



## From Acute to Chronic Pain: One Surgical Patient At A Time

### *Multimodal Analgesia for Enhanced Recovery After Spine Surgery Pathways*

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March 18, 2022



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Orthopedics  
for 12 years  
in a row.**

# Learning objectives

By the end of this session, participants will be able to:

- 1) Identify multimodal analgesic options for ERAS pathways for spine surgery
- 2) Describe procedure-specific risks and benefits of individual agents
- 3) Assess recent society guidelines for analgesic options for ERAS-spine
- 4) Evaluate the role and value of candidate fascial plane blocks in ERAS-spine pathways.

# Enhanced Recovery After Spine Surgery

## PERIOPERATIVE MEDICINE

### ANESTHESIOLOGY

#### Enhanced Recovery after Lumbar Spine Fusion

A Randomized Controlled Trial to Assess the Quality of Patient Recovery

Ellen M. Soffin, M.D., Ph.D., James D. Beckman, M.D., Audrey Tseng, B.A., Haoyan Zhong, M.P.A., Russel C. Huang, M.D., Michael Urban, Ph.D., Carrie R. Guheen, M.D., Han-Jo Kim, M.D., Frank P. Cammisa, M.D., Jerniel A. Nejim, M.D., Frank J. Schwab, M.D., Isabel F. Armendi, B.Sc., Stavros G. Memtsoudis, M.D., Ph.D., M.B.A.

ANESTHESIOLOGY 2020; 133:350–63

#### ABSTRACT

**Background:** Prospective trials of enhanced recovery after spine surgery are lacking. We tested the hypothesis that an enhanced recovery pathway improves quality of recovery after one- to two-level lumbar fusion.

**Methods:** A patient- and assessor-blinded trial of 56 patients randomized to enhanced recovery (17 evidence-based pre-, intra-, and postoperative care elements) or usual care was performed. The primary outcome was Quality of Recovery-40 score (40 to 200 points) at postoperative day 3. Twelve points defined the clinically important difference. Secondary outcomes included Quality of Recovery-40 at days 0 to 2, 14, and 56; time to oral intake and discharge from physical therapy; length of stay; numeric pain scores (0 to 10); opioid consumption (morphine equivalents); duration of intravenous patient-controlled analgesia use; complications; and markers of surgical stress (interleukin 6, cortisol, and C-reactive protein).

**Results:** The analysis included 25 enhanced recovery patients and 26 usual care patients. Significantly higher Quality of Recovery-40 scores were found in the enhanced recovery group at postoperative day 3 (179 ± 14 vs. 170 ± 16;  $P = 0.041$ ) without reaching the clinically important difference. There were no significant differences in recovery scores at days 0 (175 ± 16 vs. 162 ± 22;  $P = 0.059$ ), 1 (174 ± 18 vs. 164 ± 15;  $P = 0.050$ ), 2 (174 ± 18 vs. 167 ± 17;  $P = 0.289$ ), 14 (184 ± 13 vs. 180 ± 12;  $P = 0.500$ ), and 56 (187 ± 14 vs. 180 ± 12;  $P = 0.500$ ).

Downloaded from <http://journals.lww.com/anesthesiology>

## HEALTH SERVICES RESEARCH

### Design and Implementation of an Enhanced Recovery After Surgery Protocol in Elective Lumbar Spine Fusion by Posterior Approach A Retrospective, Comparative Study

Garg, Bhavuk MS, MRCS<sup>a</sup>; Mehta, Nishank MS<sup>a</sup>; Bansal, Tungish MS<sup>a</sup>; Shekhar, Shubhankar MBBS<sup>a</sup>; Khanna, Puneet MD<sup>b</sup>; Baidya, Dalim Kumar MD, EDIC<sup>b</sup>

Author Information<sup>⊕</sup>

SPINE: June 15, 2021 - Volume 46 - Issue 12 - p E679-E687



Smith et al. Perioperative Medicine (2019) 8:4  
<https://doi.org/10.1186/s13741-019-0114-2>


Perioperative Medicine

## RESEARCH

## Open Access

### Enhanced recovery after surgery (ERAS) program for lumbar spine fusion



Justin Smith<sup>1\*</sup> , Stephen Probst<sup>1</sup>, Colleen Calandra<sup>2</sup>, Raphael Davis<sup>2</sup>, Kentaro Sugimoto<sup>1</sup>, Lizhou Nie<sup>3</sup>, Tong J. Gan<sup>1</sup> and Elliott Bennett-Guerrero<sup>1</sup>

BMC Anesthesiology

## RESEARCH ARTICLE

## Open Access

### Pathway for enhanced recovery after spinal surgery-a systematic review of evidence for use of individual components

Ana Licina<sup>1\*</sup> , Andrew Silvers<sup>2</sup>, Harry Laughlin<sup>3</sup>, Jeremy Russell<sup>4</sup> and Crispin Wan<sup>3,5</sup>



*Despite a range of study design & quality, evidence supports ERAS-spine surgery:*

- Improves patient quality of recovery
- Minimizes opioid consumption
- Reduces length of hospital stay (without affecting readmission)
- Lowers morbidity
- Conserves hospital resources



# Enhanced Recovery After Spine Surgery: *Essential Elements?*

*International Journal of Spine Surgery*, Vol. 14, No. 4, 2020, pp. 623–640  
<https://doi.org/10.14444/7083>  
©International Society for the Advancement of Spine Surgery

## Enhanced Recovery After Surgery Trends in Adult Spine Surgery: A Systematic Review

YIXUAN TONG, BA,<sup>1</sup> LAVIEL FERNANDEZ, MD,<sup>2</sup> JOHN A. BENDO, MD,<sup>2</sup> JEFFREY M. SPIVAK, MD<sup>2</sup>

<sup>1</sup>New York University Grossman School of Medicine, New York, New York, <sup>2</sup>Spine Division, New York University Langone Orthopedic Hospital, New York, New York

### ABSTRACT

**Background:** Enhanced Recovery After Surgery (ERAS) is a multimodal, multidisciplinary approach to optimizing the postsurgical recovery process through preoperative, perioperative, and postoperative interventions. ERAS protocols are emerging quickly within orthopedic spine surgery, yet there is a lack of consensus on optimal ERAS practices.

**Objective:** The aim of this systematic review is to identify and discuss the trends in spine ERAS protocols and the associated outcomes.

**Methods:** A literature search on PubMed was conducted to identify clinical studies that implemented ERAS protocols for various spine procedures in the adult population. The search included English-language literature published through December 2019. Additional sources were retrieved from the reference lists of key studies. Studies that met inclusion criteria were identified manually. Data regarding the study population, study design, spine procedures, ERAS interventions, and associated outcome metrics were extracted from each study that met inclusion criteria.

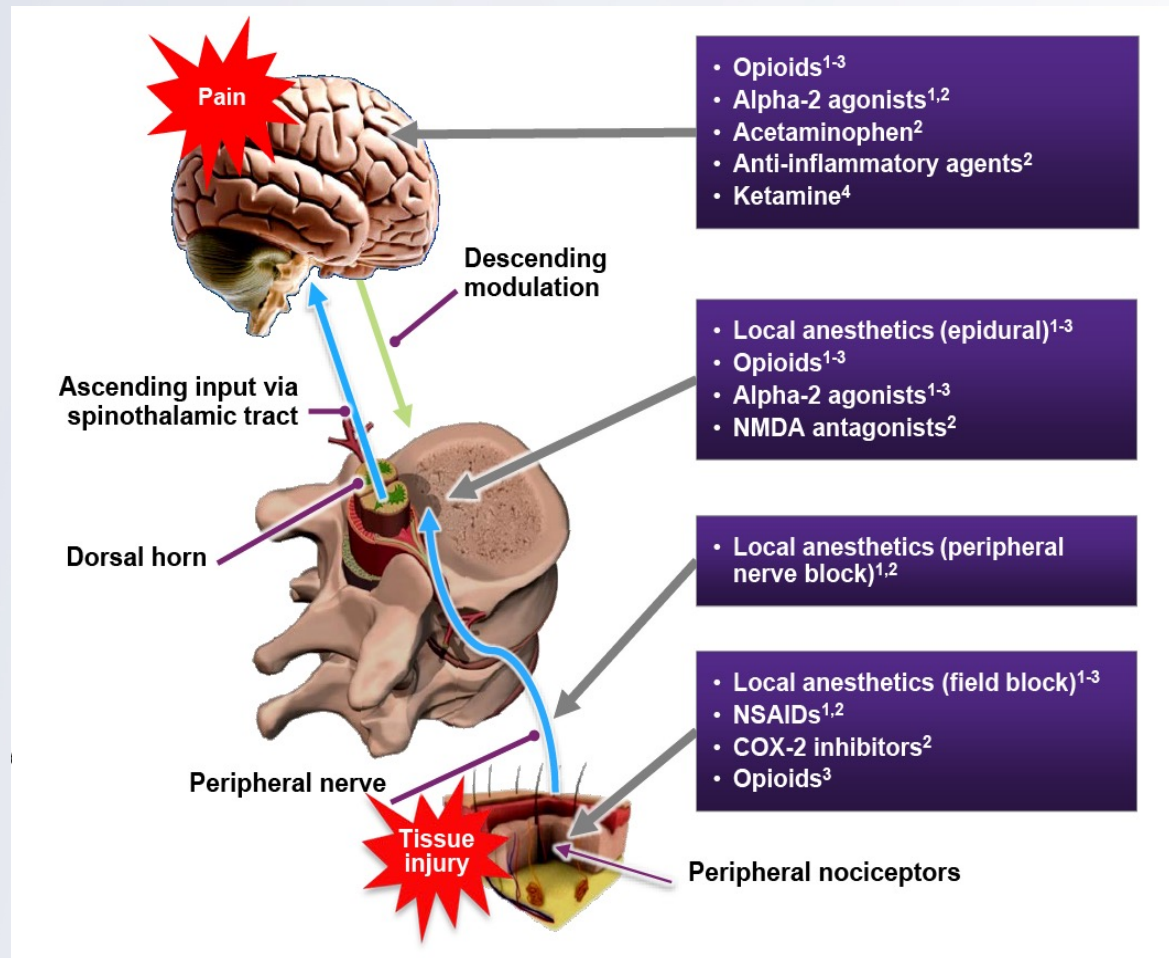
**Results:** Of the 106 studies identified from the literature search, 22 studies met inclusion criteria. From the ERAS protocols in these studies, common preoperative elements include patient education and modified preoperative nutrition regimens. Perioperative elements include multimodal analgesia and minimally invasive surgery. Postoperative elements include multimodal pain management and early mobilization/rehabilitation/nutrition regimens. Outcomes from ERAS implementation include significant reductions in length of stay, cost, and opioid consumption. Although these trends were observed, there remained great variability among the ERAS protocols, as well as in the reported outcomes.

**Conclusions:** ERAS may improve cost-effectiveness to varying degrees for spinal procedures. Specifically, the use of multimodal analgesia may reduce overall opioid consumption. However, the benefits of ERAS likely will vary based on the specific procedure.

**Clinical Relevance:** This review contributes to the assessment of ERAS protocol implementation in the field of adult spine surgery.

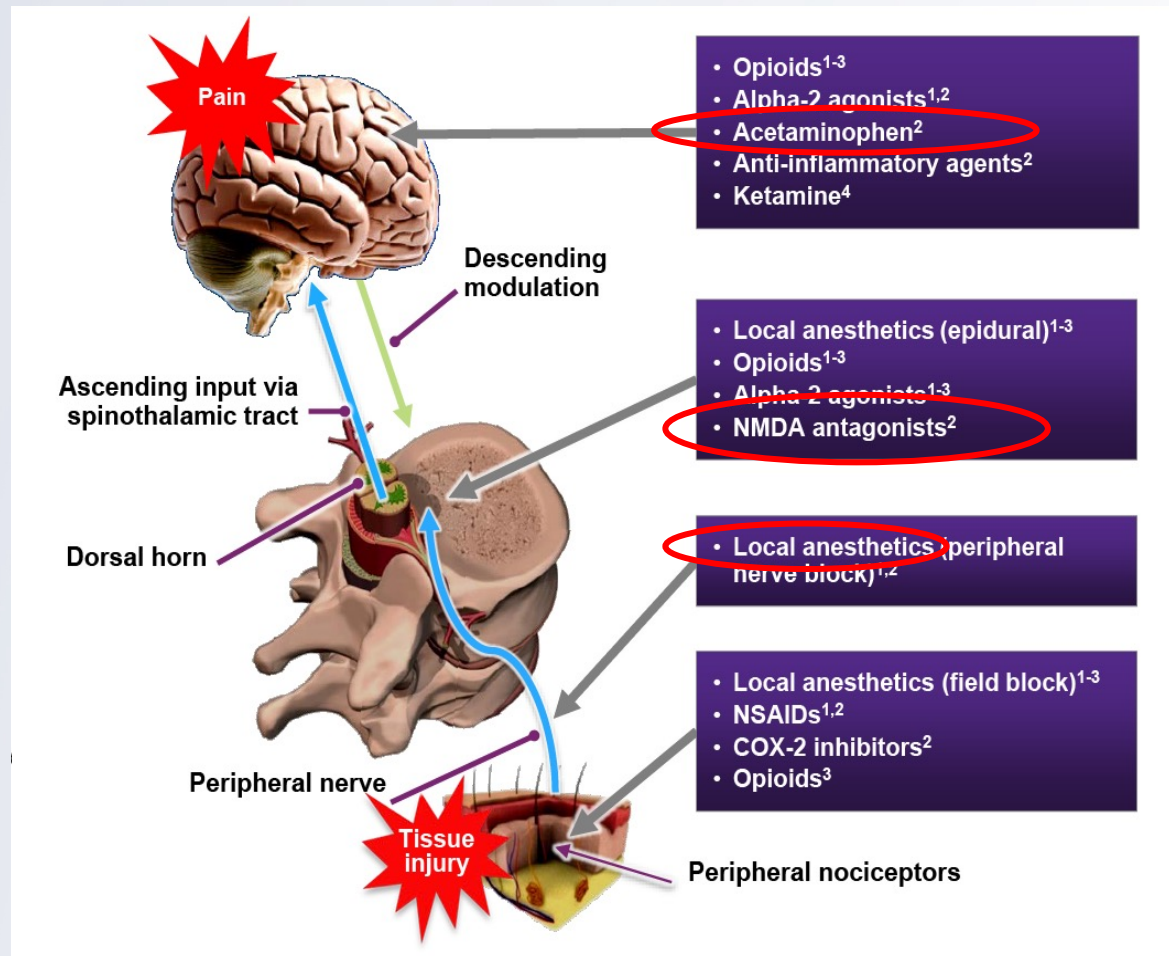


# Historically: limited options for comprehensive multimodal analgesia in spine surgery



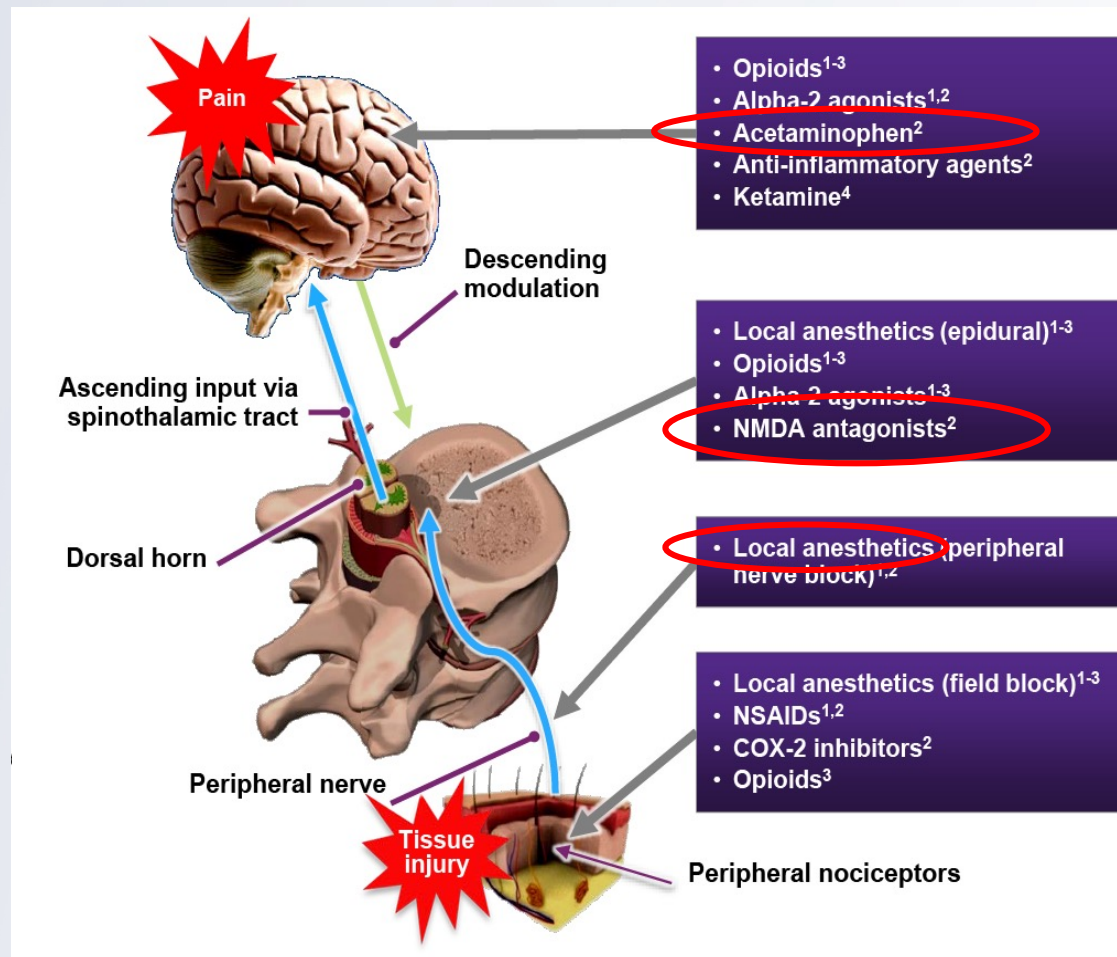
From: Kehlet, H. & Dahl, J.B. The value of “multimodal” or “balanced analgesia” in post-operative pain treatment. *Anesth Analg* 1993; 77:1048–56.

# Bundled Analgesia



- Major concerns = efficacy, polypharmacy, risk:benefit

# Historically: options for comprehensive multimodal analgesia in spine surgery



## ANESTHESIOLOGY

### Multimodal Analgesic Regimen for Spine Surgery

A Randomized Placebo-controlled Trial

Kamal Maheshwari, M.D., M.P.H., Rafi Avitsian, M.D., F.A.S.A., Daniel I. Sessler, M.D., Natalya Makarova, M.S., Marianne Tanios, M.D., M.P.H., Syed Raza, B.S., David Traul, M.D., Shobana Rajan, M.D., Mariel Manlapaz, M.D., Sandra Machado, M.D., Ajit Krishnaney, M.D., Andre Machado, M.D., Richard Rosenquist, M.D., Andrea Kurz, M.D.

*ANESTHESIOLOGY* 2020; 132:992–1002

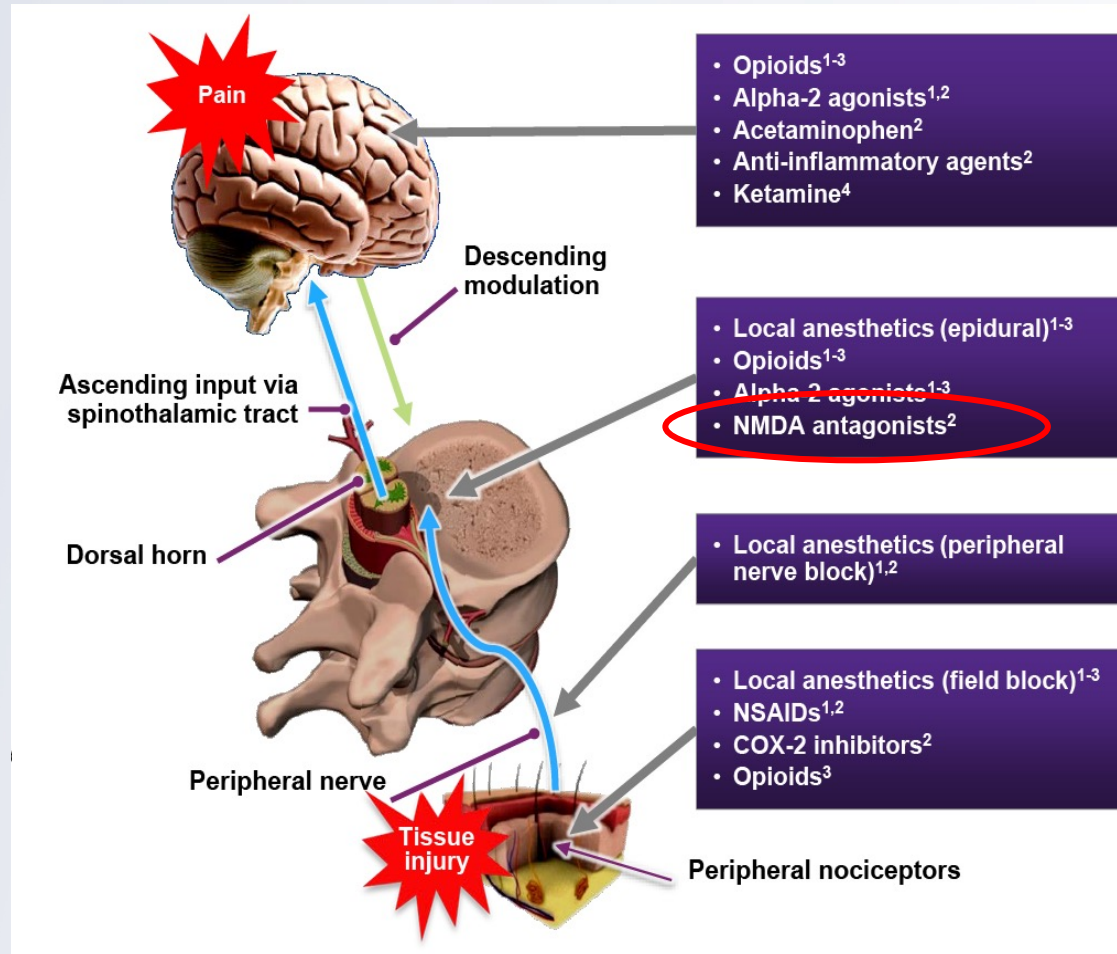
- 299 patients at risk for post-fusion pain
- Randomized to acetaminophen, gabapentin, lidocaine, ketamine
- Trial stopped early for futility



# Historically: limited options for comprehensive multimodal analgesia in spine surgery

## **Methadone:**

- Lower pain scores
- Less opioid consumption
- Higher satisfaction
- Less frequent and less severe pain at 3 months
- Fewer patients taking opioids at 3 months



## **ANESTHESIOLOGY**

Trusted Evidence. Discovery to Practice®

### **Clinical Effectiveness and Safety of Intraoperative Methadone in Patients Undergoing Posterior Spinal Fusion Surgery**

*A Randomized, Double-blinded, Controlled Trial*

Glenn S. Murphy, M.D., Joseph W. Szokol, M.D., Michael J. Avram, Ph.D., Steven B. Greenberg, M.D., Torin D. Shear, M.D., Mark A. Deshur, M.D., Jeffery S. Vender, M.D., Jessica Benson, B.S., Rebecca L. Newmark, B.A.

## **ANESTHESIOLOGY**

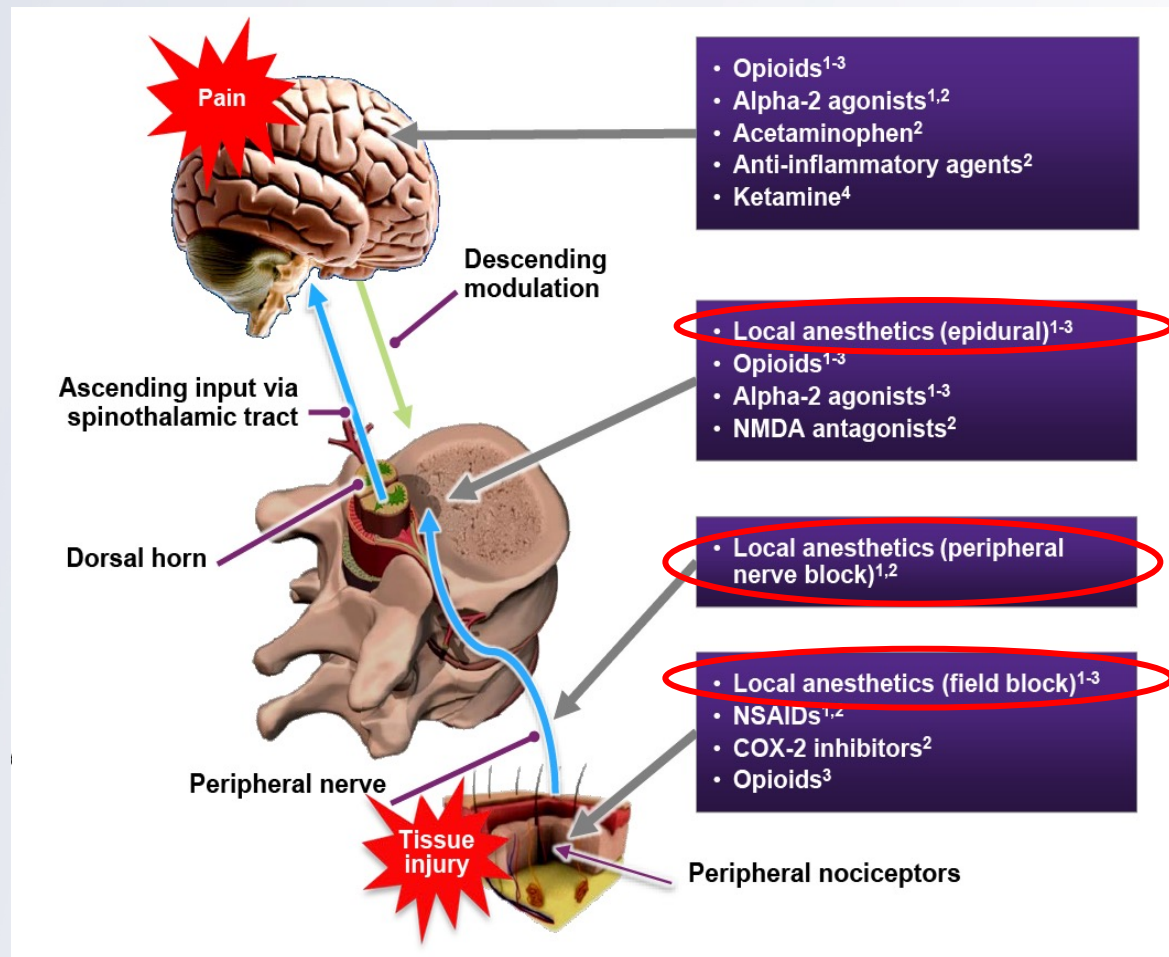
### **Postoperative Pain and Analgesic Requirements in the First Year after Intraoperative Methadone for Complex Spine and Cardiac Surgery**

Glenn S. Murphy, M.D., Michael J. Avram, Ph.D., Steven B. Greenberg, M.D., Torin D. Shear, M.D., Mark A. Deshur, M.D., David Dickerson, M.D., Sara Billimoria, B.S., Jessica Benson, B.S., Colleen E. Maher, B.S., Gregory J. Trenk, B.S., Kevin J. Teister, B.S., Joseph W. Szokol, M.D.

ANESTHESIOLOGY 2020; 132:330-42

- Major concerns = safety profile; procedure-specific evidence lacking

# Historically: limited options for regional techniques in spine surgery



Cochrane Database of Systematic Reviews

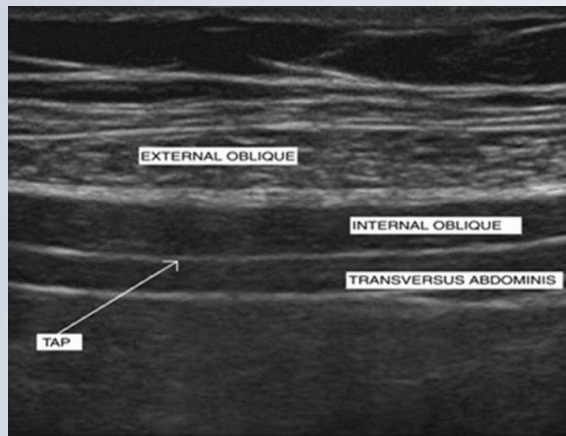
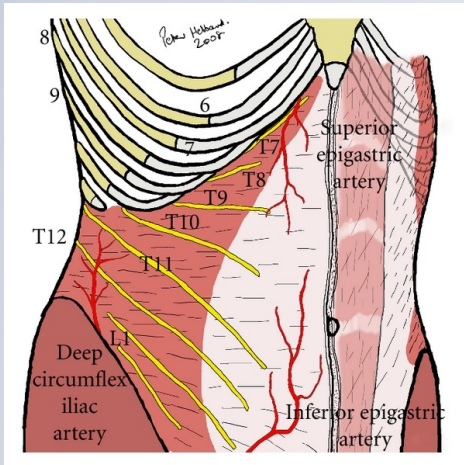
## Postoperative epidural analgesia versus systemic analgesia for thoraco-lumbar spine surgery in children

Joanne Guay<sup>1,2,3</sup>, Santhanam Suresh<sup>4</sup>, Sandra Kopp<sup>5</sup>, Rebecca L. Johnson<sup>5</sup>

- Lack anatomically amenable blocks
- Concerns re: interference with intraoperative neuromonitoring
- Concerns re: immediate postoperative examination
- Concerns re: infection risk



# Regional Analgesia for Spine Surgery Pathways: *Transversus Abdominis Plane Block*



- **TAP block is analgesic and opioid-sparing (after surgeries with anterior and/or lateral incisions) :**



Charlton S, Cyna AM, Middleton P, Griffiths JD.  
Perioperative transversus abdominis plane (TAP) blocks for analgesia after abdominal surgery.  
*Cochrane Database of Systematic Reviews* 2010, Issue 12. Art. No.: CD007705.  
DOI: 10.1002/14651858.CD007705.pub2.

Int J Clin Exp Med 2015;8(10):17343-17352  
[www.ijcem.com](http://www.ijcem.com) /ISSN:1940-5901/IJCEM0014794

## Original Article

### Transversus abdominis plane block versus local anaesthetic wound infiltration for postoperative analgesia: A systematic review and meta-analysis

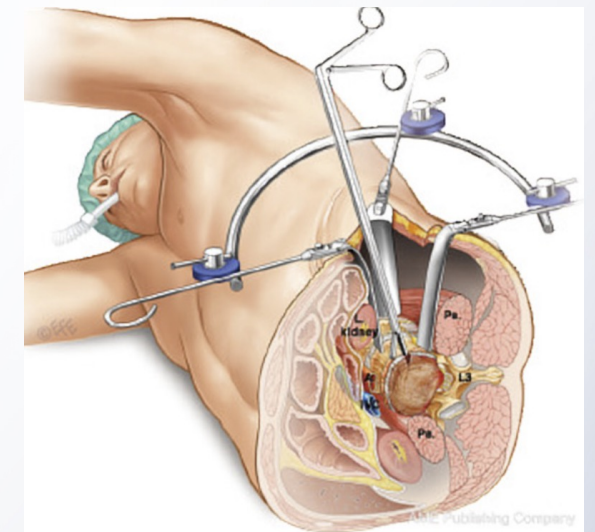
Qingduo Guo, Rui Li, Lixian Wang, Dong Zhang, Yali Ma

Journal of Laparoendoscopic & Advanced Surgical Techniques, Vol. 27, No. 9 | Full Reports

### The Role of Transversus Abdominis Plane Blocks in Enhanced Recovery After Surgery Pathways for Open and Laparoscopic Colorectal Surgery

Alexander J. Kim, Robert Jason Yong, and Richard D. Urman

Published Online: 1 Sep 2017 | <https://doi.org/10.1089/lap.2017.0337>





# Regional Analgesia for Spine Surgery Pathways: *Transversus Abdominis Plane Block*

European Spine Journal (2019) 28:2077–2086  
<https://doi.org/10.1007/s00586-019-06081-3>

## ORIGINAL ARTICLE



### Effects of a multimodal analgesic pathway with transversus abdominis plane block for lumbar spine fusion: a prospective feasibility trial

Ellen M. Soffin<sup>1,2</sup> · Carrie Freeman<sup>1</sup> · Alexander P. Hughes<sup>3</sup> · Douglas S. Wetmore<sup>1,2</sup> · Stavros G. Memtsoudis<sup>1,2</sup> · Federico P. Girardi<sup>3</sup> · Haoyan Zhong<sup>4</sup> · James D. Beckman<sup>1,2</sup>

2080

European Spine Journal (2019) 28:2077–2086

**Table 1** A clinical pathway for anterior lumbar interbody fusion and lateral lumbar interbody fusion

#### Preoperative

1. Patient education and expectation setting: emphasizes expected LoS, anticipated pain and the role of opioids in pain management
2. Preemptive analgesia: oral acetaminophen (1000 mg), gabapentin (300 mg)
3. PONV risk assessment and prophylactic scopolamine patch (1.5 mg transdermal) for high-risk patients

#### Intraoperative

4. General anesthesia with endotracheal intubation and arterial line
5. Ultrasound-guided single-injection TAP block (20–30 mL 0.5% bupivacaine with 2 mg preservative-free dexamethasone)
6. Standardized mini-open surgical approach
7. Multimodal anesthetic and analgesic agents: ketamine (0.1–0.5 mg min<sup>-1</sup>), propofol (50–150 µg kg h<sup>-1</sup>) inhaled anesthetic (up to 0.3 MAC), lidocaine (1–2 mg kg h<sup>-1</sup>) limited opioids (hydromorphone up to 1 mg and/or fentanyl, up to 4 mcg kg<sup>-1</sup>) ketorolac (30 kg; 15 mg if weight < 60 kg or age > 70)
8. PONV prophylaxis: dexamethasone (4–8 mg), ondansetron (4 mg)

#### Postoperative

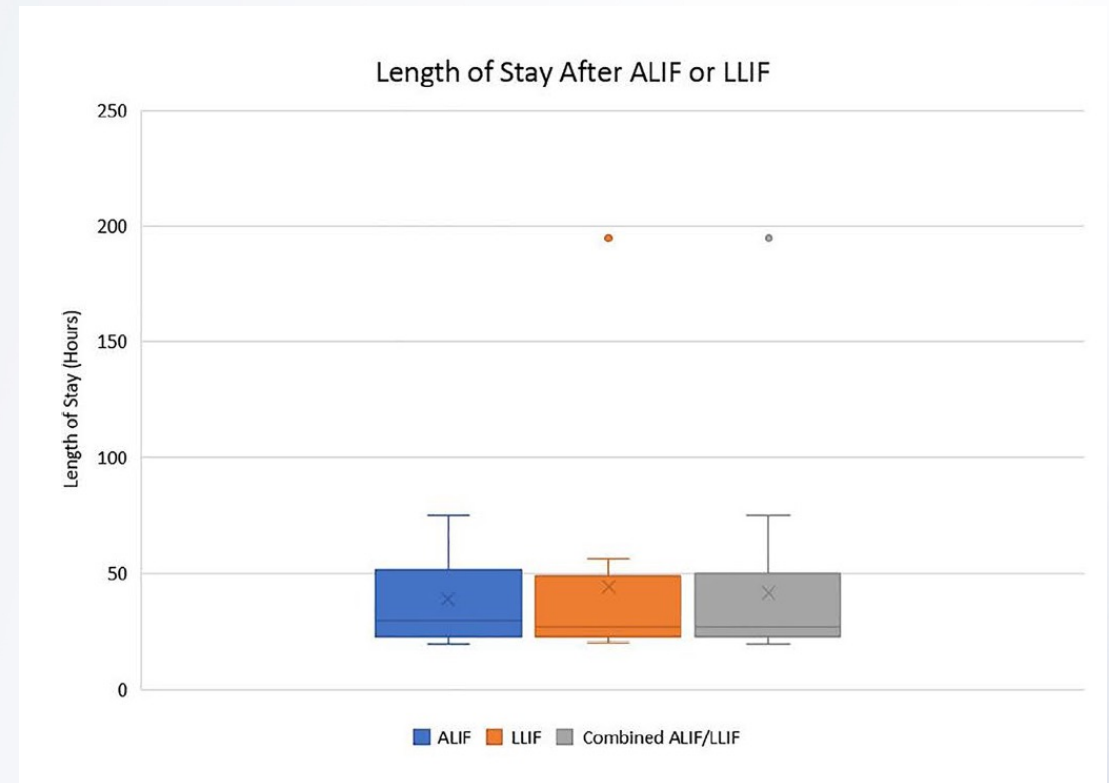
9. Continued scheduled acetaminophen, gabapentin, ketorolac
10. Oral opioids required, guided by NRS scores: NRS 5–7 = tramadol 50 mg × 2 doses, PRN; NRS > 7 = oxycodone 5–15 mg
11. Intravenous opioids as required, after all other MMA agents exhausted and NRS ≥ 8
12. PONV treated as needed

TAP transversus abdominis plane, PONV postoperative nausea and vomiting, MMA multimodal analgesia

Population	n=30 patients for ALIF or XLIF
Intervention	Enhanced recovery pathway with TAP block
Comparison	none
Outcomes	1' : number of patients requiring iv PCA  2' : feasibility outcomes (workflow; patient acceptance/rate of recruitment; general safety) TAP efficacy and duration Length of stay NRS scores; opioid consumption
Timing	Outcomes measured at POD 0 (PACU), and POD 1 (24 hours after PACU admission)

# Regional Analgesia for Spine Surgery Pathways: *Transversus Abdominis Plane Block*

	LLIF		ALIF		Combined		<i>p</i> value*
Outcome	<i>n</i>		<i>n</i>		<i>n</i>		
NRS back pain, mean ± SD							
PACU	15	4.9 ± 3.8	17	4.3 ± 3.9	32	4.3 ± 3.9	0.03
Post-op 24 h	14	3 ± 2.7	17	2.8 ± 2.8	31	2.9 ± 2.7	
NRS incisional pain, mean ± SD							
PACU	15	1.7 ± 3.1	17	2.1 ± 2.9	32	1.9 ± 3	0.04
Post-op 24 h	14	3.2 ± 2.3	17	3.4 ± 2.7	31	3.2 ± 2.5	
Opioid consumption (OME) (MED, IQR)							
PACU to 24 h post-surgery	15	50 (27.5, 67.5)	17	60 (35, 73.5)	32	57.5 (30, 74.38)	ns
24 h post-surgery-to-discharge	14	0 (0, 60)	17	16 (0, 48.75)	31	10 (0, 53.13)	ns
NRS numeric rating scale, PACU post-anesthesia care unit, OME oral morphine equivalents							



# Regional Analgesia for Spine Surgery Pathways: *Transversus Abdominis Plane Block*

European Spine Journal (2021) 30:3738–3745  
<https://doi.org/10.1007/s00586-021-06855-8>

## ORIGINAL ARTICLE



### The association of transversus abdominis plane block with length of stay, pain and opioid consumption after anterior or lateral lumbar fusion: a retrospective study

Marie-Jacqueline Reisener<sup>1</sup> · Alexander P. Hughes<sup>1</sup> · Ichiro Okano<sup>1</sup> · Jiaqi Zhu<sup>3</sup> · Shuting Lu<sup>1</sup> · Stephan N. Salzmann<sup>1</sup> · Jennifer Shue<sup>1</sup> · Andrew A. Sama<sup>1</sup> · Frank P. Cammisia<sup>1</sup> · Federico P. Girardi<sup>1</sup> · Ellen M. Soffin<sup>2</sup>

Received: 4 January 2021 / Revised: 23 March 2021 / Accepted: 18 April 2021 / Published online: 2 May 2021  
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2021

## Original Study

*J Spine Surg* 2020;6(4):681–687 | <http://dx.doi.org/10.21037/jss-20-629>

### Multi-modal pain control regimen for anterior lumbar fusion drastically reduces in-hospital opioid consumption

Yoji Ogura, Jeffrey L. Gum, Portia Steele, Charles H. Crawford III, Mladen Djurasovic, R. Kirk Owens II, Joseph L. Laratta, Eric Davis, Morgan Brown, Christy Daniels, John R. Dimar II, Steven D. Glassman, Leah Y. Carreon

## DSPN SPINE SERIES

### Thoracolumbar Interfascial Plane Block and Transversus Abdominis Plane Block for Postoperative Analgesia: 2-Dimensional Operative Video



Aria M. Jamshidi, MD, Vyacheslav Makler, MD, Michael Y. Wang, MD  
Department of Neurological Surgery, University of Miami Miller School of Medicine,  
Miami, Florida, USA

Watch now at <https://academic.oup.com/ons/article-lookup/doi/10.1093/ons/onab213>

### *Few data, but suggest TAP associated with:*

- Opioid sparing (iv and total) effects
- Fewer opioid-related side effects
- Shorter length of hospital stay
- Mixed effects on pain scores

NIH U.S. National Library of Medicine  
*ClinicalTrials.gov*

Row	Saved	Status	Study Title	Conditions
1	<input type="checkbox"/>	Completed	<a href="#">TAP Block Efficacy After Lumbar Spine Surgery Through Anterior Approach: a Randomized, Placebo-controlled Study</a>	• Pain, Postoperative
2	<input type="checkbox"/>	Completed	<a href="#">The Tap Block Technique Via the Anterior Approach in Elective Surgery of the Spine</a>	• Elective Surgery of the Spine by Laparotomy



# Regional Techniques for Spine Surgery: *Erector Spinae Plane Block*

BMJ Journals

Regional Anesthesia & Pain Medicine

CHRONIC AND INTERVENTIONAL PAIN

BRIEF TECHNICAL REPORT

## The Erector Spinae Plane Block *A Novel Analgesic Technique in Thoracic Neuropathic Pain*

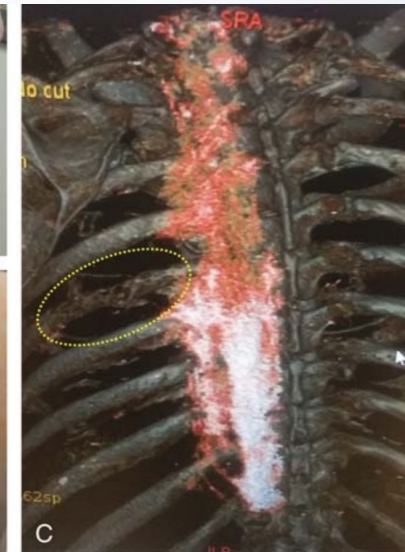
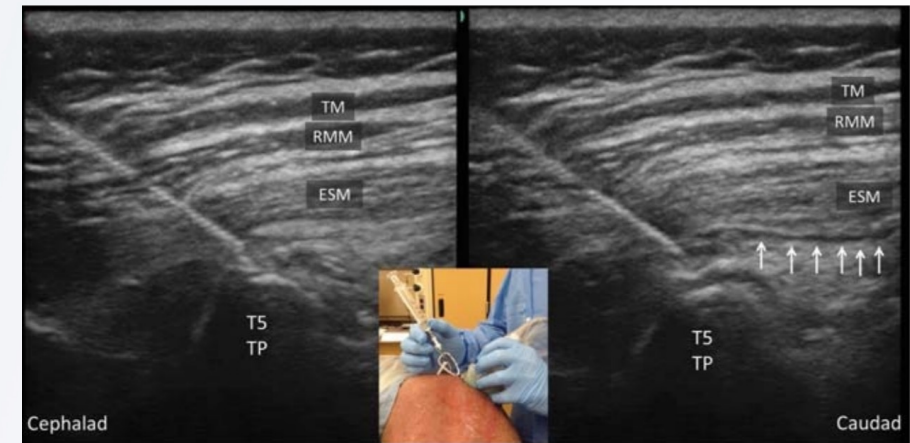
Mauricio Forero, MD, FIPP\*, Sanjib D. Adhikary, MD,† Hector Lopez, MD,‡  
Calvin Tsui, BMSc,§ and Ki Jinn Chin, MBBS (Hons), MMed, FRCPC||

**Abstract:** Thoracic neuropathic pain is a debilitating condition that is often poorly responsive to oral and topical pharmacotherapy. The benefit of interventional nerve block procedures is unclear due to a paucity of evidence and the invasiveness of the described techniques. In this report, we describe a novel interfascial plane block, the erector spinae plane (ESP) block, and its successful application in 2 cases of severe neuropathic pain (the first resulting from metastatic disease of the ribs, and the second from malunion of multiple rib fractures). In both cases, the ESP block also produced an extensive multidermatomal sensory block. Anatomical and radiological investigation in fresh cadavers indicates that its likely site of action is at the dorsal and ventral rami of the thoracic spinal nerves. The ESP block holds promise as a simple and safe technique for thoracic analgesia in both chronic neuropathic pain as well as acute postsurgical or posttraumatic pain.

(Reg Anesth Pain Med 2016;41: 621–627)

### Case 1

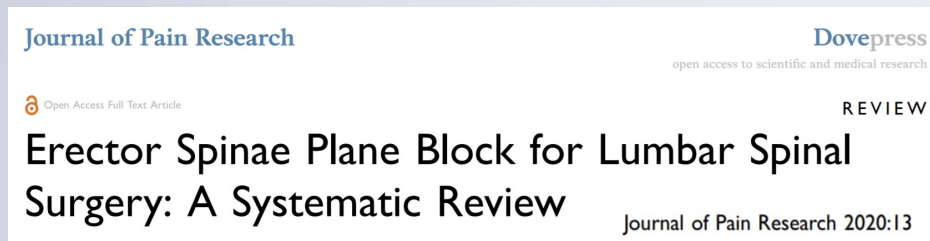
A 67-year-old man, weight 116 kg and height 188 cm [body mass index (BMI), 32.8 kg/m<sup>2</sup>] with a history of heavy smoking and paroxysmal supraventricular tachycardia controlled on atenolol, was referred to the chronic pain clinic with a 4-month history of severe left-sided chest pain. A magnetic resonance imaging scan of his thorax at initial presentation had been reported as normal, and the working diagnosis at the time of referral was post-herpetic neuralgia. He reported constant burning and stabbing neuropathic pain of 10/10 severity on the numerical rating score (NRS), radiating from his spine into the anterior chest wall, mainly at T5 and extending several dermatomes inferiorly. There was significant sleep disturbance and impairment of quality of life. Physical examination revealed allodynia and hyperesthesia over the affected dermatomes with a primary trigger point over the T5 dermatome 3 to 4 cm lateral to the neuraxial midline. Pain manage-



AAPM 2022

# Regional Techniques for Spine Surgery: *Erector Spinae Plane Block*

- 12 randomized clinical trials and 6 systematic review/meta-analyses (!)



European Spine Journal (2021) 30:3137–3149  
<https://doi.org/10.1007/s00586-021-06853-w>

## REVIEW ARTICLE

### Erector spinae plane block for postoperative analgesia in spine surgery: a systematic review and meta-analysis

Jun Ma<sup>1</sup> · Yaodan Bi<sup>1</sup> · Yabing Zhang<sup>1</sup> · Yingchao Zhu<sup>1</sup> · Yujie Wu<sup>1</sup> · Yu Ye<sup>1</sup> · Jie Wang<sup>1</sup> · Tianyao Zhang<sup>1</sup> · Bin Liu<sup>1</sup>



Journal of Orthopaedics  
Volume 24, March–April 2021, Pages 145–150



### The erector spinae plane block for analgesia after lumbar spine surgery: A systematic review ☆

James M. Rizkalla<sup>a, c, ✉</sup>, Brendan Holderread<sup>b</sup>, Matthew Awad<sup>c, d</sup>, Andro Botros<sup>c</sup>, Ishaq Y. Syed<sup>a</sup>

Pain Ther (2021) 10:333–347  
<https://doi.org/10.1007/s40122-021-00256-x>

## REVIEW

### Postoperative Analgesic Efficacy of Erector Spinae Plane Block in Patients Undergoing Lumbar Spinal Surgery: A Systematic Review and Meta-Analysis

Min-jun Liu · Xu-yan Zhou · Yi-bing Yao · Xu Shen · Rong Wang · Qi-hong Shen



World Neurosurgery  
Volume 158, February 2022, Pages 106–112



## Literature Review

### Erector Spinae Blocks for Spine Surgery: Fact or Fad? Systematic Review of Randomized Controlled Trials

Elias Elias<sup>1, ✉, ✉</sup>, Zeina Nasser<sup>2</sup>, Charbel Elias<sup>3</sup>, Ata Rahman<sup>4</sup>, Ravi Nunna<sup>1</sup>, Rod J. Oskouian<sup>1</sup>, Jens R. Chapman<sup>1</sup>

Journal of Clinical Anesthesia 78 (2022) 110647



Contents lists available at ScienceDirect  
Journal of Clinical Anesthesia  
journal homepage: [www.elsevier.com/locate/jclinane](http://www.elsevier.com/locate/jclinane)



### Analgesic efficacy of erector spinae plane block in lumbar spine surgery: A systematic review and meta-analysis

Seok Kyeong Oh, MD, PhD, Byung Gun Lim, MD, PhD<sup>\*</sup>, Young Ju Won, MD, PhD, Dong Kyu Lee, MD, PhD, Seong Shin Kim, MD

Department of Anesthesiology and Pain Medicine, Korea University Guro Hospital, Korea University College of Medicine, Seoul, Republic of Korea





# Regional Techniques for Spine Surgery: *Erector Spinae Plane Block*

Journal of Clinical Anesthesia 78 (2022) 110647

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journal homepage: [www.elsevier.com/locate/jclinane](http://www.elsevier.com/locate/jclinane)



## Analgesic efficacy of erector spinae plane block in lumbar spine surgery: A systematic review and meta-analysis

Seok Kyeong Oh, MD, PhD, Byung Gun Lim, MD, PhD<sup>\*</sup>, Young Ju Won, MD, PhD, Dong Kyu Lee, MD, PhD, Seong Shin Kim, MD

Department of Anesthesiology and Pain Medicine, Korea University Guro Hospital, Korea University College of Medicine, Seoul, Republic of Korea

### SR/MA of 12 RCTs/ 665 patients

- Inclusion: ESPB vs. none or placebo for lumbar spine surgery
- 1' outcome: opioid consumption at 24 hours
- 2' outcomes: pain; PONV, length of hospital stay; time to rescue analgesia; patient satisfaction

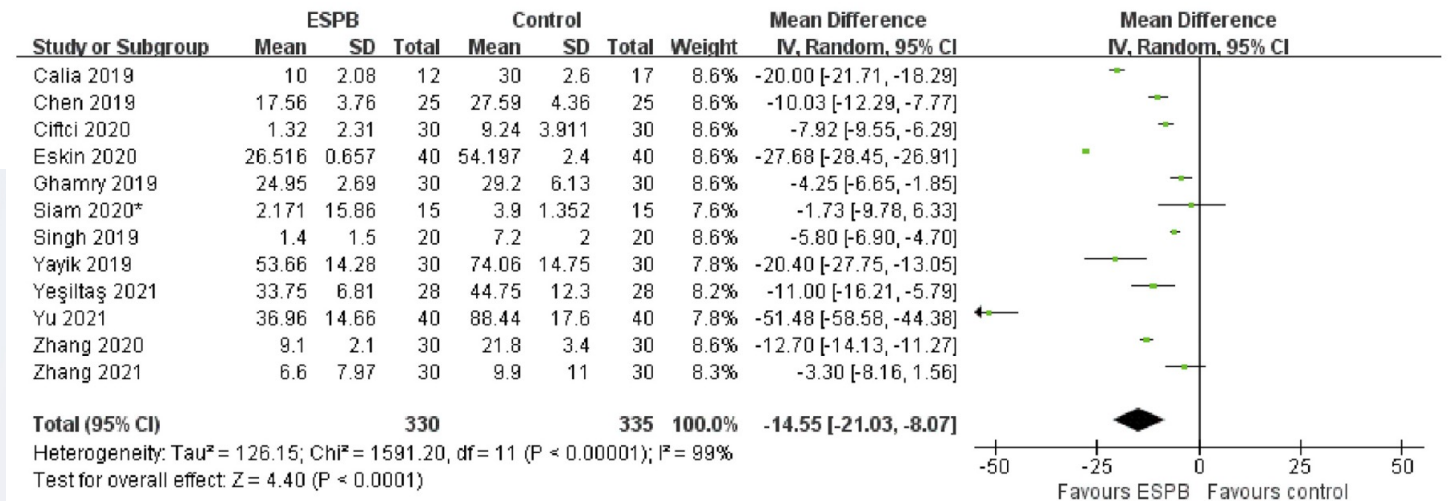


Fig. 3. Forest plot of the opioid (intravenous morphine milligram equivalents) consumption in the first 24 h after surgery.

\* indicates the study by Siam et al. [19], which evaluated the outcome at 8 h after surgery.



# Regional Techniques for Spine Surgery: *Adding ESPB to ERAS?*

## PERIOPERATIVE MEDICINE

## ANESTHESIOLOGY

### Enhanced Recovery after Lumbar Spine Fusion

A Randomized Controlled Trial to Assess the Quality of Patient Recovery

Ellen M. Soffin, M.D., Ph.D., James D. Beckman, M.D., Audrey Tseng, B.A., Haoyan Zhong, M.P.A., Russel C. Huang, M.D., Michael Urban, M.D., Ph.D., Carrie R. Guheen, M.D., Han-Jo Kim, M.D., Frank P. Cammisa, M.D., Jemiel A. Nejm, M.D., Frank J. Schwab, M.D., Isabel F. Armendi, B.Sc., Stavros G. Memtsoudis, M.D., Ph.D., M.B.A.

ANESTHESIOLOGY 2020; 133:350–63

#### ABSTRACT

**Background:** Prospective trials of enhanced recovery after spine surgery are lacking. We tested the hypothesis that an enhanced recovery pathway improves quality of recovery after one- to two-level lumbar fusion.

**Methods:** A patient- and assessor-blinded trial of 56 patients randomized to enhanced recovery (17 evidence-based pre-, intra-, and postoperative care elements) or usual care was performed. The primary outcome was Quality of Recovery-40 score (40 to 200 points) at postoperative day 3. Twelve points defined the clinically important difference. Secondary outcomes included Quality of Recovery-40 at days 0 to 2, 14, and 56; time to oral intake and discharge from physical therapy; length of stay; numeric pain scores (0 to 10); opioid consumption (morphine equivalents); duration of intravenous patient-controlled analgesia use; complications; and markers of surgical stress (interleukin 6, cortisol, and C-reactive protein).

**Results:** The analysis included 25 enhanced recovery patients and 26 usual care patients. Significantly higher Quality of Recovery-40 scores were found in the enhanced recovery group at postoperative day 3 ( $179 \pm 14$  vs.  $170 \pm 16$ ;  $P = 0.041$ ) without reaching the clinically important difference. There were no significant differences in recovery scores at days 0 ( $175 \pm 16$  vs.  $162 \pm 22$ ;  $P = 0.059$ ), 1 ( $174 \pm 18$  vs.  $164 \pm 15$ ;  $P = 0.050$ ), 2 ( $174 \pm 18$  vs.  $167 \pm 17$ ;  $P = 0.289$ ), 14 ( $184 \pm 13$  vs.  $180 \pm 12$ ;  $P = 0.500$ ), and 56 ( $187 \pm$

Table 2: Treatment Differences Between ERP and UC QoR40 Scores (POD0 to POD3)

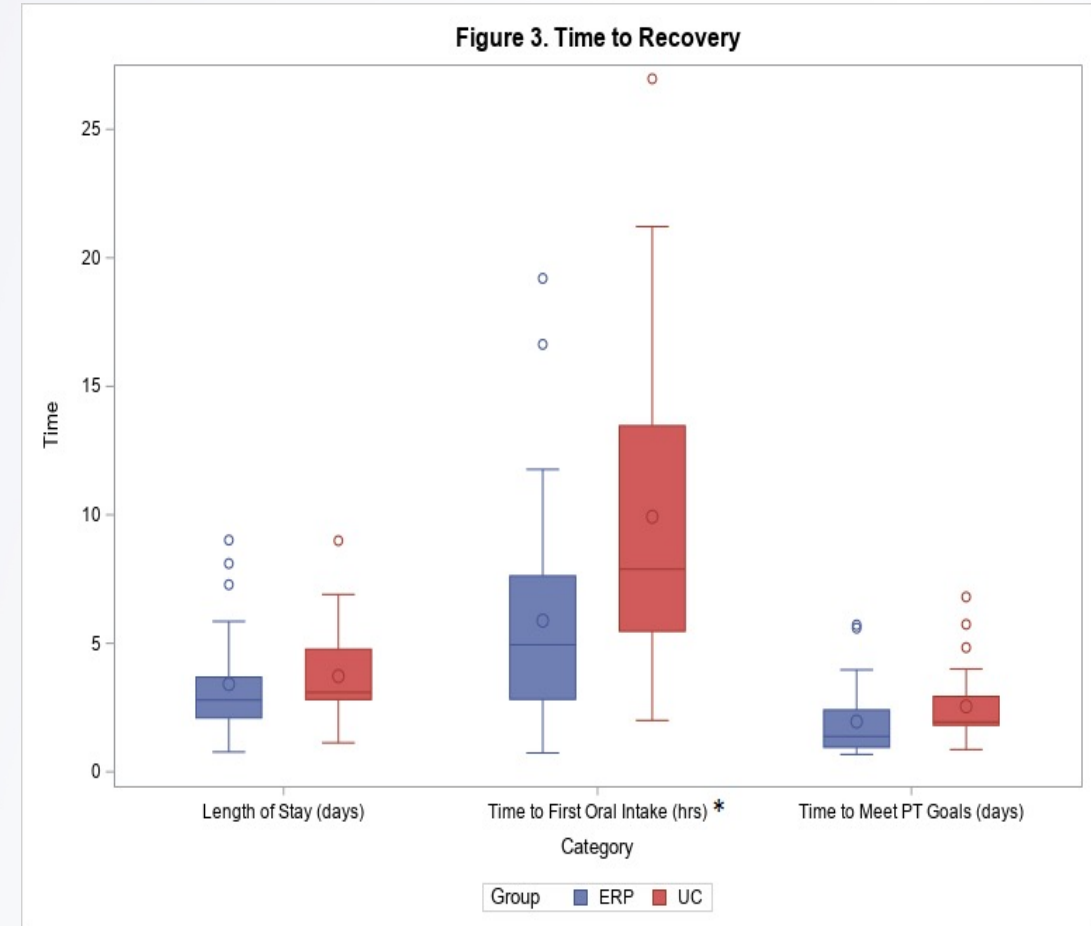
Parameter	ERP		UC		Differences in means* (95% CI)	P- value
	N	Mean (sd)	N	Mean (sd)		
<b>Primary Outcome</b>						
	22	179.4 (13.8)	25	170.3 (15.5)	9.04 (0.38, 17.71)	0.041
<b>Longitudinal QOR40</b>						
Overall Group Effect					8.02 (0.07, 15.97)	0.048
POD0	19	174.8 (15.9)	19	161.5 (21.7)	11.33 (-0.43, 23.15)	0.059
POD1	23	174 (17.8)	26	164.1 (14.6)	8.98 (0.02, 17.95)	0.050
POD2	24	174.1 (18)	25	166.6 (17.2)	5.37 (-4.56, 15.30)	0.289
POD3	22	179.4 (13.8)	25	170.3 (15.5)	8.02 (0.07, 15.97)	0.048
<b>Longitudinal QOR40 by Dimension</b>						
Overall Group Effect-Comfort					4.15 (1.06, 7.23)	0.008
Overall Group Effect-Emotions					1.70 (-0.79, 4.18)	0.181
Overall Group Effect-Physical						
Independence					1.38 (-0.58, 3.34)	0.168
Overall Group Effect-Patient						
Support					0.67 (-0.70, 2.05)	0.338
Overall Group Effect-Pain					0.24 (-1.84, 2.32)	0.821

ERP enhanced recovery pathway; UC usual care; POD postoperative day; QoR quality of recovery; sd standard deviation

# Regional Techniques for Spine Surgery: *Adding ESPB to ERAS?*

**Table 3: NRS Pain Scores with PT session and Opioid Consumption**

Parameter	ERP		UC		H-L estimate of location shift	P- value
	N	Median (IQR)	N	Median (IQR)		
Highest NRS Pain Score						
After PT session						
POD1	24	3 (2.5)	23	4 (2)	-2.0000 (-3, -1)	0.005
POD2	9	2 (2)	19	4 (5)	-2 (-4, 0)	0.078
Opioid Consumption						
0-24 hrs	24	61.8 (77.7)	26	133.2 (178.8)	-56.7 (-130, -5.3)	0.030
24-48 hrs	18	30 (77.5)	25	75 (92)	-25 (-68, 0)	0.053
Iv PCA Duration (days)	24	0.7 (0.3)	25	1.1 (0.8)	-0.45 (-0.74, -0.26)	<.0001



# Regional Techniques for Spine Surgery: *Adding ESPB to ERAS?*

BMJ Journals

Regional Anesthesia & Pain Medicine

Original research

## Impact of ultrasound-guided erector spinae plane block on outcomes after lumbar spinal fusion: a retrospective propensity score matched study of 242 patients

Ellen M Soffin <sup>1</sup>, Ichiro Okano,<sup>2</sup> Lisa Oezel,<sup>2,3</sup> Artine Arzani,<sup>2</sup> Andrew A Sama,<sup>2</sup> Frank P Cammisa,<sup>2</sup> Federico P Girardi,<sup>2</sup> Alexander P Hughes<sup>2</sup>

2022 Feb;47(2):79-86.

### ABSTRACT

**Background** We evaluated the impact of bilateral ultrasound-guided erector spinae plane blocks on pain and opioid-related outcomes within a standardized care pathway for lumbar fusion.

procedure-specific value and indications have yet to be fully characterized.<sup>4,5</sup>

To date, one of the most-investigated regional techniques for spine surgery is the erector spinae plane block (ESPB).<sup>6</sup> Several prospective studies

## Adding Erector Spinae Plane Blocks to an Enhanced Recovery Pathway for Lumbar Spine Fusion: Statistically Significant but Clinically Debatable

A retrospective, propensity-score matched cohort study of 242 patients. All patients received comprehensive multimodal analgesia within an enhanced recovery care pathway.

ESP block group had statistically significant reductions in 24-hour opioid consumption  
( $p=0.03$ )

ESP Block Group  
30 mg  
Morphine Equivalent Dose (0, 144)

No ESP Block Group  
45 mg  
Morphine Equivalent Dose (0, 225)

ESP block group had shorter hospital stays  
( $p=0.001$ )

ESP Block Group  
76 hours  
(21,411)

No ESP Block Group  
81 hours  
(25,268)

No differences observed in numeric rating scale (1-10) pain scores in PACU or at 24 hours

ESP Block Group  
4

No ESP Block Group  
4

ESP block group had lower antiemetic administration  
( $p=0.006$ )

ESP Block Group  
n=77 (64%)

No ESP Block Group  
n=97 (80%)

**CONCLUSION:** Do these differences warrant the routine addition of ESP blocks to a clinical pathway for lumbar spine fusion?

Soffin E, Okano I, Arzani A, et al. Impact of ultrasound-guided erector spinae plane block on outcomes after lumbar spinal fusion: a retrospective propensity score matched study of 242 patients. Reg Anesth Pain Med 2021; Illustration by Jim Savory

Regional Anesthesia & Pain Medicine

AAPM 2022



# MMA for Spine Surgery Pathways: *PROSPECT* Recommendations

EJA

Eur J Anaesthesiol 2021; 38:985–994

OPEN

## REVIEW ARTICLE

### Pain management after complex spine surgery

*A systematic review and procedure-specific postoperative pain management recommendations*

Piet Waelkens, Emissia Alsabbagh, Axel Sauter, Girish P. Joshi and Hélène Beloeil, on behalf of the PROSPECT Working group\*\* of the European Society of Regional Anaesthesia and Pain therapy (ESRA)

## RECOMMENDATIONS

1. Systemic analgesia should include paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) or cyclo-oxygenase (COX)-2 specific inhibitors administered pre-operatively or intra-operatively and continued postoperatively.
2. Intra-operative intravenous low-dose ketamine infusion is recommended.
3. Epidural analgesia with local anaesthetics alone or combined with opioids are recommended.
4. Opioids should be reserved as rescue analgesics in the postoperative period.

- **Recommended:**

*All:* NSAID/COX-2 inhibitor & acetaminophen

*Complex spine:* intraoperative ketamine; epidural analgesia

*Decompression:* local infiltration analgesia

- **Not recommended:** methadone, fascial plane blocks, *iv* lidocaine, gabapentin

European Spine Journal (2021) 30:2925–2935  
<https://doi.org/10.1007/s00586-020-06661-8>

## REVIEW ARTICLE



### Pain management after laminectomy: a systematic review and procedure-specific post-operative pain management (prospect) recommendations

Laurens Peene<sup>1</sup> · Pauline Le Cacheux<sup>2</sup> · Axel R. Sauter<sup>3,4</sup> · Girish P. Joshi<sup>5</sup> · Helene Beloeil<sup>6</sup> · PROSPECT Working Group Collaborators · European Society of Regional Anaesthesia

**Table 1** Overall recommendations for perioperative pain management in patients undergoing lumbar laminectomy

#### *Preoperative and intraoperative recommendations*

Oral or IV paracetamol (Grade D)

Oral or IV NSAIDs/COX-2-specific inhibitors (Grade A)

Surgical wound instillation or infiltration with local anaesthetic (Grade A)

#### *Post-operative recommendations*

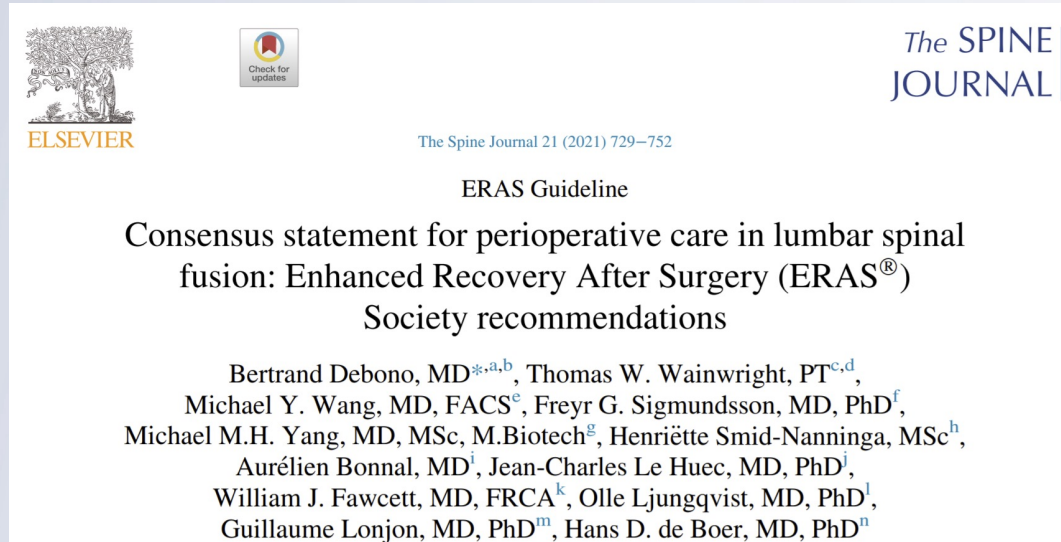
Oral or IV paracetamol (Grade D)

Oral or IV NSAIDs/COX-2-specific inhibitors (Grade A)

Opioids as rescue medication (Grade D)

COX-2, cyclooxygenase-2; IV, intravenous; NSAIDs, non-steroidal anti-inflammatory drugs

# MMA for Spine Surgery Pathways: *ERAS Society*<sup>®</sup> Recommendations



## Summary/recommendation

Use of intrathecal morphine, epidural analgesia, locoregional blocks, or wound infiltration with long-acting local anesthetics should be used to improve postoperative pain management.

Intrathecal analgesia

*Quality of evidence: High*

*Recommendation grade: Strong*

Epidural analgesia

*Quality of evidence: High*

*Recommendation grade: Strong*

Locoregional blocks

*Quality of evidence: High*

*Recommendation grade: Weak*

Wound infiltration

*Quality of evidence: High*

*Recommendation grade: Strong*

Nb	Item	Recommendation	Evidence level	Recommendation grade
Postoperative recommendations				
17	Postoperative analgesia	The routine use of multimodal analgesic regimens to improve pain control and reduce opioid consumption is recommended.	Moderate	Strong

- *Recommended:* intrathecal morphine; epidural analgesia; locoregional blocks; wound infiltration
- *Not mentioned:* methadone

# Conclusions

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- 1) There are unique challenges to constructing MMA elements for ERAS-spine pathways.
- 2) Procedure-specific risk:benefit will guide ultimate selection(s).
- 3) Evidence is accumulating to suggest the benefits of regional analgesia for spine surgery.
- 4) More evidence is needed prior to adding regional techniques to ERAS-spine pathways on a routine basis.