relaxation, respective heights of the surgeon and first assistant, adequacy of lighting, need for distance specific corrective lenses, location of operative site, and other factors.

When establishing exposure is challenging, the first step is to determine whether the contributing factors are modifiable or fixed; this step is followed by creative problem solving to determine how best to address the issue. Tools and techniques such as additional or alternate instrumentation, increased illumination, an additional first assistant, an alternate surgical approach, or extending the incision may be indicated. A step stool, also known as a "step", can be of assistance in altering the first assistant's plane of view to facilitate visualization of the operative site without interfering with the surgeon's view. The first assistant works as an integral part of the perioperative team during the problem solving process.

To provide exposure and access to the active surgical site without tissue trauma, the first assistant retracts using techniques appropriate to the tissue being handled. The techniques for providing exposure vary with the type of procedure (abdominal, laparoscopic, or vaginal) and the stage of the procedure, and are adapted to address the characteristics and anatomy of the individual client. The type of tissue, the depth of the wound, and the pressure necessary to provide exposure determine the type of instruments and tissue handling techniques used.

Retractors

Retractors are used to hold tissue away from the surgical field. They may be single-ended with a hand grip (eg, Richardson or Deaver retractor) or double-ended (eg, Army-Navy or Goelet retractor). Significant upper body strength is required to maintain exposure using hand-held retractors, especially for prolonged periods of time, such as during vaginal hysterectomy. Techniques for retracting include pulling up (lifting), pulling away, and toeing in (ie, moving the tip of the retractor laterally when providing exposure during a vaginal case).

To provide optimal exposure during abdominal surgery, the retractor is positioned under the tissue, which is then lifted or pulled away from the surgical field. During vaginal surgery, vaginal wall retractors are toed-in to move the vaginal tissue toward the pelvic sidewall and out of the surgeon's line of sight. The first assistant retracts using either hand, maintaining each hand on its respective side of the surgical plane. When arm fatigue occurs, retractors can be held alternately with the hands pronated (palm up) or supinated (palm down); this allows the large muscles to rest while maintaining effective retraction.

Self-retaining retractors are positioned in the wound and manipulated until the desired level of exposure is obtained. They are then fixed in that position, which frees the first assistant from all, or a portion of, manual retraction while the self-retraining retractor is in use.

Tissue or Thumb Forceps

Tissue forceps are used as an extension of the fine motor pincer grip of the fingers and thumb. Tissue forceps have two arms with a ridged grip on the outside. The ends are serrated (ridged) or toothed. They are held lightly between the

tips of the thumb and first fingers of the hand that is closest to the object to be grasped. Tissue forceps can be used to aid exposure or to grasp and to lift, hold, and manipulate the tissue during dissection. They are also used to manipulate and grasp the needle during suturing for a hands-free technique. The first assistant is expected to be able to use tissue forceps with either hand.

SKILLS DEVELOPMENT: Building Skill with Forceps

Smooth Tissue

- Place small objects such as beads, sunflower seeds, grains of rice, or flaked dry cereal on a large plate.
- Using tissue forceps practice gently picking up the objects without crushing them.
- Transfer the items from the left side of the plate to the right using the left hand, and from the right side of the plate to the left using the right hand.

Toothed or Russian Forceps

- Using a model, practice loading, grasping, and manipulating a suture needle in a needle holder using the tissue forceps (hint: a larger needle like a circle taper makes this easier).
- Touch the needle only with the tissue forceps (no fingers!).
- Grasp the tissue and stabilize the model with the tissue forceps when driving the needle through the model.
- Grasp the needle with the tissue forceps as it emerges from the tissue of the model.
- Stabilize the model with the needle holder while pulling the needle from the tissue using the tissue forceps.
- Immediately reload the needle in the needle holder so it is ready to use before pulling the suture through with the fingers.

Ratcheted Clamps

Clamps are one of the most commonly used instruments in a surgical procedure. They are ratcheted instruments with finger and thumb rings whose jaws can be serrated (Kelly), toothed (Kocher), broad-tipped (Pennington), finely-tipped (Hemostat or Crile), or atraumatic (Babcock). As the clamp is closed, the ratchets click into place one notch at a time.

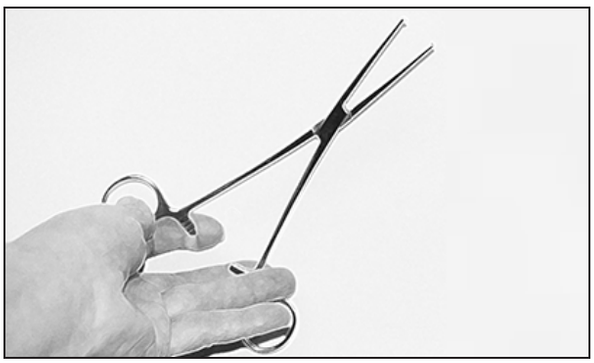

Figure 3-1. Opening Kocher clamps.

To open a ratcheted clamp, tension must be released from the ratchet and the ratchet notches must be moved away from each other. The amount of tension required to open and close ratcheted instruments is based on the tension of the instrument hinge. The tighter the hinge, the more force will be necessary to open the instrument. Quality instruments that are easy to open help the novice to learn these techniques and develop the hand coordination and muscle strength to open and close ratcheted instruments using either hand and in a variety of positions.

The first assistant is expected at times to open and close clamps by applying pressure against the instrument rings without fingers or thumb in the holes. While the rings are convenient and can be useful for attaining a secure grip, during rapid use they make accepting and returning the clamp more challenging.

Figure 3-2. The linea alba is exposed with traction on the fascia.

SKILLS DEVELOPMENT: Handling Ratcheted Clamp

Secure a fine string to a sturdy object. Grasp and release it using a clamp, with fingers against but not within the finger holes. Practice with each hand.

- Practice manipulating, opening, and closing a ratcheted instrument in the non-dominant hand while mentally engaged elsewhere. This will build overall muscle strength, dexterity, and memory allowing your fingers to "see" the instrument.
- Using an abdominal model, grasp the apex of the fascia from underneath the subcutaneous layer with a clamp, apply traction to the clamp to visualize the apex of the fascia, and place a stitch 1 cm beyond the apex of the incision. With one hand, release the clamp once the stitch has been placed.
- Using an abdominal model, place 2 clamps on the cut edge of fascia 2 cm lateral to the midline of the incision. Holding the clamps in one hand, grasp the shaft beneath the finger holes and elevate the clamps perpendicular to the abdominal wall to expose the rectus muscles under the fascia.

Dissection Techniques

Dissection is the intentional and systematic process of applying surgical techniques in order to open layers, create potential spaces, define planes, and identify and isolate anatomic structures in order to perform the intended surgical procedure.[29] The core principles of dissection require detailed knowledge of the anatomy and appropriate application of dissection techniques.

Dissection techniques fall into 1 of 2 basic categories: sharp dissection and blunt dissection. Sharp dissection involves cutting of tissue with a scalpel blade, scissors, or a surgical device such as an electrosurgical unit (Bovie). While cutting or transecting tissue using a sharp instrument or surgical device allows for a clean, straight incision, it can also sever blood vessels and nerves. Sharp dissection is used in places where meticulous control is required, such as the skin, dense tissue, and delicate tissue where blunt dissection could result in inadvertent extension of the wound or injury to adjacent tissue or organs. Sharp dissection is used when transection of blood vessels is indicated, and when meticulous preservation and re-approximation of tissue is essential, such as at the vaginal cuff during hysterectomy. The advantage of electrosurgery for sharp dissection is that the ESU cuts and cauterizes tissue simultaneously during dissection, which results in nearly bloodless surgery. The use of sharp dissection varies based on the procedure, surgeon preference for technique, and the unique features of the individual case.

Blunt dissection is the separation of tissue along natural planes. This can occur using traction applied by fingers, pledgets, sponges, or through a lever action such as occurs when scissor or a clamp is inserted between tissue and gently opened to separate layers. This action uses the blunt edge of the instrument to separate tissue along the plane of least resistance. Blunt dissection can help protect nerves and blood vessels from injury by rolling them out of the way.

Blunt dissection is used in many instances during obstetric and gynecologic surgery. Pulling or stretching is used to enlarge potential spaces, such as when stretching apart the fascia and rectus muscles during abdominal dissection or enlargement of the uterine incision during cesarean birth. Tissue can also be gently separated with pressure from fingers or a sponge on a stick (a 4 x 4 sponge wrapped on a ring forceps); examples include separating the bladder from the lower uterine segment, creating the bladder flap during cesarean birth, or separating vaginal mucosa from the underlying tissue when repairing a cystocele. Blunt dissection is used to separate tissue with minimal tissue trauma along the planes of least resistance, provided scar tissue from a previous procedures does not influence the directionality of the extension of the incision.

Electrosurgery

Electrosurgery includes the capability for cautery/coagulation and sharp dissection (cutting) and is frequently used during obstetric and gynecologic surgery. The electrosurgical unit is referred to as a Bovie, cautery, or ESU. Familiarity with the manufacturer's recommendations for use is essential. Typical power (waveform) settings include cutting, coagulation, or an intermittent blend setting. Use of the lowest effective settings that are adequate is recommended.[30] Settings are noted on the surgeon's preference card; any changes made to the settings during the case are directed by the surgeon.

The ESU can be used in a monopolar or bipolar modality. The monopolar ESU has an active electrode and a dispersive electrode. When used as a monopolar ESU, the current passes from the electrode tip (pencil) through the tissue, through the client's body, to the dispersive pad, and back to the ESU, which completes the circuit.[30] The dispersive pad should be the appropriate size for the client. The dispersive pad is placed over a large muscle mass such as the thigh because well-vascularized tissue promotes electrical conductivity and disperses heat.[30] This placement is essential to prevent heat build-up and resultant burns. Care must be taken to ensure that no metal or conductive prosthetic devices (rods, plates, or screws) are present in the adjacent tissue.

With a bipolar device, such as a Kleppinger, the current passes from the tip of one paddle to the other and back to the ESU; therefore, a dispersive pad is not necessary. Bipolar electrosurgery is typically used during laparoscopic gynecologic surgery, and monopolar electrosurgery is more often used during open abdominal surgery.

The cutting and coagulation settings refer to the constancy of the waveform, amount of voltage, and the potential for thermal spread (heat).[30] The cutting setting focuses the current in a narrow, hot, thermal band, which is used to cut or vaporize tissue with the cautery tip slightly above the tissue. The coagulation setting spreads the thermal effect from direct contact to achieve hemostasis.[30] Alternatively, vessels may be grasped with an instrument such as a hemostat or smooth tissue forceps, and cauterized by touching the tip of the cautery pencil anywhere along the instrument. The metal instrument conducts the current directly to the vessel. It is imperative that the instrument is kept clear from adjacent tissue and instruments that can conduct the current to other tissue, such as the bladder or bowel. The surgeon and first assistant are protected from the effects of the current by intact surgical gloves. Intraoperative injuries that can occur with hemostatic devices include inadvertent bleeding due to incomplete vessel sealing and unintended burns of the client and surgical team members. Laser, electrocautery, and the harmonic scalpel can create significant plume (smoke and vapor) that can contain potentially hazardous substances, including infectious or malignant cellular material, blood and tissue fragments, bacteria and viruses, and toxic gasses or vapors.[31,32] Plume can contribute to serious health conditions such as respiratory disorders, cardiac disease, and cancer, although definitive evidence of correlation between exposure and resultant conditions is limited.[31,32] Local exhaust ventilation systems are recommended as the primary means of smoke evacuation; personal protective equipment and staff education are secondary measures to reduce hazards from inhalation of plume.[32] Capture of the smoke plume with a local exhaust ventilation system removes it from the surgical field and routes it to a collection site, protecting the perioperative team.[32] Verification of the presence of local exhaust ventilation and consistent use in practice will reduce the first assistant's exposure to biohazardous material and risk of associated health conditions.

Electrosurgery Tips

- Alcohol-based prep solutions must be completely dry before draping to prevent alcohol vapors that can combust in the presence of electrosurgery.
- Ineffective power with the usual electrosurgery unit settings can indicate a flaw in the circuitry that can lead to burns or injury.
- The cautery pencil can be touched directly to tissue or applied to a metal instrument to conduct the current to the tissue.
- All smoke should be evacuated from the site via suction or a smoke evaluation device.
- The site of the dispersive pad should always be checked for evidence of burns or injury following ESU use.
- Review the principles of electrosurgery using the manufacturer's instructions for specific devices.

Safe Handling of Tissue

Tissue handling is integral to the role of the first assistant.[1] During a surgical procedure, tissue and organs are manipulated, dissected, and reapproximated. The layers and organs commonly encountered during obstetric and gynecological surgery include skin, subcutaneous adipose, fascia, muscle, peritoneum, bladder, uterus, ovaries, and fallopian tubes.

Safe tissue handling is of paramount importance. Various tissue respond differently to pressure, traction, or retraction. Tissue is more friable in the very young, the elderly, and those with poor nutrition; in the presence of infection; in tissue that

has already been traumatized, devitalized, or are necrotic; and in tissue that is edematous. The first assistant employs appropriate techniques to avoid undue trauma, bleeding, or other injury to tissue.

Gentle traction is provided with steady uniform pressure while observing the tissue for blanching or other signs of tension or incipient trauma. Gentle tension is a result of fine motor skills, such as those used when lifting a clamp on a vessel, or minimal gross motor action such as applying pressure on a thin subcutaneous layer using an abdominal retractor to expose the fascia. Moderate traction requires more force than gentle traction and as a result uses the larger muscle groups of the arms, back, and neck. Ergonomic body mechanics are encouraged to avoid strain or injury to the first assistant during retraction.

While specific tissue types have distinct characteristics, care must be taken to determine individual characteristics in each client. All tissue and organs are handled with care and attention to their inherent characteristics and the unique attributes of the individual. Many factors, such as overall health, oxygenation, and presence of disease or illness impact tissue integrity and can necessitate altering the usual techniques for tissue handling. Common characteristics of tissue types can be seen in Table 3-1.

Abdominal Dissection: Pfannenstiel Technique

In the Pfannenstiel incision, the skin is opened sharply using a scalpel. The subcutaneous tissue is then retracted to allow dissection to the fascia, either sharply using a knife or cautery or bluntly using the fingers.[29] Exposure is provided so that the surgeon can nick the fascia sharply on each side of the midline using cautery or a scalpel. The surgeon then undermines the fascia by inserting closed, blunt-tipped Mayo scissors under the fascia and moving them laterally to the margin of the rectus sheath while the first assistant moves the retractors to keep the tips of the scissors in the surgeon's view. The blades are then opened slightly and withdrawn to create a plane by separating the fascia from the underlying rectus muscle. The plane created is then cut sharply with the Mayo scissors. This process is repeated on the other side by the surgeon or the first assistant. Kocher clamps are then applied by the surgeon and the first assistant to the cut edge of the fascia, approximately 2 cm from the midline, and lifted firmly.

SKILLS DEVELOPMENT: Making an Abdominal Model for Simulation Exercises

A simple abdominal model for simulation of tissue manipulation, retraction, and suturing can be made with fleece (skin), foam (subcutaneous), and fabric (fascia). Purchase one-quarter yard each of thick smooth fleece, one-half inch thick foam rubber, taffeta or other thin durable fabric.

- Cut each material into pieces approximately 8 x 15 inches. Position the material in layers from bottom to top: taffeta (fascia), foam (subcutaneous fat), fleece (skin).
- Align the corners and staple through all layers at each corner. Use a marking pen to draw a skin incision on the fleece. Using sharp scissors, carefully cut through all 3 layers to create an abdominal incision. On the back of the model (fascia), in an area away from the incision, use a permanent marker to place 4 small dots, 1 cm apart in a square. If desired, dots can also be placed 1 cm apart on each side of the incision, and 1 cm from the cut edges. This technique is sometimes referred to as "the rule of ones."

This model can be used during individual and 2-person simulation exercises for suturing all layers, knot tying, following suture, retraction, eversion of tissue with tissue forceps, and the application and removal of skin staples. It can also be used for placing vertical and horizontal figure of 8 sutures using the 4 dots as guides.

This allows the rectus muscles to be separated or taken down along the naturally occurring plane by bluntly pushing the muscle away from the fascia, taking care not to avulse (tear) perforating vessels or nerves. Electrosurgery is commonly used when it is necessary to transect vessels and nerves.[29]

Once the rectus muscles are dissected off the fascia to the level of the umbilicus, the surgeon hands their Kocher clamp to the first assistant who lifts both clamps perpendicular to the abdominal wall to expose the linea alba. The surgeon transects the linea alba sharply with the Mayo scissors or electrosurgical instrument to the level of the umbilicus. The

Figure 3-3. The fascia is elevated with Kocher clamps to expose the rectus muscle.

process is repeated on the caudal edge of the fascia where the pyramidalis muscle is taken down with blunt dissection.

The rectus muscles are then spread in the midline via traction (blunt dissection) by the surgeon, or jointly by the surgeon and the first assistant, to expose the preperitoneal fat that covers the peritoneum. Blunt dissection with traction is performed by the insertion of two fingers of each hand along the margin of the linea alba and application of gentle steady pressure in concert with the surgeon to reveal the peritoneum. The peritoneum is then opened bluntly or sharply toward the umbilicus, while the first assistant retracts to provide exposure. When the parietal peritoneum is opened sharply, it is first tented using tissue forceps or a clamp, and palpated to ensure that there is no adherent bowel or bladder in the location to be opened. Once the abdomen is opened, the bladder and reproductive organs are visualized. Retractors are placed for optimal exposure to the intra-abdominal surgical site.

TABLE 2-2. Suture Characteristics

Tissue Type	Characteristics	Common Instruments	Techniques
Skin	Tough and durable; critical layer for wound healing and prevention of infection	Knife or cautery; toothed forceps	Moderate traction; evert when closing
Subcutaneous adipose	Insubstantial with poor blood supply; includes perforating blood vessels to the skin	Abdominal retractors; cautery	Gentle to moderate traction; incorporate Scarpa's fascia when closing
Scarpa's fascia	Thin line of connective tissue within subcutaneous layer	Toothed forceps	Gentle to moderate traction; incorporate into suture line when closing subcutaneous tissue
Fascia	Tough and durable in most people, can be fragile in those with impaired health; holds numerous perforating vessels and nerves; critical layer for abdominal wall integrity	Kocher or Kelly clamps; Mayo scissors for dissection; toothed forceps	Moderate to firm traction; rectus muscle "taken down" during surgery; cautery of perforated vessels & nerves; close using "rule of ones"
Muscle	Moderately strong; Can tear with excess tension; contains vessels and nerves; epigastric vessels are found laterally	Smooth forceps; Cautery or clamp vessels for hemostasis; cautery, scalpel, or harmonic scalpel to cut	Gentle to moderate traction; stretch open bluntly; avoid epigastric vessels in transverse incisions; if rectus is cut (Maylard technique), muscle body is re-approximated

Tissue Type	Characteristics	Common Instruments	Techniques
Blood vessels	Delicate, may retract when cut; identify, coagulate or clamp, then cut; vessels can spasm resulting in delayed bleeding: observe for hemostasis at every phase of the surgery, particularly during closure	Crile, Hemostat, Kelly, Heaney, or Masterson clamps; cautery, free tie, suture ligature	Gentle traction; identify, clamp, cut, tie, or cauterize; large vessels are flashed and/or double-tied; vessel pedicles may be "tagged"
Peritoneum	Thin and filmy; parietal peritoneum lines abdominal cavity; abdominal contents can adhere to peritoneum; vesicouterine serosa covers uterus and bladder	Fine toothed forceps, Crile, Hemostats, Metzenbaum scissors	Handle gently; tent and palpate before opening to avoid injury to bowel or bladder
Bladder	Delicate, may be difficult to identify; adheres to lower uterine segment	Bladder blade; smooth forceps, Metzenbaum scissors	Use caution with cautery near bladder; injury prevented with meticulous technique or eliminating development of a bladder flap
Uterus	Moderately strong striated muscle covered with serosa; large vessels laterally; incision can extend to vessels during blunt dissection; traction in cephalad direction is recommended	Scalpel, bandage scissors; Ring forceps, Pennington, Heaney, or Allis clamps; Tenaculum; blunt probe; cautery	Moderate traction when intact; gentle to moderate traction when opening bluntly; clamps applied to wound edges for hemostasis in surgery
Cervix	Moderately strong	Tenaculum	Moderate traction
Fallopian tubes	Delicate; attachments in broad ligament	Babcock clamps	Handle gently
Ovaries	Moderately delicate; excellent blood supply	Smooth forceps, cautery	Handle gently
Broad ligament & infundibular pelvic ligament	Thin and filmy; encases uterine vessels and fallopian tubes	Hemostats or Kelly clamps; Kleppinger or laparoscopic stapling devices	Gentle traction "window" created during open tubal ligation
Round ligament	Moderately strong	Kelly or Masterson clamps	May be "tagged" during hysterectomy and incorporated into vaginal cuff
Pelvic sidewall	Encases ureters and vessels; ureter peristalsis is visible	Deaver retractor, smooth forceps, Metzenbaum scissors	Handle gently; identify all structures during dissection
Vagina	Moderately strong, varies with age and health	Allis clamps; smooth and toothed forceps; weighted speculums; Metzenbaum or Mayo scissors; vaginal sidewall retractors (Sims)	Gentle to moderate traction; "toe-in" sidewall retractors for best visibility
Perineum	Moderately strong, varies with age and health	Toothed forceps, Allis clamps	Gentle to moderate traction

The CNM/CM can include a wide array of surgical skills in their scope of practice as a first assistant, the use of which is based on facility or practice-specific expectations. The amount of tissue dissection performed by the first assistant through blunt or sharp dissection varies with the type of surgery, surgeon, practice location, and the midwife's skills. In many rural settings, the midwife is often the most educated and experienced birth professional other than the surgeon. Therefore, during education and development of clinical skills, it is recommended that the first assistant learn how each aspect of the cesarean birth procedure is performed; from "skin-to-skin" (beginning to end), even when they are not expected to perform these actions in clinical practice. Learning in this manner reinforces anticipation of the surgeon's next action and the first assistant's ability to act accordingly, and can be valuable during emergency cesarean birth or when complications arise.

Didactic and clinical educational and skills simulations enhance the midwife's ability to perform or anticipate each aspect of the procedure. Acquisition of anticipatory thinking skills results in the ability to work smoothly with the surgeon. Thinking like the surgeon—imagining that the first assistant is the one performing the surgery, provides insight and understanding of the critical thinking and decision-making that occurs throughout the procedure. This aids the midwife in being the most effective first assistant: one who is able to anticipate the surgeon's next actions and be responsive at all times to protect the health and well-being of the client.

The skilled first assistant continually observes technique, clarifies with the surgeon as needed, and speaks up when there is potential for harm. The role of the first assistant includes questioning the surgeon in real time when techniques are unfamiliar or appear unsafe. Like everyone else, surgeons can become fatigued, distracted, or simply make an error in judgment. A critical conversation can determine the rationale for the surgeon's action, provide an opportunity for discussion, and prevent potential client injury.[24] Being diplomatically proactive in protecting the client is a learned skill. Speaking up when a question arises is necessary when the goal is an optimal client outcome and prevention of injury or unplanned return to surgery.

Techniques for Ensuring Hemostasis

Next to infection control, hemostasis is the single most important concern for safe surgery. The ability to assess blood loss and provide hemostasis allows surgery to be performed safely. Acute blood loss obscures the operative field and has significant effects on client well-being, wound healing, and recovery.[33]

Maintaining blood volume is critical to safe surgery. Prevention of bleeding is the first step in ensuring hemostasis. Many newer surgical techniques such as laparoscopic and minimally invasive modalities effectively reduce primary blood loss. When vessels are in the direct line of dissection, they are most often cut by planned transection, that is, identification and isolation of the vessel. This involves occlusion of the vessel using a clamp, clip, or stapling device, followed by transection (cutting of the vessel). In the case of clamping and cutting, application of a free tie or suture ligature occurs. In all cases, hemostasis is verified before moving on with the case.

Hemorrhage increases the risk of infection, wound devitalization, and compromises health and healing. The surgical first assistant must remain constantly aware of ongoing blood loss, through observation for acute bleeding and blood collected on surgical sponges and through suction devices. During the interoperative period of the procedure, the surgeon's focus is primarily on the operative site and the steps of the procedure. The focus of the first assistant is on maintaining visualization of the operative field for the surgeon including keeping the operative field clear of blood or other fluids. When excess bleeding is effectively removed with suction, the surgeon may be unaware of its occurrence and should be advised of bleeding by the first assistant.

The first assistant maintains awareness of estimated blood loss. When the suction canister or used sponges cannot be visualized or when concern about blood loss needs to be communicated to the team, the first assistant can inquire about the amount of the estimated blood loss from the anesthesia provider and/or the circulating nurse. While intraoperative estimation of blood loss may be necessary, quantified blood loss is the preferred method for determining and recording intraoperative blood loss, particularly for cesarean birth.[34]

Vessel trauma or inadequate hemostasis can result in hematoma formation, physiologic consequences of acute

blood loss, potential need for blood transfusion, return to surgery, and increased risk for tissue devitalization and wound infection. The techniques used to provide hemostasis include electrocautery, suture ligatures, ligation clips, chemical agents, and harmonic scalpel or laser.[33] Visible small vessels (bleeders) can be clamped with fine hemostats and cauterized or occluded with a free tie (suture). Cautery is used for small vessels, while large vessels must be ligated with suture, clipped, or sealed with a vessel closure device. Vessel ends can spasm, thus mimicking hemostasis and delaying the appearance of bleeding. Severed vessel ends can also retract into the surrounding tissue, making it difficult to grasp the vessel with an instrument. For small vessels, a figure-of-eight suture can be placed adjacent to the bleeding site to tamponade the vessel. Cautery can also be used on the coagulation setting to desiccate the vessel and surrounding tissue. Retracted large vessels represent a surgical emergency, as significant blood loss can occur rapidly while blood obscures the operative site and makes finding the vessel challenging. The location of large vessels, like the epigastric vessels, should be anticipated, so that when they are in the active surgical field they can be identified, and if necessary, doubly clamped, cut and tied to avoid accidental injury.

Occlusive Techniques for Hemostasis

Suture may be used to ligate a vessel as a suture ligature or a free tie. The suture includes a needle when used as a suture ligature. When used as a free tie, the suture includes a reel (a small spool of suture without a needle) or passer (right angle clamp) without a needle. A free tie is a length of suture that is tied around a clamped, small vessel for hemostasis. When tying a free tie around a vessel, care must be taken to tie the knot gently yet firmly to ensure occlusion and avoid inadvertent avulsion or tearing of the vessel. Usually, the first assistant's role is to manipulate the clamp to allow access while placing the suture and initial knot. The clamp is then released, and the suture cut close to the knot. Alternatively, the first assistant will place the knot while the surgeon holds the clamp.

A suture ligature is a suture that is placed by the surgeon around a large vessel for hemostasis and secured in adjacent tissue to prevent the ligature from slipping off the vessel. Tissue with large vessels are doubly tied for security. This requires double clamping and "flashing". To flash, gradually release the clamp's grasp on the tissue slightly to allow the tissue to be compressed as the knot tightens, then quickly and securely reclamp to prevent blood loss and stabilize the pedicle for the next suture. The clamp on the pedicle is again slowly released as the second suture is tightened. The pedicle is regrasped if there is active bleeding. The first assistant must be prepared to maintain the tissue within the jaws of the clamp at all times and rapidly and securely reclamp any pedicle that actively bleeds when the clamp is released.

When double clamps are used, the suture is first passed around the distal clamp, and the suture is tightened and tied as the clamp is removed. A second suture is then passed around the proximal clamp and tightened and tied in the usual fashion.

Ligating clips are commonly used in pairs to occlude a vessel prior to transection. Clips may be made of stainless steel, titanium, or absorbable materials. Clips come in numerous sizes and are used with a non-disposable clip applier or a prefilled (single size) disposable unit.

Vascular staples are used in gynecologic procedures. These devices are designed to hold and compress the tissue before firing one or more rows of vascular staples. Some stapling devices simply staple, while others fire a double row of staples and cut between them. Vascular staplers are particularly useful during laparoscopic surgery in locations where intracorporeal suturing (laparoscopic instrument tying of sutures) is cumbersome and time-consuming. The first assistant's role is to assure adequate visualization and stabilization of the tissue while the surgeon applies and fires the mechanical hemostatic device.

The Role of Pressure in Achieving Hemostasis

Pressure is the oldest and simplest method for obtaining hemostasis. Pressure is applied to the edges of the wound using a sponge or laparotomy pad (lap pad). Pressure is commonly applied by the first assistant by blotting the surgical incision. Pressure can be applied to a bleeding site using a sponge on a ring forceps, lap pad, or packing. Pressure is a fast way to limit blood loss while a clamp or cautery is being obtained. Pressure is a particularly useful technique for mild bleeding in locations where cautery or suture can be problematic, such as along the bladder flap or cut edges of the peritoneum. These sites tend to ooze rather than

bleed profusely. Packing the area with a damp lap pad and applying pressure while continuing with another portion of the procedure allows the body's natural clotting mechanism to stop the oozing in an atraumatic fashion.

Chemical Hemostatic Agents

Chemical hemostatic agents aid the clotting process. They are not a substitute for adequate hemostasis but can facilitate clotting in areas that ooze. Chemical hemostatic agents that are commonly used in obstetric or gynecologic surgery include Gelfoam, Surgicel, and Arista powder. Gelfoam is a pork by-product, while Surgicel and Arisa are vegetable-based.[35-37] Surgicel and Gelfoam can be cut to size, with the minimal amount anticipated, to be effectively applied with gentle pressure to the bleeding site. Arista powder allows for disbursement across a broad surface. Surgicel also comes in powder form. Chemical hemostatic agents are especially useful near the bladder, fallopian tubes, or other locations where cautery or suture can cause injury. The surgeon typically applies these hemostatic agents while the first assistant blots, applies suction, or retracts to provide visualization. All hemostatic agents should be applied consistent with manufacturer's instructions and excess product removed before closure.

SKILLS DEVELOPMENT: Achieving Hemostasis

- Use the surgeon's preference cards to identify their preferred method of hemostasis.
- Learn how the electrosurgical unit functions. Review the operating instructions, apply the ground pad, identify the common settings, and practice use and storage of the cautery pencil during surgery.
- Practice gentle application, handling, and release of hemostats from a simulated vessel using the non-dominant hand on the hemostat.
- Practice gentle one-handed ties using a tab from an aluminum can as an anchor until it is possible to tie a one-handed knot without tipping the can over. Hint: start with the can full!

Hemostasis is ensured by using a combination of prevention, electrosurgery (cautery, Bovie), occlusive techniques, pressure, or hemostatic agents. Every portion of the operative site is evaluated for hemostasis before wound closure.

Wound Closure Technique and Materials

The education and experience of suturing lacerations sustained during vaginal birth is included in the core midwifery skill set. However, based on practice volume and techniques learned, the suturing experience of many midwives offers limited opportunities to hone this skill set.[38] The additional suturing techniques and skills practice required of the midwife as first assistant can enhance the midwife's skills for perineal assessment and repair.

Wound closure and subsequent wound healing are affected by multiple factors. The surgical incision is kept as small as possible to effectively perform the surgery. Wounds are most effectively closed when dissection techniques maintain tissue integrity on both sides of the wound, and wound margins are approximated with "like-to-like" tissue.[39]

Careful attention to tissue handling avoids undue trauma or desiccation of tissue. The wound must be "dry", meaning good hemostasis is obtained and all devitalized tissue is cleaned from the wound. Prior to wound closure, observe for sites of potential hematoma formation. The pelvis and abdominal cavity may be irrigated prior to closure to remove organisms, debris, and tissue fragments. Abdominal irrigation is no longer recommended during cesarean birth, unless there is gross contamination such as blood, meconium, or purulent amniotic fluid.[40]

Knowledge of wound closure materials and their characteristics is necessary to select the most appropriate materials for the procedure, the tissue type, and the client. Wound closure materials are classified as either absorbable or non-absorbable and are selected by the surgeon based on the layers or tissue being sutured and the tissue integrity of the client.[39]

Standard sutures come connected to the inside of the needle swage by tiny barbs so that the smallest possible needle diameter passes through the tissue. This allows the needle to be backed out of the tissue if a stitch is misplaced. Each suture packet provides information about the suture size, length and configuration and the needle size, curvature, and tip. Suture is described using several standard characteristics.

The size (diameter) of the suture ranges from very heavy to very fine, and is expressed as the United States Pharmacopeia (USP) gauge that ranges from (4 to 12-0).[38,41] Heavy suture is expressed as a whole number (1, 2) while the size of the finer sutures is expressed in multiples of 0 (2-0, 3-0, 4-0) with the higher number of zeros (4-0 is the equivalent of 0000), representing finer sutures. Suture length varies, and is expressed in inches or centimeters, based on the manufacturer. Knot-holding characteristics are linked to the suture structure as a monofilament (single strand) or braided (multifilament) suture.[39,41]

The suture tensile strength is a function of the suture size, material, and structure and refers to the amount of tension required to break the suture. Suture absorption occurs as a variable of the suture material and is classified as rapid (approximately 50 days), moderate (60 to 90 days) or long-term (180 to 210 days). The suture strength retention diminishes over time, and manufacturers provide information about the percentages of strength retention in days after placement. For example, Vicryl suture retains approximately 50% of its strength at 21 days post-op, Vicryl Rapide retains 50% of its strength at 5 days, and PDS II retains 60% of its strength at 42 days postop.[39]

Monofilament sutures tend to be slick and slippery, allowing them to slide easily through tissue with a minimum of friction, while this same characteristic makes knot tying a challenge and thus requires more throws and greater tension when tying to form a secure knot. Monofilament sutures can also have significant memory, that is, a natural tendency to spring back into their packaged shape, which makes working with them more challenging than working with braided sutures. Monofilament sutures do not wick fluid along the suture line and are thus less likely to foster migration of bacteria along the suture line, an important characteristic when caring for clients at risk of wound infection.

Braided or multifilament sutures are soft and flexible, making them particularly easy to work with. The braided filaments result in a texture that "grabs" and this friction can abrade delicate tissue as the suture is passed. This same friction allows braided suture to hold knots securely with a minimal amount of tension when tying, and a smaller number of throws are needed compared to monofilament suture. Braided sutures do wick fluid along the suture line, contributing to the sutures' capacity to carry and move bacteria into the wound via the suture.

Synthetic, absorbable sutures are commonly used in obstetric and gynecologic surgery and break down via hydrolysis, a process by which water is used to break a covalent bond resulting in the gradual disappearance of the suture.[39,41] The breakdown of synthetic sutures is more predictable than the enzymatic breakdown of surgical gut sutures and their use results in less tissue reactivity. Synthetic non-absorbable sutures and staples can also be used during skin closure. The benefit of non-absorbable suture and skin staples is their low tissue reactivity. Non-absorbable sutures and skin staples require removal within 5 to 10 days. An absorbable subcuticular staple is now available and offers the benefit of an absorbable material with the ease and rapidity of application of traditional surgical staples.

Needles are described in term of their size, curvature, and configuration of the needle tip. The curvature of the needle can range from straight (Keith needle) to a gentle 2/8 or 3/8 curvature, a 4/8 or "half-round" needle, to a 5/8 curvature, which can be useful to protect tissue in the tight space of the vaginal vault. Needles vary based on their intended use and have specific names based on the needle shape (curvature), size, and tip.[39,41]

Common needle tips used in obstetric and gynecologic surgery include blunt, taper, conventional cutting, and reverse cutting. The cutting tips have sharpened cutting edges with which to pass through dense tissue with minimal trauma, while the taper and blunt-tipped needles have rounded tips, which push through less dense tissue. In an obstetric-gynecologic surgery, blunt tip and taper needles are recommended as a means of preserving tissue integrity and as a measure to decrease risk of needlestick injury.

Cutting Suture with Either Hand

Cutting suture is a common task for the first assistant. The first assistant is expected to be able to effectively cut all sutures with whichever hand is available. Practice begins with fine braided sutures and progresses to heavy monofilament sutures as strength and dexterity improve. Handle the scissors with either hand by placing the thumb and fingers against

Figure 3-4. Holding the scissors supported by the index finger for stability. Used with permission. Green Landing, Inc. All rights reserved.

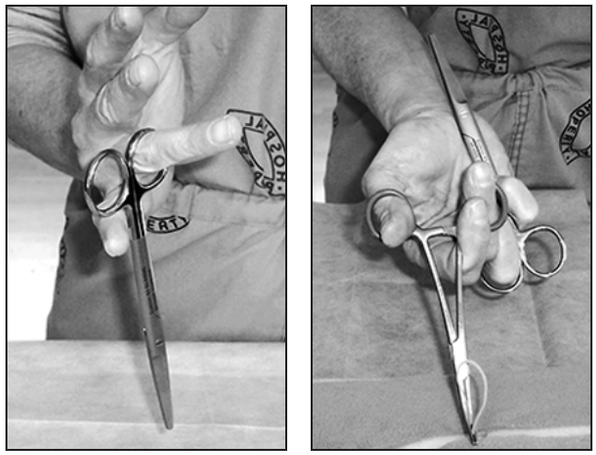

Figure 3-5. Technique for efficient use of scissors. Used with permission. Green Landing, Inc. All rights reserved.

but not in the finger rings. At times, the third finger may be inserted slightly into the ring with the first finger extended so the tip rests on the blade. The second finger grasps the outer rim of the scissor at the inner edge of the ring to provide stability. A number of different techniques are used to handle suture scissors. Experimentation is needed to determine which techniques can be performed efficiently and reliably with each hand.

The scissors use opposing forces to bring the blades toward each other so that the cutting edges grind together. The scissors need to open only far enough to allow the strand of suture between the blades. Suture is cut with a swift snip, leaving a tail of suture behind. The length of the tail varies with the location and importance of the suture and as directed by the surgeon. Suture that closes tissue under tension or critical suture lines, such as the uterus and the fascia, is left with a tail approximately 1 to 2 cm in length from the knot. Suture that is not under tension is left with a tail approximately a half cm long, while absorbable skin sutures are generally cut very short or right at the knot.

Some sutures are used for traction or to identify anatomic landmarks. In these instances, the suture end is left long (approximately 8 to 10 cm) and is tagged by clamping the suture end with a small clamp (commonly called a tag or snap). Traction can be applied to the clamp to identify the end of the suture line, rotate the adjacent tissue, or identify anatomic landmarks prior to closure.

The ability to hold the scissors out of the way when multiple ties are being placed, is another technique that improves efficiency. In this technique, the scissors are held with the ring on the third finger under tension just above the second joint. The thumb operates the scissors by pressing on the thumb ring. Once the suture has been cut, the scissors are closed and the ring is released by the thumb. The scissors are allowed to drop and pivot on the ring finger and the blades are tucked along the wrist. The shaft of the scissors is then held securely using the little finger.

When the scissors are again required, the grasp of the little finger is released, and the scissors are swung forward until the thumb is engaged against the ring. During this maneuver, the finger ring is allowed to slide down the third finger until it is held securely above the second joint. This technique is primarily used when multiple free ties are used for hemostasis and the first assistant is required to rapidly hold then release a hemostat, cut the suture, move the next hemostat, and repeat the process.

Ratchets, Suturing, and Handedness

Ratcheted instruments are designed for ease of opening with the right hand (the ratchets are directional). However, all first assistants are expected to develop the skill to open and close ratcheted instruments with either hand. The techniques for opening ratcheted instruments with the left hand require additional strength and dexterity.

During suturing, most clinicians prefer to hold the needle holder in the dominant hand. This can present challenges for left hand dominant individuals, both when learning, and during suturing. Left-handed clinicians may wish to consider

expanding practice to include use of the needle holder in the right hand, with tissue forceps in the left hand. This may result in faster, more efficient suturing due to the design of the needle holder.

Suturing and Following Suture

The most common instruments for suturing include the suture, needle, needle holder (alternately called a needle driver), and tissue forceps. The needle can be divided into three parts: the tip, the body, and the swaged end (the end at which the needle is attached). The flat needle body is grasped at the end of the needle holder jaws and the needle is positioned at an angle that allows for optimal placement through the tissue. When loading needles, care is taken to avoid damage to the swaged end of the needle.

The needle holder is handed to the first assistant or surgeon loaded and ready to use. A basin or designated sharps area may be used to pass the loaded needle holder using a hands-free approach to avoid needlestick injury. Tissue forceps are used to reposition the needle when necessary and to grasp the needle during suturing and when reloading it. It is helpful to learn to handle the tissue forceps proficiently before advancing to use of the needle-driver. This allows the first assistant to focus on one new skill at a time.

The needle holder is held in the palm with the index finger extended along the shaft and the remaining fingers and thumb surrounding (not within) the instrument rings. This technique is called the thenar grip, as the thenar eminence of the thumb (the fleshy pad at the base of the thumb) of the right hand is used to press upwards against the thumb ring of the instrument while the fingertips press downwards against the finger ring to open the instrument. This technique allows the instrument to be gripped in the palm during suturing, and through rotation of the wrist, a delicate, ergonomic motion is used for placement of the stitch.

When closing the needle holder, the grip is simply tightened around the outside of the instrument rings until the ratchet clicks into place. The ratchet is tightened as necessary to hold the needle securely. The thenar grip removes the spatial limitation of the instrument rings and allows the operator to orient to the relationship of the needle to the tissue. When placing the suture, the index finger slides up the shaft toward the needle holder hinge to guide or drive the needle through the tissue using fine motor rotation of the forearm.

Once the stitch has been placed, and the needle has emerged from the tissue, the needle is grasped with the tissue forceps and the ratchet of the needle holder is released. To open the needle holder with the right hand, the thenar eminence of the thumb is used to push against the thumb ring of the needle holder, and the fingers are curled around the needle holder to push down against the finger ring while gently squeezing the handles together to create the opposing forces necessary to open the ratchet. The needle is then pulled from the tissue with the tissue forceps. This avoids damage to the needle tip and allows for rapid reloading of the needle in the needle holder. To avoid sharps injury, the needle tip is protected during knot tying by rotating the needle 90 degrees so that the tip of the needle is over the needle holder jaws or hinge.

The thenar grip is more difficult to learn when the hinge of the needle holder is tight and limits opening of the ratchets. In this instance, or as a step along the way of developing kinesthetic memory, it can be helpful to use a modified thenar grip. In this modification, the thumb is placed within the thumb ring, with the fingers wrapped around the needle holder. This grip is more secure for the beginner, and provides improved control compared to both thumb and finger in the holes when opening the instrument. The thenar grip is still used for placement of the stitch.

"Following" suture requires the first assistant to grasp and maintain tension on the suture while the surgeon takes the next stitch. As the stitch is drawn through the tissue, the first assistant releases the suture until the surgeon draws it tight. The first assistant then readjusts to grip the new stitch, repeating this process while the running or locked row of stitches is completed. This tension facilitates visualization while simultaneously keeping the suture out of the surgeon's way. Attention to the motion of the needle is essential to avoid sharps injury.

Each stitch can be placed with precision by securely grasping the tissue adjacent to the planned insertion site with tissue forceps. The tissue forceps are used to lift and stabilize the tissue. The wrist is rotated so the needle enters the tissue at an optimal angle, and the index finger applies the necessary pressure to the shaft of the needle driver to guide the needle

SKILLS DEVELOPMENT: Suturing and Following Suture

- Holding the needle driver in the thenar grip, practice opening and closing the needle holder wide enough to pick up and release a needle.
- Protect the needle during knot tying by securing the needle in the needle holder with the tip pointing at the hinge or box on the needle holder. Avoid crimping the swaged end or the tip in the jaws of the needle holder.
- Stabilize, position, protect, and reposition the needle using tissue forceps.
- Using a foam and fabric or animal tissue model, such as turkey breast, practice suturing with a partner using the thenar grip and tissue forceps while the first assistant follows the suture (and retracts if necessary). Practice placing running, and running locked stitches 1 cm apart. Alternate roles.
- Practice following the suture for a partner, working to coordinate manipulation of the suture with your partner's actions.

smoothly through the tissue. When the tip of the needle becomes visible, it is grasped between the arms of the tissue forceps, and the operator uses the needle holder to apply counter pressure to bring the instruments close together. This allows the maximum amount of the needle to be visible so it can be grasped securely with the tissue forceps before the needle is released from the needle holder.

The needle is then released from the needle holder, which can be moved to apply counter pressure to the exit side of the tissue as the needle is pulled free using tissue forceps. Once the swaged end of the needle is visible, the needle is pulled forward slightly and again seated in the needle holder, appropriately positioned for the next stitch, and lifted away from the wound in one smooth motion. The first assistant may pull the suture through the wound and tighten the suture while the surgeon prepares for the next stitch. When the needle holder is used to grasp the needle, as may be necessary in thick or tough tissue, care must be taken to avoid grasping the needle tip, which can subsequently bend and break off in tissue if it is damaged. At all times the suture needle should be maintained in close proximity to the sterile field to avoid contamination or sharps injury.

The first assistant is expected to develop the ability to follow suture, that is, manage the suture while the surgeon performs the closures. This requires coordination of suture manipulation with the surgeon's actions, often while retracting to provide exposure. To follow suture placed by the surgeon, the first assistant applies gentle, steady tension to the emerging loop of suture to maintain approximation of the wound edges and keep the suture out of the active operative site and the surgeon's field of vision. When the suture is to be locked, such as during closure of the uterus following cesarean birth, the first assistant flips the loop of the suture over the needle tip as it emerges from the tissue. The surgeon grasps the needle in the usual fashion, and the first assistant applies lateral traction on the suture, effectively locking the previous bite while preparing the loop for the next bite. Care must be taken to pull on the arm of the suture from the previous stitch and avoid undue traction on the needle end of the suture as the surgeon moves to place the next stitch.

Each bite of tissue should be large enough to hold securely and gently approximated in an anatomic manner to avoid extraneous tissue being captured by the stitch, as well as to avoid tissue that is puckered or strangulated, or suboptimal approximation. The depth and distance between each stitch

Figure 3-6. Closure of the fascia with modified thenar grip.

varies with tissue type. The aim is anatomic approximation of tissue using the least suture material and fewest punctures possible while attaining effective hemostasis and closure.

Knot Tying

Knot tying is a core midwifery skill, and most midwives are proficient in one or more forms of knot tying.[5] However, it may be appropriate to update these skills for use in surgery. When performing repairs after vaginal birth, tissue often anatomically approximates with minimal tension, and healing is quite rapid. Use of specific knot tying techniques is less important under these circumstances.

The knots used in surgery include the two-handed tie, which lays down the most reliable square knot; the instrument tie, which is ideal for short suture ends; and the one-handed tie, which is quickly performed while holding the needle holder. During surgery, knot tying must be performed in a smooth and efficient manner.[41] When surgical knots are performed correctly, one throw leads seamlessly into the next. Perfecting knot tying skills can result in swifter perineal repairs as well as proficiency in the operating room.

Learning to tie quality surgical knots efficiently takes patience and is best learned under the guidance of a mentor using realistic lengths of suture material. Each aspect of knot tying should be practiced slowly, carefully, and correctly until the kinesthetic memory for each knot is firmly embedded in the muscles of the operator's hands. Once the optimal formation of the knot becomes part of the midwife's muscle memory, proficiency and speed when tying will occur. The suture manufacturer's knot tying manuals are excellent resources for learning knot tying, as are many videos available on the internet.

The more important the knot, the greater the number of throws are made. Two throws equal one square knot; therefore, a minimum of 3 throws (one and a half knots) are made in noncritical knots, with as many as 4 to 8 throws used to form critical knots. Fewer throws are required when using braided or chromic suture compared to monofilament suture, as the suture material binds to itself, which results in a more secure knot. Monofilament suture is slick and slippery and tends to seat knots less securely. It requires more force when tightening knots and additional throws to compensate for these characteristics. The two-handed tie is preferred for critical knots, as it seats a more secure square knot, while a one-handed tie is often preferred for general knot tying due to the speed with which it can be performed.

SKILLS DEVELOPMENT: Surgical Knots

- Learn each knot separately and take at least a week before moving to the next knot type.
- Use the length of suture you would normally use to tie the knot.
- Practice slowly, carefully, and correctly with no extra hand motions (observation by a mentor or self-video can be helpful).
- Practice one throw until you are proficient. Drop the suture at the end of the throw and re-grasp it so that you start fresh each time.
- Stop as soon as you have the feel of the throw and have done it correctly. Celebrate and let that memory soak in overnight before you practice again.
- Practice the second throw until you are proficient without combining it with the first throw.
- When correctly performed, the last motion of each throw will set you up for the first motion of the next throw.
- Practice both throws, slowly, in sequence until you are able to tie multiple throws smoothly and seamlessly.
- Continue to practice slowly and carefully until you are proficient, then add the element of distraction. Check often to ensure you have maintained your technique, then add speed, and then work on speed with distraction.

Layers of Wound Closure

In the perioperative setting, the midwife first assistant can help with, or perform closures. Familiarity with the characteristics and landmarks of surgical anatomy allows for anticipatory thinking and appropriate responses as the closure proceeds.

Closure of abdominal incisions follows the same basic premise as the closure of perineal trauma sustained during childbirth: anatomic approximation of like tissue and elimination of

hollow areas where tissue is not in contact with itself (dead space). The abdominal incision closure technique must provide interval support to the abdominal wall during wound healing. Use of suture appropriate for the tissue type with tensile strength that lasts long enough to allow for adequate healing and tissue strength to develop, as well as careful spacing of stitches, will result in reduced rates of wound dehiscence and hernia formation.[42]

Transverse abdominal incisions are associated with lower herniation rates than midline incisions. However, the directionality of the incision does not appear to affect rates of wound dehiscence.[42] When closing fascia, it is pulled together under tension, therefore care must be taken to ensure each stitch is made through intact tissue, sutures are placed close enough together to ensure effective anatomic approximation, and knots are securely tied so that they will not slip and lead to wound disruption or dehiscence.[42] This is ensured by using the "rule of ones" where the first stitch is placed 1 cm beyond the apex and the subsequent stitches are placed 1 cm from the wound edge and 1 cm from the previous stitch. For a midline abdominal incision, slowly absorbable monofilament sutures are used. In this case it is recommended that stitches incorporate 5 to 8 mm of fascia and be placed every 5 mm in a continuous suture line.[42] This provides prolonged wound support while healing occurs.

Subcutaneous layer closure is recommended when this layer is greater than 2 cm in thickness.[43] The subcutaneous layer can be closed with running or interrupted sutures. The purpose of this closure is to effectively eliminate dead space where a seroma can occur while enhancing the cosmetic result of the subsequent skin closure. Failure to anatomically approximate the subcutaneous layer can result in superficial dimples or puckers. The role of the first assistant frequently includes suturing of this layer with assistance from the surgeon or scrub technician. When the surgeon performs the closure, the first assistant may tie the knots, follow the suture, and cut the suture ends.

Skin closure is performed using absorbable or non-absorbable subcuticular suture, absorbable subcuticular staples, or metal skin staples.[39,43] There is evidence that suture or subcuticular absorbable staples are associated with lower rates of wound complications and are preferred by clients.[44]

Care must be taken when closing the skin with suture to place each stitch in the dermis, using small stitches at the wound apices and larger stitches in the midline. All sutures are foreign bodies and can cause inflammatory reactions. Sutures that perforate the dermis can increase the incidence of granuloma formation. Knots of absorbable sutures are buried to avoid irritation of the wound. When using skin staples, the skin edges are everted using two Adson tissue forceps. Staples are placed approximately 1 cm apart. Many surgeons approximate the wound first using widely spaced staples and anatomic landmarks, then fill in with additional staples as necessary to approximate all skin edges.

When closing the skin, additional knot tying techniques may be used. When using a non-absorbable monofilament suture for skin closure, the first bite of the suture is placed through the skin into the wound approximately 1 cm beyond the apex of the wound. A looped knot is formed to anchor the suture using an instrument tie. The instrument tie is performed by tying the suture to itself for the first throw resulting in a small loop of suture and the tag end of the suture. The wound is

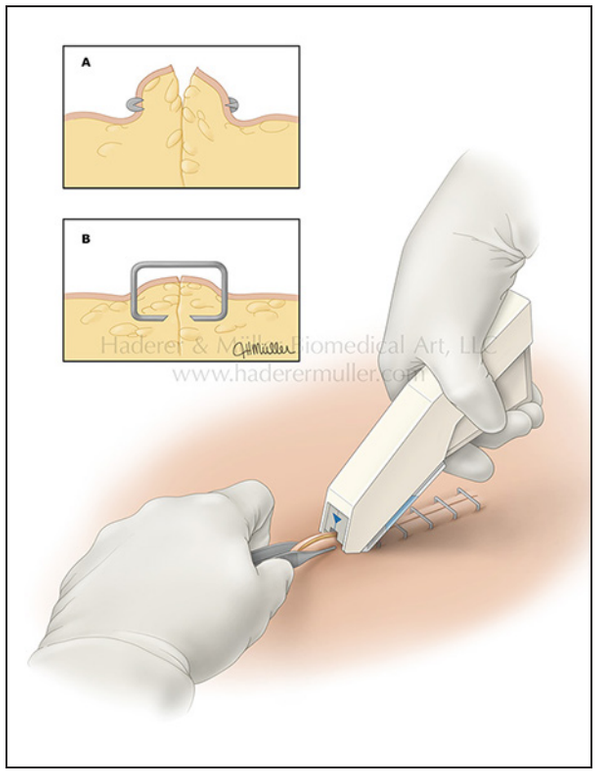

Figure 3-7. A pplication of skin staples.
Used with permission from Kronfol, R. Closure of minor skin wounds with staples. UpToDate. http//www.uptodate.com/contents/closure-of-minor-skin-wounds-with-staples. Accessed November 2, 2015. Copyright©UpToDate, Inc. For more information visit www.uptodate.com

then closed in the usual fashion. Following the final stitch, the needle is placed in the apex of the wound and emerges through the skin, again approximately 1 cm beyond the apex. A second looped instrument tie is performed. The suture is removed 3 to 10 days postop. To remove the suture, one loop is grasped under tension to stretch the suture. The knot is elevated, and the suture is cut below the knot. The second loop is then grasped securely in a clamp, and the suture is pulled gently and firmly from the incision line. Thin adhesive bandage strips are applied as needed for support of the wound.

When using absorbable suture for skin closure, the knots are typically buried. The first bite is placed in the dermis close to the apex of the wound, and a knot is tied to anchor the suture. The suture end is cut close to the knot. The suture is then brought back nearly to the apex, which tucks the knot, and the wound is closed in the usual fashion. As the last stitch is being placed, 1 of 2 techniques is commonly used to tie off the suture.

The first technique consists of taking bites perpendicular to the dermis. The first bite is made from deep to shallow (subcutaneous to dermis), and the loop of suture is pulled partially through the tissue, leaving a loop for tying. The second bite is made from shallow to deep (dermis to subcutaneous), and the two ends (the one looped, the other still attached to the needle) are used to tie the suture. The looped end is then cut close to the knot, and a final bite is made deep to the apex of the wound to exit through the skin approximately 1 cm lateral to the apex of the wound. Gentle traction (tugging) is applied to bury the knot. The suture is then clipped at the skin. In the second technique, called the Aberdeen knot, the skin closure begins with a bite made close to the apex which is not pulled all the way through. This forms a loop of suture. Two fingers and the thumb are placed through the loop while the needle remains firmly held in the opposite hand, and the long end of the suture is grasped, pulling a second loop of suture through the first. Using traction on the lower strand of the second loop, the first loop is gently tightened down. This process is repeated once more before the needle end of the suture is carefully pulled through the remaining loop, which is tightened down securely. A final bite is placed at the apex of the wound through the skin approximately 1 cm from the wound apex and a gentle tug is used to bury the knot. The remaining suture is pulled taut and clipped at the skin, which allows the cut end to withdraw under the skin surface.

Non-absorbable sutures or staples are removed 3 to 10 days postoperatively and after skin healing has occurred. Removing every second or third staple to start will give an indication of skin healing. Separation of the skin is common when the incision is under tension. When separation occurs, removal of remaining staples can be delayed for 2 to 4 days to allow for additional healing. Adhesive strips or skin glue can be applied after skin sutures to assist with the healing process, or used to provide additional support after external staples are removed.

CLINICAL EXAMPLE: Wound Closure Following Cesarean Birth

During cesarean birth, the uterus is the first layer closed, and is typically closed by the surgeon. The closure is performed using a heavy (0 or 1) absorbable suture using a one-layer or two-layer technique. Controversy exists over which technique is superior for clients who plan a vaginal birth after cesarean in a subsequent pregnancy.[43,44] However, many practitioners require evidence of a two-layer closure for trial of labor after cesarean when anticipating a vaginal birth after cesarean. The traditional first layer of the uterine closure is a running locked stitch to secure hemostasis. The first assistant is responsible for locking each stitch and maintaining tension on the suture as the suture line progresses. More recently, a plain running stitch has gained favor. This technique is thought to reduce tissue strangulation and perhaps result in decreased "window" formation and reduction of the risk of uterine rupture in a subsequent pregnancy and labor. "Window" refers to an area of the surgically incised uterus that heals in such a way as to have an area of myometrum that is abnormally thin. This weakened area of the uterus can be observed during a subsequent surgery and can be so thin as to be semitransparent. The recommended technique is to meticulously align the myometrium while excluding the serosa and endometrial layers.[43] A second imbricating layer (also known as a Lembert stitch) pulls the myometrium together over the first suture line and takes tension off the healing wound. This second layer is typically a running horizontal or vertical mattress stitch, with additional figure-of-eight stitches performed as needed to assure hemostasis. When visceral peritoneal closure is performed, a (2-0 or 3-0) suture is used.

The abdominal layers are closed by the surgeon, the first assistant, or both. Some surgeons layer commercial adhesion

barriers (film, sheet material, or gel agents) over the uterus prior to abdominal wall closure to isolate the uterine wound from the abdominal wall and decrease adhesion formation. During the closure of the parietal peritoneum a (2-0 or 0) suture is used. Some surgeons believe that the heavier suture may prevent tearing of this delicate layer. The abdominal peritoneum heals rapidly, and many surgeons leave the parietal peritoneum open following abdominal surgery. Peritoneal closure may decrease the formation of abdominal adhesions and scarring, although it is associated with increased postoperative pain, contributes to a slightly longer operative time, and can result in a longer hospital stay.[44]

The fascia is the primary layer that provides support to the abdominal wall and is always closed using a heavy (0 or 1) absorbable suture with moderate to long strength retention. The rule of ones is used when closing fascia (ie, each bite is placed approximately 1 cm from the wound apex, 1 cm from the wound edge, and 1 cm from the previous stitch). The fascia is the primary support for the abdomen, and careful attention to closure decreases the incidence of dehiscence. The rule of ones ensures that both layers of the anterior fascia are included in each bite as the suture line progresses. Some surgeons close the fascia from one apex to the midline and have the first assistant close from the other apex to the midline, while others close from one apex to the other in a continuous suture line.

As previously mentioned, closure of subcutaneous tissue of 2 cm or more is recommended in an effort to prevent unnecessary "dead space" seroma formation and the associated increased risk of superficial wound infection, particularly in clients with an elevated body mass index.[43,44] After hemostasis is ensured, the subcutaneous layer is closed with running or interrupted stitches, using a (3-0 or 2-0) absorbable suture. When closing the subcutaneous layer, it is helpful to look for the thin line of Scarpa's fascia, a connective tissue that runs through the subcutaneous layer. Incorporating Scarpa's fascia into the subcutaneous closure provides additional strength to the closure of this layer. Subcutaneous tissue is not well vascularized and therefore heals slowly.

The skin is closed using suture, staples, or skin adhesive. Staples decrease operative time but in some populations are associated with an increased incidence of wound infection or disruption, while sutures take slightly more operative time and are cosmetically more acceptable to clients.[43-45] Surgical staples are placed on the everted skin surface, or in a subcuticular manner when absorbable staples are used. Regardless of closure materials, the external incision is carefully approximated to prevent puckers or undue tension. Some surgeons mark the skin with a skin marker prior to making the initial incision so that a curved incision can be more easily approximated. When closing the skin with suture, a fine (4-0) suture is used on either a straight Keith needle or a small curved needle. Absorbable or nonabsorbable, braided or monofilament suture can be used.

Following wound closure, sterile dressings are applied prior to removal of the drapes. Once the drapes are removed, the anesthesia provider will indicate when the client is ready to be moved. Estimated blood loss is determined and intake and output are measured. When time permits, it is helpful for the midwife first assistant to participate in client transfer from the OR table to the bed or gurney and transition to the recovery room.

Wound Dressings

Dressings are applied at the close of surgery using sterile technique. Thin adhesive bandages can be applied to the wound for support with tincture of benzoin applied to the wound edges to aid adherence. Small wounds, such as those created during laparoscopic surgery, may be covered with an occlusive dressing. This allows the client to shower without getting the wound wet.

While each surgeon has preferences for dressings, the goal of the dressing is to protect the wound for the first 24 to 36 hours during re-epithelialization. The ideal dressing protects the wound, maintains optimal wound healing conditions, resists fluids yet allows the tissue to breathe, is nonadherent, acts as a barrier to bacterial contamination, and allows for observation of the wound without disturbing the dressing.[46]

For large incisions, a polyurethane film surgical dressing can be applied.[46] Based on client factors, specialty wound dressings may be used. These include negative pressure dressings, silver impregnated dressings, among others. If these are used, the first assistant should know how to apply and remove them and understand their anticipated benefits.

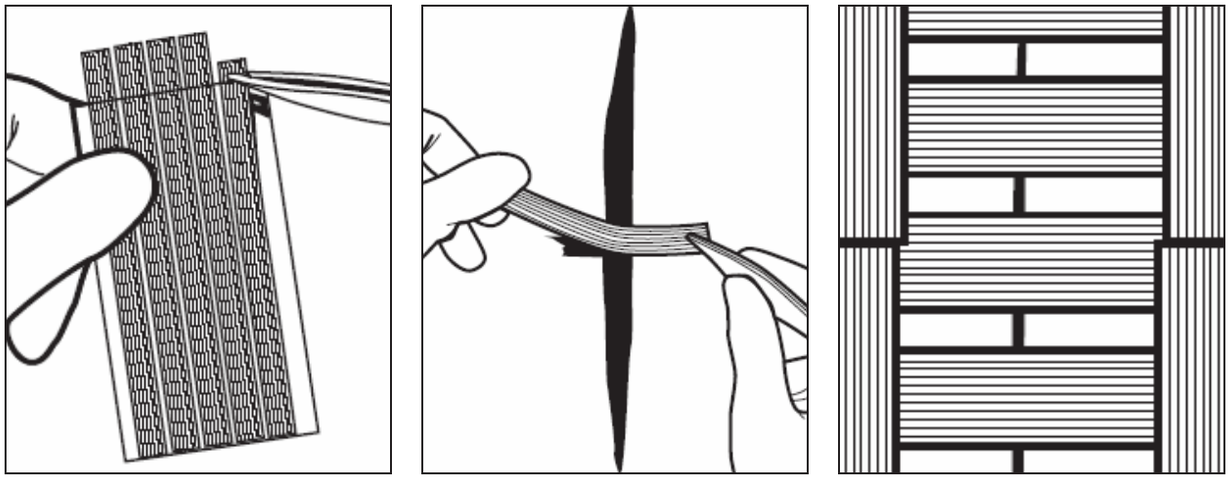

Figure 3-8. Thin adhesive bandages are applied with tissue forceps to reduce wound tension.

Sterile sponges or dry dressings can negatively affect healing, interfere with visualization of the wound without removal of the dressing, and must be kept clean and dry. They are not generally recommended for incisions with a primary closure.[46] Vaginal wounds are not dressed, although occasionally vaginal packing is placed.

POSTOPERATIVE SURGICAL AND MIDWIFERY CARE

The surgical postoperative client assessment is included in the scope of practice of the midwife first assistant. The postoperative assessment includes evaluation of the client's status as well as monitoring for potential complications, such as infection at the surgical site or other location, cardiovascular changes, pulmonary atelectasis, thrombus formation, or paralytic ileus.[47]

In some settings, the midwife assists with skin-to-skin care in the recovery room as long as the client and the neonate are stable. Postoperative responsibilities for the midwife first assistant can include initiation of routine postop orders, providing and assessing postop pain control, assessment and identification of postoperative complications, writing discharge orders, and initiation of treatment pending consultation. Clear indications and mechanisms for physician consultation and collaboration in the postoperative period assures optimal care for the client and assists in building trusting, collegial relationships with surgeons.

In other settings, the surgeon performs all postoperative rounds. In this instance, when the midwife continues to provide social or educational support, the care is documented in the health record as midwifery rounds. Provision of routine clinical postpartum or postoperative midwifery services, such as dialogue regarding the indications and client's experience of the procedure, recommended self-care, infant care and feeding, and education regarding follow-up after discharge, are documented in the health record by the midwife during postpartum rounds. This allows the unique features of midwifery care to be captured in the health record and demonstrates the contributions of midwifery care to the client's well-being following cesarean birth, tubal ligation, or other obstetric and gynecologic surgery.

Postoperative Evaluation and Treatment

Postanesthesia care takes place in a designated recovery area. During this time, the client is closely monitored for return of sensation or consciousness and stability of vital signs. Once the client is stable, they are transferred to their postoperative room. This may be a hospital room or an ambulatory surgery unit, based on the type of case and client response to surgery.

The surgical recovery process typically follows a predictable timeline. Recovery from major abdominal or vaginal surgery takes approximately 4 to 6 weeks, while recovery from laparoscopic surgery occurs over a 2 to 4-week period.

Wound Healing

Wound healing is a complex process affected by a number of factors such as the client's overall health, mental status, and immune response. In addition, intraoperative events

may have a significant impact on the client's postoperative course. Tissue handling, hemostasis, and length of procedure all impact wound healing and tissue integrity.[39]

Literature on the one versus two-layer uterine closure technique for cesarean birth often neglects consideration for additional factors that can impact wound healing and final scar integrity. Clients with poor perfusion or oxygenation, anemia, excessive stress or fatigue following surgery, tobacco or alcohol use, poor immune response, or who acquire postoperative infections are more likely to have delayed wound healing and may benefit from two-layer closure.[39]

Gynecologic surgery that is performed to repair pelvic prolapse or injury can have a significant relapse rate.[47] Aging and/or poor overall health affects wound healing, with a decrease in tissue elasticity and circulation to the affected area.[48] Obesity can add undue stress to wound closure, inhibiting prompt bridging of the wound by collagen.[49] Presence of chronic disease decreases the speed of wound healing while increasing the risk of postsurgical wound complications.

Attention to client well-being before, during, and after surgery is key to fostering optimal wound healing and tissue integrity, particularly in the setting of comorbid conditions.

During the first 4 days postoperatively, all wounds undergo an inflammatory reaction. During this time, cellular responses are initiated which the body's process of physiologic wound evaluation, clearing of cellular debris, and initiation of healing. The inflammatory process may be prolonged in the presence of devitalized tissue, infection, hematoma, or wound contamination.[39]

After the inflammatory phase, from about the fifth postoperative day to the twentieth day, collagen formation occurs, and the wound begins to knit together. The wound is highly vascular and appears red. Healthy granulation tissue forms to bridge the gap caused by the incision, and wound tensile strength increases. Absorbable sutures lose much of their strength during this time as they are broken down by phagocytosis or hydrolyzation. Interruption or delay in collagen bridging, due to a prolonged inflammatory phase or poor health, can lead to wound breakdown or dehiscence.

The final phase of wound healing is maturation of the scar, which can take up to 12 months. During this time, the collagen fibers reorganize, wound tensile strength continues to increase, and the scar becomes smaller and less red as vascularization diminishes.[39] Excessive inflammatory response to suture or during wound healing can result in an overgrowth of granulation tissue and formation of a granuloma. Granulomas are red raised tissue that may be painful and bleed. Some people develop excessive granulation tissue or keloid formation on the scar. There are now evidence based wound management strategies and treatments available to help prevent or diminish excess scar development.

Wound Classification

Surgical and traumatic wounds are classified based on methodical assessment of wound contamination and the associated risk for wound infection. There are four classifications:

- Class I: clean
- Class II: clean-contaminated
- Class III: contaminated
- Class IV dirty and/or infected

Most obstetrics and gynecology cases fall into the category of Class II: clean-contaminated due to the involvement of the genitourinary system. Clean-contaminated means that the usual genitourinary flora is present, there is absence of infection or contamination, and the wound was incurred in a controlled setting with no major break in sterile technique.[50] A gynecologic procedure performed in the presence of perforating trauma or infected urine would change the wound classification from Class II to Class III: contaminated. Presence of an infected abscess, such as occurs with pelvic inflammatory disease, would move the wound into Class IV: dirty and infected.

Wound classification can affect the choice and use of antibiotics, placement of drains, type of wound closure used, and anticipated postoperative surveillance.

Techniques used to prevent postoperative complications and wound infection include early ambulation, effective ventilation, and wound evaluation. Clients are encouraged to cough and deep breathe to promote gas exchange and decrease pooling of fluids in the lungs. Optimal inspiration using incentive spirometry can be effective in reducing postoperative pulmonary complications.[51]

Staples, stitches, and dressings are typically removed prior to discharge or during follow-up appointments in the week following discharge. Routine discharge education provides information on self-evaluation of the healing wound, incision care, and specific indications for calling when a problem arises. The client's hospital discharge summary includes relevant information about the client's diagnosis, treatment, hospital stay, and plans for follow-up. Most postsurgical clients are seen 1 to 2 weeks postoperatively to assess for signs or symptoms of infection, wound healing, and bowel and bladder function. Clients are seen again at 4 to 6 weeks postoperatively to asses for overall healing, status related to the indication for surgery, and planning for continued care.[51]

SUMMARY

The scope of practice for the midwife who includes first assistant activities as part of midwifery practice goes beyond technical assistance during the procedure itself and can extend across the perioperative period. The role of the first assistant is to facilitate the safest surgical procedure possible. Surgery is performed in an organized and systematic fashion using a team approach. The level of involvement and collaboration with the surgeon and perioperative team defines the specific clinical activities of the midwife first assistant in any given setting. Knowledge of surgical anatomy, tissue and instrument handling techniques, and the sequence of the procedure form the foundation of first assistant practice. Anticipatory thinking allows the first assistant to function in concert with the surgeon and other members of the perioperative team.

Clear understanding of the first assistant role and activities allows the midwife first assistant to plan learning sessions and gain the ability to function effectively as a member of the perioperative team. Skills training requires thoughtful development of meticulous technique through simulated practice sessions and the support and feedback of one or more mentors. Periodic self-assessment by the midwife can be useful in attaining expertise in surgical first assistant activities such as providing exposure, participating in dissection and tissue handling, ensuring hemostasis, and wound closure. The midwife's ability to integrate broad clinical knowledge, process information, and respond clinically on a minute-by-minute basis in coordination with the surgeon are hallmarks of a skilled first assistant. The midwife who practices in the surgical setting is ideally positioned to act as a client advocate from the preoperative period through the postoperative phase as a member of the interdisciplinary team. Clinical and professional activities performed by the midwife can support development of these skills.

Clinical Activities

- Discuss specific learning goals with mentor(s) as well as the role of the mentor during evaluation.
- Identify which sutures are used for specific tissue or layers.
- Note needle types for each suture including tip, size, and curvature.
- Observe expert practitioners performing closures and following suture to see how these actions are coordinated.
- Using a model, practice handling a retractor to effectively expose the apex of a wound for a partner during simulated dissection and wound closure.
- Perform self-assessment of current retraction, suturing, following, and knot tying skills.
- Observe dissection techniques during obstetric and gynecologic surgery.
- Note the names and locations of the abdominal wall structures and pelvic contents as they are encountered during dissection.
- Observe the characteristics of each tissue type as durable or delicate and identify appropriate instruments and handling techniques for each tissue type.
- Using preference cards, identify sutures commonly used in obstetric and gynecologic surgery.
- Practice retraction, suturing, following, knot tying techniques, and cutting suture with the non-dominant hand with a mentor or colleague.
- Visit the operating room or Central Sterile Processing department during a slack period to review the list of instruments that will be used in the procedure with which you will assist.

Professional Activities

- Seek out information about the pathologic processes that result in obstetric-gynecological surgery.
- Review texts and current literature on techniques for obstetric-gynecological surgery
- Practice utilizing surgical instruments such as retractors or scissors in your non-dominant hand during simulation.
- Use an anatomy resource to learn to identify the abdominal layers by location, color, and texture, as well as how they are handled during dissection, hemostasis, and closure.
- Read operative notes to learn the sequence of the procedure, the anatomy encountered, and the associated techniques used during dissection, hemostasis, and closure.

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THE FIRST ASSISTANT DURING CESEAREAN BIRTH

4

Cesarean birth has become ubiquitous in modern obstetrics in the United States, with an overall cesarean birth rate of 31.9% in 2018 and a rate of 25.9% among low-risk pregnancies.[1] For many midwives, being able to provide continuity of care to clients in the surgical suite as surgical first assistants has become a priority. This chapter focuses on the technical details of the cesarean birth procedure and the active participation of the midwife as surgical first assistant. While the presentation of this material is technical and clinical, this does not preclude the midwife from embracing and applying the hallmarks of midwifery when practicing as a first assistant.[2]

BACKGROUND

Cesarean birth is a surgical procedure that results in the birth of the fetus through incisions in the woman's abdominal and uterine walls. Early cesarean births were lethal to women and were performed on moribund women to save the lives of their infants.[3] The major cause of maternal death was hemorrhage, followed by sepsis. With the advent of suturing the uterine wall in the 1880s, the mortality rate for cesarean birth decreased from virtually 100% to approximately 50%. Advances in technique continued through the early part of the twentieth century. With the advent of antimicrobials, the risk of death after cesarean birth decreased further.[3] In the 1960s, cesarean births were performed in the Western world only 4.5% of the time, as compared to a third of all births in 2018.[1,4] The ideal cesarean birth rate to optimize maternal and fetal/neonatal outcomes has yet to be established. However, the World Health Organization (WHO) found that rates above 15% offer no additional positive effect on maternal and neonatal mortality at the population level.[5]

Cesarean birth is associated with increased short and long-term risks and consequences when compared with vaginal birth, such as surgical complications, newborn admission to neonatal intensive care, and increased cost.[6] Efforts to improve vaginal birth rates are fostered by Healthy People 2020, The Joint Commission, the California Maternal Quality Collaborative, the Alliance for Innovation on Maternal Health and numerous professional organizations such as the American College of Nurse-Midwives and the American College of Obstetricians and Gynecologists.[6-10] Every midwife and maternity care professional should be aware of the resources available for optimizing vaginal birth rates.

WHO Statement on Cesarean Section Rates: Conclusions[5]

1. Based on available data, and using internationally accepted methods to assess the evidence, the World Health Organization (WHO) concludes:
2. Caesarean sections are effective in saving maternal and infant lives, but only when they are required for medically indicated reasons.
3. At population level, caesarean section rates higher than 10% are not associated with reductions in maternal and newborn mortality rates.
4. Caesarean sections can cause significant and sometimes permanent complications, disability or death particularly in settings that lack the facilities and/or capacity to properly conduct safe surgery and treat surgical complications. Caesarean sections should ideally only be undertaken when medically necessary.
5. Every effort should be made to provide caesarean sections to women in need, rather than striving to achieve a specific rate.
6. The effects of caesarean section rates on other outcomes, such as maternal and perinatal morbidity, pediatric outcomes, and psychological or social well-being are still unclear. More research is needed to understand the health effects of caesarean section on immediate and future outcomes.

To address the complications that can lead to cesarean birth, many practices offer prenatal education sessions to discuss the potential for unexpected labor and birth complications and the shared decision-making process. This ensures that clients know that unexpected events can happen and that as birth professionals, midwives are prepared to recognize emerging problems. Optimal practices include midwives who function as part of a team that can manage the unexpected and keep clients informed of changes in any given situation. When shared-decision-making is part of the process at every stage, clients are prepared to be adaptable as labor and birth unfolds, and ready to participate in the informed consent process in the event that the unexpected occurs.11 The information shared with clients can include information

about the practice's vaginal birth rates and reinforcement of the practice's commitment to vaginal birth and that vaginal birth is expected for the majority of clients.

- An educational graphic or illustration of indications for cesarean birth can improve client understanding of the reasons a cesarean birth may be recommended. Indications for cesarean birth include situations in which neonatal or maternal morbidity or mortality can be decreased. In many instances, the cesarean birth may be preventable through optimal clinical management.[6] Examples of reasons for cesarean birth include:
  - » Labor arrest (34%);
  - » Abnormal or indeterminate fetal heart rate tracings (23%);
  - » Fetal malpresentation or multifetal pregnancy incompatible with vaginal birth (17%);
  - » Multifetal gestation (7%);
  - » Fetal macrosomia (4%);
  - » Preeclampsia (3%); and
  - » Other maternal-fetal indications including but not limited to placenta previa, abruption, previous cesarean birth, active genital herpes infection, and client request (12%).[6]

Slow progress in labor and category II or III fetal heart rate (FHR) patterns are the primary contributors to the primary cesarean birth rate.[6] Support of physiologic birth practices and appropriate positive prenatal education by maternity care providers can contribute to the safe reduction of cesarean birth rates.

Role of the Midwife as First Assistant During Cesarean Birth

When a cesarean birth occurs, having a trusted midwife present provides valuable continuity of care and support to the family.[2,12-14] In midwifery-led care and based on the practice location and arrangement, many clients first meet physicians when a medical or obstetric condition arises necessitating physician consultation or collaboration. Collaborative care or team-based models of perinatal care provide access to expanded medical care and interventions when needed and include the midwife and the midwifery model of care in partnership with medical care.[12,14]

The role of the midwife first assistant is to provide continuity of care while performing first assistant activities during cesarean birth. This requires a melding of the midwifery model of care with the meticulous attention to detail and specific skill set required for safe surgical care.[15]

Anesthesia for Cesarean Birth

Regional or epidural anesthesia is the first choice for most cesarean births. When an epidural is used for labor analgesia, additional dosing is provided to ensure adequate anesthesia, or a spinal anesthetic injection is performed immediately prior to the surgery. The client either sits upright or lies on their left side for administration of regional anesthesia. When time allows, the midwife can assist by physically supporting the client and reassuring her during anesthesia administration. Following administration of spinal anesthesia, maternal venodilation with hypotension can occur with associated maternal or fetal bradycardia in as many as 50% of clients. This effect can be decreased by administration of ondansetron (Zofran) prior to regional anesthesia.[16] When a client's blood pressure varies significantly compared to their preop blood pressure, the anesthesia provider is notified, and the fetal heart rate is assessed. Phenylephrine or norepinephrine is often administered prophylactically as a routine part of the anesthesia protocol to maintain maternal blood pressure with administration of regional anesthetics.[17] The primary action of phenylephrine is as an ∂-adrenoreceptor agonist; it offsets the fundamental maternal physiologic effects of vasodilation, nausea, and vomiting that result from sympathetic blockade during spinal anesthesia.[17] With a rapid onset and short duration of action, phenylephrine is ideally administered by infusion, which allows for greater control of maternal blood pressure and heart rate, and is thought to maintain uterine blood flow. Bradycardia and decreased cardiac output are known side effects of phenylephrine, leading to exploration of alternate options. Recently, norepinephrine has been evaluated as an alternative due to its dual antagonist-agonist properties. Norepinephrine leads to stabilization of blood pressure with less effect on heart rate or cardiac output than phenylephrine. When compared to administration of rescue doses, prophylactic infusion can result in more stable maternal blood pressure and can contribute to improved fetal pH.[17] In the event one of these medications is not used routinely, it can be administered on an as needed basis to raise and improve

placental perfusion and permit intrauterine autoresuscitation of the fetus prior to application of the drapes.

While regional anesthesia is preferred for cesarean birth, in select circumstances general anesthesia is the appropriate choice. General anesthesia includes administration of short acting anesthetic agents and endotracheal intubation, followed by rapidly metabolized inhalation agents in combination with other anesthetic agents, and is typically reserved for emergencies, contraindications to regional anesthesia, or in the presence of failed regional anesthesia.[18-20] The primary maternal risks of general anesthesia for cesarean birth include difficulty with airway management, client intraoperative awareness, and reflux and aspiration of gastric contents.[18]

A retrospective study examined racial and ethnic disparities in mode of anesthesia for over 50,000 women undergoing cesarean birth between 1999 and 2002 and found that during the study period black women had the highest odds of undergoing general anesthesia for cesarean birth (Odds Ratio 2.3), while white women had the lowest odds.[19] Maternal mortality is higher for women undergoing general anesthesia (6.5 deaths/million) as compared to women receiving neuraxial anesthesia (3.8 deaths/million) in the United States.[19] With black women having a maternal mortality rate approximately 3 to 4 times higher than white women, vigilance for implicit bias and careful attention to every aspect of perioperative care is required.[19]

The physiologic changes of pregnancy result in reduction of the functional size of the airway. The contraindication of paralytic agents for intubation of a pregnant person can increase challenges during intubation and the potential for laryngospasm during intubation or extubation.[18,20] In addition, as general anesthesia is more often administered during serious clinical conditions in an emergency, the surgical team must be prepared for maternal and neonatal resuscitation and the potential need for respiratory support of the neonate until anesthetic agents have been metabolized.[20] Resuscitation and ventilatory support for neonates born following general anesthesia are based on immediate neonatal assessment and follow Neonatal Resuscitation Program recommendations established by the American Heart Association and American Academy of Pediatrics.

To allow for minimal exposure of the fetus to the general anesthetic agents, the client is prepped, draped, and the perioperative team is ready to make the initial incision prior to administration of general anesthesia. When time is of the essence, the proximity of available personnel, such as a midwife first assistant who is on the unit, can lead to a more rapid birth of the neonate and subsequent stabilization of the parent. In the case of an extreme emergency or serious complication, the midwife first assistant can request that a second surgeon be called to act as the first assistant, begin the case with the surgeon, and then act as a second assistant upon arrival of the second surgeon.

CLIENT CARE FOR CESAREAN BIRTH

Clients may ambulate to the operating room (OR) or be moved by bed or stretcher. Ambulation can foster feelings of health and autonomy and is appropriate for those clients undergoing a non-emergent cesarean birth. The client is positioned on the OR table in the supine position with a left lateral tilt to offset compression of the great vessels by the uterus. A strap is placed across the legs for security, and armboards are positioned at less than 90 degrees.[21] Care should be taken at all times to respect the client's right to bodily privacy and to maintain warmth.

It may be accepted practice for clients to void prior to transport to the operating room rather than have an indwelling catheter placed.[22] When indicated, the Foley catheter is inserted following regional anesthesia. The woman's legs are bent at the knees with soles touching in the frog-leg position for catheter insertion. In a recent review, researchers suggested that postoperative urinary tract infections can be decreased by encouraging clients to void immediately before cesarean birth and omit placement of a Foley catheter, or by removing the Foley catheter immediately after the surgery is completed.[22]

Surgical preparation can include preoperative vaginal preparation with providone-iodine solution. A Cochrane review found that use of a vaginal prep immediately before cesarean birth reduced the incidence of postoperative endometritis in women undergoing cesarean birth from 7.2% to 3.6%, compared to the control group. The effect was even more pronounced in the presence of non-intact membranes (15.4% to 1.4%).[23]

Abdominal preparation begins at the incision site and is performed in increasing concentric circles to the upper abdomen and thighs.[24] The abdomen can first be draped

Reducing the Primary Cesarean Birth Rate

Maternity care that fosters physiologic birth can be used to safely reduce the number of primary cesarean births. Midwives are poised to act as role models and can provide active support for physician colleagues to partner with women, increase access to nonmedical birth support practices, and apply the clinical skills of patience, individualized care, and watchful waiting to support people as they give birth.[14]

The number of preventable cesarean births can be reduced through system-wide changes, such as timing of admission after the onset of active labor, quality improvement audits, practice feedback, clinical guidance, multidisciplinary collaboration, and development of a birth friendly culture and environment.[8-14] Resources for improving vaginal birth rates include:

- ACNM BirthTOOLS: http://www.birthtools.org
- California Maternal Quality Care Collaborative (CMQCC): https://www.cmqcc.org/VBirthToolkit

with sterile towels to define the surgical site. The abdomen is then covered with a full laparotomy drape, which is expanded to cover the legs and arms and is secured at the head of the table. Surgical drapes for cesarean birth that include a clear window that can be adjusted to allow the client to watch the birth without contaminating the surgical field are now available.[25] Once the client is prepped and draped, the adequacy of anesthesia is assessed and the surgical time out is performed prior to the initial incision.

The surgical time out includes the following: verification of the procedure, administration of prophylactic antibiotics, verification that pneumatic compression stockings are on and functional, identification of any allergies, and review of any other information critical to the safe provision of care.[26]

SURGICAL INSTRUMENTS, EQUIPMENT, SUPPLIES, AND SUTURES

Surgical instruments, equipment, supplies, and sutures are the tools employed by the surgeon and first assistant to conduct a safe cesarean birth. Instruments and other sterile supplies (sponges and laparotomy pads) are handed to the active operators by the scrub nurse or technician and returned to the scrub nurse or technician following their use. The cautery and suction are typically secured to the drapes with the hand-held devices kept in a holster when not in use.

Operative Anatomy During Cesarean Birth

During a cesarean procedure the abdominal wall is systematically opened in layers. The skin incision reveals the subcutaneous tissue. The incision is extended through this fatty layer to the fascia, which is nicked in the midline to expose the rectus muscles. The epigastric vessels run laterally in the rectus muscles and can be a significant source of bleeding if disrupted. The rectus and pyramidalis muscles are separated in the midline after cutting the linea alba to expose the parietal peritoneum. The peritoneum is examined and palpated before opening to avoid injury to bowel, bladder, or omentum. Once the peritoneum is entered, the uterus is visualized.

The uterus and bladder are covered by a layer of visceral peritoneum called the vesicouterine serosa, which can be incised and separated at the level of the bladder dome to create a bladder flap. The lower uterine segment is exposed and the myometrium is incised to expose the amniotic sac. The uterine incision is extended cranially using blunt dissection or laterally using scissors, using care to avoid injury to the large uterine vessels.[27] The amniotic sac is opened, and the fetus is born through the wound with the head maintained in flexion. After spontaneous (preferred) or manual delivery of the placenta, the uterus, ovaries, and fallopian tubes are examined, and the uterine incision is sutured closed. The pelvic gutters are cleared of debris (clots, vernix, amniotic fluid, or meconium), and the pelvic organs are examined for injury. The appendix may be visualized, and abdominal organs such as the gallbladder and liver may be palpated before closure of the abdominal wall.[27]

SURGICAL TECHNIQUES FOR CESAREAN BIRTH

During cesarean birth, the fetus is born through an abdominal incision (laparotomy) and a uterine incision (hysterotomy). The abdominal incision can be midline or transverse and has no bearing on the direction or location of the uterine incision.[27] Rationale for direction of the incision is described in the text that follows.

Cesarean Birth Instrument Set-up

The Cesarean birth instrument set-up will vary from facility to facility. The following is an example instrument, supply, and suture list:

- Knife handles (2) with (number 10 and 15 or 20) blades
- Scissors
  - » Metzenbaum (1)
  - » Curved Mayo (1)
  - » Straight Mayo (2)
  - » Lister bandage scissors (1)
- Clamps
  - » Kelly clamps (8)
  - » Hemostats or Crile clamps (8)
  - » Allis clamps (4)
  - » Kocher clamps (2)
  - » Babcock clamps (2)
  - » Ring forceps or Pennington clamps (4)
- Retractors
  - » Richardson large and small (2)
  - » Army-Navy (2)
  - » Goelet, Parker, or Roux retractors (2)
- Tissue forceps
  - » Bonney forceps (1)
  - » Russian forceps (1)
  - » Toothed forceps (1)
  - » Adson forceps (2)
- Cord blood collection devices
- Bulb syringe
- Sterile blankets
- Cord clamps
- Vacuum extractor (available)
- Piper forceps (available)
- Sutures
  - » Uterus: 0 or 1 absorbable: Chromic, Monofilament, or Braided suture
  - » Peritoneum: 0 or 3-0 absorbable: Braided suture
  - » Fascia: 0 or 1 absorbable: Monofilament, or Braided suture
  - » Muscle: 2-0 absorbable: Braided suture
  - » Subcutaneous: 2-0 and/or 3-0 absorbable: Braided suture
  - » Skin: 4-0 absorbable: Monofilament, or Braided suture, skin staples, or nonabsorbable Monofilament

Table 4-1 provides an example of the roles of the surgeon and first assistant during cesarean birth and the instruments and supplies used at each phase of the procedure. In this example a Pfannenstiel incision is described. Other techniques may be used and the role and scope of the first assistant's activities may vary from this example.

TABLE 4-1. Roles of Surgeon and First Assistant During Cesarean Birth

Surgeon	Surgical First Assistant
1. Participates in preprocedure time out. Verifies adequate anesthesia. Advises the client that surgery is about to begin.	Participates in preprocedure time out. Verifies position of cautery pencil and suction device. Obtains laparotomy pads and places them adjacent to planned incision site.
2. Incises skin using the skin knife with a smooth motion in a curvilinear fashion slightly above the mons pubis.	Applies pressure and traction to skin using laparotomy pads to allow smooth passage of knife blade through skin.
3. Uses a fresh blade or cautery to open the subcutaneous tissue to the fascia; blunt dissection with the fingers may be performed to access the fascia.	Keeps field clear of blood using laparotomy pads, clamps, and/or cautery. May assist with blunt dissection of adipose.
4. Uses electrosurgery or curved Mayo scissors with pick-ups with teeth to incise the fascia on each side of the midline.	Retracts adipose laterally using abdominal retractors to provide exposure to the midline.

Surgeon	Surgical First Assistant
5. Undermines the fascia laterally with the Mayo scissors and then sharply dissects by cutting the plane that was developed in a curvilinear fashion.	Maintains exposure of the scissor tips as the fascia is undermined and sharply dissected. May perform sharp dissection of the fascia contralateral to the surgeon.
6. Applies Kocher clamp to the cut edges of the fascia. Kocher clamp is elevated on the surgeon's side to expose the rectus muscles.	Applies Kocher clamp to fascia approximately 2 cm from the midline. Elevates Kocher clamp on first assistant's side.
7. Dissects the rectus muscle bluntly from the fascia superiorly and inferiorly in sequence. Applies hemostats or cautery to visible or bleeding vessels as needed for hemostasis.	Dissects rectus muscle off fascia using care not to traumatically transect perforating vessels or nerves. Assists with free ties or cautery to maintain hemostasis.
8. Cuts the linea alba superiorly and inferiorly using curved Mayo scissors.	Elevates both Kocher clamps perpendicular to the client to allow visualization during dissection of linea alba. May also apply downward pressure toward the uterus for better visualization of the linea alba.
9. Bluntly separates the muscles using coordinated traction to expose the peritoneum.	Provides traction in a coordinated effort with the surgeon to separate the rectus muscles.
10. Palpates, tents, and incises the peritoneum superiorly using Metzenbaum scissors or opens bluntly in a cranial direction to avoid the bladder.	Retracts to provide exposure of peritoneum; may assist with tenting of the peritoneum and blunt dissection.
11. Enlarges the peritoneal opening using blunt dissection to expose the uterus and abdominal contents. Disposable ring retractor may be inserted into the abdominal cavity at this time.	Inserts bladder blade over symphysis to protect the bladder and to provide exposure to the uterus. If disposable ring retractor is inserted, grasps the outer ring and rolls it taut in conjunction with the surgeon.
12. When a bladder flap is performed: Identifies and grasps the vesicouterine serosa with pick-ups. Sharp dissection in the midline using Metzenbaum scissors inserted to create a plane, then cut in a curvilinear fashion. Care is taken to stay close to the uterus to avoid injury to the bladder.	Provides exposure by moving bladder blade laterally to keep tips of scissors in surgeon's view. Uses abdominal retractor to pull back abdominal tissue.
13. Creation of the bladder flap using blunt dissection with the palmar surface of the fingers to push the uterus away from the bladder.	May assist with blunt dissection of the bladder off of the lower uterine segment. Inserts bladder blade into pocket created by bladder flap.
14. Incises uterus with fresh blade, making a 2 cm incision. Each stroke dissects 1 layer of muscle fibers at a time.	Suctions uterine incision toward self after each knife stroke to keep field clear of blood. Retracts to ensure adequate exposure to active site of uterine incision.
15. Enters uterus carefully with the blunt edge of the knife handle, finger, or closed clamp. Expands incision with blunt finger dissection in a cranial direction or laterally with bandage scissors.	Provides exposure. Assists with traction during blunt dissection, using care to provide smooth, gentle, steady pull. Provides pressure or suction as needed for hemostasis and exposure. Removes bladder blade.
16. Ruptures amniotic sac and inserts hand into uterus. Identifies and brings presenting part into the wound, maintaining fetal flexion.	Suctions amniotic fluid. Prepares to assist with delivery. Provides fundal pressure as requested once the presenting part is firmly in the wound.

Surgeon	Surgical First Assistant
17. Guides the newborn through the wound. Shows to parent(s). Neonate can be placed on maternal abdomen while cord pulses and respiration are established. Hands newborn to infant care provider or places newborn on warmer after cord separation.	Clamps and cuts cord when indicated. Delay of cord clamping greater than 60 seconds is recommended. May dry and cover newborn with a sterile blanket. Suctions newborn's mouth and nares only when indicated per NRP. Hands baby to the pediatric provider or places the infant directly on the warmer on a sterile drape. Collects cord blood samples.
18. Delivers placenta using controlled cord traction and fundal massage (preferred technique). Manual removal of the placenta may also be performed.	May deliver placenta while surgeon prepares to apply clamps.
19. Surgeon or first assistant applies clamps to edges of uterine wound at the apices and over bleeding vessels.	Provides retraction, suctioning, or pressure with lap pads to provide exposure and hemostasis.
20. Cups fundus and debrides endometrium of residual placenta or membrane using a dry or saline-moistened lap pad and/or ring forceps.	May perform debridement. If uterus is exteriorized, applies warm moist lap pad to fundus and provides compression and traction.
21. The uterus may be exteriorized or repaired in situ. Closes the uterus in 1 or 2 layers based on hemostasis and preferred technique. Cautery may be used as needed for hemostasis.	Reinserts bladder blade, follows suture, and locks each stitch when locked technique is used. Applies tag to suture end. Provides retraction, pressure with lap pads, or suction to provide exposure and hemostasis. Cuts suture when requested.
22. Clears pelvic gutters of debris. Assesses adnexa and re-peritonealizes uterus as needed. Warm saline irrigation is recommended only in the presence of gross contamination.	Removes bladder blade. Suctions pelvic gutters as needed using Poole tip or with lap pad over Yankauer suction tip. Avoids traumatizing tissue when suctioning fluid.
23. Assesses uterine incision, bladder flap, and peritoneum for hemostasis before closure.	Participates in assessment of hemostasis. Follows suture if bladder flap or peritoneum closed. Cuts suture.
24. May reapproximate the rectus muscles with suture. Cauterizes or ligates bleeding vessels.	Provides retraction, suctioning, or pressure with lap pads to provide exposure and hemostasis. Cuts suture, as needed.
25. Identifies and grasps 2 layers of anterior rectus sheath (fascia) at each apex using Kelly or Kocher clamps.	Provides retraction. May apply clamp to apex of fascia distal from self.
26. Closes fascia from the lateral apex to the midline or opposite apex using the rule of ones.	May close fascia from distal apex toward self to midline or proximal apex using the rule of ones and/or follows suture. Cuts suture.
27. Assesses the subcutaneous layer for hemostasis; may be irrigated to remove debris. Closes when adipose tissue greater than 2 cm.	Provides retraction. Participates in hemostasis. May close subcutaneous tissue incorporating Scarpa's fascia into suture line.
28. Closes the skin with an absorbable or non-absorbable subcuticular stitch or staples.	Everts skin edges during closure. May suture skin, apply staples, or evert tissue. Care is used to approximate tissue for best cosmetic effect.
29. May apply skin adhesive for wound support. Applies dressing prior to removal of the drape.	Wipes wound clean. May apply adhesive bandage strips for support, using tincture of benzoin or Mastisol at wound edges.

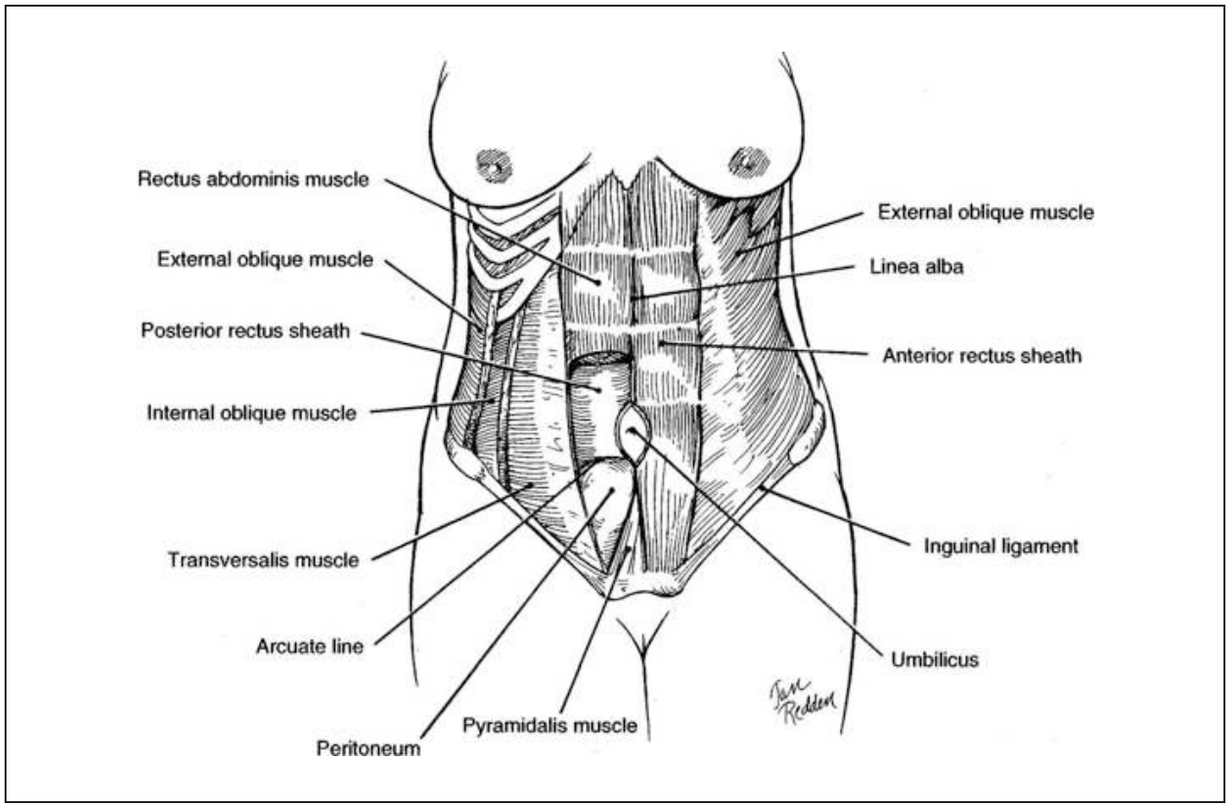

Figure 4-1. Abdominal muscles.
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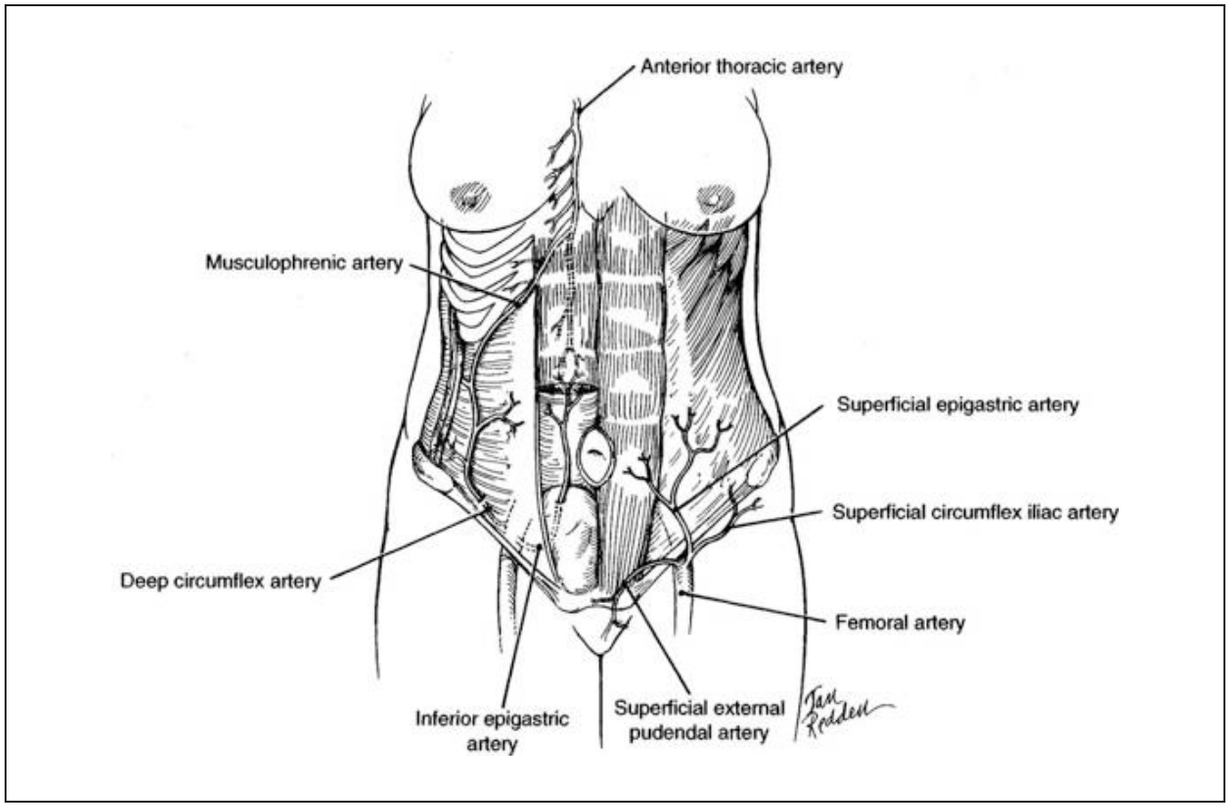

Figure 4-2. Abdominal arteries.
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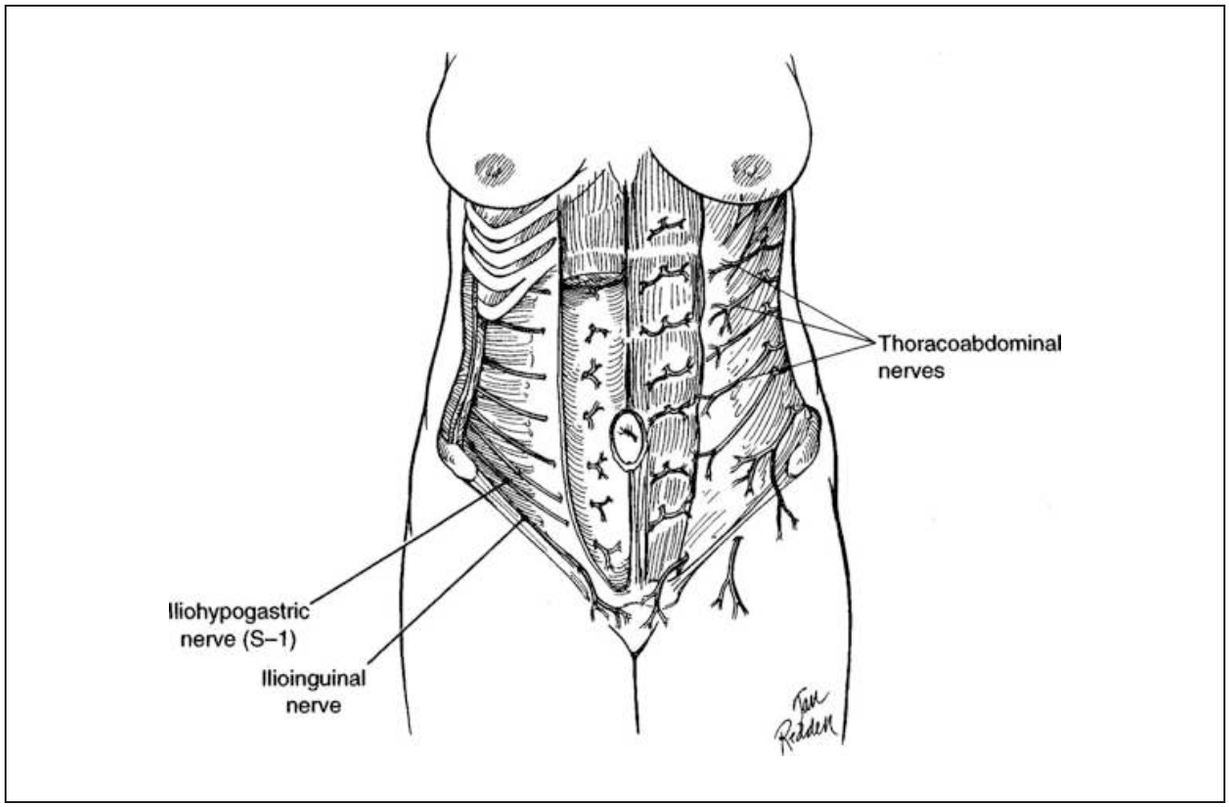

Figure 4-3. Abdominal nerves.
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Following administration of regional anesthesia, the client is prepped, draped, and all devices and cords are secured in sterile fashion by the perioperative team. The first assistant may not be able to visualize the active surgical site, yet is expected to provide adequate exposure for the surgeon. A step or lift may be of assistance in altering the first assistant's plane of view to facilitate visualization of the operative site without interfering with the surgeon's view.

The time out is called, and the adequacy of anesthesia is tested prior to the initial incision by gently pinching the skin with forceps to the level of the xiphoid process. The skin is incised with a scalpel or electrosurgery, and uniform tension is applied by the first assistant to the skin at a 90 degree angle to the planned incision line. The first assistant uses a laparotomy sponge to provide pressure for hemostasis of skin bleeders and retracts tissue using retractors as needed to expose the active operative site as the incision is extended through the subcutaneous tissue to the level of the fascia.

Bleeding vessels are blotted and may be cauterized with electrosurgery, clamped, or left to clot spontaneously. The first assistant can blot and show bleeding vessels to the surgeon or run the cautery pencil. Clamped vessels can remain clamped while the fetus is born, or they can be tied and the clamps removed. The experienced first assistant can place clamps on bleeding vessels while the surgeon continues the dissection. When a free tie is performed, the first assistant may place the free tie on the vessel while the surgeon holds the clamp or vice versa. During a cesarean birth on a healthy client with no clotting abnormalities, many surgeons opt not to clamp or cauterize small vessels until after the neonate is born. Individuals who are pregnant tend to clot quite readily, and vessels often stop bleeding by the time that the neonate has been placed on the mother's chest or handed to the waiting pediatric team.

Incision Techniques

A number of abdominal incisions are discussed in the literature, with the Pfannenstiel and modified Joel-Cohen techniques the most commonly performed. With the Pfannenstiel technique, the surgeon uses primarily sharp dissection. With the Joel-Cohen technique, more blunt dissection occurs.[27-31] The skin

is incised transversely with each of these techniques. The location of the skin incision may vary cephalad, especially in a woman with a significant panniculus or when a longer incision is indicated.

In the Pfannenstiel method, a curvilinear incision is made sharply approximately 2 to 3 cm above the symphysis pubis and 8 to 12 cm in length through the skin and subcutaneous tissue to the level of the fascia. The entire length of the fascia is sharply divided using cautery or heavy curved Mayo scissors.[27-30] The rectus muscles are separated from the fascia and bluntly separated in the midline to expose the parietal peritoneum. Once the abdominal wall has been dissected, the parietal peritoneum is opened vertically in a cephalad direction.

In the modified Joel-Cohen technique, the skin incision is slightly higher. A straight skin incision of 15 to 17 cm long is made approximately 3 cm below the line of the anterior superior iliac spines (hip bones). The incision is extended to the level of the fascia only in the midline, the fascia is nicked on each side of the midline, and then the subcutaneous layers are opened using blunt dissection to expose the fascia.[30] The entire length of the fascia is sharply divided using cautery or heavy curved Mayo scissors and the parietal peritoneum is opened in the midline. The rectus muscles and the peritoneum are simultaneously separated using blunt dissection (traction). This protects the nerves and vessels within the tissue. The modified Joel-Cohen technique is associated with less postoperative pain, need for anesthesia, and risk of nerve trauma as the nerves remain encased in muscle as the dissection proceeds.[29]

The midline infraumbilical incision is typically reserved for when time is of essence or when greater access to the pelvis or abdomen is needed, such as in the presence of coexisting pathology. In the midline incision, the skin, subcutaneous tissue, rectus fascia, rectus muscles, and peritoneum are dissected in the midline to provide rapid access to the abdominal contents. Most surgeons perform transverse incisions even in the case of an emergency, as it is their usual technique, and the vertical incision is not associated with improved neonatal outcomes.[31] In the Maylard technique, most often used as a modification of a Pfannenstiel or modified Joel-Cohen incision, the rectus muscles are sharply dissected transversely to provide greater access to the abdomen.[31] In all cases the abdominal incision is made just large enough to effectively birth the fetus, based on the anticipated size of the fetus, without difficulty.

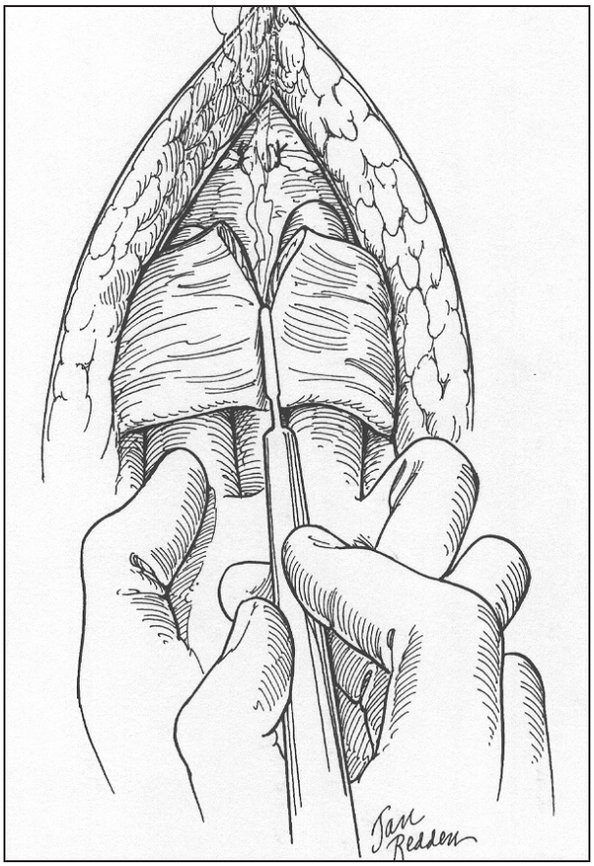

Figure 4-4. Dissection of the rectus muscles using the Maylard technique. Used with permission from Gilstrap L, et al. Operative Obstetrics, 2nd ed.©2002 McGraw-Hill Education..

Cesarean Birth Using the Pfannenstiel Technique

While the modified Joel-Cohen technique is becoming more widely used, the traditional Pfannenstiel technique remains the most common approach, although many surgeons now combine various aspects of the two techniques.[30] Following verification of adequate anesthesia, the surgeon makes the initial transverse curvilinear incision. The first assistant applies gentle traction to the skin using a dry laparotomy sponge to help stabilize the incision line. Once the initial skin incision is made, the sponge is used to retract the incision line by laying it over the edge of the wound and grasping the cut edge. Gentle traction exposes the area of dissection. As the dissection proceeds more deeply, a hand-held retractor such as a Richardson, Goulet, Roux or Army-Navy is used by the first assistant to provide adequate visualization. The first assistant is attentive for areas of bleeding as the dissection progresses.

When the level of the fascia is reached, the fascia is nicked in the midline with the scalpel or electrosurgical pencil.[30] Curved Mayo scissors are used by the surgeon or the first assistant to create a plane under the fascia in the following manner: the closed scissors are inserted with their tips up laterally under the fascia along the planned dissection line. This bluntly separates a thin area of the anterior rectus fascia off the underlying rectus muscle. The scissors then are opened slightly (1 to 2 cm), and with tips remaining upward to separate the fascia from the muscle, are withdrawn, to create a plane. The fascia is then sharply incised along this plane using the Mayo scissors to expose the underlying rectus muscle. The first assistant uses hand-held retractors to provide optimal visualization along the areas being dissected and moves the retractor from one side of the incision to the other as the dissection proceeds.

The epigastric vessels are located at the lateral edges of the fascia and are at risk for injury during dissection of the fascia.[30] The first assistant must be prepared to provide adequate exposure of the lateral edges to visualize the epigastric vessels, allowing them to be preventatively clamped, if they are in the way of the dissection. Once clamped, the epigastric vessels can be occluded with a free tie. In the event of inadvertent injury to the epigastric vessels, the first assistant will need to rapidly apply suction and pressure to expose the vessel so it may be grasped before it retracts within the muscle. It can then be tied, or a figure-of-eight suture can be placed in the surrounding tissue to provide hemostasis.

The cut edge of the fascia is then grasped on each side of the midline using Kocher clamps. The first assistant places the clamp approximately 2 to 3 cm from the midline capturing about 1 cm of the cut edge of fascia and taking care not to entrap any muscle tissue within the jaws of the clamp. The clamp is then elevated with one hand at a 90 degree angle from the abdominal wall to expose the rectus muscles. Using the fingers of the other hand, the rectus muscles are gently and bluntly dissected off the fascia by both surgeon and first assistant to the level of the umbilicus, leaving the linea alba exposed in the midline.[30]

Both clamps are then handed to the first assistant, who continues to apply traction perpendicular to the abdominal wall, while the surgeon uses heavy Mayo scissors to cut the connective tissue in the midline. The clamps are released and placed on the inferior edge of the fascia and the procedure is repeated to expose the pyramidalis and rectus muscles. After the linea alba is cut, the rectus and pyramidalis muscles are split in the midline. This is done by making a small opening or cut in the midline. Fingers are used to enlarge the opening, and surgeon and first assistant pull gently, steadily, and firmly, causing traction to separate the muscle in the midline. Alternately, when scarring exists, sharp dissection is used to free the muscles in the midline so they can be separated.

Once the muscles are separated, preperitoneal fat is bluntly dissected to expose the parietal peritoneum. The area of the peritoneum exposed should be well above the symphysis pubis and the expected location of the bladder. The exposed peritoneum is grasped and tented using Crile hemostats or smooth tissue forceps. The area is inspected visually and by palpation to ensure that bladder, bowel, or omentum are not immediately underneath. The peritoneum is then opened vertically away from the bladder using sharp or blunt technique.

Opening the peritoneum exposes the rounded globe of the uterus. The bladder blade is placed over the symphysis pubis to expose the lower uterine segment where the junction of the bladder and uterus is visible at the vesicouterine serosa. This intersection of organs can be challenging to visualize. Slightly above the junction with the bladder, the serosa is tented with smooth forceps, and Metzenbaum scissors are used in the midline to make a small opening in the serosa. A transverse plane is created by inserting the Metzenbaum scissors between the uterus and the serosa, above the level of the bladder. The first assistant gently swings the bladder blade from one side of the wound to the other to expose the margins of the vesicouterine serosa as the surgeon dissects the tissue. Once the plane is created and the vesicouterine serosa opened using sharp dissection, the surgeon can gently create the bladder flap by separating the bladder from the lower uterine segment using a blunt or gentle sharp technique. The bladder blade is then placed into the pocket created to cover the bladder and expose the lower uterine segment. Development of a bladder flap is optional and is based on surgeon preference.[22,32]

The uterus is incised sharply with a scalpel using gentle pressure to make an incision approximately 2 to 3 cm in

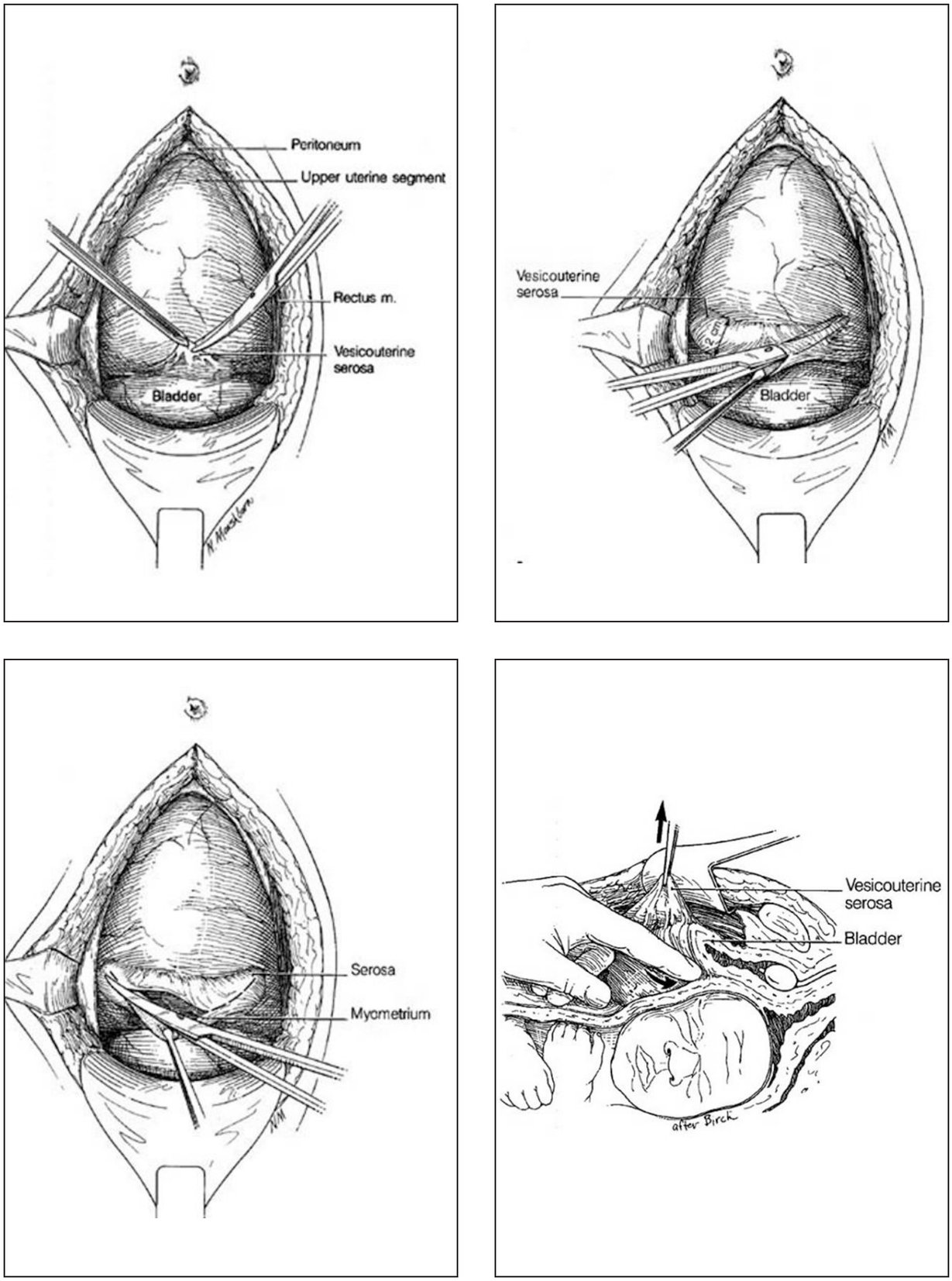

Figure 4-5. Development of the bladder flap.
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length.[22] Several passes are made to open the uterine muscle carefully in layers to avoid injury to the fetus. The first assistant uses suction to follow the knife blade after each pass. This removes blood to allow continuous visualization of the deepening wound. When the wound appears paper thin, the blunt end of the scalpel handle or a clamp is used to bluntly push the last layer of muscle fibers apart. A finger is inserted into the wound and using fingers and traction for blunt dissection or blunt-tipped bandage scissors for sharp dissection, the wound is enlarged to allow passage of the fetus taking care to avoid injury to the uterine vessels.

Blunt technique results in less blood loss than sharp extension and is strongly recommended to expand the hysterotomy (uterine incision).[22,30] During blunt dissection, cephalad-caudad traction is preferred to lateral traction to avoid the uterine vessels. Some surgeons prefer sharp extension of the uterine hysterotomy because of greater control of the length and direction of the incision. Inadvertent, uncontrolled extension can lead to damage to the uterine vessels and increased blood loss. Following extension of the uterine incision, the membranes become visible in the wound and the color of the fluid can be ascertained prior to opening the amniotic sac. The first assistant should ensure the presence of appropriate fluid containment and suctioning devices prior to opening the amniotic sac.

Once the amniotic sac is opened, the bladder blade is removed. The surgeon introduces a hand into the uterus, determines the fetal position, and cups the fetus to bring the head through the incision in a flexed position. If the client intends to watch the birth of their baby, the opaque drape is dropped so they can see through the clear portion of the drape to watch as the neonate emerges.

As the head is lifted towards the incision, the first assistant prepares to provide steady fundal pressure when directed by the surgeon and assist with the birth. After the head emerges from the incision, the shoulders are lifted slowly and gently, followed by the rest of the body. The neonate is assessed for breathing and secretions are suctioned only as necessary following current Neonatal Resuscitation Program guidelines. The initial steps outlined in the guidelines (warmth, positioning, suctioning if needed, drying and stimulation) can be provided on the field. The cord is left intact for 30 to 120 seconds while breathing is established. Once the umbilical cord has been separated, the newborn can be placed on the parent, skin-to-skin, for warmth and while newborn vital signs are obtained.

Delayed cord clamping provides advantages to the newborn and can occur while the newborn is being dried and stimulated with a sterile towel.[33] While not currently part of routine practice, researchers are examining initial resuscitation of the neonate with an intact cord.[34] To avoid interference with the active operative site, neonatal assessment can occur on the upper portion of the parent's abdomen, including brief positive pressure ventilation, provided appropriate, sterile equipment and personnel are available. The cord is clamped and separated by the surgeon or first assistant, and the newborn is handed off the sterile field to the waiting pediatric team or placed on the mother's chest. Cord blood and cord blood gases are obtained based on facility practice by the first assistant or the surgeon.

The placenta is delivered by the first assistant or the surgeon. Delivery of the placenta with gentle cord traction and uterine massage results in decreased blood loss and lower rates of postop endometritis than manual removal.[30] The uterus may be debrided of residual membranes and debris with moist lap sponges and/or ring forceps. Clamps are placed by the surgeon on the apices and margins of the uterine wound as needed to attain temporary hemostasis in preparation for suturing. The uterus can then be repaired in situ or exteriorized (brought through the abdominal incision and onto the abdomen) for greater visualization and access, as needed based on the client's clinical condition.[30] Exteriorization often results in nausea, vomiting, and discomfort for the parent which can interfere with early skin-to-skin contact. Manual cervical dilation through the operative incision prior to uterine repair is not recommended.[22]

Early skin-to-skin contact after cesarean birth is gaining popularity in the United States and many facilities have adopted this practice to support neonatal thermoregulation, foster maternal-infant attachment, and support early infant feeding.[35,36] Early skin-to-skin contact during the intraoperative period requires that sterile fields are maintained while the parent -infant dyad is supported by nursing staff or dedicated perioperative doulas.[36] A routine practice for healthy babies, skin-to-skin contact can result in a significantly more positive

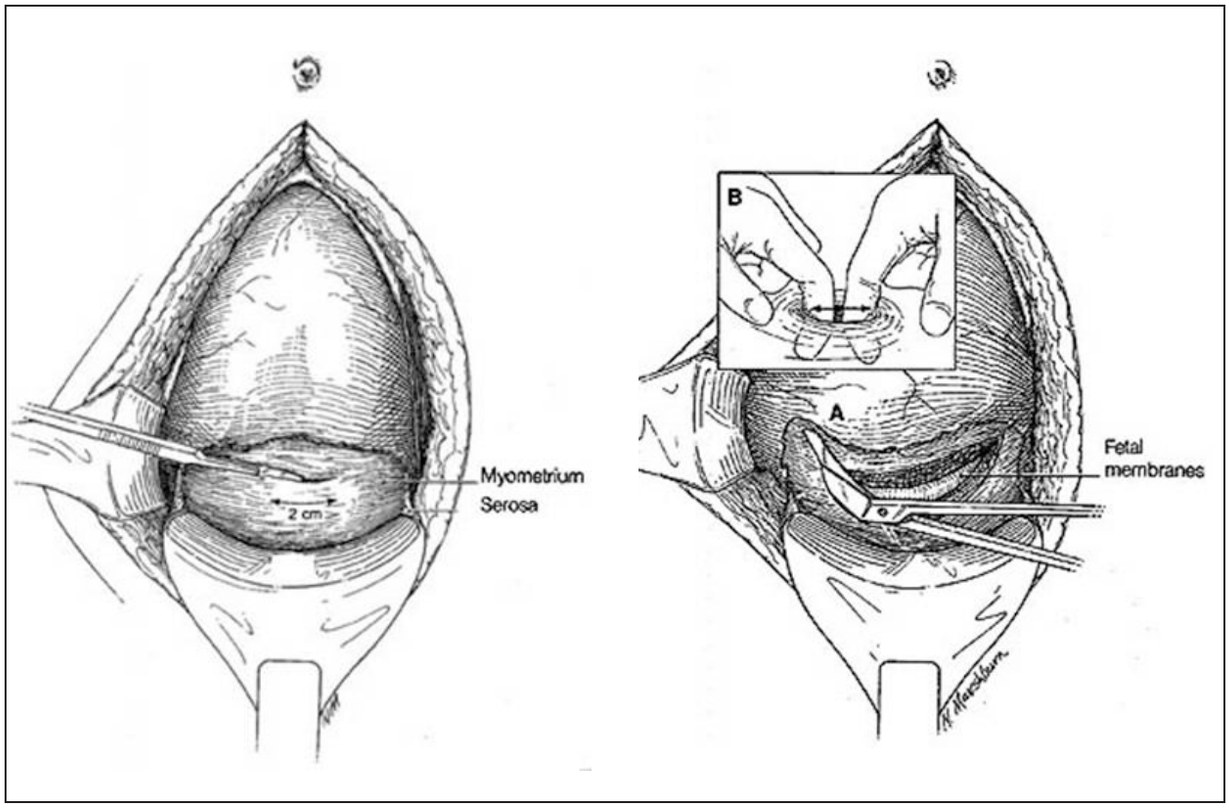

Figure 4-6. The uterine incision.
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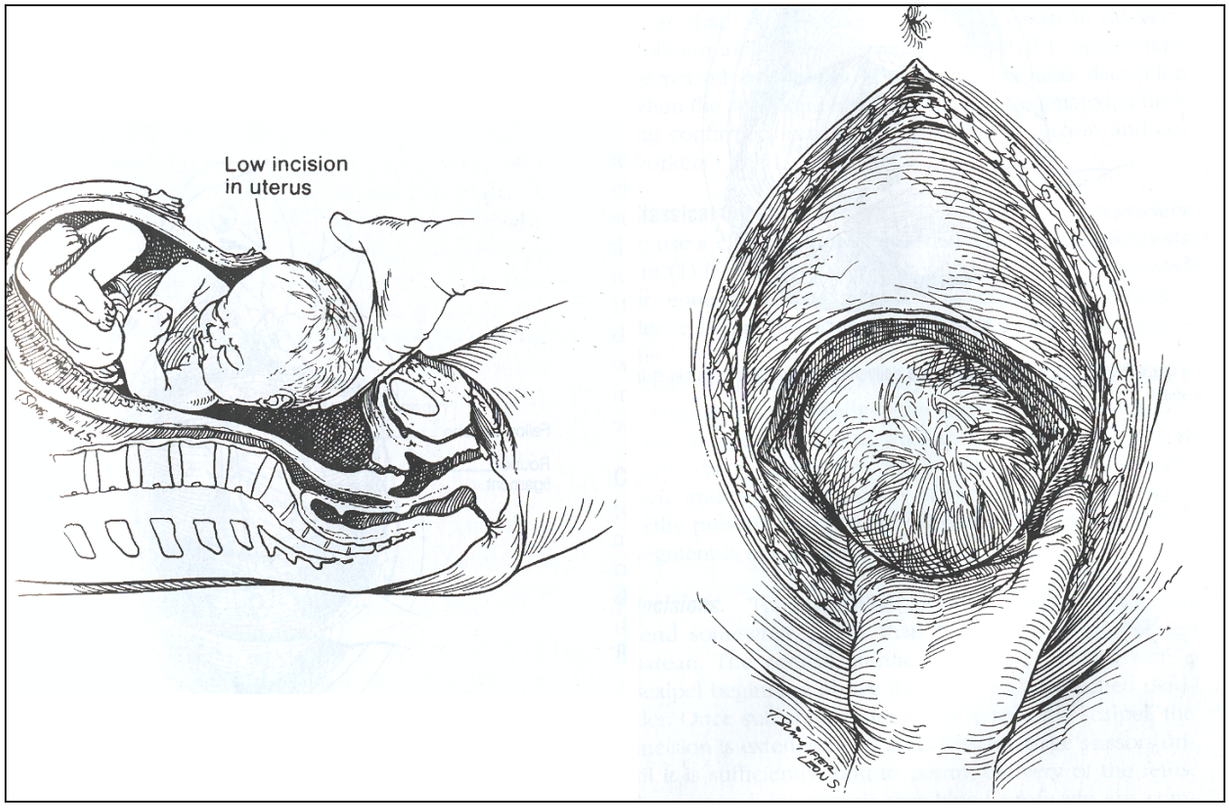

Figure 4-7. The neonate's head is lifted through the uterine incision.
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maternal experience of cesarean birth, foster early maternal-infant bonding, and achieve successful infant feeding.[35,36]

Delivery of the placenta using controlled cord traction results in less blood loss and decreased incidence of postoperative endometritis, and is the recommended evidence-based technique.[22,30] However, because manual removal of the placenta is often necessary during cesarean birth, this is an opportunity for the midwife first assistant to acquire or maintain skill in assessing uterine contents by feel, determining the position of the placenta, finding the placental margin, and performing manual placenta removal. Manual delivery of the placenta is accomplished by inserting the fingers of one hand into the uterus and palpating the location of the placenta while the other hand cups the uterine fundus and provides counterpressure. The fingers of the intrauterine hand move within the uterus to find the edge of the placenta. The fingers are then held firmly against each other to form a wedge which is gently worked beneath the presenting edge of the placenta. Using a sawing motion of the rigid fingers, the entire maternal surface of the placenta is gradually separated from the endometrium. The placenta is then grasped and lifted from the uterus.

Wound Closure in a Cesarean Section

Following the birth of the neonate, the surgeon and first assistant work together to clamp the bleeding edges of the uterine incision using ring forceps, Pennington clamps, T-clamps, or other hemostatic instruments. This can occur before or following delivery of the placenta, depending on the delivery method. When the uterus is left in the abdominal cavity, pressure is applied to the fundus through the abdominal wall to reduce blood loss. When the uterus is exteriorized, the first assistant wraps the fundus in a warm moist lap pad and applies pressure and traction to the uterus to minimize bleeding.

The hysterotomy is closed in 1 or 2 layers using heavy absorbable suture, such as (0 or 1) chromic, braided, or monofilament suture.[22,30,37] Current best practice recommendations support closure in 2 layers for those clients who are candidates for vaginal birth after cesarean and wish to retain their fertility.[22,37] The initial uterine suture layer is commonly performed with running locked sutures, although a single layer of plain running sutures is also considered acceptable.[30] The first assistant follows the suture by applying steady traction on the suture

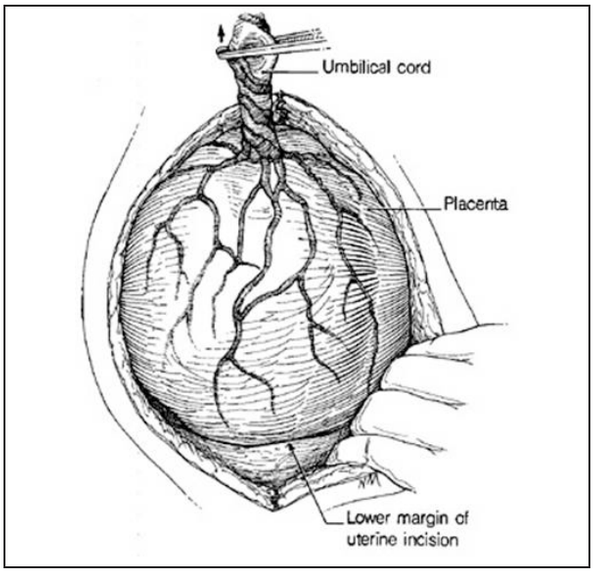

Figure 4-8. The placenta is delivered using cord traction.
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CASE STUDY: The Surgical Conscience

A novice first assistant is assisting during a cesarean birth. The surgery goes smoothly and a healthy neonate is born. As the first assistant hands the newborn off from the sterile field to the pediatric provider, the first assistant feels a light touch on the sleeve of their gown at the wrist of the right arm.

The first assistant looks around. No one seems to have noticed, and the first assistant is not sure if the gown was contaminated, as the touch was very light. The first assistant is unsure what to do and hesitates before stepping back to the table. When the first assistant realizes that there is no room for error when maintaining a sterile field, the first assistant clearly states, "My right sleeve is contaminated. May I have a new sleeve, please?"

The first assistant steps back to the sterile field and continues to assist using her left hand only while she holds her right arm away from the surgical field. The circulating nurse provides a sterile sleeve to the scrub nurse. Using sterile technique, the scrub nurse slides a fresh sterile sleeve over the first assistant's potentially contaminated sleeve, and the first assistant returns to using both hands at the field.

after the surgeon has placed each stitch. This keeps the suture line from loosening, and when a locked suture is used, prevents the lock from being released. The initial suture line is often tagged with a small clamp to mark the apex of the wound, and the suture end is cut following closure and verification of hemostasis. A second overlapping (imbricating) suture layer may be performed to cover and take tension off the initial suture line. Additional figure-of-eight sutures are placed as needed to obtain hemostasis.

When the one-layer closure technique is used, a running or running locked suture is placed to meticulously approximate the layers of the myometrium taking care to exclude the decidua and the serosal layers.[37] When good hemostasis is obtained, this one-layer technique is deemed sufficient for uterine closure, particularly in clients who elect to undergo permanent sterilization during the procedure. Occasionally a surgeon will close the bladder flap (visceral peritoneum) to provide a layer over the uterine wound to separate it from the abdominal cavity. More commonly, closure of the parietal peritoneum or rectus muscles is used to separate the uterine incision from the rectus muscles.

Research is ongoing regarding the risk of future uterine rupture related to closure technique. When considering the risk of uterine dehiscence or rupture, additional factors such as elevated body mass index, tissue oxygenation and perfusion (smoking, peripheral vascular disorders, hypertension, diabetes), tissue integrity (postoperative infections or immune compromise), spacing between pregnancies, etc, must be taken into consideration. Researchers recently suggested that the level of compression obtained with running locked sutures can lead to tissue strangulation and the development of windows as the uterus heals.[38] Evidence suggests that presence of labor and cervical dilatation at the time of previous cesarean birth and use of synthetic suture to close the uterine incision, can contribute to a thicker lower uterine segment at term in a subsequent pregnancy.[38] Investigators found that synthetic suture with a running technique for the first layer combined with meticulous technique to approximate only myometrium to myometrium (avoiding the uterine decidua and serosa) resulted in fewer scar defects.[37-39] Additional research on this method and determination of the optimal suture type for uterine closure is needed.

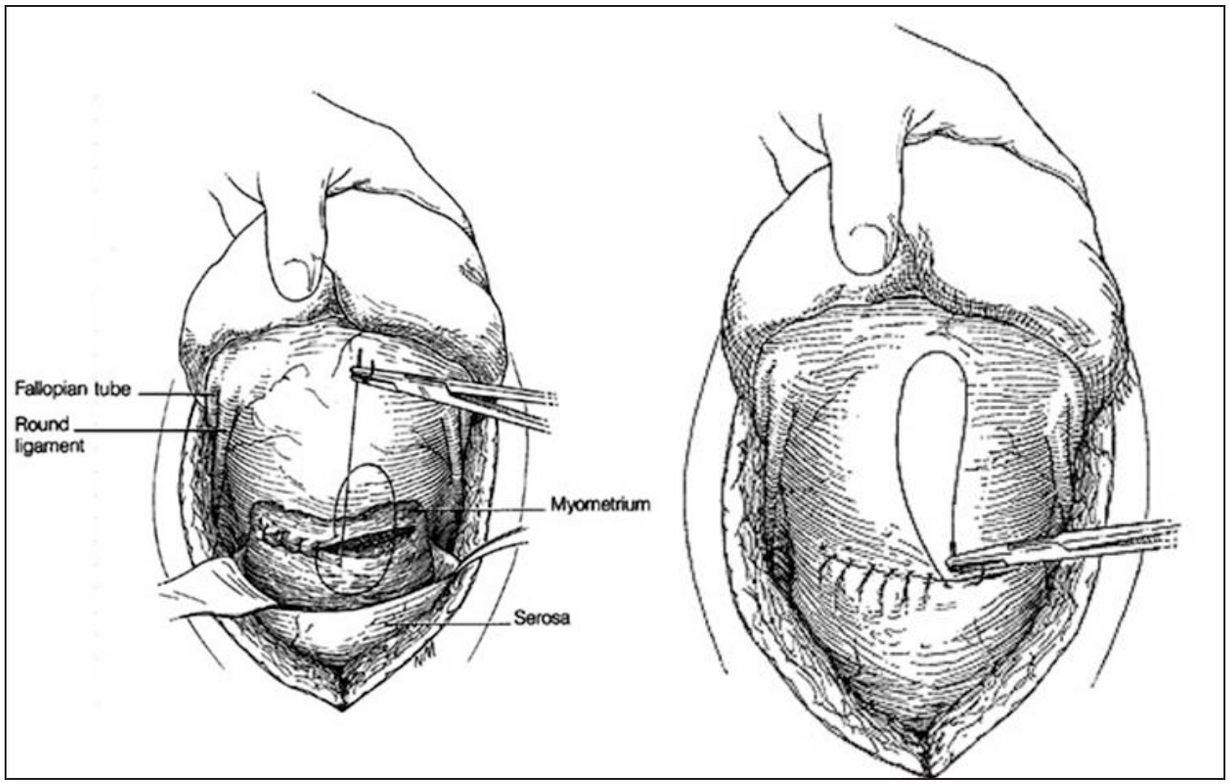

Figure 4-9. Uterine closure.
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The vesicouterine serosa (visceral peritoneum) overlying the bladder and the uterus is often left to heal without suturing and is loosely approximated. Alternately, it can be sutured with a fine suture such as 3-0 or 4-0 synthetic braided or chromic suture to restore this layer to its anatomic position. When a bladder flap is omitted, the bladder maintains its usual position on the uterus. The pelvic gutters are then cleared of fluid and debris with warm, moist lap sponges. The area can be irrigated with warm saline, which is removed with suction. However, current evidence recommends against this practice except in the presence of gross contamination of the abdominal cavity, as irrigation significantly increases rates of intraoperative nausea.[22] Irrigation is recommended when there is gross contamination of the abdominal cavity, such as with infected amniotic fluid, meconium, or excess blood. When using a Yankauer suction to remove fluid, the first assistant can cover the suction tip with a lap pad to avoid tissue trauma from direct application of suction to tissue.

The ovaries and tubes may be examined, and tubal ligation can be performed at this time when previously requested by the client. When tubal ligation occurs, the surgeon isolates the fallopian tube and follows it to the fimbriated end. The ovary is examined, and the anatomy verified before the tubal ligation procedure occurs. The first assistant stabilizes the tube while the surgeon interrupts the tube surgically or with an occlusive clip or band. The first assistant's familiarity with the surgeon's usual method(s) allows the first assistant to be prepared to cut suture or rapidly move to stabilize the opposite tube. Other abdominal organs or structures such as the appendix can also be examined before abdominal closure.[22]

Adequate hemostasis of the uterine suture line and adjacent tissue are verified immediately prior to closure of the abdominal wall. The parietal peritoneum is closed with a fine running suture, or it can be left to heal (reperitonealize) without suturing.[32] The evidence is mixed on parietal peritoneal closure versus non-closure. Closure is found by some studies to result in decreased formation of adhesions, while non-closure results in shorter operating time, fewer instances of postoperative fever, and shorter hospitalization.[30] Muscle closure brings together the posterior portion of the rectus sheath and may be a protective factor against the formation of abdominal adhesions. Muscle closure is optional unless the Maylard technique is used, in which case, the cut muscle is approximated with running or interrupted suture of moderate strength, such as 2-0 absorbable synthetic braided suture.

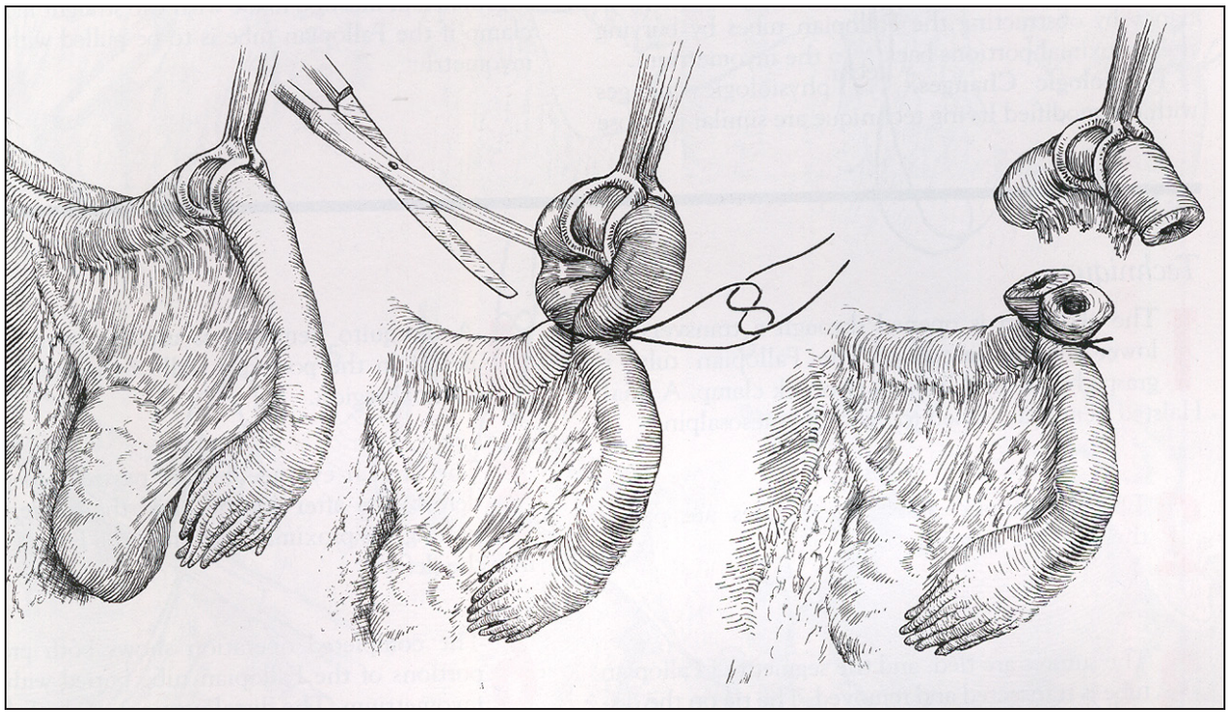

Figure 4-10. Tubal ligation utilizing the Pomeroy technique.
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The fascia is then closed using heavy absorbable suture such as (0 or 1) braided or monofilament suture. Careful technique ensures that both layers of anterior fascia are grasped when suturing fascia. The usual technique to suture fascia is to use the rule of ones: Begin the suture with an anchor stitch 1 cm beyond the apex of the wound. Take each bite 1 cm from the last bite and 1 cm from the cut edge of fascia. Fascia can be sewn from one apex to the other, which has the advantage of reducing the risk of dehiscence should a knot give way or it can be sutured using separate sutures from each apex to the midline. The first assistant may suture the entire line of fascia, the contralateral portion (far apex to midline), or follow the surgeon's suture during closure. This is a critical suture layer as fascia provides the strength to the abdomen, and defects in the fascia can result in the development of an incisional hernia.

Subcutaneous tissue is closed in clients with greater than 2 cm thickness of subcutaneous tissue.[22,30] Prior to closure, the area is frequently irrigated with sterile saline, and care is taken to assure that the subcutaneous tissue is hemostatic. Closure is performed by the first assistant or the surgeon in one or more layers using running or interrupted stitches using a 2-0 or 3-0 absorbable suture. The decision to close subcutaneous tissue is dependent on the size of the potential dead space. Incorporation of the white line of Scarpa's fascia into the subcuticular suture line adds strength and stability to this layer of the wound.

The skin is closed by the first assistant or the surgeon using a subcuticular stitch or a skin-stapling device. Absorbable or non-absorbable suture or staples may be used. When staples are applied, the surgeon and first assistant work in tandem; one everts the tissue using Adson forceps and the other fires the device to apply the staples. Following wound closure, a sterile dressing is applied prior to removal of the drapes. Sponge, needle, and instrument counts occur prior to the closure of each major layer (uterus, fascia, and skin).

POSTOPERATIVE PAIN CONTROL

Adequate pain control allows for early return to movement and deep breathing and fosters optimal surgical recovery, bonding with the newborn, and a more positive birth experience for the parent. The client can communicate their pain level using an objective tool such as a visual analog scale.

Anesthesia personnel typically provide initial postop pain management. Pain control can be attained with intrathecal analgesics, wound infusion pumps or nerve blocks, patient controlled analgesia devices, and non-steroidal, anti-inflammatory medications such as diclofenac and/or acetaminophen.[40]

Pain control for people with substance use disorders can be challenging. Spinal or epidural narcotics when accompanied by intravenous non-steroidal, anti-inflammatory medications and/or acetaminophen can effectively reduce pain in the first 24 hours.[41] Women on opioid-replacement therapy can require 1.5 to 2 times the usual dose of opioid analgesic to achieve pain relief. Narcotics that are opioid agonists, such as fentanyl and morphine, may need to be prescribed in more frequent doses. Oral analgesics are used in conjunction with replacement therapy to achieve adequate pain control. The substance use treatment prescriber should be notified, or consulted as needed, for adjustment of medication assisted treatment dosages during hospital and home-based pain management.[40,41] In addition, substance-exposed neonates may need to be transferred to intensive care for management of neonatal abstinence syndrome, which can further complicate the early postoperative, postpartum, and neonatal periods.

Guidelines for Prescribing Opioids

The Centers for Disease Control and Prevention (CDC) has published the *CDC Guideline for Prescribing Opioids for Chronic Pain and offers an interactive online training series on Applying CDC's Guideline for Prescribing Opioids* that provides information to guide the clinician in managing pain.

- CDC Guideline for Prescribing Opioids for Chronic Pain: https://www.cdc.gov/drugoverdose/prescribing/guideline.html
- Interactive Training Series: https://www.cdc.gov/drugoverdose/training/online-training.html

The midwife first assistant who intends to manage postoperative pain during hospitalization is expected to work with obstetric and anesthesia providers to become conversant in the usual medications, doses, routes, pharmacologic properties, side effects, and alternative medications used for postoperative pain. A plan for consultation should be in place for management of excess pain or signs or symptoms of developing postoperative complications. Continuing education on opioid prescription and alternatives to opioids for postoperative pain are important aspects of midwifery practice.

POSTOPERATIVE CARE

Postoperative rounds are performed by the surgeon or the midwife. Daily evaluation includes examining the patient for signs of infection, fluid balance, return of bowel function, and the absence of pulmonary atelectasis and deep vein thrombosis. Pain management and adaptation after the surgery are evaluated. Shadowing the surgeon can give the midwife insight into postoperative care expectations. When the surgeon performs postoperative rounds, the midwife can continue to provide midwifery rounds to talk about the birth, self-care, and newborn care and feeding.

Daily postoperative evaluation includes routine postpartum care as well as assessment of the surgical site and resumption of normal bladder and bowel function. The Foley catheter is removed immediately following surgery or when the woman is able to ambulate without assistance and full sensation has returned, approximately 12 hours postop.[42] Voiding is encouraged every hour while awake to avoid overdistension of the bladder, and when a bladder flap has been performed to foster healing in the usual anatomic position. Frequent voiding also retrains the bladder to the sensation of fullness without the weight of the pregnant uterus. Bladder trauma can occur during development of the bladder flap, during the delivery, or secondary to dissection of scarring when a repeat cesarean birth is performed.[32] Assess for bladder spasms or overflow voiding, which occur with urinary retention.

Diet is advanced as tolerated, and early gum chewing and eating are now recommended practices to improve return to bowel function.[42] Intravenous fluids are discontinued as soon as the client is able to take fluids by mouth without difficulty or nausea. A light diet is recommended until flatus is passed and bowel function has resumed. Chewing gum and periodically moving from side-to-side or assuming the knee-chest position may help pass gas and reduce pain as the bowels resume function.

When used, anti-thrombolytic devices are continued after surgery per recovery room or postpartum unit policy. Early ambulation is encouraged to promote circulation and reduce the risk of deep vein thrombosis.[42-44] Women with risk factors for deep vein thrombosis may also receive anti-thrombolytic therapy for up to 6 weeks postpartum.[44]

Coughing and deep breathing are especially important for clients with elevated body mass indices and those who smoke. Clearing of lung secretions aids in gas exchange and reduces the risk of pulmonary atelectasis and pneumonia. Also, careful postoperative glucose control for clients with diabetes, and observation for evolving complications are essential components of postop evaluation, as more than 60% of maternal deaths are thought to be preventable.[45-46] Multiple factors contribute to pregnancy-related deaths, near-miss occurrences, and maternal morbidity. Prevention requires integrated multidisciplinary care, recognizing the role of social determinants of health, and implementing preventive actions such as client education, safety bundles for team education and training, and effective access and transfer to specialized care teams when indicated.[45-46]

Postoperatively, a complete blood count or hemoglobin and hematocrit is commonly obtained to evaluate blood loss and need for therapeutic measures to treat anemia. A urinalysis may be performed upon removal of the Foley catheter or in the presence of urinary signs or symptoms. Other tests can be ordered based on specific history or findings. Monitoring of blood pressure and other vital signs is critical to early identification of evolving problems.

Social-Emotional Status

When the cesarean birth was unexpected, the client may have significant feelings of grief or loss related to the events surrounding the baby's birth. Hormonal changes associated with the postpartum period can contribute to postpartum blues. Postpartum care includes providing an opportunity for the client to talk about their birth experience. Providing a safe environment and an unbiased listening ear allows exploration

of the client's response to labor, birth, the newborn, ability to bond, and expected or unexpected family changes following the birth.

Screening for postpartum depression can occur prior to hospital discharge for all clients, with particular attention to individuals who have had an unexpected birth outcome, or an unexpected reaction to their labor, birth, or newborn. In addition, midwife assessment of social support, newborn care and feeding, plans for self-care following discharge, and the ability to return for postoperative care are integral parts of postoperative assessment for midwifery clients. Care provided by the midwife during midwifery rounds is documented in the health record.

Follow-up Client Care After Discharge

Most clients remain in the hospital for 48 to 72 hours after cesarean birth and are discharged home with instructions to follow up in 7 to 14 days and continue prenatal vitamins for at least 3 months. A high fiber diet is encouraged to prevent constipation. Heavy lifting is discouraged for 4 to 6 weeks. This can be especially difficult when there are toddlers at home. Clients are encouraged to refrain from driving for up to 4 weeks to allow optimal healing and encourage rest. Warning signs of potential complications are reviewed with the client and instructions provided for how to access care should it become necessary.

A postoperative follow-up visit, 7 to 14 days after discharge allows for wound assessment, evaluation of overall well-being, and delayed staple or suture removal when indicated. An interval history is obtained, and the wound is examined for any signs or symptoms of infection. Additional assessments are performed for signs or symptoms of postpartum depression and medical or surgical complications. Assessment of culturally appropriate transitions to parenthood and/or to changes in family configuration are frequently included at the postoperative and postpartum visits. Contraception is initiated as desired and clients are given individualized instruction about resumption of sexual activity.

Complications of Cesarean Birth

Clients who undergo cesarean birth are 2.7 times more likely to develop perinatal complications than those who give birth vaginally.[47] Higher rates of maternal morbidity were found primigravidas, when the client was older than 35 years old, had a BMI greater than 30, had no private insurance, self-identified as non-Hispanic black.[47,48] Pre-pregnancy comorbidities combined with cesarean birth is associated with increased maternal morbidity. These risks may be related to the indications for cesarean birth and other factors such as the need to travel to access care, and systemic factors that affect care provided to particular populations.[47,48]

Complications of cesarean birth can be divided into intraoperative complications and long-term maternal or neonatal morbidity or mortality. Complications are more common during or following unplanned cesarean birth than scheduled cesarean birth and include the need for blood transfusion, Intensive Care Unit (ICU) admission, unplanned hysterectomy, and uterine rupture.[47,48]

Short-term complications of cesarean birth include those that occur during the procedure and in the immediate postoperative period. These include extension of the uterine incision, hemorrhage, anesthesia-related problems, and injury to bowel, bladder, or ureters.[22,32] Examples of early postoperative complications include emergent postpartum hysterectomy in response to hemorrhage, bladder flap hematoma, endometritis, wound infection, thrombo-hemolytic disorders, urinary tract infection, acute gallbladder disease, and appendicitis.[22] In a review of recent birth certificate data, the rate of maternal transfusions was 167 per 100,000 live births for people who gave birth vaginally with no prior cesarean births compared to 601 for women who gave birth by primary cesarean after labor and 487 for primary cesarean birth without labor.[48] In women with a previous cesarean birth, transfusion rates were 367/100,000 for those giving birth vaginally following cesarean birth; 731/100,000 for those undergoing repeat cesarean birth during labor; and 458/100,000 for those who had a cesarean birth before labor.[48] People with successful vaginal births following cesarean birth had lower rates of all morbidities compared to those who had repeat cesarean births either before labor or after the onset of labor. Those who had a repeat cesarean birth after labor had the highest incidence of morbidities.[48]

People who experience cesarean-related complications are transferred to intensive care at a rate more than triple that of people who birth vaginally.[48] These factors can adversely

affect maternal-infant attachment and the client's feelings about the birth. There are significant disparities in cesarean birth complications as well. For example, some research has found that non-Hispanic black women have the highest rates of transfusion and ICU admissions following cesarean birth.[48]

Long-term complications of cesarean birth are also concerning. Potential reproductive consequences include future uterine rupture, pregnancy implantation in the uterine scar, increased incidence of placental abruption, placenta previa, and hemorrhage during subsequent pregnancies with accompanying perinatal morbidity.[22,49,50] The occurrence rate for abnormal placental attachment following cesarean birth ranges from approximately 11% (second cesarean) to 67% (fifth or higher cesarean). Abnormal placentation is the primary indication for peripartum hysterectomy, which substantially increases maternal morbidity.[49,50]

People who give birth by cesarean have a greater incidence of infertility and future ectopic pregnancies, and for subsequent pregnancies, have increased rates of spontaneous abortion, congenital malformations, and stillbirth.[50] Infants born via cesarean have increased rates of neonatal intensive care unit admissions, asthma, preterm birth, and low-birth weight.[50]

When compared with people who give birth vaginally, non-reproductive consequences for people who undergo cesarean birth include increased risk of depression and post-traumatic stress disorder, greater difficulty with infant feeding, and development of abdominal adhesions which can result in persistent pelvic pain and/or life-threatening bowel obstruction.[49,50]

A useful evidence-based patient booklet regarding the risks and benefits of cesarean birth titled, *What Every Pregnant Woman Needs to Know About Cesarean Section*, is available from the National Partnership for Women & Families at http://www.nationalpartnership.org/our-work/resources/health-care/maternity/what-every-pregnant-woman-needs-to-know-about-cesarean-section.pdf

CASE STUDY: Cesarean Birth for Fetal Indications

B. is a 32-year-old primigravida (pregnant for the first time) who presents to the maternity unit at term after an uneventful pregnancy. The fetus has an estimated weight of 7 pounds, 2 ounces and is in vertex presentation. A pelvic examination indicates that B.'s cervix is 6/100/-2. The fetal heart rate (FHR) is Category I with a baseline in the 130 beats per minute (BPM) range. B.'s vital signs are stable, and contractions that palpate as strong are occurring every 4 to 5 minutes and lasting 50 to 60 seconds. B. is walking around and working with each contraction.

As labor progresses, B. lays down on the right side. The FHR is assessed by auscultation and remains stable in the 130s with accelerations into the 150s. With a particularly strong contraction, B. notes an urge to push, and the midwife notes a change in the FHR to 90 BPM. The midwife examines B. and finds the cervix is dilated to 8 cm, and the fetal head is at +1 station. The head retreats as the contraction diminishes, and gradually the FHR rises again to the 130s.

With the next contraction, B. again has the urge to push; the FHR decreases to 70 BPM and remains there. The FHR gradually rises to 90 BPM. Oxygen is started by mask, and B. is moved to left lateral position. There is minimal improvement in the FHR, and the midwife requests that the obstetrician be notified of the potential need for an emergency cesarean birth. An anesthesia consultation and preoperative orders are initiated by the midwife.

With each contraction, persistent severe decelerations to 50 to 60 BPM occur that resolve to a baseline of 90 BPM between contractions. B. is advised of the situation, consent is obtained, and B. is rapidly prepared for cesarean birth with a working diagnosis of a Category 3 FHR tracing secondary to probable cord compression.

Prophylactic antibiotics are administered. As they head for the OR, the midwife reassures B. that the fetus appears to be resilient and will be born soon.

In the operating room, things proceed quickly. The midwife scrubs with the surgeon and they confer about the surgical approach. Anesthesia staff place the spinal and administer prophylactic phenylephrine to prevent vasodilation hypotension. The circulating nurse inserts the Foley catheter. The scrub nurse preps and drapes B. before initiating the surgical time out and bringing B.'s partner into the OR. The final FHR before the prep is 106 BPM. Anesthesia is tested, and the surgeon makes the initial transverse incision. The midwife applies a laparotomy sponge to absorb blood and expose the wound as the surgeon proceeds. The midwife and the surgeon work together quickly to open the fascia, dissect the muscle, and spread the rectus muscles. The peritoneum is opened and the uterus is exposed.

Once the uterine incision is made, the first assistant and surgeon extend it bluntly with care. The amniotic sac is ruptured and clear fluid is noted as the surgeon places a hand inside the uterus to cup the fetal head. Fundal pressure is applied by the midwife, who stands on a step stool to provide leverage. B. is advised that there will be a sensation of pressure as the baby is born.

The neonate is delivered without event and is dried and stimulated. The infant cries spontaneously and vigorously shortly after stimulation. The cord is noted to be somewhat short and a true knot is present. The knot is loosened and after breathing is well established, the cord is doubly clamped and cut. The newborn is lifted and shown to B. and their partner. The newborn is handed to a non-sterile surgical team member and placed skin-to-skin on B.'s chest where verification of neonatal well-being is assessed by the neonatal nurse. After cuddling for a few minutes, infant feeding initiates.

The midwife collects cord blood and delivers the placenta with moderate cord traction and fundal massage. The placenta shears cleanly off the uterine wall and is delivered via the Schultz mechanism. Using ring forceps, the surgeon clamps the lateral apices and bleeding edges of the myometrial wound. The anesthesia team adds oxytocin to the intravenous fluids (20 units per 1000 mL) as routine prophylaxis. As the closure proceeds, the first assistant applies compression as well as traction to the uterus to decrease bleeding and simultaneously follows the surgeon's suture.

The uterus is closed in 2 layers, with careful approximation of the layers. Once the uterus is closed and hemostasis is noted, the surgeon and first assistant assess the fallopian tubes and ovaries. Sponge, needle, and instrument counts are reported as accurate by the circulating nurse. The abdomen is closed in layers, beginning with the fascia. The surgeon sutures from the distal apex toward the midline and knots the suture just beyond the midline. The first assistant sutures the contralateral side, brings the final stitch beyond the midline, and ties a two-handed surgical knot. The subcutaneous layer is less than 2 cm in thickness and closure is not indicated.

The surgeon leaves to dictate the operative note while the first assistant closes the skin using a subcuticular stitch. Attention is turned to meticulous approximation and eversion of the skin edges. A sterile towel is placed over the wound while the drape is removed. An occlusive dressing is applied to the incision. The midwife first assistant carefully removes and discards the gown and gloves before moving to congratulate B. and look at the newborn. The first assistant then works with the perioperative team to move B. from the OR table to the bed, and then to the postanesthesia recovery unit.

B. and the newborn appear to be stable and bonding well during recovery. The midwife provides daily postpartum midwifery rounds and documents the care provided, while the surgeon provides routine postop care and orders. B. expresses disappointment to the midwife that surgical intervention was required for the birth and profound relief that the system worked so well to provide prompt care when it was needed. B. expresses positive feelings about the care received and appreciation for the system in place to deal with emergencies.

SUMMARY

While practicing specialized surgical skills, midwife first assistants can promote a person-, client-, and family-centered focus as they care for people in the perioperative setting. Cesarean birth requires simultaneous attention to two clients: the pregnant person and the fetus (or fetuses). Safe cesarean birth requires attention to detail and application of first assistant skills in coordination with the surgeon.

Maintaining the focus on birth during a cesarean birth can provide significant support for families and increase recognition of the significance of the birth for the perioperative team. Such recognition can facilitate greater acceptance of practices that support optimal physiologic transition for parent and newborn in the perioperative period, including active engagement of the client in shared decision-making, delay of cord clamping, early skin-to-skin contact, and early infant feeding. There are a number of steps a midwife can take to develop pertinent skills to first assist in a cesarean birth.

Clinical Activities

- Meet with the OR staff and review the contents of a cesarean birth instrument tray.
- Observe cesarean births and note surgeons' preferences for the first assistant's actions.
- Observe cesarean births and note first assistant's role.
- Engage mentor in pre-case briefing and sharing learning goals (in non-urgent scenarios).
- Engage mentor in post-case debriefing and evaluation of skill development.

Professional Activities

- Discuss or establish the expected perioperative role of the midwife first assistant at your facility.
- Perform a literature search on techniques and best practices for cesarean birth.
- Read operative notes with a focus on the sequence of the cesarean birth procedure and the techniques used for dissection and closure of the abdominal layers.
- Meet with one or more surgeons and ask about their usual techniques, rationale for using them, and relevant recommendations or findings in literature.
- Explore ways to enhance the neonate's physiologic transition in the operating room.
- Use the quality improvement process to champion evidence-based changes to neonatal routines.

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THE ROLE OF THE FIRST ASSISTANT DURING REPRODUCTIVE HEALTH SURGERY

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According to ACNM, acting as the first assistant for gynecological surgeries is within the scope of practice for certified nurse-midwives and certified midwives.[1] In some jurisdictions and facilities, midwife first assistant activities are limited to acting as the first assistant exclusively during cesarean birth. While many midwives voluntarily limit their first assistant role to the birth setting, the opportunity to provide continuity of care and meet community needs prompt some midwives to include participation in gynecologic surgery in their first assistant skill set.

This chapter is written for midwives who choose to expand their practice to include the role of first assistant during reproductive health procedures. The essential first assistant skill set of exposure, hemostasis, and tissue handling is transferable across virtually all procedures, with specific instruments, equipment, techniques, and approaches for each procedure.

As previously discussed, obtaining and documenting education and clinical experience to act as the first assistant during gynecologic procedures can occur through formal courses, continuing education workshops, or self-study using current literature, educational videos, grand rounds, and mentored clinical experience.[1] Forms for documenting expanded practice education and experience are included in Appendix 4.

Preoperative Client Care in Reproductive Health Surgery

Gynecological surgery is performed for benign or malignant indications which can affect perioperative client outcomes and the participation of the first assistant. The midwife first assistant reviews the indication for a procedure, noting the size and position of uterus, ovaries etc, as applicable. The client's history in reference to the procedure is also reviewed. In some collaborative practice settings, the midwife performs the preoperative history, client interview, and physical examination, particularly for midwifery clients. The client is provided information regarding the expected procedure, including the indication(s) for the procedure, necessary preop laboratory tests or preparation, and information about the admission process. The anticipated intraoperative course and postoperative discharge criteria are discussed as part of the shared decision-making and informed consent processes.[2-4] Assessment of family and/or community support systems are included as part of the preoperative care as are any concerns or questions. The assessment process allows the opportunity for scheduling additional time to address questions or meet with the surgeon as necessary.

The midwife may order and/or review diagnostic tests that may include: complete blood count, type and screen, quantitative human chorionic gonadotropin (Q-βHCG), pelvic ultrasound, or a computerized tomography scan. Preoperative medications and devices are ordered based on collaborative practice arrangements with the surgeon and anesthesia personnel. Preoperative medications and therapy administered to clients commonly include midazolam (Versed), intravenous (IV) fluids, and prophylactic antibiotics "on-call" to the operating room (OR); antibiotics given immediately prior to transfer to the OR and other antithrombotic devices and medications.[5,6]

In some instances, where extensive pelvic dissection may occur, a bowel prep may be ordered to cleanse the bowel. The purpose of a bowel prep is to mechanically evacuate stool from the colon and minimize gross fecal contamination of the abdomen in the event the bowel is inadvertently perforated.[5] Current recommendations are for antimicrobial administration for gynecological surgery with the potential for bowel involvement.[5]

Sample Indications for Gynecological Surgical Procedures

- Hysterectomy for benign disorders
- Hysterectomy for early malignant uterine or ovarian disease
- Hysterectomy as part of gender affirming care
- Repair of pelvic prolapse, cystocele, rectocele
- Excision of ovarian mass or cyst
- Treatment of ruptured ectopic pregnancy

Surgical Approaches to Reproductive Health Procedures

The choice of approach for pelvic surgeries—abdominal, vaginal, or laparoscopic, will vary based on a number of factors such as the woman's body habitus, the type of procedure, the indication(s) for the procedure, the size and shape of the uterus, the presence of adhesions or scarring, presence and extent of extrauterine disease, and the skill and experience of the surgeon.[6] While the American College of Obstetricians

and Gynecologists (ACOG) recommends a vaginal approach for uncomplicated hysterectomy for benign indications, 2008-2014 data found that the abdominal approach was performed in approximately 34% of cases, with 29% of undergoing vaginal hysterectomy, and 30% undergoing a laparoscopic procedure.[7]

Vaginal surgery is commonly performed for cystocele and rectocele repair and to address other aspects of pelvic organ prolapse (POP), often in conjunction with a hysterectomy. The benefits of vaginal and laparoscopic surgery for benign conditions include shorter hospital stay and recovery time, lower morbidity, and better cosmetic results than open surgery. Minimally invasive surgery using laparoscopic techniques has become the gold standard for many procedures, many now being performed in the outpatient surgical setting.[6-8]

It is important to note that there are a variety of techniques used for pelvic surgeries, and those used by any specific surgeon can differ from those presented here. With all surgeries, multiple approaches are available. This text provides a very broad overview of each procedure. The first assistant is encouraged to work with each surgeon and members of the perioperative team to identify the specific techniques, approaches, and instruments used for each procedure in which they participate. Resources, such as operative procedure texts, training videos, and review articles can provide additional details about evidence-based best practices.

Reproductive surgery can profoundly impact a person's self-image. Individual responses will vary based on understanding of the reasons for the procedure, the postoperative course, active involvement of a strong support system, appearance and healing of the incision, presence or absence of complications, and the need for additional treatment.[5]

Anesthesia for Reproductive Health Surgical Procedures

General anesthesia has historically been preferred to regional anesthesia for pelvic surgery due to superior client relaxation, which can enhance visualization and provide significant improvement in the comfort of the client. It is common for the person under regional anesthesia to feel pulling and tugging as significant visceral discomfort can occur with manipulation of the peritoneum or abdominal contents. Current recommendations include multimodal anesthesia, which may include a combination of neuromuscular block and general anesthesia.[5,9] This approach can improve abdominopelvic relaxation and be effective at reducing postoperative opioid use.

Trendelenburg's position is commonly used to shift the abdominal contents cephalad, thus exposing the pelvic organs. Caution is needed during positioning as the transition to Trendelenburg's can lead to inadvertent displacement of the extremities, and can have significant effects on cardiac, respiratory, and central nervous system functions.[10,11] General anesthesia can be used to obtain the abdominal wall relaxation required for optimal visualization and to limit injury secondary to intraoperative patient movement in the presence of fixed devices such as self-retaining retractors or laparoscopic ports and instruments.[5,9] During laparoscopic procedures, muscle relaxation as a result of anesthesia allows for smooth and controlled insufflation of the abdomen with CO_2 gas which creates a pneumoperitoneum.[12] This distension of the abdominal wall allows room for manipulation of instruments and direct visualization of the abdominal and pelvic contents during laparoscopic procedures. Appropriate intraabdominal pressures must be maintained during insufflation to minimize risk of gas embolism, cardiac arrhythmias, and vagal reactions.[12] Abdominal pressures can be affected by the depth of anesthesia, client perception of pain, and muscle relaxation.

Intraoperative Client Care

Prior to surgical reproductive procedure, the pubic and abdominal hair may be clipped based on hair distribution and planned incision site. Clients are encouraged to ambulate to the operating room when they are able; this promotes a sense of autonomy and wellness. As the client is typically not familiar with the OR staff, introductions are common and occur before the onset of intraoperative care begins. This establishes the client as central to the care and promotes trust in the surgical team. Care must be taken to cover the client appropriately as the preparation for surgery proceeds. Chilling is prevented with warm blankets, IV fluid warmer, or placement of an external warming device.[5]

With the client in the supine position on the operating room bed, placement of electrocardiogram leads, pulse oximeter, and administration of anesthesia can occur. The client's knees can be elevated slightly on a pillow as needed to protect the lumbar spine.[11] Arms are placed on armboards at an angle of less than

90 degrees to prevent nerve damage or tucked at the client's side to provide additional room for the team to maneuver. Bony prominences are padded to avoid pressure injury.[11] Compression stockings and sequential compression devices are commonly recommended during most gynecological procedures.[5] For clients at risk for deep vein thrombosis, concomitant administration of anticoagulants such as heparin or low molecular weight heparin may be recommended.[5]

Prior to draping, the grounding pad for the electrosurgical device is applied over a large muscle mass, the umbilicus is cleansed, and the surgical site and surrounding area is prepped with the preferred antimicrobial solution. Alcohol-based prep solutions are used on intact skin and are contraindicated for use on mucous membranes. Water-based povidone-iodine solution is commonly used for vaginal prep. During vaginal procedures, the abdomen is often also prepped in case an abdominal approach becomes necessary. Sterile surgical drapes are used to delineate the surgical field, leaving the operative site exposed. Laparotomy drapes may have a narrow fenestration (opening) for a midline incision, or a wider opening that can accommodate transverse (Pfannenstiel, Maylard or Joel-Cohen) or laparoscopic incisions. The vaginal drape pack includes an under buttocks drape, leg covers, and an abdominal drape with a flap to expose the abdomen for a laparoscopic or abdominal approach if needed or planned as part of the surgery. The first assistant often participates in the application of the antimicrobial solution and draping and is expected to be adept in these practices. A planned surgical time out is performed before the surgery begins to verify the planned procedure and all significant client information that may affect the procedure or its outcome.

Considerations in Abdominopelvic Reproductive Surgery

- Incisional approaches vary with the indication for the surgery.
- Important anatomical landmarks during reproductive surgery include the bladder, ureters, bowel, reproductive organs, ligaments, and blood vessels.
- During hysterectomy, the paired ligaments are systematically identified, clamped, cut, and ligated.
- Each pedicle must be inspected for hemostasis before closing.
- Peritoneal edges often bleed and are incorporated into the vaginal cuff or otherwise sutured to ensure hemostasis.

Equipment, Supplies, and Sutures

Instrument kits used in reproductive surgery include basic vaginal, laparoscopic, and/or abdominal gynecology instrument sets. They also include:

- Long and deep instruments as indicated by the individual's size
- Self-retaining retractors such as the O'Connor-O'Sullivan, Balfour, or disposable self-retaining retractor
- Weighted vaginal specula and sidewall retractors (Sims)
- Masterson and Heaney clamps
- Uterine manipulation device (RUMI, HOHL)
- Foley and/or suprapubic catheter
- Electrosurgical unit and/or harmonic scalpel
- Suction equipment

Additional specialized equipment can be required when there is potential for bladder, ureter, or bowel involvement during the procedure.

Examples of sutures used during abdominopelvic gynecologic surgery include:[13,14]

- 1, 0, and 2-0 Dexon, Polysorb, or Vicryl for suture ligatures
- 1, 0, or Dexon, Monocryl, or Vicryl suture for the uterus
- 0 barbed suture or 2-0 Dexon, Polysorb, or Vicryl for vaginal cuff closure
- 0, 2-0, or 3-0 Dexon, Polysorb, or Vicryl to close peritoneum
- 1 or 0 Dexon, Polydioxanone (PDS), or Vicryl to close fascia
- 2-0 or 3-0 Dexon, Polysorb, or Vicryl for subcutaneous tissue
- 4-0 Dexon, Polysorb, or Vicryl braided suture, barbed suture, or absorbable staples for subcuticular closure, superficial skin staples, or skin adhesive to close skin
- Subcutaneous or peritoneal drains (current evidence shows limited benefit and recommends against drain use)[5]

HYSTERECTOMY

Hysterectomy is the surgical excision of the uterus. Total hysterectomy includes the removal of the uterus and the cervix.

Subtotal hysterectomy involves the removal of the body of the uterus, leaving the cervix in place. During a total hysterectomy with bilateral salpingo-oophorectomy, the fallopian tubes and ovaries are also removed.[15] Hysterectomy is the second most common surgical procedure performed on women in the United States after cesarean birth, with approximately 480,00 undergoing this procedure per year.[16] Most hysterectomies (86.6%) are performed for benign indications.[16] Compared to other approaches, robotic-assisted cases make up less than 5% of hysterectomies. With the advent of clear guidance regarding indications for hysterectomy, more effective and innovative treatments for benign disorders such as leiomyoma, abnormal bleeding, benign ovarian masses, and endometriosis, the rate of hysterectomy is decreasing.[17]

While recent trends show an overall decrease in the rate of hysterectomy, with an annual decrease of 39% in commercially insured women from 2009 to 2014, it is increasingly common for a vaginal or laparoscopic hysterectomy to occur as an outpatient procedure.[18] The minimally invasive approach to hysterectomy has gained popularity.[7] A retrospective review that examined rates of hysterectomies by location of service demonstrated a shift from 13% of hysterectomy procedures being performed in an outpatient setting in 2008 to 57.5% being performed as outpatient procedures in 2014.[7]

Vaginal hysterectomy is considered the safest, most cost-effective route for hysterectomy when performed on women who are parous or have a mobile uterus size less than 12 weeks regardless of parity, and when there is no suspicion of adnexal pathology.[6] ACOG recommends that vaginal hysterectomy be the primary approach for most women with benign conditions with indications for hysterectomy, followed by laparoscopic surgery. There are many factors than can limit the accessibility of the uterus from the vaginal approach. Individuals who are nulliparous or who have undergone one or more cesarean births can be considered candidates for vaginal hysterectomy when the uterus is relatively mobile, and the vagina is adequate to permit access to visualize and divide the uterosacral and cardinal ligaments to facilitate uterine mobility and descent.[6]

Abdominal hysterectomy is reserved for those circumstances where direct access and visualization of the organs is indicated, such as the presence or suspicion of malignancy, a substantially enlarged uterus, or intraabdominal adhesions that

Comparison of Different Approaches to Hysterectomy

Vaginal Hysterectomy Compared with Abdominal Hysterectomy

- Shorter duration of hospital stay
- Faster return to normal activity
- Better functional capacity and improved pain assessment
- No evidence of difference in satisfaction, complications, or intraoperative injury
- No studies evaluated costs

Vaginal Hysterectomy Compared with Laparoscopic Hysterectomy

- Shorter operating time
- Lower overall costs
- Patients were more satisfied than those who had a laparoscopically assisted vaginal hysterectomy (no difference between vaginal hysterectomy and total laparoscopic hysterectomy)
- No evidence of difference in return to normal activities, urinal tract injury*, complications

Laparoscopic Hysterectomy Compared with Abdominal Hysterectomy

- Shorter duration of hospital stay
- Faster return to normal activity
- Fewer wound or abdominal wall infections
- Longer operating time
- Higher rate of lower urinary tract (bladder and ureter) injuries
- Improved quality of life in the first months and at 4 years postsurgery
- No evidence of difference in satisfaction or major long-term complications
- No evidence of difference in overall cost (limited studies)

Laparoscopic Hysterectomy Compared with Robot-Assisted Laparoscopic Hysterectomy

- No evidence of difference in any of the measured outcomes
- No studies evaluated costs

*These findings may be attributable to limited power to detect a difference given the very low incidence of urinary tract injuries.

Data from Aarts JW, Nieboer TE, Johnson N, Tavender E, Garry R, Mol BW, et al. Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database of Systematic Reviews 2015, Issue 8. Art. No.: CD003677. DOI: 10.1002/14651858.CD003677.pub5.

limit laparoscopic visualization or uterine mobility. The 2017 ACOG Committee Opinion *Choosing the Route of Hysterectomy for Benign Disease*, states:

> "For an individual patient, the surgeon should account for clinical factors and determine which route of hysterectomy will most safely facilitate removal of the uterus and optimize patient outcomes, given the clinical situation and surgeon training and experience."[6]

Most hysterectomies for benign disorders occur in premenopausal women, with resultant improvement in quality of life, mood, and sexual functioning which can be verified by client reported outcome responses.[5] However, when concomitant removal of the ovaries (oophorectomy) is performed, premenopausal women who undergo hysterectomy for benign conditions can require prompt initiation of short-term hormone therapy to offset abrupt onset of menopausal symptoms.[19]

The Role of the First Assistant During Abdominal Gynecological Surgery

Use of the abdominal approach during gynecological surgery allows for full access to the abdominopelvic contents. It was the standard for many gynecological procedures before the advent of laparoscopic surgery and the current recommendation to use the vaginal approach whenever feasible.[6] The first assistant has a key role in providing visualization during the abdominal surgical approach and ensuring surgical access to the abdomen and pelvis. Visualization is primarily provided by retraction by the first assistant and aided by positioning, packing, blotting, suctioning, and adjustment of the surgical spotlight to illuminate the active surgical site. It is challenging to maintain optimal visualization of the active surgical site for the surgeon at all times, particularly when the first assistant is unable to see the area.

Incision Techniques During Abdominal Hysterectomy

The Pfannenstiel or low transverse incision is commonly used during open abdominal gynecologic cases such as total hysterectomy. The abdominal dissection techniques for the transverse incision are similar to those for cesarean birth with blunt dissection performed using gentle traction.

When the potential exists that a transverse incision will not be large enough to provide full access to the pelvic organs, remove a significantly enlarged uterus, or allow adequate visualization of the operative site, a midline incision can be performed. A midline incision allows full access to the abdomen and pelvic cavity and if necessary, can be extended cephalad to the level of the xiphoid. The midline incision is typically reserved for large or complex procedures including the presence of a significantly enlarged uterus, an intraabdominal malignancy, or extensive adhesions, as this approach permits access to both the abdomen and pelvis.

The abdomen is opened in layers until the abdominal cavity is reached; dissection occurs through skin, subcutaneous tissue, fascia, rectus muscle, and peritoneum. The small bowel is organized by the mesentery and is typically covered by the omentum. The appendix is located at the ileocecal junction. The pelvis contains the uterus, ovaries, fallopian tubes, ureters, bladder, and iliac vessels. Uterine ligaments include the paired round ligaments, broad ligaments, uterosacral ligaments, and cardinal ligaments. Uterine vessels are found within the broad and cardinal ligaments.[20]

Sharp dissection using a scalpel or electrosurgery is common in abdominal hysterectomy. When blunt dissection is used, care must be taken to handle the tissue gently to avoid injury. The client is placed in Trendelenburg's position to help in cephalad displacement of abdominal contents. A self-retaining retractor is placed, often with moist lap pads to provide cushioning beneath the blades. Care is taken that no bowel or other tissue is caught beneath the blades before tightening the thumb screw. The bowel is packed cephalad using warm, moist laparotomy sponges. The bladder blade protects the bladder and elevates it out of the operative field.

A tenaculum is frequently placed in the uterine fundus to allow traction and manipulation of the uterus; alternately, an intrauterine positioning device can be placed before draping to allow for external manipulation of the uterus to provide greater visualization of the junction of the cervix and vagina. Traction is applied to the uterus to offset it alternately to one side then the other, as the paired ligaments are carefully identified, doubly clamped, divided, and cut. The round ligament is identified before being clamped and cut. The round ligament stump is ligated with heavy (0 or 1) absorbable suture. The fold of the broad ligament (mesosalpinx) can then be entered bluntly using Metzenbaum scissors and dissected anteriorly

to the vesicouterine fold of peritoneum. The vesicouterine fold is elevated, and the filmy attachments to the bladder are gently taken down using blunt or sharp dissection. This peritoneal edge can bleed or ooze persistently. There can be extensive scarring in this area following multiple cesarean births or with extensive pelvic disease. Gentle technique is used to avoid injury to the bladder.

When the ovaries are retained, traction is applied to the uterus to move it anteriorly. This applies tension to the ovary, tube, and infundibulopelvic ligament. The surgeon then bluntly dissects the broad ligament with a finger or the tip of a closed clamp placed under the suspensory ligament of the ovary and tube. The tube and suspensory ligament are doubly clamped, cut, and ligated with heavy (0 or 1) absorbable suture. Tension is placed on the uterus in a cephalad and lateral direction. This applies traction on the lower broad ligament, which accommodates and protects the major uterine vessels. These vessels are triple clamped before being cut and ligated with heavy (0 or 1) absorbable suture. One clamp remains close to the uterus while the other two clamps remain on the pedicle, or stalk, of the vessel. The surgeon applies and ties the suture ligature to the vessel pedicle while the first assistant manipulates the clamps to provide exposure. The posterior clamp is removed slowly to allow the tissue to be compressed as the suture ligature is tightened, while the anterior clamp secures the vessel to ensure hemostasis is obtained. Two suture ligatures are typically placed on each vessel.

The procedure is then repeated on the opposite side. Next, the cardinal ligament is exposed, clamped, cut, and ligated. The uterosacral ligaments are clamped, cut, and suture ligated. Key sutures are often left long and tagged with hemostats or other clamps so that each pedicle may be readily identified and examined for hemostasis at the close of the dissection and prior to abdominal closure.

When the uterus is free of its ligamentous attachments and blood supply, the upper portion of the vagina is entered using sharp dissection, with the surgeon taking care to retain the full length of the vagina. The vagina is then carefully incised around its circumference to free the uterus. The surgeon can perform this portion of the dissection with angled hysterectomy scissors or a scalpel blade. While the dissection proceeds, the edges of the vaginal cuff are grasped by the first assistant with Allis clamps at the lateral edges and in the midline. It is important to grasp the full thickness of the vaginal cuff and include the surrounding peritoneum within the jaws of each clamp to ensure adequate hemostasis.

The circumference of the vaginal cuff is often oversewn to provide hemostasis before the cuff is reapproximated. The cardinal and uterosacral ligaments are commonly sutured to the cuff to provide anatomic support to the vagina. The vaginal cuff is then closed. When a running suture is used, the first assistant follows the suture, maintaining a steady, even tension to keep the stitches well seated. The cuff can also be closed with a series of interrupted stitches. Alternatively, a portion of the vaginal cuff may be left open to heal by secondary intention with the vesicouterine peritoneum closed to isolate the vaginal cuff from the abdomen and provide hemostasis, while allowing drainage of blood and surgical debris.

Following completion of the vaginal cuff closure, the abdomen is copiously irrigated using warm saline, and hemostasis is meticulously ensured prior to closure of the abdomen. At this time, the surgeon or first assistant inquires as to the color and quantity of urine produced during the procedure. Damage to the bladder can cause the urine to become pink tinged or cherry red. The proximity of the bladder and ureters to the uterus requires careful technique to avoid trauma to these structures. Occlusion or transection of the ureters results in diminished urinary output and is a surgical emergency.

Once hemostasis is verified and all irrigation fluid is suctioned from the abdominal cavity, the self-retaining retractor is removed from the abdomen. Sponge, needle, and instrument counts are verified before the wound is closed in layers. Heavy absorbable suture (0 or 1) is used to close the fascia. Subcutaneous tissue is closed in one or more layers depending on thickness. Hemostasis is obtained and the subcutaneous tissue is irrigated with warm normal saline to remove organisms and surgical debris before closure. The skin is typically closed with an absorbable suture and a subcuticular stitch, or skin staples. No vaginal packing is necessary, and a perineal pad is placed to collect any vaginal drainage.

Postoperative Care Following Abdominal Hysterectomy

Daily postop evaluation includes assessment of pain status, vital signs, the appearance of the surgical site, and bowel

and bladder function. Vital signs should be consistent with preoperative status. Tachycardia can be an early indicator of hypovolemia, fever, or changes in cardiac function. Excessive or referred pain can indicate damage to tissue or internal bleeding. Bowel sounds should be auscultated and heard shortly after surgery. Chewing gum and gradual oral intake is encouraged approximately 4 hours following surgery and bowel sounds should be heard in all 4 quadrants.[5] Abdominal distention can indicate development of an ileus. The Foley catheter is removed within the first 24 hours when the client is alert, has full sensation, and is able to ambulate.[5] Spontaneous and adequate voiding should be documented. Early ambulation the day of surgery fosters circulation and helps to prevent deep vein thrombosis. Continued ambulation and sitting up for meals are expected after the day of surgery. For premenopausal women who undergo hysterectomy with oophorectomy, short-term hormone therapy with estrogen can be initiated postoperatively, after counseling on benefits and potential harms, to offset the abrupt drop in endogenous hormones that results from the onset of surgical menopause.[19] Timing of hormone initiation is dependent on risk for deep vein thrombosis in the postoperative period. Transdermal administration of hormones can reduce thromboembolic risk.[21] All hormone therapy is individualized. Following current guidelines for hormonal treatment is recommended. A complete blood count or hemoglobin and hematocrit test is obtained to evaluate blood loss and need for therapeutic measures to treat anemia. A urine culture can be obtained at the time of Foley catheter removal.

Emotional Status of Client

Clients who undergo abdominal hysterectomy can experience a wide range of emotional responses following surgery. In some part, feelings about the surgery are dependent on the indication for the surgery. However, all clients will need to adjust to the changes in their bodies, even when the surgery was desired or troubling symptoms have been resolved.[22] Many people have questions following surgery about recovery, the need for hormones and their associated risks, and the return to sexual activity. Other women will have concerns about their diagnosis and next steps in their continued care. Some women will need support with child or parent care, meal preparation, driving, etc. Time for listening and reflecting back to the client should be part of daily midwifery rounds.

Follow-up Care

Discharge home varies on the complexity of the surgery and the individual's physiologic and emotional responses. For uncomplicated abdominal hysterectomy, discharge typically occurs on the second or third following surgery, after successful voiding, return of appetite, passage of flatus or stool, and an absence of signs or symptoms of infection or other complications. Return postop visits are typically scheduled for 1 to 2 weeks and 6 to 8 weeks after discharge. At the postop visit, the incision should appear well healed with no evidence of infection.

CASE STUDY: Abdominal Hysterectomy

C. is a 44-year-old with a history of uterine fibroids. C.'s annual examination was essentially normal except that the uterus palpated at 18 to 20 weeks size, a finding that was unchanged from 1 year ago. A pelvic ultrasound at that time indicated multiple intermural uterine fibroids. Menses have been regular with a usual flow.

C. calls the midwifery office 1 month after the last annual examination. C. reports waking in the morning to find the bedding soaked with a large amount of blood. C. denies any cramping or clots. C.'s last period was 2 weeks ago. C. is given an appointment to be seen, and on examination, the midwife finds that C.'s uterus is now well over 20 weeks size, a significant change from only 1 month ago.

Follow-up ultrasound findings remain consistent with a fibroid uterus. The endometrial stripe is 10 mm. The midwife consults an obstetrician/gynecologist colleague, who recommends discussion with the client about use of a selective progesterone receptor modulator to reduce

the size of the fibroids, and the potential for a total hysterectomy for definitive diagnosis and treatment of the problem.

C. is anxious to have this problem treated and discussion follows regarding options. C. opts for the medical treatment to reduce the size of the fibroids prior to making a further decision regarding definitive treatment. C. begins a 3-month course of the selective progesterone receptor modulator ulipristal acetate prior to potential surgery to minimize the incision size and avoid unnecessary blood loss.23 After 3 months of treatment and discussion of the anticipated management plan, C. is referred to the obstetrician/gynecologist for a consultation. The uterus is now reduced to 16 weeks size, and after a physical examination and discussion of the options, C. decides to move forward with the hysterectomy. Due to the size and configuration of the uterus, the surgeon informs C. that the abdominal approach is the preferred surgical option. C. clearly indicates a desire to keep the ovaries at this time. After reviewing expected benefits, possible harms, and alternative treatments, C. gives consent and is scheduled for abdominal hysterectomy. Preop history, physician examination, and informed consent documents are completed.

On the day of surgery, the midwife sees C. in the holding area, walks with C. into the OR, and assists with positioning on the OR table. The OR team introduce themselves to C. The padded armboards are placed at less than 90 degrees. C. is positioned, prepped, and draped while the perioperative team ensures privacy and dignity. After induction of general anesthesia and with C.'s prior consent, the midwife and the surgeon perform bimanual exams to reassess the size and contour of the uterus in order to plan the course of the surgery. The uterus is firm and knobby at 16 weeks size. Following a routine surgical scrub, the certified surgical technologist assists the midwife first assistant and the surgeon in donning their gowns and gloves. The midwife and surgeon apply the drapes in a coordinated manner across C.'s prepped abdomen.

The surgeon makes a transverse incision above the symphysis pubis. Once the abdominal wall is opened to the abdominal cavity, the bowel is packed cephalad with warm, saline moistened laparotomy sponges to create additional exposure. The first assistant and the surgeon place lap sponges to protect the abdominal wall as the self-retaining retractor is placed. The enlarged uterus is easily visible. There are multiple fibroids visible under the surface, and the contour is clearly distorted. The fundus of the uterus is firmly grasped with a single-toothed tenaculum. Using the tenaculum, the midwife first assistant applies traction and rotation to the uterus to pull the supporting ligaments clearly into the surgeon's view under tension.

The surgeon grasps the round ligament with 2 clamps, and the first assistant holds one clamp while the ligament is cut. A suture ligature is placed around the ligament pedicle. As the knot is tightened, the first assistant gently releases the clamp with the right hand and then cuts the suture with suture scissors using the left hand.

An opening in the broad ligament is made with blunt dissection by separating the tips of the Metzenbaum scissors. The visceral peritoneum is dissected anteriorly and across the vesicouterine serosa. The process is repeated on the other side. The margins of the bladder are carefully identified by both the surgeon and the first assistant. The peritoneal bladder reflection is carefully incised superior to the bladder, and the bladder is bluntly dissected off of the lower uterine segment by gently using a moistened 4 x 4 on a sponge stick to push the tissue toward the cervix.

Care is taken to clearly identify the ureters in the pelvic sidewalls by their distinct peristaltic action before clamping or cutting any structures in this region. The fallopian tube and ovarian suspensory ligament are doubly clamped and cut next. Again, the first assistant holds the clamps as the suture ligatures are placed, and releases each clamp slowly while watching for bleeding as the initial knot is tightened.

As each ligament is approached, the first assistant gently rotates the bulky uterus out of the surgeon's field of vision to allow meticulous placement of the clamps. The surgeon holds each clamp during placement of the suture ligature. The first assistant then holds the clamp while the surgeon

ties the suture ligature and releases the clamp slowly as the suture tightens. The first assistant requests suture scissors to cuts each suture, leaving a tail approximately 1 cm in length. This process is repeated until all ligaments and vessels have been cut and the lower uterine body is exposed to the level of the vagina.

With the blood supply disrupted, the uterus is now pale. However, it still fills the wound and makes visibility within the pelvis difficult. Due to the large size of the uterus, palpation of the cervix and surrounding tissue is necessary to determine that the dissection is sufficient. The first assistant applies moderate traction to reveal the upper portion of the vagina. The surgeon makes a stab incision into the upper vagina in the midline with a scalpel blade. Curved hysterectomy scissors are placed into the opening and a circumferential incision is gradually made around the vagina. As the surgeon separates the uterus from the upper vagina, the first assistant requests long Allis clamps and carefully grasps the full thickness of the vaginal mucosa and the peritoneal edge of the vaginal cuff as it is separated from the uterus to ensure hemostasis and anatomic approximation of tissue during closure of the vaginal cuff.

The surgeon closes the vaginal cuff with interrupted sutures and incorporates the uterosacral ligaments in the closure for vaginal support. The entire pelvis is examined for bleeding. Blood loss is estimated, and urine color and volume are assessed. The pelvis is gently irrigated with warm saline to remove excess blood, and the first assistant suctions the irrigation fluid by placing the corner of a lap pad over the suction tip so that no tissue is pulled into the suction. The areas of dissection in the pelvis appear to have good hemostasis. The ureters are visibly functioning. The urine is pale yellow.

The self-retaining retractor is removed and the bowel is released. Initial sponge, needle, and instrument counts are performed as the surgeon prepares to close the laparotomy incision. All counts are correct.

The abdominal peritoneal edges are grasped by the surgeon with Kelly clamps. The peritoneum is pulled together in the midline with a running 0 Vicryl suture. The knot is placed well above the lower apex to avoid injury to the bladder. Following the closure of the peritoneum, the fascia is closed by the surgeon with heavy 0 Vicryl suture using a running stitch and the rule of ones. The first assistant follows the suture to maintain the approximation of the tissue until the entire suture line has been placed, while the surgeon places each stitch 1 cm from the edge of the incision, and 1 cm from the previous stitch. The subcutaneous tissue is irrigated with warm saline, and cautery is used to ensure hemostasis before the subcutaneous layer is closed with a running 3-0 Vicryl suture to eliminate dead space and reduce the tension at the skin edges. The skin is approximated by the first assistant with a 4-0 braided absorbable suture using a subcuticular technique. The first assistant everts the skin edges and applies slight traction using Adson forceps as each stitch is placed until the wound is closed. The suture is tied, brought through the wound to exit on the skin surface where it is cut short, so the suture end retracts below the skin surface.

Following surgery, C. has an uneventful recovery. The midwife evaluates overall status and incision before discharging C. on the third day following surgery. At 6 weeks postop, C. is very pleased with resolution of the bleeding and pelvic pressure symptoms. When the midwife examines the incision site, C. states that the scar is still tender, but the presence of the scar is becoming more familiar.

THE ROLE OF THE FIRST ASSISTANT DURING LAPAROSCOPIC GYNECOLOGIC SURGERY

In the gynecologic setting, laparoscopy is commonly used for the evaluation of conditions that are difficult to diagnose without direct visualization of pelvic contents. Laparoscopy provides excellent visualization of pelvic contents with the smallest possible incisions and can result in improved client outcomes compared to laparotomy. Laparoscopy provides direct visualization or access of uterine support, vasculature, or other pelvic structures using a minimally invasive approach. Many gynecological procedures can be performed laparoscopically, and this approach can result in reduced blood loss, diminished postop pain, shorter hospital stays, lower rates of infection, and faster return to normal daily functioning compared to open abdominal surgery.[6]

Diagnostic laparoscopy is most often performed for evaluation of pelvic disease, infertility, or evaluation of pelvic pain.[24] Laparoscopy is also used for tubal ligation using a number of different techniques, treatment of ectopic pregnancy unresolved by medical management, treatment of pelvic or adnexal masses, and hysterectomy either via laparoscopic assisted vaginal hysterectomy or total laparoscopic hysterectomy.

Laparoscopy involves viewing the abdomen or pelvis via an endoscope or miniature camera that is inserted into the abdomen.[25] The camera is typically connected to an external screen so the images are projected for visualization by the team. Small abdominal incisions are created, taking care to avoid abdominal vessels, and sleeves or trocars are introduced through the abdominal wall into the abdominal cavity. These ports range from 5 to 15 mm in diameter and allow access into the abdomen for the endoscope and laparoscopic instruments.

To allow visualization of the abdominopelvic contents and room for the instruments to be manipulated, carbon dioxide gas is gently insufflated into the abdomen to create a pneumoperitoneum. This process distends the abdominal wall, provides the space needed to visualize and manipulate organs, and allows access to the organs and anatomic structures during surgery to diagnose or treat disease.[25] Intraabdominal pressure must be maintained in a safe range to avoid the development of subcutaneous absorption of CO_2 which can result in subcutaneous emphysema or a collection of CO_2 in the tissue.

The skills used to perform laparoscopic surgery are different from those used during open surgical cases. The surgeon must adapt to technical challenges, including limited range of motion within the surgical field, indirect tactile sensation, changes in depth perception, and the limitations inherent in manipulating laparoscopic instruments.[26] The surgical field is viewed remotely via a video monitor, and laparoscopic instruments are manipulated through the ports while watching their actions on the monitor screen. Instruments specifically developed for laparoscopic use are long and narrow and are designed to fit through specific port sizes.

Different approaches can be used to maintain visualization of the active surgical site. Trendelenburg position displaces abdominal contents cephalad to reveal the pelvic contents. The camera must be maintained with the active surgical field displayed upright. Antifogging solutions or sealed cameras are used to keep the view clear. Bleeding vessels can be clipped, tied, or sealed using a tissue sealing device. Smoke plume and steam from use of a cautery or the Harmonic scalpel are evacuated to maintain picture clarity. Blood and fluid are removed from the abdomen or pelvis with suction.

The midwife assuming the role of first assistant during laparoscopic surgery can create a personalized learning plan (Appendix 3) to become familiar with the range of laparoscopic equipment used, the sequence of the procedures to be performed, and the surgeon's expectations for the first assistant. Ideally, an in-service visit with the manufacturer's sales representative or an OR staff member who is skilled in the use of the equipment, is arranged. The first assistant can learn to assemble and disassemble the laparoscope, ports, and instruments and become familiar with the monitor(s) and connections. Practice setting up the laparoscope and related

Sample Indications for Laparoscopy[26]

- Diagnostic evaluation: pelvic pain or adnexal mass.
- Ectopic pregnancy: diagnosis and surgical treatment.
- Endometriosis: diagnosis and treatment.
- Ovarian or adnexal mass: diagnosis and/or treatment.
- Laparoscopically-assisted vaginal hysterectomy.
- Total laparoscopic hysterectomy.

equipment such as the monitor and CO_2 insufflator can aid in technical problem solving when needed.

Preoperative Client Care in Laparoscopy

Preoperative client care for those undergoing laparoscopy includes evaluation for factors that might affect the laparoscopic approach, require variations in technique, or hold the potential for transition to open surgery. While an elevated body mass index can make initiating the laparoscopic approach more difficult and contribute to laparoscopic-related complications, in general, the laparoscopic approach allows for greater visualization and easier manipulation of the pelvic contents.[25,26] Underlying cardiac or respiratory disease can pose additional challenges related to the insufflation pressure of the abdomen, absorption of CO_2, and the use of Trendelenburg's position.[10,12,27] A lower insufflation pressure or other measures may be required.

Laparoscopic surgery can be performed electively (eg, tubal ligation) or as an emergency surgical procedure (eg, ruptured ectopic pregnancy or acute torsion of the ovary). In emergency circumstances, the surgeon's preoperative evaluation includes timing of the last oral intake and evaluation for signs or symptoms of hypovolemia secondary to hemorrhage. These signs include weak thready pulse, cold extremities, hypoperfusion (which can lead to mental status changes), and decreased renal blood flow with diminished urine output.

Preoperative client education includes discussion regarding indications for the procedure and the expectation of general anesthesia. Benefits of laparoscopic surgery include smaller incisions, direct visualization of abdominal contents, minimal postop pain, brief recovery time, and low rates of infection. Risks of laparoscopic procedures include the potential for injury to bowel or bladder with insertion of trocars, potential respiratory difficulty secondary to insufflation of the abdomen, effects of positioning, and the usual risks of surgery. The alternatives to laparoscopic surgery include open abdominal surgery and vaginal surgery, depending on the condition being evaluated or treated.[6]

Whenever laparoscopic procedures are performed, the potential for conversion to an open procedure or laparotomy exists. Conversion to an open case can be due to the presence of adhesions, difficulty performing the procedure via laparoscopy, hemorrhage, or injury to organs. Following informed consent, preoperative history, physical exam, and laboratory studies, the client ambulates or is moved to the operating room. Antibiotics are administered approximately 1 hour before the surgery, and antithrombotic devices are applied. In clients with elevated risk for venous thromboembolism, pharmacologic prophylaxis is initiated.

Preoperative Diagnostic Testing May Include the Following:

- Pelvic ultrasound or computed tomography
- Q-βHCG
- Complete blood count
- Prothrombin time (PT), partial thromboplastin time (PTT), and bleeding time
- Type and screen or crossmatch, based on working diagnosis
- Blood urea nitrogen (BUN), creatinine
- Urinalysis

Intraoperative Client Care: Anesthesia for Laparoscopic Procedures

General anesthesia has long been preferred for laparoscopic procedures. General inhalation anesthesia is commonly used for short procedures, such as postpartum tubal ligation, as the effects can be quickly reversed, and can be transitioned for longer cases as needed. General anesthesia allows for good muscular relaxation and can reduce the sensations of pulling and tugging that can often be felt with regional anesthesia. Attention is paid to the depth of anesthesia and muscular relaxation.[27] However, with more surgeries being performed in the outpatient setting, regional anesthesia is being used more often for laparoscopic procedures with significant advantages. Current evidence suggests that it can provide greater muscle relaxation than general anesthesia, with a client who is awake and spontaneously breathing.[27] There tends to be less postoperative nausea and vomiting with regional anesthesia, and there is less use of narcotics as regional anesthesia provides a measure of pain relief in the immediate postop period.

Client Care During Laparoscopic Procedures

The procedure is started with the person supine or in the dorsal lithotomy position. Pressure points are padded. Consider slight flexion of knees if the client will remain supine. Legs are secured with a leg strap or placed in leg rests when vaginal access is needed. When using leg rests, legs are moved simultaneously to avoid straining the client's lumbar spine.[11] The client's abdomen and umbilicus are carefully cleaned. The genital region is prepped from mons to upper thigh, including vaginal prep if there is a vaginal component to the procedure, as with a laparoscopically-assisted vaginal hysterectomy.[28,29]

The client is draped using a laparotomy drape or an "up and down" gynecologic laparoscopy drape, which has separate fenestrations for the abdomen and the genital area. Based on the anticipated procedure, drapes or extra half-sheets are used as needed to complete the sterile field. Trendelenburg's position is commonly used to displace pelvic contents cephalad after abdominal insufflation and placement of the laparoscope.

Laparoscopic Equipment

Laparoscopic equipment includes:

- Laparoscope with lens system, light source, and cable.
  - » The lens may be 0° or 30°. The 0° lens is more commonly used in gynecologic procedures, but the angle of the 30° lens can allow superior visualization of difficult to see areas.
- Monitor(s) are commonly used to allow for remote visualization of the surgical site by the OR team. The monitor can be placed at the foot of the bed, or two monitors can be used with one on each side of the client, so the surgeon and the first assistant each facing the OR table can have good visualization of the field through the monitor. The set up that is most ergonomically correct for the surgeon and first assistant is preferred to avoid undue fatigue and potential compromise of technique and procedure.
- An automatic CO_2 insufflator system will allow regulation of abdominal pressure. The abdominal pressure is maintained between 12 to 15 mmHg. Use of the lowest pressure that allows for adequate abdominal distention can reduce the incidence of subcutaneous emphysema, which can occur when gas is trapped in the superficial tissue.
- A Veress needle or Hasson trocar is placed into the abdominal cavity for initial insufflation of the abdomen with CO_2.[25] The camera is inserted through the umbilical port. Additional trocars of various sizes are strategically placed under direct visualization for additional ports. Trocars may be reusable or disposable and the cannula has a valve to prevent the escape of gas. Trocars are used to enter the abdomen and provide cannulas with ports through which the laparoscope or instruments may be passed. Cannulas may have a threaded exterior to help anchor them in tissue and prevent inadvertent removal when withdrawing an instrument.

Instruments and Other Supplies

- A uterine elevator or manipulator can be placed vaginally into the uterus and used to manipulate the uterus to allow greater visualization of the posterior uterus, ovaries, and tubes as the case progresses. The elevator or manipulator is usually inserted through the cervix and is secured by inflation of a balloon-tip or clamp system. The instrument handle is covered with a sterile drape so it can be manipulated manually by the surgeon or the first assistant to position the uterus. Uterine elevators may be fixed once the desired position has been obtained.
- Needle-tipped aspirators can be used to suction contents from cystic masses or the cul-de-sac.
- Collection devices can be used with the aspirators to collect specimens for cytology or culture.
- Blunt irrigator-aspirators allow for irrigation and directed mechanical suctioning. This can be very helpful in clearing the surgical site of blood, smoke, or irrigation fluid and permit adequate visualization of the operative site. Blunt irrigator-aspirators can also be used as probes to manipulate tissue.
- Probes are used for atraumatic manipulation of tissue. Probes are smooth, blunt instruments. They are most often used in gynecologic surgery for gently moving mobile tissue such as bowel or fallopian tubes.
- Graspers or forceps come in a wide range of sizes and tip types. They may be blunt or needle-nosed and have straight or curved tips. They may be atraumatic, such as a Babcock or bite tissue such as a biopsy forceps. Forceps are used to grasp, hold, and dissect tissue and collect specimens. Locking forceps are ratcheted; this maintains

the hold on tissue without having to hold the handgrips closed and under pressure.

- Laparoscopic scissors (endoscissors) can be straight or curved. Scissors can be attached to unipolar or bipolar cautery to allow for coagulation prior to cutting tissue. Endoscissors have the ability to rotate the blades using a thumb wheel located at the handle to facilitate directing the blades to the desired plane.
- Hemostatic devices for laparoscopic surgery can include monopolar and bipolar electrosurgical devices, and the Harmonic scalpel. Based on the device, it can seal a vessel up to 7 mm in diameter, which allows some procedures to be performed exclusively using laparoscopic devices.[30] Other devices include monopolar or bipolar electrosurgical scissors; monopolar electrosurgical devices with a hook tip or a spatula tip; a bipolar electrosurgical grasper such as the Kleppinger. Smoke or plume from these devices can obscure visibility and must be vented with care to remove the smoke from the surgical field. All electrosurgical instruments must be insulated to protect the client from burns. Care is taken to avoid touching metal instruments or trocars with the electrosurgical device while using current, as this could conduct the current to unintended sites.
- A laparoscope warmer is a vacuum bottle on a stand filled with warmed saline solution that is used to maintain the scope at, or greater than, body temperature when it is not in use. This can help to reduce fogging and inadvertent dropping and damage of delicate equipment.
- Antifogging solution reduces fogging of the laparoscope and is applied to the lens and fittings as appropriate for the camera. The first assistant who drives the camera will be expected to know how to use its components and how to troubleshoot if fogging or other difficulty occurs. Alternative defogging techniques include gently dipping the camera lens against soft tissue or removing the camera from the abdomen to wipe the lens with a dry sponge.

Sutures and Hemostatic Devices

Laparoscopic suturing requires skill and dexterity to perform. Various endoscopic suturing devices are available. One study examined the effect of an educational video on operator skill using a device and found that accuracy of stitch placement in simulation was improved.[31] Barbed suture, which doesn't require knots, is available for use in laparoscopic cases and has been demonstrated as safe for closure of the vaginal cuff during a total laparoscopic hysterectomy.[32] Upon completion of the case, heavy (0 or 1) braided or monofilament absorbable suture is used to close the fascial opening at the umbilical port site to prevent hernia development. When ports larger than 5 to 7mm are used, the fascia is usually closed. Subcutaneous and subcuticular sutures are then used to close the superficial aspects of the incision sites.

Considerations for the First Assistant During Laparoscopy

Laparoscopic procedures are considered minimally invasive and are performed through very small incisions which require the surgeon and first assistant to operate in a coordinated manner with a heightened awareness of each other's actions each step of the procedure.[6] The abdomen is entered at the umbilicus using either an open technique (Hasson) or using a Veress needle.[25] The open technique is associated with a lower rate of failed entry, while the Veress technique is associated with higher rates of failed entry, extraperitoneal insufflation, and omental injury.[25]

Previous abdominal or pelvic surgery can result in scarring or adhesions that increase the risk of injury to abdominal contents during insertion of the trocar or Veress needle or as the case progresses. Careful attention to technique is required to avoid injury to bowel or other tissue that may be adherent to the underside of the abdominal wall or are fixed rather than mobile, secondary to adhesions or scarring.

Once entry into the abdominal cavity is verified, gradual abdominal insufflation may occur. Abdominal pressure is maintained at 12 to 15 mmHg to avoid subcutaneous emphysema. When the Veress needle technique is used, the trocar is inserted after insufflation.[25] Observe for safe CO_2 insufflation pressures. Notify the surgeon and anesthesia personnel if pressure raises above 15 mmHg; the client may require deeper anesthesia, or there may be an equipment malfunction. Insertion of the laparoscope or camera allows for direct visualization and transillumination of the abdominal wall to highlight large blood vessels during insertion of trocars to assure optimal placement.

The first assistant typically holds instruments during laparoscopic surgery and may run the camera. It takes time and practice to perfect the ability to hold the camera

steady and in the correct plane to provide the surgeon with the appropriate view. Additional skill is needed to grasp instruments or probes with the free hand while looking into the monitor. Every effort is made to keep the active surgical field in the center of the monitor screen. Whether the surgeon stands on the client's right or left depends on the procedure and the primary location of the area of concern.

Incision Techniques

The abdomen is entered through a small, usually subumbilical incision and insufflation with CO_2 is initiated, as described in the section that follows. The resultant pneumoperitoneum creates space that allows visualization of abdominal and pelvic contents. The laparoscopic cannula is secured to hold the device in place and form a seal, and the CO_2 hose is attached to the insufflation port of the cannula.

In the Hassan or open technique, a small (2 cm) incision is made at the midline, either horizontally following the natural curve of the umbilicus, or vertically. The abdominal wall is incised inferior to the umbilicus to the level of the fascia. The fascia is cut and grasped using Kocher clamps, or by placement of heavy retention sutures. Traction is applied to the sutures and the peritoneum is entered bluntly with closed Metzenbaum scissors. The scissors are then gently opened, and as they are withdrawn, they tent the abdominal wall and enlarge the puncture to accommodate the trocar. Digital palpation can be performed prior to insertion of the trocar to verify free space in the abdominal cavity below the planned port site. The blunt-tip trocar is inserted and the obdurator is removed from the cannula. The cannula is then secured to the abdomen with fascial or skin stay sutures.[25]

Alternately, a safety trocar may be introduced directly into the abdomen. A safety trocar has a sharp tip to puncture the fascia and peritoneum. Once the device enters the abdominal cavity, the tip then automatically withdraws to avoid inadvertent tissue trauma.

During the direct technique, a small abdominal incision is made and the abdominal wall is grasped at the level of the umbilicus and lifted manually on each side of the umbilicus to create open space in the abdominal cavity. This allows the sharp tip of the safety trocar to be pushed through the fascia and peritoneum. The elevation during entry into the abdomen decreases risk of injury to intraabdominal organs or vessels. The angle of insertion of the safety trocar tip is adjusted according to the anticipated thickness of the abdominal wall.[25]

In the Verres technique, a small incision is made in the skin. The abdominal wall is grasped firmly on each side of the umbilicus and elevated to tent the abdominal wall away from intra-abdominal contents. The needle is slowly inserted at an angle toward the pelvis and away from abdominal vessels until the parietal peritoneum is perforated.[25] The abdomen is then insufflated gradually with CO_2 until it is apparent that the needle tip is intraabdominal. Once pneumoperitoneum has been obtained, the initial cannula is placed similarly to the direct technique and the laparoscope is inserted.

In all techniques, additional trocars are placed under direct visualization of the intraabdominal wall by use of the laparoscope. The location of additional trocars is dictated by the client's anatomy and the planned procedure.

Operative Anatomy

Common trocar placement locations in the abdominal wall are: inferior to the umbilicus, superior to the symphysis, and in the right and left lower quadrants, taking care to avoid the epigastric arteries. Transillumination of the abdominal wall with the laparoscope can be performed to identify the location of the epigastric vessels. Abdominal layers that are punctured during trocar insertion include: subcutaneous, fascia, muscle, and parietal peritoneum. When there is potential to encounter scar tissue adhered to the internal layer of the abdominal wall due to previous surgery or abdominal or pelvic inflammation or infection, extreme caution is used when entering the abdomen and when placing trocars.

The uterus, ovaries, fallopian tubes, and other pelvic structures can usually be clearly identified using the laparoscopic approach. The infundibulopelvic ligament, round ligament, and location of the uterine artery are clearly identified prior to any dissection. The bladder can be identified by its rosy yellow layer of protective fat or by manipulation of the Foley catheter. When the margins of the bladder are unclear, the Foley can be clamped briefly to allow bladder distention which will delineate the bladder margins. Both ureters must be definitively identified during pelvic dissection to avoid damage or inadvertent ligation. The colon and small bowel,

including the appendix (if present), are clearly identified and any abnormalities noted.

Surgical Techniques

The abdomen is entered using either the open or closed technique described earlier. The laparoscopic view of the pelvis shows the fundus of the uterus and the bladder. External manipulation of the uterus allows exposure of the ovaries, fallopian tubes, and supporting ligaments. During diagnostic laparoscopy, (ie, for evaluation of endometriosis), the surgeon determines next steps based on their initial clinical findings. Tissue samples can be taken for microscopic evaluation. Examples of 2 laparoscopic surgical procedures are provided.

Laparoscopic Management of Ectopic Pregnancy

While treatment with methotrexate for ectopic pregnancy is increasingly offered to clients, surgical management remains common practice. It is important to know that research suggests that there are disparities in which management options for ectopic pregnancy are offered. In one study, the authors found that Medicaid recipients and the uninsured were less likely to receive methotrexate (8% and 13% respectively) than those clients with commercial insurance.[33] Salpingostomy (tubal conserving) and salpingotomy (tubal removal) surgery occurred in 72% of women on Medicaid (2015 data).[33] Among the women who underwent surgery, salpingotomy occurred at a rate of 94% (2015 data) and was more common among black and hispanic women and those without commercial insurance coverage.[33]

During laparoscopic surgery, an intact ectopic pregnancy can be difficult to visualize. Once the pregnancy is identified, the fallopian tube can be opened and evacuated via salpingostomy. A 1 to 2 cm incision is made in the affected area of the tube using a laparoscopic needle-tipped electrosurgical device or other sharp dissection instrument. The products of conception and all injured tissue are evacuated from the tube and captured in a specimen pouch to avoid spillage of trophoblastic tissue, which could result in intraabdominal trophoblastic cysts.[34] Care is taken to copiously irrigate and suction the affected area to remove all blood and debris. The wound is typically left to heal by secondary intention.[35] Bleeding is ideally controlled with pressure or compression to avoid excess tissue damage. A bleeding ruptured ectopic pregnancy can require copious irrigation and suctioning to clear the field and establish the exact site of the bleeding. Salpingectomy is often indicated and can occur using a laparoscopic linear cutting or electrosurgical device to desiccate the tissue prior to sharp dissection and removal of the tube.[35] Follow-up discussions with the client are provided so they are aware of the technique used, and its effect on future childbearing.

Laparoscopic-Assisted Vaginal Hysterectomy with Bilateral Salpingo-Oophorectomy

The laparoscopic approach can provide superior visualization of the uterine vessels during hysterectomy. After appropriate anesthesia, prep, and draping are completed, a uterine manipulation device is inserted through the cervix. Laparoscopic access to the abdomen is obtained, the abdomen is insufflated, and additional access ports are inserted. Using the intrauterine manipulation device, the uterus is lifted up and laterally, to reveal the round and infundibulopelvic ligaments on one side. The infundibulopelvic ligament is transected using a laparoscopic vascular device, while the tube and ovary are held under gentle tension with a grasper. The round and broad ligaments and associated vessels are identified and dissected close to the uterus. This process is repeated on the opposite side. The endoscissors or shears, are then used to dissect the vesicouterine fold of peritoneum anteriorly off the lower uterine segment. The vesicoperitoneum is tented to allow placement of a vascular sealing device on the lower broad ligament close to the uterus, above the uterine artery, and medial to the ureter, which is clearly identified prior to performing this dissection.[36] Injuries to the ureters most commonly occur at the level of the vaginal cuff, constitute a surgical emergency, and may not be apparent until after the surgery has been completed. Treatment consists of a retrograde ureteral stent or additional surgery for repair of the injury.[36]

Once the uterus has been freed from its pelvic attachments, attention is turned to the vaginal portion of the case. At this time, the laparoscope can be withdrawn from the abdomen or operated by the first assistant for greater visualization as vaginal dissection takes place. Care is taken to keep the laparoscope lens away from tissue, as burns can occur. If the pneumoperitoneum is lost when the uterus is withdrawn from

the vagina, the laparoscope is temporarily removed from the port and placed on the sterile Mayo stand or in a scope warmer.

Moving to the vaginal approach, the cervix is grasped with a tenaculum by the surgeon, and the anterior peritoneal space is entered through the previously dissected vesicouterine fold. A tenaculum is used to apply traction to the uterine fundus to flex it anteriorly and bring it through the anterior cul-de-sac into the vagina. The uterus is then fully rotated and gentle traction is applied until the uterine fundus is visualized at the introitus. The uterine arteries are identified, suture-ligated, and sharply separated along with the cardinal ligament. The uterus is withdrawn from the vagina. The vaginal mucosa is identified, clamped above the uterosacral ligaments, and incised. The uterosacral ligaments are plicated or stitched to the midline of the vaginal cuff to provide vaginal support. The raw edge of the vaginal cuff is run with a locked suture to ensure hemostasis. The vaginal cuff is then closed.

Following re-insufflation of the abdomen, the laparoscope can be used to verify adequate pelvic hemostasis. Once hemostasis is confirmed, laparoscopic ports are removed under direct visualization. At the close of the procedure, all incision sites are evaluated for hemostasis, and excess CO_2 is allowed to escape from the abdomen. Pre-or intraoperative injection of 0.5% Marcaine into the abdominal port incisions can reduce postoperative pain.

Urine output and color are monitored throughout the case. Due to the proximity of the dissection to the ureters, the surgeon may opt to use methylene blue dye and a cystoscope to verify bilateral patency and integrity of ureters at the close of the procedure.

Laparoscopic Wound Closures

Laparoscopy incisions at the umbilicus, or punctures from a 10 mm or greater sharp trocar, require fascial repair to prevent the development of hernias.[37] The subcutaneous tissue is retracted to expose the fascia. The fascia is grasped, and then using a heavy (0 or 1) absorbable suture, it is closed using running or interrupted stitches.

Skin is closed using a subcuticular technique. Small skin incisions (eg, for a 5 to 7 mm port) can be closed using a single stitch with a buried deep knot. The needle is inserted deep in the incision and brought out at the skin edge in the center of the skin incision. The needle is then inserted in the opposite skin edge and brought down deeply. Care is taken to avoid twisting the suture. Both free ends must be on the same side of the stitch before the knot is tied. Tension of the knot on the suture will pull the knot deep into the wound. Adhesive bandage strips can be applied to further approximate skin edges as necessary.

Postoperative Care after Laparoscopic Surgery

Postop pain can be reduced by the use of a long-acting local anesthetic at the incision site. Careful deflation of the pneumoperitoneum prior to closing the incision can reduce pain in the first 24 to 48 hours related to postoperative CO_2 migration. CO_2 moves through the tissue and can cause significant shoulder pain as it moves up and out of the body. This pain can be reduced by lying supine.

When used, the Foley catheter is removed at the close of the case or when the client is able to ambulate and any local edema that could interfere with voiding has diminished. A regular diet is provided. Most people are discharged home within 24 hours, based on the indication for the procedure and individual response to the surgery. Incisions are examined for integrity and signs of impending infection before discharge.

Emotional responses to laparoscopic surgery vary with the indication for, and results of, the procedure. Diagnostic laparoscopy can be very stressful emotionally when the diagnosis is uncertain. There may be a significant wait for final pathology results to be returned or to determine whether the procedure restored fertility.

Clients should return to the office for evaluation at approximately 1 to 2 weeks postop. The postoperative discussion includes inquiry into bladder and bowel function, healing of incisions, and any discomfort or concerns regarding sexual activity. Pathology reports are reviewed in detail along with any follow-up that is indicated.

THE ROLE OF THE FIRST ASSISTANT DURING VAGINAL SURGERY

Preoperative Client Care

Many people have complex feelings about impending vaginal or urogenital surgery.[38] The preoperative history and physical

CASE STUDY: Laparoscopic Approach to Ruptured Ectopic Pregnancy

S. is a 24-year-old who is pregnant for the first time and scheduled for anthe initial obstetric intake visit. S. calls the office reporting right lower quadrant pain and requests to be seen immediately. As the triage midwife obtains the history, the midwife notes that the client has a prior history of chlamydia at age 18. S. has never had any surgery, including appendectomy. S. is at 10 weeks gestation by last menstrual period. In addition to the right lower quadrant pain, S. reports pain in the right shoulder. On gentle external physical examination, S. guards the lower abdomen. Vital signs include the following: T-99.2°F, P-100, BP-100/58, R-20. A QßHCG and CBC are drawn and a pelvic ultrasound is performed.

The midwife's working diagnosis is right lower quadrant pain in the presence of a positive pregnancy test. Differential diagnoses under consideration are ectopic pregnancy, appendicitis, or adnexal mass. Lab results indicate a QßHCG of 12,000, white blood cell count of 10.4, and hematocrit of 30%. Ultrasound shows a mass in the right lower quadrant with free fluid in the abdomen and no evidence of intrauterine pregnancy.

S. is admitted to the hospital with a diagnosis of ruptured ectopic pregnancy and is prepped for surgery. The consultant obstetrician-gynecologist performs the preop history and physical as part of the work-up. The midwife next sees S. in the OR, where the midwife provides support during administration of general anesthesia. Once S. is prepped and draped, the surgeon makes the initial subumbilical incision. The midwife first assistant sponges away bleeding to allow visibility of the small incision. Two Kocher clamps are applied to the fascia approximately 1 cm apart. Traction is applied to the clamps by the first assistant to tent the abdomen as the surgeon sharply dissects the fascia and preperitoneal fat and punctures the peritoneum.

A Hassan trocar is placed into the abdomen through the incision, and the trocar is removed leaving the cannula or port in place. The CO_2 tubing is connected to the port, and the abdomen is insufflated to 12 to 15 mmHg pressure. The laparoscope is inserted in through the port, and the intraabdominal contents are visualized. There is obvious blood in the pelvis, with a large clot and an actively bleeding vessel clearly in view on the right adnexa.

Under direct visualization with the laparoscope, additional trocars are inserted in the left lower abdomen and midline above the mons. A laparoscopic probe is used to gently manipulate the uterus for greater visualization. An endoscopic vascular sealing device is inserted into the left port, while the suction irrigator is inserted in the midline port. The midwife first assistant holds the camera steady in the umbilical port and directs the view at the bleeding vessel.

The bleeding edges of the tube are obviously ruptured, and the decision is made to perform a salpingectomy rather than try to repair the extensive damage to the tube. The vascular sealing device is placed across the tube and mesosalpinx by the surgeon; pressure is held for 60 seconds to improve hemostasis before the device is activated. The visible bleeding promptly stops. Additional electrosurgery is used as needed to ensure hemostasis.

A specimen collection bag is inserted through the lower midline port by the first assistant. A blunt-tipped grasper is inserted into the left hand port by the surgeon. The tube, large clots, and residual tissue too large to be removed via suction, are carefully placed in the specimen collection bag using the grasper. The suction irrigator is then used to gently break up and remove remaining blood, clots, and debris from the abdomen. No further bleeding is noted. The lower midline incision is enlarged slightly to allow withdrawal of the specimen collection bag. As the bag is removed, the first assistant quickly places a damp sponge in the wound to prevent gas escape and loss of the pneumoperitoneum.

The surgical site is once again evaluated for hemostasis. All is dry. The remaining accessory port is removed under direct visualization after which the laparoscope and Hassan port are removed. Incisions are closed simultaneously by

the first assistant and the surgeon using 0 Vicryl for the fascia and 4-0 Vicryl for the skin. S.'s vital signs are stable. S. is extubated when awake from anesthesia and moved to the postanesthesia unit.

Postoperatively, the midwife provides information and support and answers S.'s questions about the ectopic pregnancy, need for the removal of the tube, and future fertility.

provide an opportunity to assess the individual's emotional response to this surgery. As always, it is important to review the indications for surgery, anticipated benefits, possible risks, and available options or alternatives. It is essential to verify each person's understanding of the information provided before consent is requested. This is particularly important with vaginal hysterectomy, which has no external incision. As a result, it can be perceived as a minor procedure.

Explanations must be culturally appropriate, using an interpreter as needed to ensure full understanding of the planned procedure, anticipated postoperative course, and pre- and postoperative self-care.[3] Teaching related to postoperative pain management, vaginal discharge, urinary hygiene, need for hormone replacement, signs and symptoms of complications, and resumption of sexual activity is particularly important for people undergoing vaginal surgry. Discussion of draping and positioning to safeguard privacy and provide respectful care is an integral part of the perioperative preparation process. When examination under anesthesia is necessary, the need is explained to the client, and the person is advised who will be performing such examinations and the indications.[4]

Examples of Indications for vaginal surgery include:

- Hysterectomy for persistent dysfunctional uterine bleeding, benign lesions of the reproductive organs, or endometriosis;
- Cystocele, rectocele, enterocele repair;
- Pelvic organ prolapse (POP);
- Urogynecologic procedures; and
- Gender affirmation surgery

Comprehensive descriptions and illustrations of common gynecologic procedures can be found in texts such as *Atlas of Pelvic Anatomy and Gynecologic Surgery* by Michael S. Baggish, MD, FACOG and Mickey H. Karram, MD and *Atlas of Pelvic Surgery* by Clifford R. Wheeless.

Physical Examination

Routine preoperative physical assessment is performed. Elevations in blood pressure should be noted and shared with both the surgeon and anesthesia personnel. Hypertension can affect the surgeon's decision to use vasopressin (Pitressin) for hemostasis.[39] Vasopressin is a potent vasoconstrictor used to decrease blood loss during the initial dissection before the uterine vessels are interrupted. A thorough bimanual examination is performed preoperatively, after administration of anesthesia, to determine uterine size, verify the feasibility of using the vaginal approach when hysterectomy is planned, and to determine the presence and degree of any pelvic prolapse, cystocele, or rectocele. The remainder of the preoperative physical examination remains essentially the same as for other pelvic surgery.

Client Care for Vaginal Surgical Procedures

The dorsal lithotomy position is most commonly used for vaginal procedures. This position can be combined with the Trendelenburg position, especially during combined laparoscopic and vaginal cases.[11] Leg rests may be fixed or adjustable. Adjustable leg rests allow greater exposure of the surgical site as the case progresses. When manipulating the leg rests, care is taken to prevent excessive external rotation or flexion of the hip joint. Gluteal folds should be at the break in the OR table. The client's legs are raised and lowered simultaneously to prevent injury to the client's lumbar spine.[11] Compression stockings and/or a sequential compression device are used to prevent venous stasis in the client who is in the lithotomy position for a prolonged period of time.

Preoperative clipping of pubic hair is performed when needed. An antimicrobial scrub or prep solution is applied from vulva to mid-thigh, with additional prep of the urethra, vagina, perineum, and anus. Additional Povidine-iodine can be applied and allowed to pool in the vagina to ensure contact with all surfaces.

Draping begins with a sterile, waterproof drape under the buttocks. A sterile towel with an adhesive strip is commonly used to isolate the anus from the rest of the sterile field. Sterile leggings are applied followed by the abdominal drape. Care is taken to ensure that the drapes do not part at the client's hip and provide an opportunity to contaminate the first assistant when they are working from above. The first assistant can also work from the vaginal side of the field, provided there is ample room. The surgeon operates seated on a stool placed in the space between the client's separated legs.

Equipment, Supplies, and Sutures

Leg rests are used to hold the legs in the lithotomy position. These can be sling-style, below knee, or whole leg rests. They can be fixed or adjustable. Leg rest posts are fixed to the OR table with a mechanical device. The leg rests are adjustable to fit the individual's leg length and the amount of hip flexion desired to maintain physiologic positioning while providing exposure to the operative site. Adjustable leg rests are able to be adapted during surgery with handles covered by sterile drapes. This allows for more precise exposure of the surgical site as needed. Care is taken to avoid trauma secondary to excessive abduction of the hip when the client is under anesthesia and musculoskeletal resistance is diminished.

Weighted speculums are commonly used to reveal the posterior portion of the vagina and provide exposure. Care is taken to keep the weighted speculum positioned and in place to avoid injury to pelvic tissue or inadvertent dislodgement.

Grafts may be used to provide reinforcement to weakened tissue. For example, a urethral sling can be used to support the bladder neck for the treatment of incontinence. Grafts can be created from the client's tissue (an autologous graft, such as a graft created from fascia), or heterologous grafts from cadaver or animal tissue, which is favored over synthetic material, such as Gortex or Marlex mesh.[40]

Throughout the procedure, number 0 absorbable Vicryl or Dexon sutures are commonly used. A curved-tip needle holder (ie, Heaney needle holder) is commonly used for vaginal surgery. The needle used commonly has a tight (5/8) curve to protect vaginal tissue and the needle is frequently angled to allow for accurate suture placement in the confined space of the vagina. The curve (back) of the needle can be used to safely push against adjacent tissue to expose the desired needle insertion site.

Considerations for the First Assistant During Vaginal Surgery

Vaginal surgery is performed to treat disease; repair pelvic prolapse, cystocele, or rectocele; perform perineoplasty; or for gender affirming surgery.[41] When performing hysterectomy, most operators prefer some degree of pelvic laxity that permits descent of the uterus. Visibility during vaginal hysterectomy is often minimal for the first assistant. Care is taken to provide maximum exposure by positioning and holding retractors under guidance from the surgeon without being able to see the operative site.

General anesthesia is commonly used for vaginal surgery. General anesthesia allows for good muscular relaxation and prevents the sensations of pulling and tugging, which are part of the procedure and can often be felt with regional anesthesia.

When needed and authorized by the client, a bimanual examination can be performed under anesthesia to better assess the size of the uterus, including contours and mobility, and the presence of any pelvic organ prolapse.[42,43] A small, smooth, mobile uterus that descends easily with traction is ideal for vaginal hysterectomy. A large fibroid uterus (greater than 12 cm in size) that does not descend well can make for a complex and difficult vaginal case or may require intraoperative techniques that reduce uterine bulk or conversion to a laparoscopic assisted procedure.[43,44] Because surgeon experience is a crucial factor when using the vaginal approach, the surgeon may wait to determine the optimal surgical approach until after the examination conducted under anesthesia is performed.

Incision Techniques

Vaginal surgery includes many types of procedures. Incisions are made following anatomic lines whenever possible to aid healing and to preserve the appearance of the genital region.[44] Incision techniques vary depending on the nature of the procedure to be performed.[44] During vaginal surgery, incision lines are placed to allow access to the needed anatomic planes and structures and allow anatomic repair and approximation of tissue following the procedure.

Vaginal and cervical tissue can be injected with Pitressin prior to incision. Pitressin is used to help minimize bleeding in this highly vascular area, but its use is not without risk of complications.[39,45] Pitressin injection can help to define the planes of the pelvic tissue and limit blood loss, thus improving visualization in the tight confines of the vagina. However, it can also affect blood pressure and cardiac output. Therefore, the anesthesia provider is notified verbally by the first assistant or surgeon immediately prior to administration of Pitressin injection by the surgeon.[39,45]

Operative Anatomy

Identification of anatomical landmarks is essential to assuring optimal surgical outcomes although superficial appearances vary widely between people. The hymenal ring is identified by the change from vulvar epithelium to vaginal mucosa at the introitus. Remnants of the hymenal ring delineate the original border of the vaginal introitus. The urethra, perineum, rectum, and vaginal mucosa with anterior and posterior cul-de-sac are identified. Care is taken to note any cystocele, rectocele, or enterocele that is present, as these can distort anatomic landmarks.[45] For gynecologic or urogynecologic cases, a Foley catheter can be placed preoperatively and removed when access to the urethra is required.

The uterus has ample mobility for a vaginal procedure when there is visible decent of the cervix when traction is applied with a tenaculum. During a vaginal hysterectomy, the posterior vaginal fornix is incised to enter the pelvis. After the peritoneum is entered, the long, weighted speculum is placed through the incised posterior fornix and peritoneum into the pelvis to expose the uterus, accompanying ligaments, and vessels, and to provide the visualization necessary so they can be isolated, clamped, and ligated.[45] The vesicouterine fold of the vesicouterine serosa is identified, as this is where the uterus will be separated from the posterior bladder margin. The broad ligament, tubo-ovarian round ligament, uterosacral ligament, cardinal ligament, and uterine artery are often identified by the first assistant by the stage of the procedure and adjacent structures rather than by clear visualization.

Pelvic organs that can inadvertently be damaged include the bladder, ureters, fallopian tubes, ovaries, small intestine, rectum, and colon. Close attention when applying clamps can minimize risk of injury. Clamping of the broad ligament where it attaches to the lower uterine segment also clamps the uterine artery. The first assistant must observe for bleeding from this pedicle following vessel transection and ligation. Injury to the ureters can occur during lateral clamping of the broad ligament. To prevent injury, the surgeon maintains the clamps as close to the body of the uterus as possible and observes for the characteristic pulsatile peristalsis of the ureter to identify its location.

Surgical Techniques

Vaginal surgery presents a challenge for the first assistant. Visualization is minimal, and postures are frequently awkward. The first assistant can work with the surgeon from below (at the level of the vagina), or from above (at the client's side). When the first assistant is positioned at the client's side and reaching over the legs to provide visualization, it is essential to avoid applying pressure on the client's legs.

Vaginal Hysterectomy

For the appropriate candidate, vaginal hysterectomy offers a surgical approach that is more cosmetically pleasing, is less painful postoperatively, and has fewer complications than abdominal hysterectomy.[6] The vaginal approach to hysterectomy requires meticulous attention to anatomic landmarks during dissection, as visibility may be extremely limited, and inadvertent injury can occur to pelvic structures such as the ureters, the sigmoid colon and rectum, pelvic nerves, and numerous pelvic vessels.[40,44-46]

A short, weighted speculum is placed in the vagina. The cervix is grasped with a tenaculum and pulled into the vaginal opening. The anesthesia provider is notified prior to vasopressin being injected. Vasopressin solution is injected superficially into the cervix. The injection plumps up the tissue, makes the planes easier to identify, and provides vasoconstriction to reduce blood flow to the area. The cervix is incised circumferentially using a curved or Beaver blade. Once the cervix has been incised, the mucosa can be separated from the cervix and uterus. Posteriorly, the vaginal cuff is retracted to reveal the posterior cul-de-sac, and the triangle of safety between the base of the cervix and the rectovaginal fold. This triangle of safety allows for transvaginal access to the abdomen with minimal risk of injury to surrounding structures.[44] When the posterior cul-de-sac is entered, a long, weighted speculum

or right-angle retractor is placed through the cul-de-sac into the peritoneal cavity. The anterior portion of the uterus is covered by the vesicouterine serosa, which also covers the bladder. Dissection of the vesicouterine fold will allow entry into the anterior cul-de-sac.

Right-angle vaginal wall retractors are used to provide exposure and reveal the broad ligament. These retractors are handled gently to avoid injury to delicate structures. They are designed so that the blade is offset from the handle to allow retraction of the vaginal walls without placing the first assistant's hand in the surgeon's line of sight and allow greater visualization through the vaginal canal. The surgeon clamps and cuts the uterosacral ligament, which is then suture-ligated under direct visualization. The first assistant releases each clamp slowly as the knot is tightened to ensure the tissue folds securely within the suture ligature. This provides for superior hemostasis and ligature strength. The amount of control necessary to release the clamp may require use of the first assistant's dominant hand. The tails of the suture are kept long and are often tagged using a hemostat or Crile clamp so that they can later be identified and incorporated into the vaginal cuff to provide anatomic support.

The remaining uterine ligaments are sequentially clamped, cut, and ligated until the tubo-ovarian round ligament remains. At this point, the uterus can be rotated 180 degrees, until the fundus is visible in the vagina, thereby occluding the vessels.[45] The tubo-ovarian round ligament is then clamped close to the uterus, cut, and ligated under direct visualization. The uterus is handed off, and all ligated pedicles are carefully examined for bleeding. The large uterine vessels can spasm and temporarily appear to have good hemostasis with suture ligature. Excellent hemostasis of all pedicles should be assured before attention is turned to the vaginal cuff.

The uterosacral ligaments can be incorporated into the vaginal cuff to provide the support needed to prevent prolapse of the vagina. Each pedicle is evaluated for hemostasis before the incisions are closed. The vaginal cuff is closed only after hemostasis has been assured. The peritoneal edge of the vesicouterine serosa is identified and hemostasis is secured. The serosa or the vaginal epithelium can be closed to form the vaginal cuff.[45] The vaginal cuff can also be left partially open (healing by secondary intention) to allow for drainage post-operatively, or the entire cuff may be closed with a running locked suture to provide additional hemostasis.[45]

Anterior/Posterior Repair

Cystocele, rectocele, or enterocele can result from childbirth, weakened tissue, or aging, and therefore pelvic floor muscles can require surgical reapproximation. These procedures can be performed at the same time as vaginal hysterectomy or as separate procedures.[47] The goal of these procedures is to restore anatomic positioning and improve function of the pelvic floor, bladder, and/or bowel. A purse string suture line can be used to pleat excess tissue and enhance tissue density.

Wound Closures

Vaginal tissue is highly resilient and heals remarkably well when primary closure occurs via the transvaginal route.[45-47] Hemostasis must be assured prior to closure of the vaginal cuff. Peritoneal edges are incorporated into the cuff to achieve hemostasis. The vaginal cuff is closed in a manner that minimizes risk of vaginal cuff dehiscence.[47] Closure following cystocele or rectocele repair may include excision of excess superficial tissue prior to closure.[46] Vaginal and perineal closures are performed by the surgeon using absorbable sutures in layers in a manner similar to episiotomy repair.

Blood loss during vaginal hysterectomy is normally quite low, with the blood loss being significantly less than in an abdominal procedure. While vaginal packing is sometimes used to absorb residual bleeding and to minimize the potential for hematoma formation, careful technique is the best approach to prevention of injury. A recent review found no clear benefit from vaginal packing.[45]

Postoperative Client Care

Physical Examination

Following vaginal procedures, clients are evaluated for the presence of excess bleeding or swelling of tissue, adequate pain control, and signs of hematoma formation. Suture line breakdown or strangulation of tissue can occur from edema. When vaginal packing is used, it is removed after 24 hours. The Foley catheter is removed when the client is able to ambulate and when any edema that might interfere with voiding has diminished.

Emotional Status of Client

Some individuals experience significant feelings of loss after hysterectomy, while for others this procedure may be a relief.[48] While vaginal hysterectomy results in no visible scarring to mark the removal of the uterus, the potential exists for significant re-evaluation of body image, especially for individuals undergoing gender affirming surgery.[41,48] For all clients, the absence of the uterus can be associated with feelings of loss of femininity or fertility. Other individuals are delighted by the absence of bleeding, resolution of chronic pelvic prolapse, and elimination of the risk of pregnancy. Emotional response to hysterectomy is highly variable and is profoundly affected by the indication for the procedure.

After anterior/posterior, cystocele, or rectocele repair, most people express relief that a troublesome, chronic problem has been resolved, whether it is urine leakage, difficulty passing stool, or pelvic prolapse. With gender affirming surgery the recovery may require extensive follow-up as well as hormonal support. In all cases, there are more visible signs of the surgery, including external wounds, indwelling catheters, and/or pain that can play a role in the client's perception of their postoperative healing.[41,48]

Client Follow-up Care

After vaginal surgery, clients typically return for evaluation between 1-2 weeks postoperatively and again at 6 weeks. Evaluation includes inquiry related to signs and symptoms of infection, bladder and bowel function, healing of any incisions, discussion of return to sexual activity, and assessment of overall psychosexual well-being. Observation for complications is needed for the first year after surgery. When seen in the midwifery or primary care office, clients with persistent symptoms are referred back to the surgeon for follow-up.[49] Vitamin E oil or estrogen cream can be applied to the vaginal area to keep tissue supple once the incisions have healed.

CASE STUDY: Vaginal Hysterectomy for Menometrorrhagia

Z. is a 45-year-old with a long history of heavy menses. As Z. has aged, periods have come more frequently and lasted longer. For the past 18 months, Z. has had heavy bleeding for approximately 10 to 12 days out of every 28. Z.'s work-up with the midwife included a pelvic ultrasound and an endometrial biopsy showing endometrial hyperplasia. Hormone regulation using a levonorgestrel releasing intrauterine system was unsuccessful. Z.'s uterus palpates at 8 cm; it is mobile, anteverted, and nontender. Adnexa are unremarkable. The pelvic floor is well supported.

Z.'s family history includes a mother and grandmother who had "female troubles" and eventually had hysterectomies. Z. has 3 grown children and would like relief from the bleeding. Z. is referred for further evaluation to the obstetrician-gynecologist in the practice. Hysteroscopy with dilatation and curettage is performed with findings consistent with endometrial hyperplasia. Z.'s bleeding diminishes briefly following the procedure, then the same heavy flow resumes. Z. has been on iron replacement therapy for the past 12 months.

Z. is given information about options for uterine ablation, abdominal hysterectomy, total laparoscopic, or vaginal hysterectomy. Z. gives informed consent for total vaginal hysterectomy without oophorectomy. The procedure is scheduled with the midwife as the first assistant.

On the day of the surgery, Z. walks to the OR and is positioned in dorsal lithotomy position following the induction of general anesthesia. The surgeon performs a pelvic examination following administration of anesthesia to verify the size and mobility of the uterus. The uterus palpates at 8 cm, is mobile, and descends easily with traction. The decision to proceed with vaginal hysterectomy is confirmed.

A time out is performed before the surgery begins. The surgeon requests Pitressin solution for injection, and prior to injection, the first assistant informs the anesthesia provider. The initial incision is made around the cervix, and the bladder is dissected off the anterior wall of the cervix prior to opening the anterior cul-de-sac. The triangle of

safety is identified, and the posterior cul-de-sac is opened. A duck bill speculum is placed through the opening in the posterior cul-de-sac into the pelvis. A right-angle retractor is placed anteriorly after the bladder is dissected off the anterior lower uterine segment, and the peritoneum is tented and entered.

The first assistant holds lateral traction on the cervix to expose the broad ligament. The surgeon carefully places a Heaney clamp on each side of the uterosacral ligament. The ligament is cut to the tip of the clamp with heavy curved Mayo scissors. The first assistant continues to displace the cervix laterally while the surgeon places each suture ligature by driving the needle through the tissue at the tip of the clamp, bringing the suture around the clamp and through the tissue again. The first assistant performs a controlled slow release of the clamp as the surgeon tightens the knot and asks for a tag to identify the sutures as those on the uterosacral ligaments. The tag is placed and secured to the drape out of the way. The first assistant cuts the remaining suture to free the needle and returns it to the scrub nurse or surgical technologist using the hands-free technique.

The first assistant moves from side-to-side to provide the surgeon with optimal visualization as the paired ligaments are sequentially clamped, cut, and ligated. The uterus pales as the blood supply diminishes. The surgeon grasps the tenaculum holding the cervix and pushes the cervix cephalad while simultaneously working to bring the fundus in to view caudally. A tenaculum is used to apply traction to the uterine fundus, and it comes into view. The last uterine vessels are now under torsion within the infundibulopelvic ligament. The surgeon places a Heaney clamp close to the uterine corpus bilaterally and using heavy curved Mayo scissors, cuts the uterus free. The uterine specimen is handed to the scrub nurse or surgical technologist.

Each pedicle is examined for bleeding, and the ovaries are examined. The pedicles are tied off with heavy number 0 absorbable suture. The first assistant keeps the suture scissors ready and cuts each suture as it is placed. The tagged sutures identifying the uterosacral ligaments are released. The uterosacral ligaments are incorporated into the vaginal cuff to provide support for the vagina. The surgeon grasps the edge of the anterior peritoneum with forceps and incorporates the peritoneum into the closure as suture is placed to close the vaginal cuff. The first assistant gently applies tension to the suture to keep the locked stitches seated and to keep the developing vaginal cuff closure into better view.

Once the vaginal cuff is secured, the vulva is gently washed, and a peri-pad is applied. The client's legs are moved simultaneously from the stirrups and gently placed together. Quantified blood loss is 250 ml. Z. awakens without difficulty and is moved to the postanesthesia care unit.

SUMMARY

Midwives may choose to expand their practices to assist with reproductive health procedures in addition to cesarean birth. The essential first assistant skill set is transferable across procedures with specific instruments, equipment, techniques, and approaches for each procedure. Assisting with gynecologic surgery provides the midwife with an additional means to provide continuity of care, and can enhance the midwife's understanding of pelvic anatomy, physiology, and presentation of pathologic conditions.

Obtaining and documenting education and practice in gynecologic procedures is required and can occur through documented self-study and mentorship, hospital or university-based programs, or continuing education workshops.[1] Documentation of educational activities should be maintained (see Appendix 4). Clinical and professional activities that follow are examples of steps a midwife can take as part of self-study. Each midwife has the opportunity to determine how best to meet the needs of the community of clients served and the midwife's personal and professional interests within the confines of their professional scope of practice, state regulations, and facility and surgeon expectations.

Clinical Activities

- Read operative notes to identify the usual sequence of events for each surgeon and the role of the first assistant.
- Review surgeon and case-specific instrument sets, sutures, and equipment with surgical scrub personnel.
- Review the pharmacology and doses of medications used during gynecologic procedures.
- Seek in-service education or tutorials on use of equipment for gynecologic surgery, such as the laparoscope and related viewing monitors, laparoscopic instruments, and tissue sealing devices.
- Observe gynecologic surgeries, review medical illustrations from a gynecological surgical text, or watch videos tutorials on technique, such as those available from ACOG.

Professional Activities

- Meet with surgeons to discuss common indications for gynecologic surgery and the anticipated role of the first assistant.
- Develop procedure-specific learning goals to learn relevant surgical anatomy and new techniques.
- Document informal and self-study educational activities (See Appendix 4).
- Plan periodic review of learning goals through self-assessment and dialogue with mentoring surgeon(s).

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APPENDICES

APPENDIX 1

Checklist for Expanding Midwifery Practice as a Surgical First Assistant

This checklist is designed to assist the midwife in developing a customized learning plan to meet professional learning expectations and needs when expanding practice to include surgical first assistant activities.

Moving through these steps in a systematic way will facilitate understanding of the role and scope of the midwife first assistant as part of midwifery practice. They provide a framework for pursuing the didactic learning and clinical skill development needed to add these activities to the midwife's privileges, and to negotiate with health insurers for appropriate reimbursement for first assistant services. Documenting acquisition of skills is required for the credentialing process.

Expanded Practice Documentation Checklist:

Create a first assistant file to document education and training for first assistant activities, including but not limited to the following:

- ACNM position statement on the midwife as first assistant
- State regulatory authority information regarding expanded practice
- Midwife First Assistant Education Activity Log
- Midwife First Assistant Skills Checklist
- Credentialing and Professional Documentation Checklist
- Midwife First Assistant Clinical Competency Forms
- Additional Information as required for expanded practice as first assistant

Regulatory Questions

Identify need for first assistant services

- Community interest or need
- Surgeon or midwife interest or need
- Facility interest or need
- Benefit, facilitator, and barrier assessment

Regulatory authority

- Relevant state statutes, regulations, and opinions
- Facility bylaws and medical staff rules and regulations
- Relevant surgical policies and procedures
- Health insurance regulations

Regional practices of first assistants

- Local practices and potential supports
- Billing and reimbursement practices
- Champions, issues, and barriers

Education and Clinical Practice

- Identify desired first assistant activities to include in practice privileges
- Notify liability insurance carrier of planned addition to practice
- Perform preliminary and interval self-assessment
- Create a learning plan for skill development and strategies to attain requisite skills including:
  - » Observation
    - ➔ Simulation
  - » Mentored practice
- Identify mechanism(s) for didactic education
- Document relevant education and training
  - » CEU certificate
  - » Course transcript
  - » Self-study log
  - » Clinical case log
  - » Clinical learning journal
- Explore clinical expectations per facility or practice
  - » Expected first assistant role and activities
  - » Concurrent or sequential education and clinical experience
  - » Mechanism(s) for validation of competency
  - » Whether a specified number of cases is required, in addition to demonstrated competency
- Core perioperative practice
  - » Formal orientation to the operating room
  - » Mentoring in aseptic technique
  - » Identification of instrument names, handling, and uses
- Clinical mentorship and evaluation
  - » Identify one or more mentors (scrub personnel, first assistants, surgeons)
  - » Identify learning goals for each planned experience
  - » Review goals with mentor(s) before and after each case
  - » Use an evaluation tool to validate knowledge and skill development to include:
    - ➔ Application of aseptic technique
    - ➔ Effective interoperative communication
    - ➔ Knowledge of expected first assistant activities
    - ➔ Knowledge of the sequence of the procedure
    - ➔ Knowledge of the surgical anatomy encountered
    - ➔ Instrument identification and handling
    - ➔ Safe tissue handling
    - ➔ Effective management of bleeding
    - ➔ Anticipatory thinking and related clinical actions
- Mentor Role
  - » Participate in case pre-briefing and discussion of learning goals
  - » Completion of the Midwife First Assistant Clinical Competency Form
  - » Discuss learner's strengths and opportunities for improvement

  - » Dialogue regarding surgical techniques and learner skill development
  - » Observe or participate in simulation activities
- Midwife First Assistant Clinical Case Evaluations (See Appendix 6)
  - » Objective assessment tool
  - » Completed by mentor(s)
  - » Validates developing proficiency and level of competency
  - » Used to support credentialing for expanded practice privileges
- Mechanisms for evaluation of clinical competency
  - » Objective and competency-based evaluation tool
  - » Number of cases required for competency
  - » Frequency of evaluation and responsible individual(s)
  - » Documentation disposition of case evaluation(s) assuring HIPAA compliance

Professional Issues

- Documentation of didactic education per ACNM
- Documentation of clinical education per ACNM
- Self-assessment and reflection of learning experiences and competency
  - » On-going process; documented in learning journal
  - » Midwife retains the option to request additional mentoring until competency is attained, as needed
  - » Maintain person, client, and family-centered approach
- Health insurance reimbursement after privileging approved
  - » Regulations and practice regarding payment for midwifery services
  - » Notification of health insurance companies and verification of modifiers
  - » Credentialing with health insurance companies as needed
- Billable midwifery service after privileging approved
  - » Midwife responsibility for initiating billing
  - » First assistant services billed under midwife's NPI number
  - » Billing data shows financial value of midwife's first assistant services

Credentialing Issues

- Define scope of practice as first assistant
  - » Preoperative care and orders
  - » Cesarean birth and/or pregnancy-related procedures
  - » Obstetrical and gynecological procedures
  - » Postoperative care and orders
- Update delineation of privileges or job description as needed
- Request addition to delineation of privileges
  - » First assistant activities
  - » Provide documentation based on Credentialing and Professional Documentation Checklist
- Notification of liability insurer when privileging approved

APPENDIX 2

Sample Administrative Policy and Procedure: First Assistant Education for Expanded Midwifery Practice

Title: The Certified Nurse-Midwife/Certified Midwife as Surgical First Assistant

Developed By: _____

Effective Date: _____ **Reviewed Dates:** _____

Revision Dates: _____

PURPOSE: The purpose of this policy is to provide guidance to midwives, surgeons, perioperative staff, and medical staff professionals when midwives expand their practice to function as surgical first assistants during cesarean and other obstetric and gynecological surgical procedures.

POLICY: Midwives are permitted to expand their midwifery practice privileges to include serving as first assistant during cesarean and obstetric and gynecological surgical procedures. The education and training process must follow the current American College of Nurse-Midwifery (ACNM) Standards for the Practice of Midwifery and be consistent with the ACNM position statement, Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery. Certified nurse-midwives (CNMs) and certified midwives (CMs) who act as first assistants in obstetric and gynecologic surgery do so under their midwifery certification. The perioperative scope of practice for the midwife first assistant includes pre-, intra-, and postoperative care.

RESPONSIBILITY: Midwives, physicians, perioperative staff, and medical staff professionals.

Definitions: Surgical first assistant is a qualified health care professional that actively assists the surgeon during cesarean or other obstetric and gynecological surgical procedures.

PROCEDURES:

A. Midwives are expected to complete didactic education as described by the ACNM position Statement Certified Nurse-Midwives/Certified Midwives as First Assistant During Surgery. Midwives will provide documentation of course content, program completion (CEU certificate), or a self-study log upon request.
B. Initial clinical education and training as a first assistant may occur simultaneously with didactic education and is assessed by a qualified mentor (surgeon or first assistant).
    a. The following recommendations for clinical experience are provided as guidance for the surgeon, midwife, and perioperative team.
    b. Observation of 5 cases, each with a distinct focus area:
        i. Aseptic technique, scrubbing, patient prep, draping, time-out
        ii. Surgical instruments
        iii. Relevant anatomy
        iv. Role of the first assistant
        v. Sequence of the procedure
    c. Participation in at least 5 mentored cases as the first assistant, or
    d. As many cases as needed to demonstrate competency as a surgical first assistant at the novice level.

C. The perioperative scope of practice for the midwife first assistant includes perioperative, intraoperative, and postoperative skills.
   1. The perioperative skill set demonstrated by the midwife first assistant may include, and is not limited to:
      - Determining the need for cesarean and obtaining surgical and anesthesia consultations
      - Performing and documenting the preoperative history and physical examination
      - Writing preoperative orders; reviewing lab results
      - Providing client education, participating in shared decision- making, and obtaining informed consent
      - Providing client support and information
   2. The intraoperative skill set demonstrated by the midwife first assistant may include, and is not limited to:
      - Patient positioning, preparation, and draping
      - Application of surgical aseptic technique
      - Anticipation of the surgeon's actions
      - Using surgical instruments and devices
      - Providing exposure
      - Handling and dissection of tissue
      - Wound closure and suturing
      - Providing hemostasis
      - Initiating emergency actions as indicated
   3. The postoperative skill set demonstrated by the midwife first assistant may include, and is not limited to:
      - Immediate postoperative orders
      - Postoperative and midwifery rounds
      - Identification and triage of postoperative complications
      - Consultation for emerging or apparent complications
      - Postoperative follow-up after discharge

D. Evaluation of competency is performed using an objective tool to validate that the midwife demonstrates adequate, safe beginning competency. (See Appendix 6).

E. Demonstration of skills:
   1. The midwife will demonstrate beginning, safe competency in the designated skill sets (above).
   2. Experienced midwives that have demonstrated current competency based on ongoing professional practice evaluation and outcomes within the past 24 months, including at another facility, may have competency validated by a letter from a surgeon with whom they have practiced.
   3. Documentation of previous evaluations may be maintained in the midwife's medical staff file.

F. Privileging:
   1. The CNM/CM functions as a first assistant under their midwifery certification and licensure. An additional credential is not required.
   2. Following education and training as described above, the relevant supporting documents will be submitted to the medical staff office for review by the Credentialing Committee.
   3. First Assistant activities must be added to the midwife's list of delineated privileges prior to the midwife being identified as the first assistant of record or billing for first assistant services.

APPENDIX 3

The First Assistant Learning Plan

Midwives are expected to be active participants in the first assistant education program. This is an opportunity to review the first assistant knowledge base and expected surgical assistant skill set. Each midwife shall perform a personal skill inventory and develop a personal clinical learning plan based on skill inventory. Mentors and instructors assess each midwife's skills in terms of competence and confidence.

Midwives are encouraged to set up skills practice simulation opportunities with colleagues, continue practice until skill is performed correctly and efficiently in the presence of distraction, and ensure mastery of skills.

Midwife First Assistant Primary and Secondary Skill Sets

The skills needed to be an effective first assistant will vary based on the needs of the person receiving care, the midwife's education, skills and competence, and parameters set by the surgeon and the facility. The primary skill set is appropriate for all midwives who act as a first assistant and forms a uniform set of minimal expectations for surgeons. The secondary skill set includes a range of skills for midwives who continue to develop their skills and competency beyond the core skills based on interest, aptitude, and community or practice need. One or more expanded skills can be included in the midwife's skill set, either as part of initial clinical skills development or as skills acquired over time.

First Assistant Clinical Competencies

The clinical competencies are divided into primary and secondary skill sets.

The primary skill set represents a common set of expectations for the midwife first assistant in many settings. It can be helpful to describe the minimum expectations for all midwives who act as first assistants in a practice or facility. This provides a basis for midwifery education and training and ensures that the surgeons and midwives hold mutual expectations of the midwife first assistant role.

Components of the secondary skill set may be included in the midwife's practice based on clinical setting, job expectations, surgeon preference, and midwife skill. Learning skills in the secondary skill set during first assistant mentoring can aid in the ability to anticipate the surgeon's next steps, even when they are not a routine part of the midwife first assistant role. In teaching facilities, the midwife may be expected to function in place of a resident, and thus may perform many aspects of the procedure as the first assistant, while the attending is the surgeon of record.

Competencies also include aspects related to administrative functioning such as: documentation of education, training, and competence; midwifery leadership and support of medical staff office personnel during the addition of first assistant activities to gain practice privileges; and documenting participation in each case and initiating billing. All of these functions are integral to the role of the midwife as first assistant.

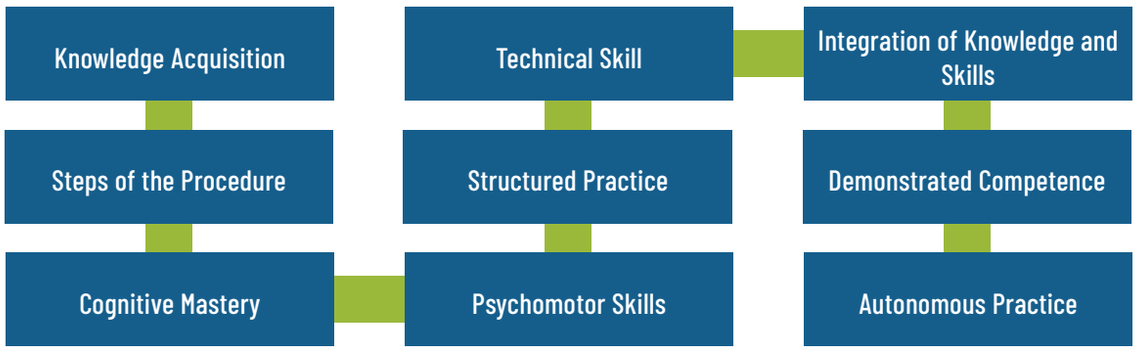
Primary Skill Set

- Perform the pre-op history and physical, conduct procedure-specific client education, and write pre-op orders
- Participate in the informed consent process; provide information and support; obtain informed consent (per facility)
- Demonstrate knowledge of role identification and expectations for perioperative team members (surgeon, first assistant, scrub personnel, circulating nurse, anesthesia, pediatric, and other ancillary personnel)

- Engage in effective interdisciplinary communication to ensure best care for the patient
- Perform surgical aseptic technique related to scrub, gowning, gloving, and maintaining sterile fields consistent with Association of periOperative Registered Nurses (AORN) standards
- Participate in patient positioning, prep and draping, equipment set up, and time-out consistent with AORN standards
- Verbally identify instruments by name, uses, and handling techniques
- Visually and verbally identify anatomy and landmarks, and describe appropriate handling techniques by tissue type
- List and anticipate steps of procedure from draping to application of sterile dressing, with site-specific expectations of the first assistant and surgeon
- Function as the first assistant under the direction of the surgeon
- Apply retraction, suction, and other techniques to ensure adequate exposure to the active surgical site
- Perform surgical knot tying, following of suture, and application of skin staples
- Demonstrate sound perioperative clinical judgment and collaborative practice
- Effectively anticipate surgeon's actions and the first assistant's role in supporting client-centered perioperative care
- Perform staple or suture removal
- Complete documentation and record keeping necessary during education and training, for privileging, and billing processes

Secondary Skill Set

- Active anticipation of surgeon's actions and accompanying first assistant role
- Perform and participate in dissection (blunt and sharp) and tissue manipulation
- Perform and participate in hemostasis, such as applying pressure, cautery, free ties, application of clamps, suture ligatures, and estimated blood loss or quantification of blood loss
- Integration of anatomic recognition with first assistant/surgeon's actions
- Perform or participate in delivery of neonate, placenta
- Management of neonate (Neonatal Resuscitation Program initial steps), timing of cord clamping
- Facilitate early skin-to-skin and infant feeding as desired by client
- Perform or participate in uterine and/or abdominal closures ensuring anatomic approximation
- Participate in collaborative assessment for intraoperative complications
- Manage, in conjunction with the surgeon, anticipated or actual intraoperative complications, or
- Identify when participation of a second surgeon is indicated
- Demonstrate ability to function as first assistant
- Provide post-op rounds and orders (inpatient and outpatient)



Learning Journal

Names and other patient identifiers are excluded from the learning journal.

People learn in many different ways; reflection and writing are two of them. The learning journal is the place for each midwife to describe, after reflection, how and what they are learning in order to document the transition from novice, to competent, to expert first assistant (depending on the individual's starting place).

Participants are expected to review the operating room note when possible, and write about what was seen, actions performed, what was or wasn't understood, areas for improvement or practice, resources that were helpful, and thoughts and feelings about learning this expanded practice role. Participants are encouraged to keep their focus and language positive, as part of the purpose of journaling is embedding the information in memory and creating positive associations with first assistant skill development that carry over into practice.

APPENDIX 4

Midwife First Assistant Education Activity Log

This log documents non-clinical independent study activities related to first assistant education, including but not limited to review of journal articles, texts, multimedia presentations, mentored simulation, discussion of techniques, observation, continuing education programs, and online information.

Name:	**Certification #:**
Primary Address:	
Primary Phone:	
Email:	

Date of Activity	Title of Activity	Type of Activity	Time	CEU / CME

I verify that this is an accurate and true representation of my education in surgical first assisting and is consistent with the ACNM position statement: *Certified Nurse-Midwife/Certified Midwife as First Assistant During Surgery and the ACNM Standards For the Practice of Midwifery.*

Signature **Date**

Midwife First Assistant Education Activity Log - Page 2

Activity Keys:	**J** = Journal Article **T** = Textbook **MM** = Multimedia **W** = Classroom or Workshop **S** = Simulation **O** = Observation **I** = Internet or Online Materials

Date of Activity	Title of Activity	Type of Activity	Time	CEU / CME

Name

APPENDIX 5

Midwife First Assistant Skills Checklist

Activity	Didatic	Simulation	Practice	Clinical
Preoperative Care				
History				
Physical exam				
Labs; orders and review				
Collaboration with anesthesia				
Informed consent for procedure				
Prebriefing and sharing of clinical goals				
Aseptic Technique				
Positioning to avoid injury				
Surgical skin prep				
Surgical scrub				
Gowning and gloving				
Maintenance of sterile fields				
Participation in "time out"				
Surgical consciousness				
Removing gown and gloves				
Intraoperative Skills				
Skin tension for incision				
Hemostasis				
Electrocautery & Tutorial				
Hemostats				
Free ties				
Pressure				
Providing exposure during dissection				
Safe tissue handling				
Appropriate use of instruments				
Identification of anatomy				
Fascia				
Rectus muscle and epigastric vessels				

Activity	Didatic	Simulation	Practice	Clinical
Bladder and ureters				
Uterus, ovaries, and tubes				
Colon				
Instrument handling				
Hands-free needle transfer				
Scissors				
Dominant hand cutting				
Non-dominant hand cutting				
Needle holder				
Modified thenar grip				
Thenar grip				
Thumb forceps				
Grasping tissue				
Grasping needle				
Hemostats				
Application for free tie				
Free tie and removal				
Use as tag				
Participation in dissection of abdominal layers				
Abdominal retractors				
Lifting tissue				
Sweeping tissue off fascia				
Exposing tips of dissecting instrument				
Bladder blade				
Exposure of vesicouterine serosa				
Exposure of lower uterine segment				
Ring forceps or Pennington clamps				
Hemostasis of uterus				
Babcocks				
Lifting of fallopian tube				
Fundal pressure to affect birth of the infant(s)				
Delivery of placenta (traction/manual)				

Activity	Didatic	Simulation	Practice	Clinical
Compression of uterus during closure				
Suturing				
Knot tying				
Two-handed				
One-handed				
Instrument				
Deep tie [one-handed]				
Free tie				
Following				
Suturing fascia				
Grasp both layers of fascia				
Place first throw above apex				
Use "rule of ones"				
Subcutaneous closure [Scarpa's fascia]				
Subcuticular closure				
Skin staples				
Postoperative Care				
Pain control				
Routine post-op orders				
Post-op assessment				
Evaluation for complications				
Professional Issues				
Clinical mentoring & mentor support				
Debriefing & case review				
Documentation of cases				
Credentialing & privileging				
Informing liability insurance				
Billing & coding practices				

APPENDIX 6

Midwife First Assistant Case Evaluation Form

Midwife:	**Date:**
Diagnosis:	**Procedure:**

1 - Not applicable	**2** - Not demonstrated	**3** - Demonstrated
4 - Skilled	**5** - Proficient	**6** - Able to teach

Skills to be Evaluated / Demonstrated	1	2	3	4	5	6
1. Pre-op care/History & Physical						
2. Demonstrates knowledge of surgical procedure						
3. Applies principles of aseptic technique						
4. Assists with positioning, draping, and equipment set-up						
5. Anticipates needs of surgeon						
6. Demonstrates safe tissue handling						
7. Utilizes safe suctioning techniques						
8. Provides effective retraction with:						
a. Techniques appropriate for tissue and anatomy						
b. Appropriate instrumentation						
9. Provides hemostasis utilizing:						
a. Electrosurgery						
b. Clamps/ties						
c. Pressure/sponging						
d. Collagens/cellulose						
e. Other						
10. Performs safe dissection of tissue and layers						
11. Demonstrates suturing skill, "following", and cutting of suture						
a. Knot tying						
i. Two-handed tie						
ii. One-handed tie						
iii. Instrument tie						
b. Ligation of vessels						

Skills to be Evaluated / Demonstrated	1	2	3	4	5	6
c. Closure of surgical site						
i. Approximation of layers						
ii. Fascial closure						
iii. Subcutaneous closure						
iv. Skin closure						
12. Exhibits manual dexterity						
13. Offers suggestions based on clinical & theoretical knowledge						
14. Works effectively as part of the perioperative team						
15. Effective in emergency or stressful situations						
a. Provides appropriate action						
b. Provides direction to team members						
c. Provides assistance to team members						
16. Provides post-op care						
a. Post-op orders						
b. Post-op rounds						
c. Post-op instructions and discharge						
d. Office-based post-op follow-up						

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Mentor Validation: _____

APPENDIX 7

First Assistant Mentor Guide

This guide outlines the expectations for the mentoring of Certified Nurse-Midwives (CNMs) and Certified Midwives (CMs) to develop the surgical first assistant skill set.

OBJECTIVES:

1. To ensure surgeons are familiar with the first assistant activities that may be performed by the CNM and CM.
2. To provide guidance for surgeons on the mentoring process and the evaluation and documentation needed to add first assistant activities to midwifery privileges.

Midwife First Assistant Clinical Skills and Practice

The following information describes the range of perioperative scope of practice for CNMs and CMs as defined by the American College of Nurse-Midwives.[1] This list can be used as a basis for mentoring and midwife skill development during clinical case participation. The range of the midwife's clinical involvement is determined by facility policy and individual surgeon preference. The goal of mentoring is to ensure that each midwife develops the necessary clinical competency to anticipate the surgeon's needs and function in the role of first assistant.

Recommended Surgeon Mentoring Process

A similar approach to mentoring obstetrics and gynecology residents can be used when mentoring CNM and CM first assistants. Expect a natural progression from novice to skilled practitioner based on prior experience, natural aptitude, and opportunities to gain experience. Each midwife should arrive in the operating room prepared to actively learn and apply the skills necessary to make the procedure progress smoothly and safely. While some facilities limit the first assistant role of the CNM and CM, surgeons may teach to the full ACNM scope, which encourages the anticipatory thinking and actions that are particularly useful during emergency cesarean.

Case Prebriefing: Identify the midwife's learning goals within the context of the planned procedure and variations specific to the individual client and fetus, and the surgeon's expectations for CNM and CM participation.

Case Debriefing: Review surgical procedure in the context of clinical outcomes, the CNM and CM learning goals, and demonstrated skills. Complete case review form.

Surgeons and Perioperative Team Members: Identify preferences for the first assistant skill set during cesarean, describe criteria for mastery of skills, and review recommended learning techniques. When time and interest allow, participate in skills practice and simulation. Observe and acknowledge correct technique, provide feedback when modifications are needed. Praise work! Be generous.

Participate in case pre-briefing. Pre-briefing provides a time to discuss your planned approach for this surgery and any anticipated variations, as well as a structured time and format to review the CNM and CM proposed area of focus and appropriate teaching methods to consider for this specific case.

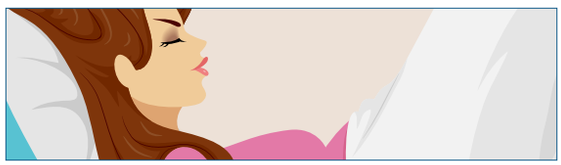
During the case, provide guidance and feedback relevant to the CNM and CM identified area of focus. Following the case, participate in the formal structured debriefing process. Constructive criticism and acknowledgment of developing skills are both helpful.

CNM/CM Perioperative Scope of Practice includes, and is not limited to:

- Preop
  - » Identifying indication for cesarean and obtaining surgical consultation
  - » Performing the admission and/or preoperative history and physical examination
  - » Initiating preoperative orders and calling for anesthesia
  - » Providing the patient and family with support and information
  - » Contributing during the informed consent process and obtaining informed consent where permitted by law
- Intraop
  - » Positioning, prepping and draping the woman
  - » Application of correct surgical aseptic technique
  - » Use of surgical instruments and devices
  - » Providing exposure (ie, retraction, suction, manipulation of uterus)
  - » Handling and dissection of tissue (ie, blunt and/or sharp; birth of baby or placenta)
  - » Wound closure and suturing (ie, performing or following)
  - » Providing hemostasis (ie, cautery, ties, or application of hemostatic materials)
  - » Initiating emergency actions when indicated
- Post-op
  - » Implementation of immediate postoperative orders
  - » Postoperative surgical and/or midwifery rounds
  - » Identification and triage of postoperative complications
  - » Postoperative follow-up after discharge

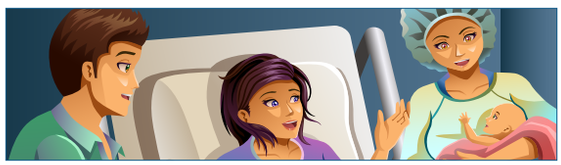
Surgeon Tier

Prebrief: Identify role in mentoring and expectations
Debrief: Recommendations for simulation or practice



Patient Tier

Prebrief: Specifics of individual woman's case
Debrief: Outcome of case/care provided



Midwife Tier

Prebrief: Midwife's focus or learning goals
Debrief: Learning goal assessment and next steps

Evaluation of Skills and Competency

Clinical evaluation of first assistant competency is performed in the operating room. A standardized checklist is available for rapid evaluation of developing CNM and CM skills and competency after each case. These completed forms provide the necessary documentation to support expanded CNM and CM practice privileges.

1. ACNM. (2012). Position Statement: The Certified Nurse-Midwife/Certified Midwife as Surgical First Assistant During Surgery, http://www.midwife.org/acnm/files/ACNMLibraryData/UPLOADFILENAME/000000000270/PS-First-Assist-Revisions-FINAL-Feb%202018.pdf

APPENDIX 8

First Assistant Study Guide

1. Describe the core skills and activities that define the first assistant role.
2. Describe the CNM and CM scope of practice related to the first assistant role.
3. Describe the purpose of an orientation to the operating room for the first assistant.
4. Describe the purpose of the clinical case log.
5. Identify techniques for maintaining hemostasis during surgery.
6. Identify 5 benefits of the midwife as first assistant for cesarean.
7. Describe the midwife's role in preoperative assessment, including anesthetic assessment.
8. Identify the key components of surgical aseptic technique.
9. What is "exposure" and how does the first assistant ensure that it occurs?
10. Identify the key anatomic structures and landmarks that are encountered during abdominal wall dissection for cesarean.
11. Identify the instruments in each category that are most commonly used during cesarean.
    a. Retractor:
    b. Tissue forceps:
    c. Scissors:
    d. Clamps:
12. Identify two uses for electrosurgery.
13. Describe the difference between blunt dissection and sharp dissection
14. Identify three common knot tying techniques used during cesarean, along with the primary benefit of each knot.
15. Using the image of the suture packet below, describe the suture, needle characteristics, and their significance related to cesarean.
    a. What type of suture material is this?
    b. What are the benefits and drawbacks of this suture material?
    c. What is the suture size?
    d. What is the suture length?
    e. What is the manufacturer's needle name or designation?
    f. What is the type of tip on the needle?
    g. For what abdominal layer is this suture and needle most appropriate?

Suture Packet

16. Below are the main types of stitches used. Provide a brief description of each type and identify indications for its use.
    a. Interrupted stitches
        i. Simple interrupted
        ii. Figure 8 (horizontal or vertical)
    b. Continuous (running) stitches
        i. Simple running stitch
        ii. Running locked stitch
        iii. Running mattress stitch (horizontal or vertical)

17. Describe the continuous suturing technique used for repair of the fascia, using the "rule of ones".
18. Describe abdominal wall closure, including the role of the midwife, the sutures for each layer, and the first assistant's and surgeon's actions.
19. Describe the value of capturing one's experience in a learning journal, reading operative notes, and reflective thinking after each case.
20. What is the purpose of having a uniform policy to support expanded practice privileges for midwives as first assistants?

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