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Interventions for Chronic Facial Pain and Beyond

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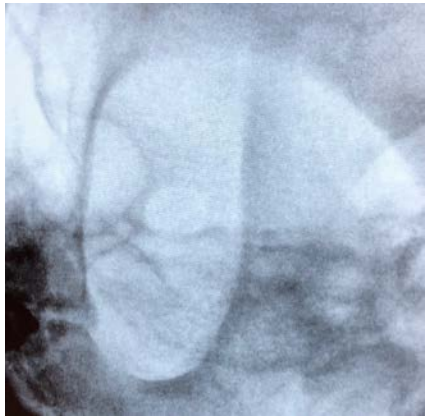


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MEETING

Disclosure

Financial Disclosure

-- Scientific advisor of Shanda Group

-- Advisory Board, Stanford eWEAR Initiative

Drug/Product Off-Label Use Disclosure

This presentation does not contain off-label or investigational use of drugs or products.

Session objectives:

- Participants will learn about the overview of orofacial nerves and ganglions, its correlating neuralgia conditions, and how those conditions can be treated with novel interventions.
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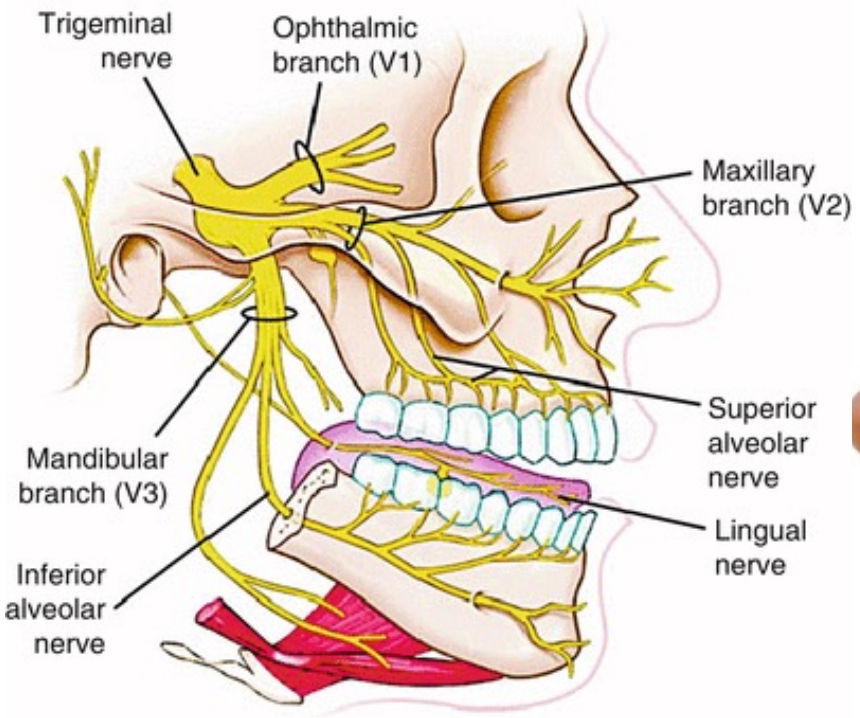
Agenda

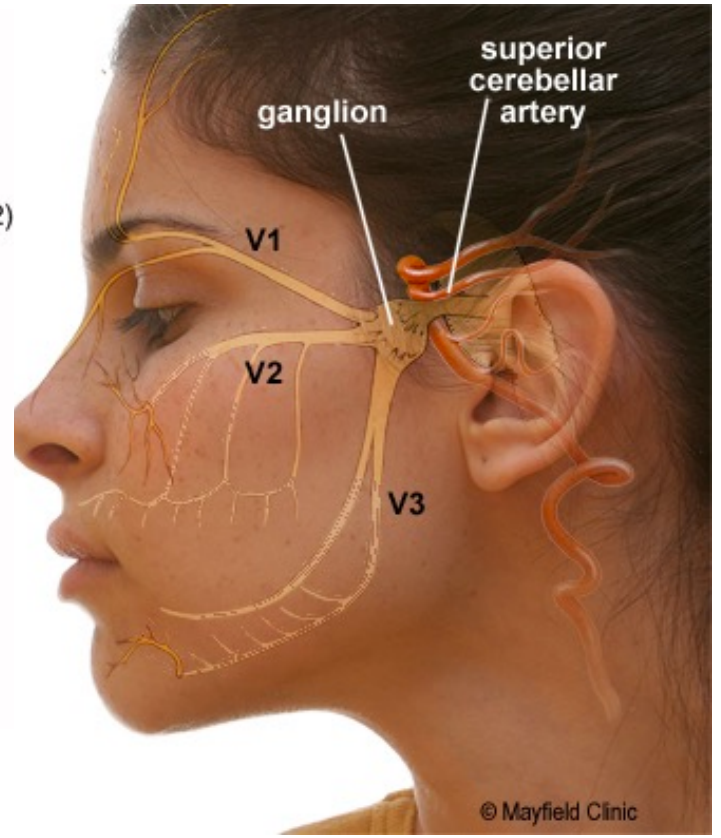
1. Review the nerves and ganglia of the head and neck, and correlate that with various cranial neuralgia conditions.

2. Introduce novel interventions performed at Stanford Pain Center

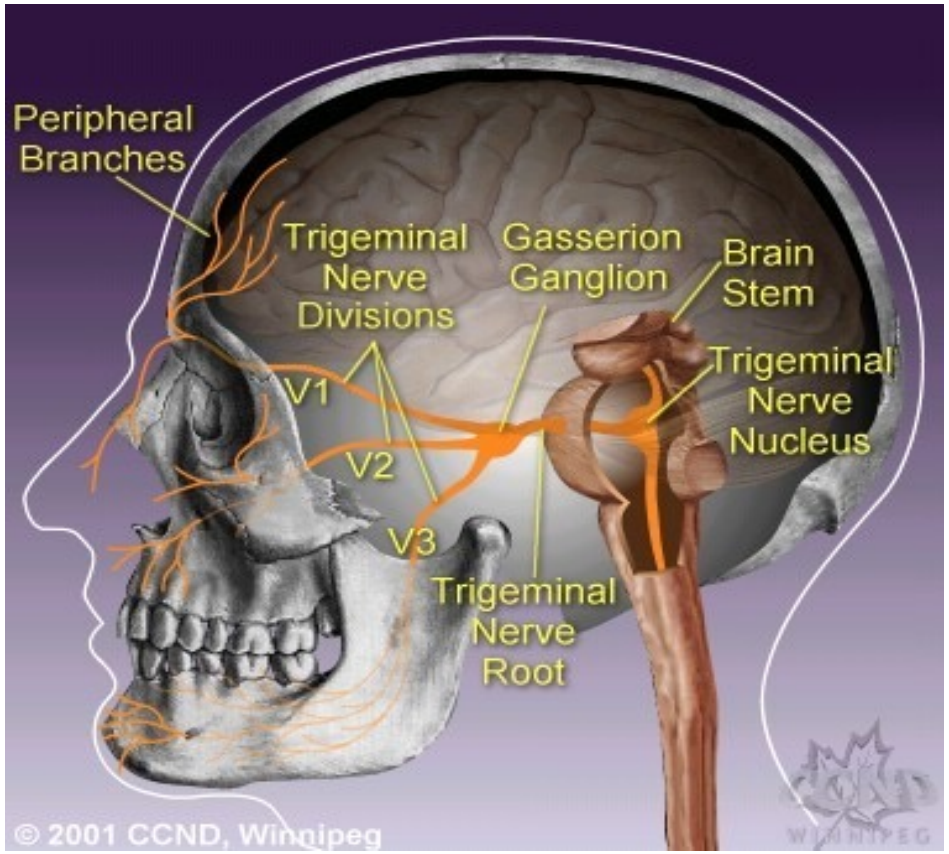
CN V Trigeminal Nerve

- Largest cranial nerve
- Sensory root in the pons
- Three branches
  - Ophthalmic (V1)
  - Maxillary (V2)
  - Mandibular (V3)
- Innervates the skin, mucous membranes and sinuses of the face



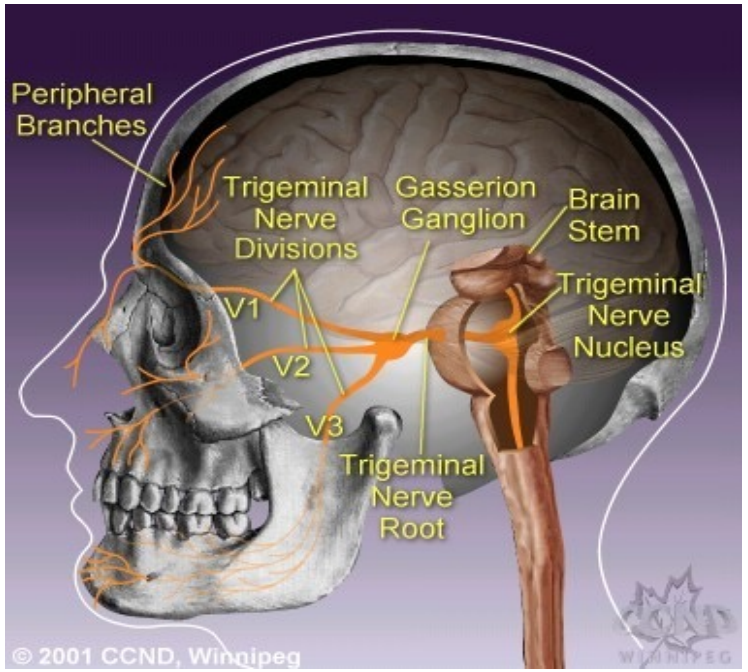


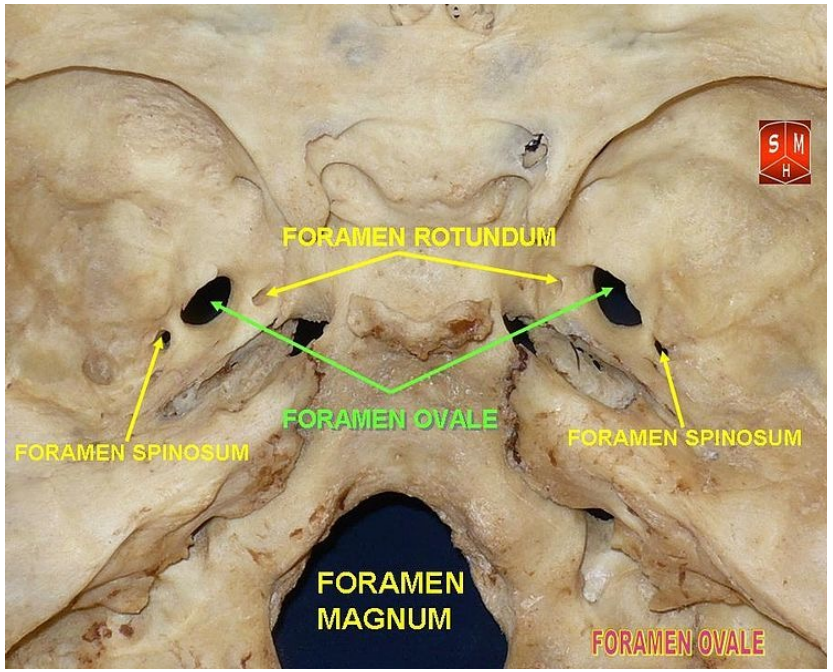
Trigeminal Neuralgia: Anatomy

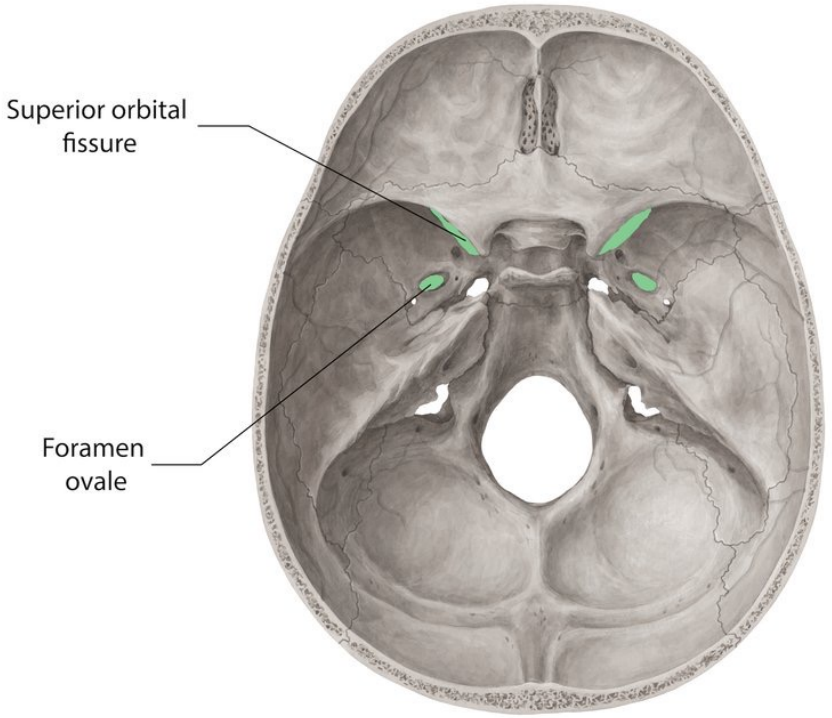


- The trigeminal nerve transmits sensation from the skin of the anterior part of the head, the oral and nasal cavities, the teeth and the meninges.
- It has three divisions: ophthalmic V1, maxillary V2, and mandibular V3
- All divisions come from the trigeminal ganglion, also known as Gasserian ganglion

CN V Trigeminal Nerve







Trigeminal Neuralgia

- Brief (seconds to minutes) episodes of severe, sharp, stabbing, lancinating, pain
- Nicolas Andre 1756 – coined the term - tic douloureux to imply contortions and grimaces accompanied by violent and unbearable pain.
- Almost always unilateral
  - Bilateral V1 pain suggestive of MS
- Pain occurs along one or more trigeminal divisions
- Spontaneous or evoked pain
  - Cutaneous trigger zones
- Multiple attacks may occur over short periods
- "Refractory period", after a paroxysmal attack where new attacks cannot be elicited. Up to 50% with underlying aching, dull or burning background pain of lower intensity in the same area. This background pain is most common in women. (Maabjerg S et al Headache 2014).
- In general normal facial sensation

Trigeminal Neuralgia: Epidemiology

Table 2 Pain distribution in the various nerve branches in trigeminal neuralgia

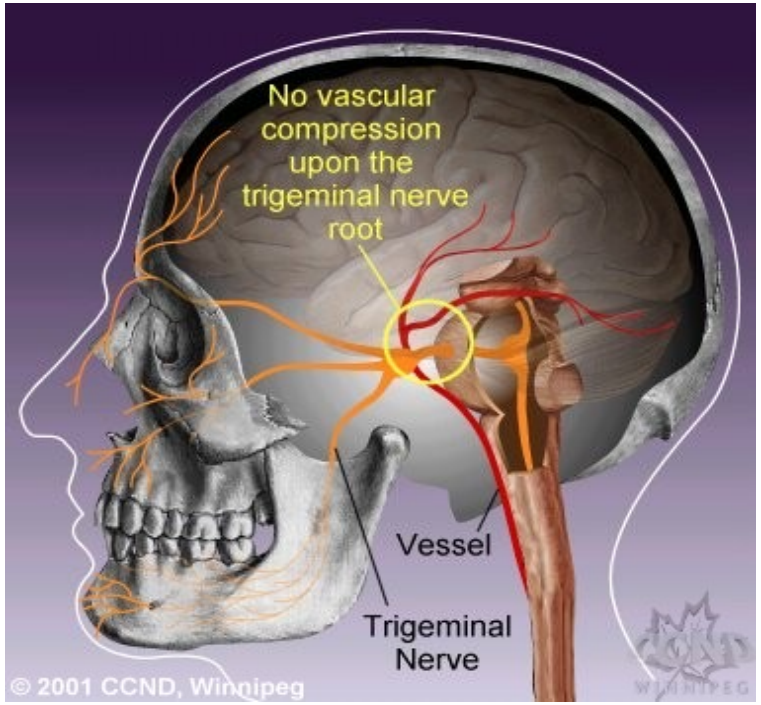
Trigeminal nerve branch affected (pain)	Percentage (%) of patients
V1 only	4
V2 only	17
V3 only	15
V1 + V2	14
V2 + V3	32
V1 + V2 + V3	17

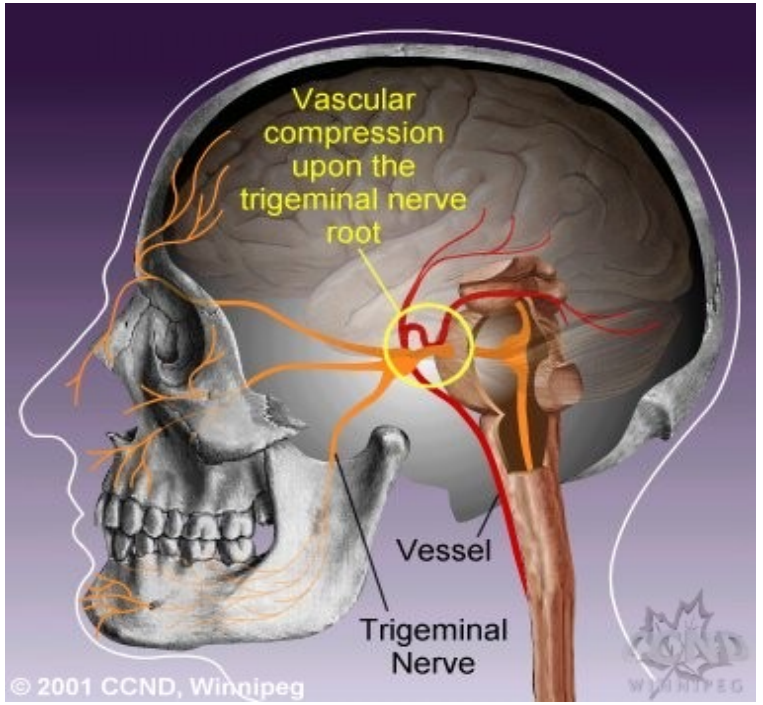
Vorenkamp KE. Interventional procedures for facial pain. Curr Pain Headache Rep. 2013. Jan;17(1):308

Trigeminal Neuralgia: Natural History

- Few studies examining the natural history of TN.
- Pain may worsen with time and that TN in its chronic state is characterized by longer lasting, medically refractory pain, sensory disturbances and progressive neuroanatomical changes of the trigeminal root
- Unpredictable periods of complete remission that may last months or even years.
- Challenges to this include: Di Stefanoih et al. found that in the majority of TN patients the pain does not increase in frequency or duration, nor did it become refractory to medication, and the dosage needed to relieve pain did not increase with time. Maarbjerg et al. found that concomitant persistent pain and neuroanatomical morphological changes were not related to age or to duration of disease.

Trigeminal Neuralgia: Compression Theory





COMPRESSION THEORY: the trigeminal nerve is susceptible to mechanical compression as it exits the brainstem pons and passes across the subarachnoid space toward Meckel's cave.

http://www.umanitoba.ca/cranial_nerves/trigeminal_neuralgia/manuscript/types.html

Ann Surg. 1980 Oct; 192(4): 518–525. PMCID: PMC1346998
Neurovascular compression in cranial nerve and systemic disease.
P J Jannetta

TABLE 1. *Microvascular Decompression in Trigeminal Neuralgia*

Operative Findings	Number of Patients
Arterial	242
Aneurysm	1
Venous	57
AVM	1
Mixed arterial/venous	96
Tumor	15
No pathology	1
Unrecorded	1

Trigeminal Neuralgia: Epidemiology

1. Used to think - 4.3 new cases per 100,000 people annually (roughly 13,000-15,000 cases per year in US alone).

2. More recently, European studies have found significantly higher incidence rates for TN, ranging from 12.6 to 27 per 100,000 (38,000-81,000 per year in US)

3. The female to male ratios in these newer studies are also significantly higher, at approximately 2.3 to 1.

4. TN has also been associated with other cranial nerve neuralgias, most notably GPN, in which approximately 11% of subjects have associated TN.

5. Occasional familial occurrences

Trigeminal Neuralgia: Classification

Criteria – ICHD3 (The International Classification of Headache Disorders)

- **13.1 Trigeminal neuralgia**
- **13.1.1 Classical trigeminal neuralgia**
  - 13.1.1.1 Classical trigeminal neuralgia, purely paroxysmal
  - 13.1.1.2 Classical trigeminal neuralgia with concomitant persistent facial pain

- **13.1.2 Painful trigeminal neuropathy**
  - 13.1.2.1 Painful trigeminal neuropathy attributed to acute Herpes zoster
  - 13.1.2.2 Post-herpetic trigeminal neuropathy
  - 13.1.2.3 Painful post-traumatic trigeminal neuropathy
  - 13.1.2.4 Painful trigeminal neuropathy attributed to multiple sclerosis (MS) plaque
  - 13.1.2.5 Painful trigeminal neuropathy attributed to space occupying lesion
  - 13.1.2.6 Painful trigeminal neuropathy attributed to other disorder

Trigeminal Neuralgia: Classification

Criteria – ICHD3

Painful Trigeminal Neuropathy

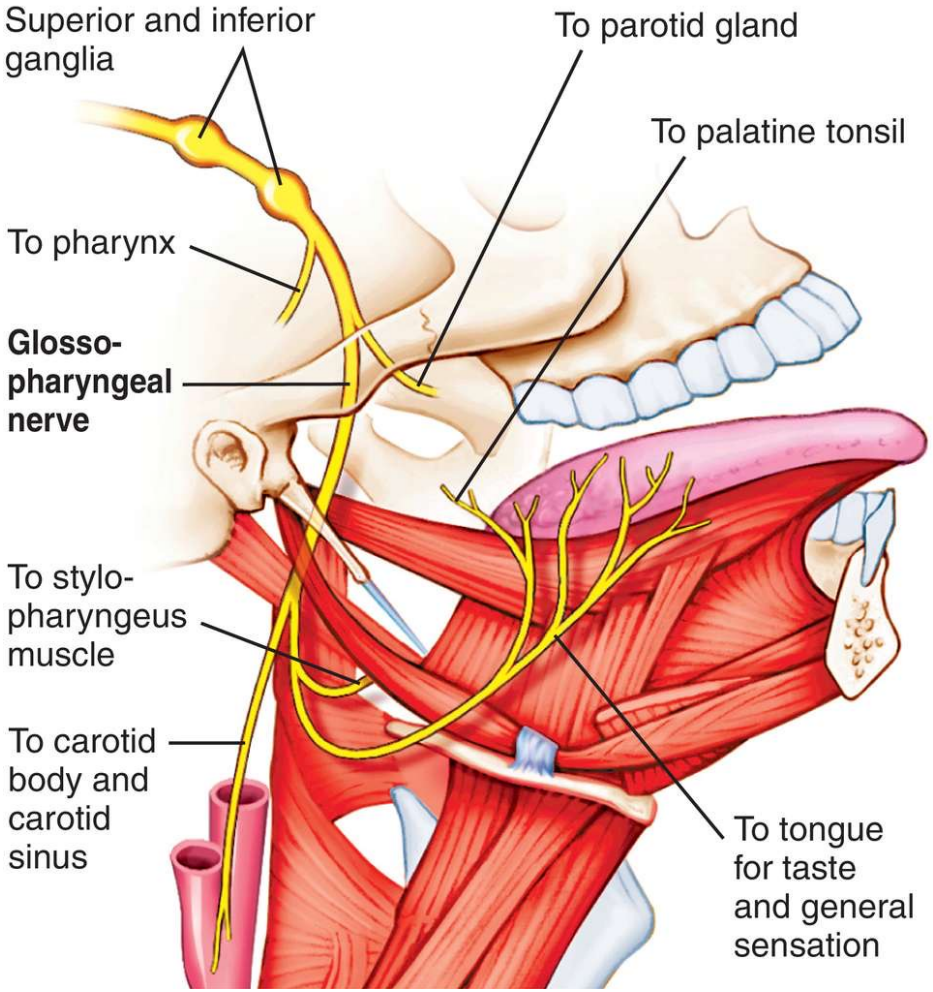
The ICHD-3 notes that the finding of hypoesthesia or hypoalgesia in the affected trigeminal region always indicates axonal damage and therefore a trigeminal neuropathy -though not all experts agree.

In such cases, an extensive diagnostic work-up may be necessary to identify the cause.

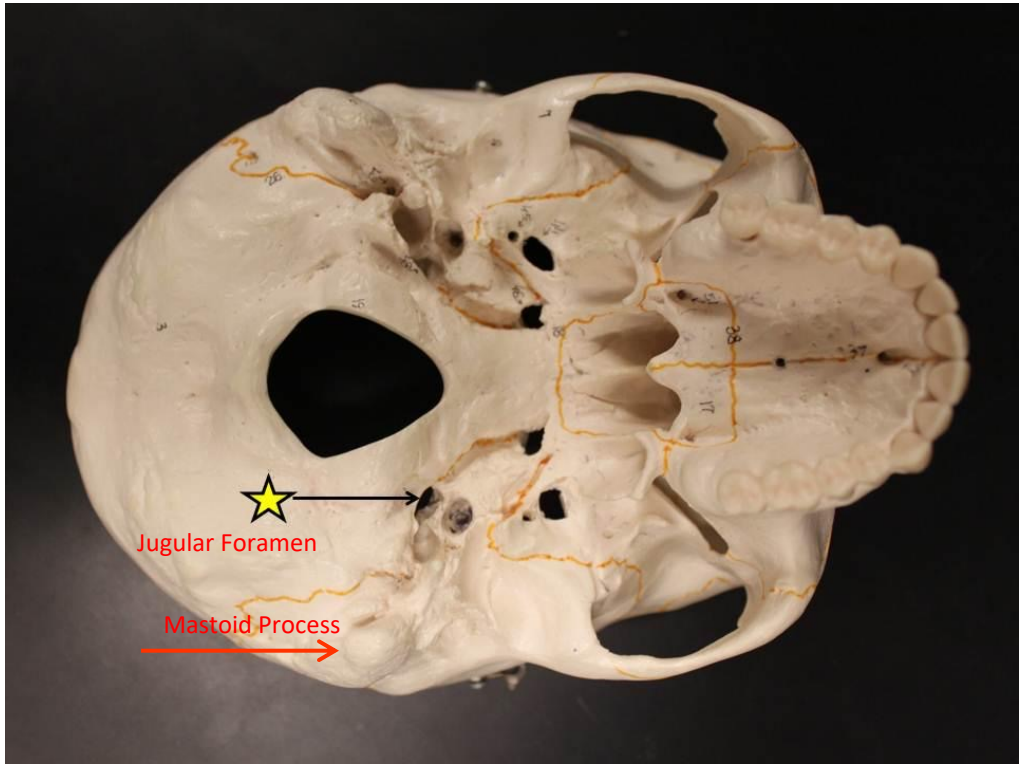
In contrast, hyperalgesia in the painful region should not necessarily lead to a diagnosis of secondary TN or trigeminal neuropathy because it may reflect increased attention to the painful side.

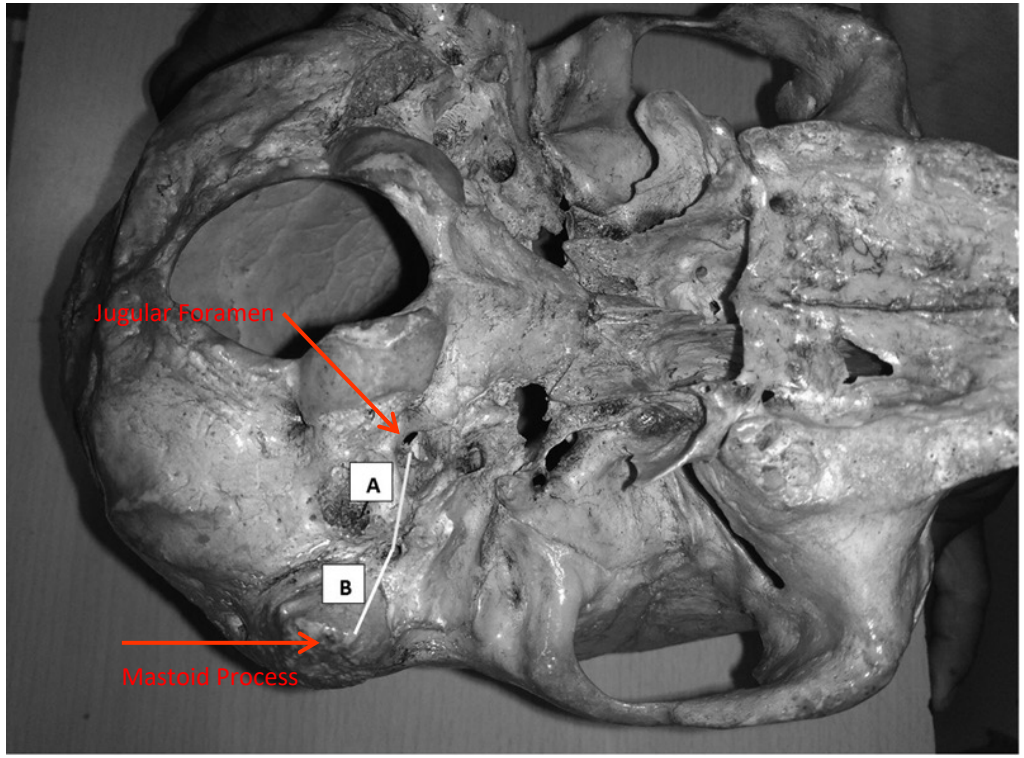
CN IX Glossopharyngeal Nerve

- Sensory inputs from the oropharynx, carotid body and sinus, posterior tongue, middle ear cavity, and Eustachian tube
- Parasympathetic innervation to the parotid gland
- Originates in the medulla, courses laterally through posterior cranial fossa, through the **jugular foramen**, then forming the superior and inferior ganglia

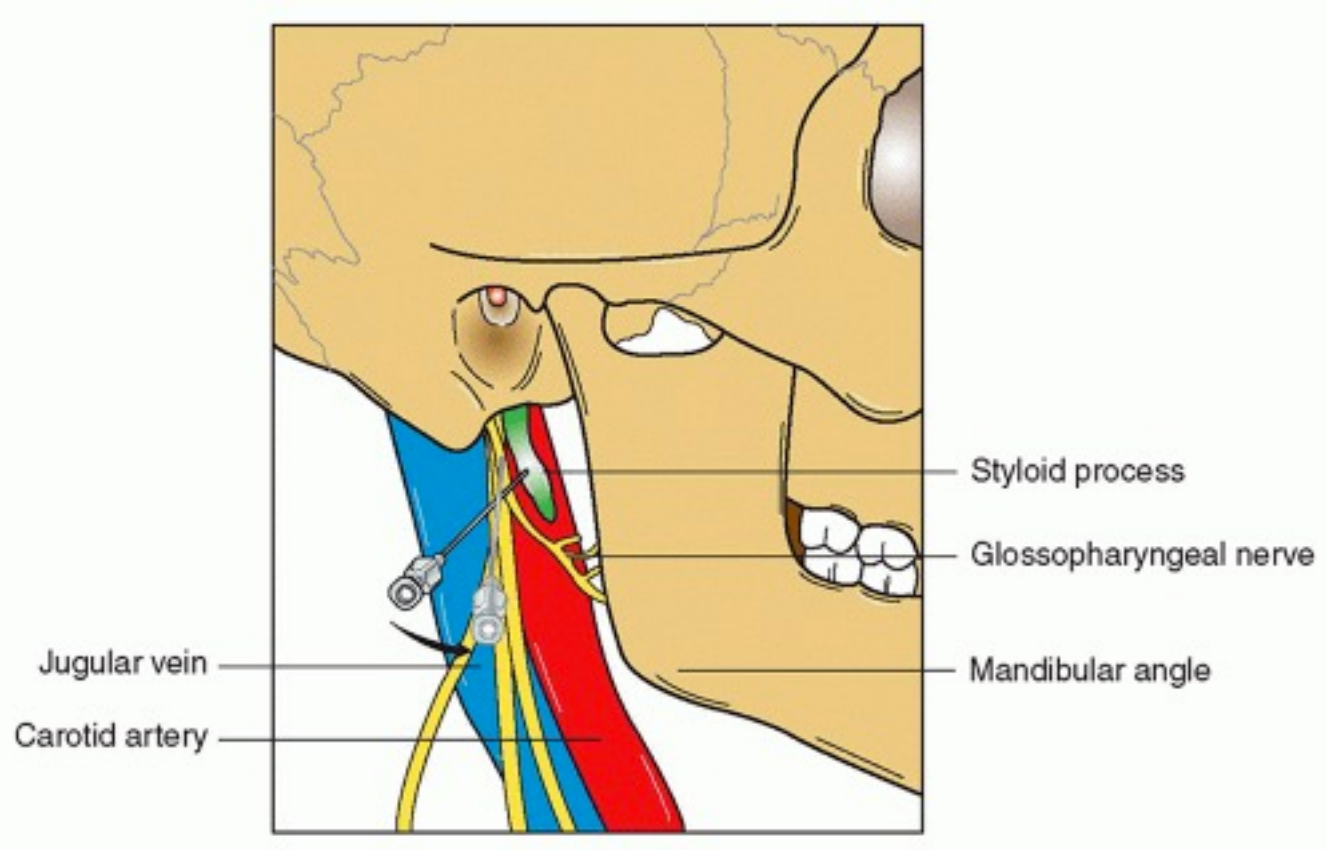


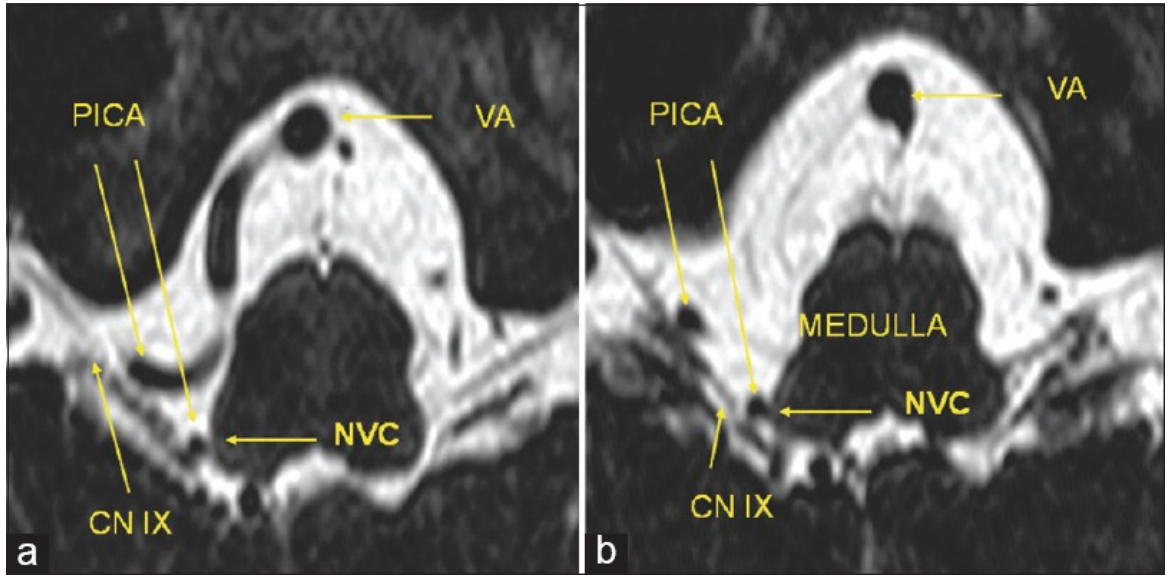
CN IX Glossopharyngeal Nerve





Glossopharyngeal Nerve Relevant Pathology





anrikulu L, Hastreiter P, Arnd Dörfler, Buchfelder M, Naraghi R. Classification of neurovascular compression in glossopharyngeal neuralgia: Three-dimensional visualization of the glossopharyngeal nerve. Surg Neurol Int 24-Dec-2015;6:189.

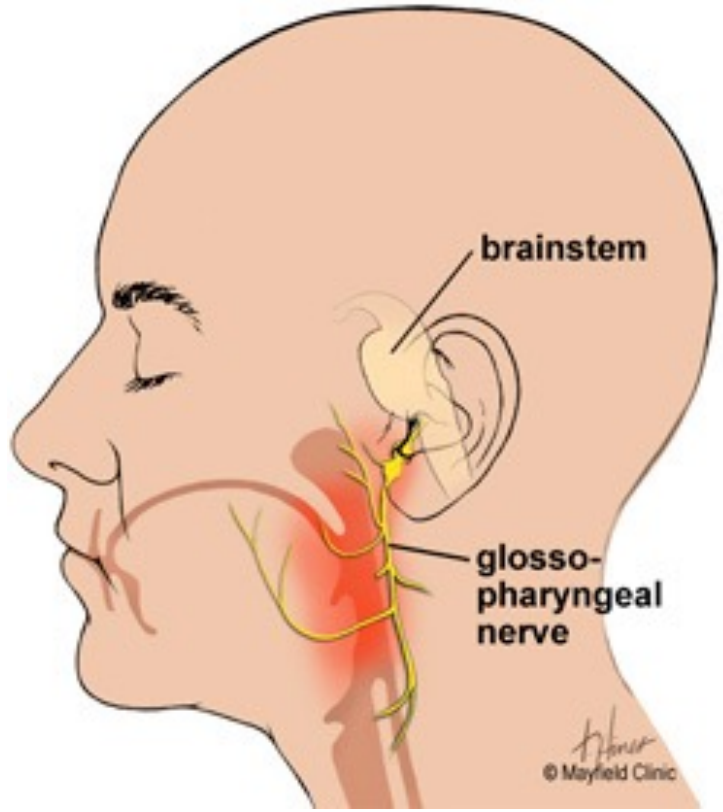
Glossopharyngeal Neuralgia (GPN)

1. Per ICHD-3 classification, GPN is characterized by a brief episodic unilateral pain, with sharp and stabbing in character, with abrupt onset and cessation, in the glossopharyngeal nerve distribution (angle of the jaw, ear, tonsillar fossa and the tongue base). Pain is commonly triggered by coughing, talking, and swallowing.

2. Very painful condition, similar in severity to TN. GPN often gets misdiagnosed as TN since pain characteristics are very similar in both entities.

3. Pain episodes can occur within minutes of each other and then stop entirely for days at a time. The physical examination of patients with GPN is generally benign, and the painful areas do not show any signs of sensory abnormalities for both light touch and pinprick

4. GPN is a rare condition. The prevalence of GPN is estimated to be approximately 0.8 per 100,000 populations in a year

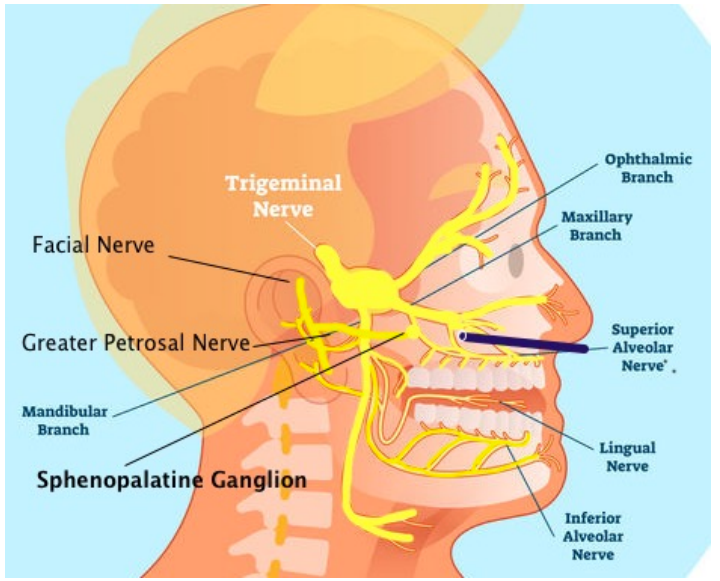


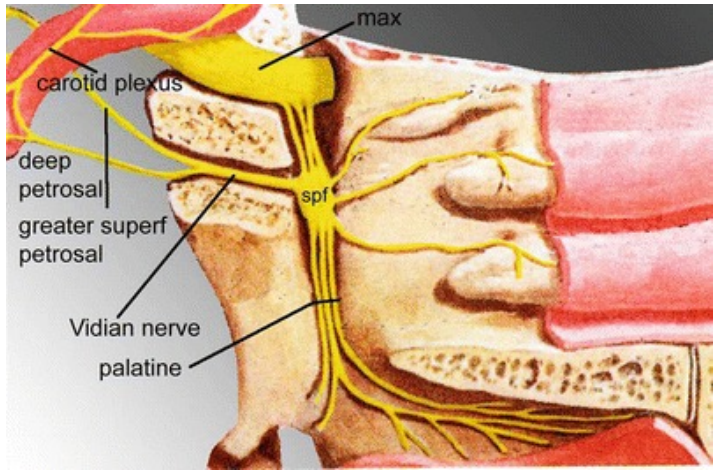
Sphenopalatine Ganglion (SPG)

- Extracranial; nerve bundle behind the bony structure of the nose; closely associated with the trigeminal nerve; responsible for **trigeminal autonomic reflex**.

- Lies posterior to the middle nasal turbinate and maxillary sinus, within the pterygopalantine fossa (**PPF**)

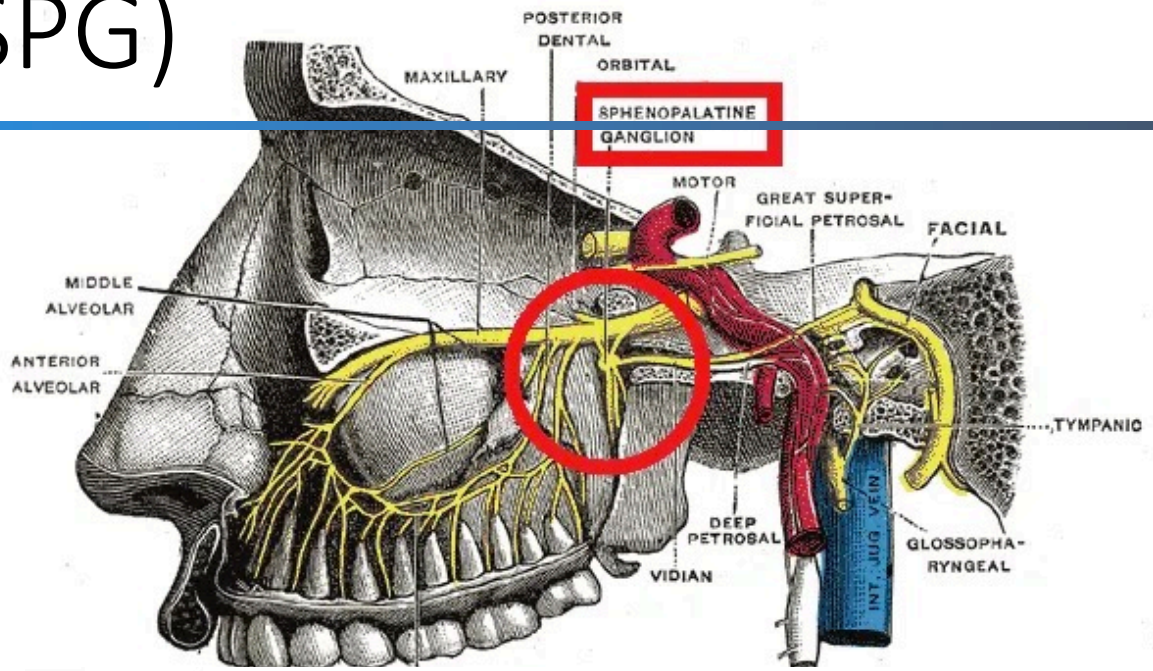
- Also known as: Pterygopalantine ganglion; it is mainly parasympathetic ganglion

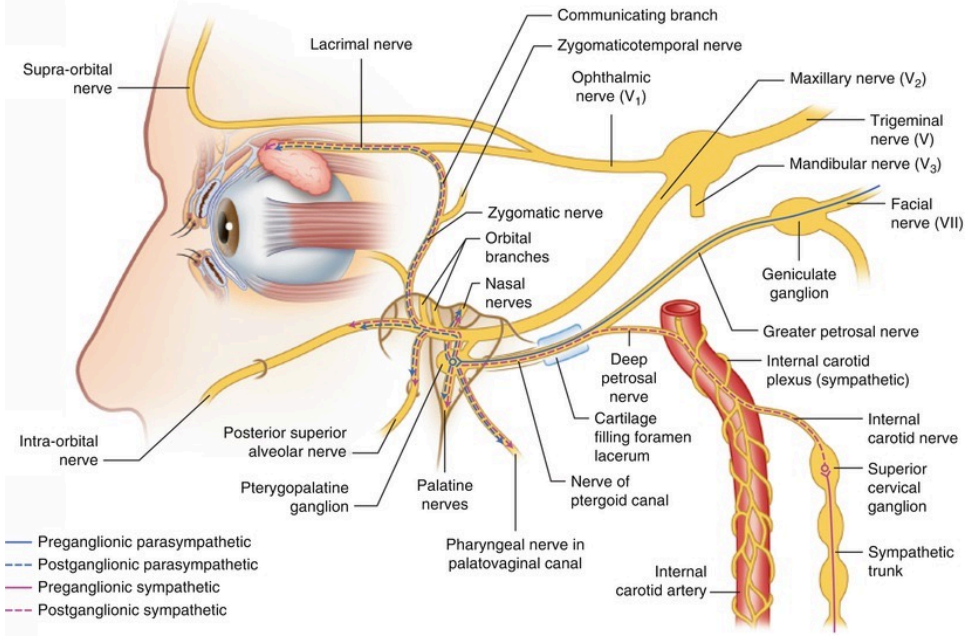




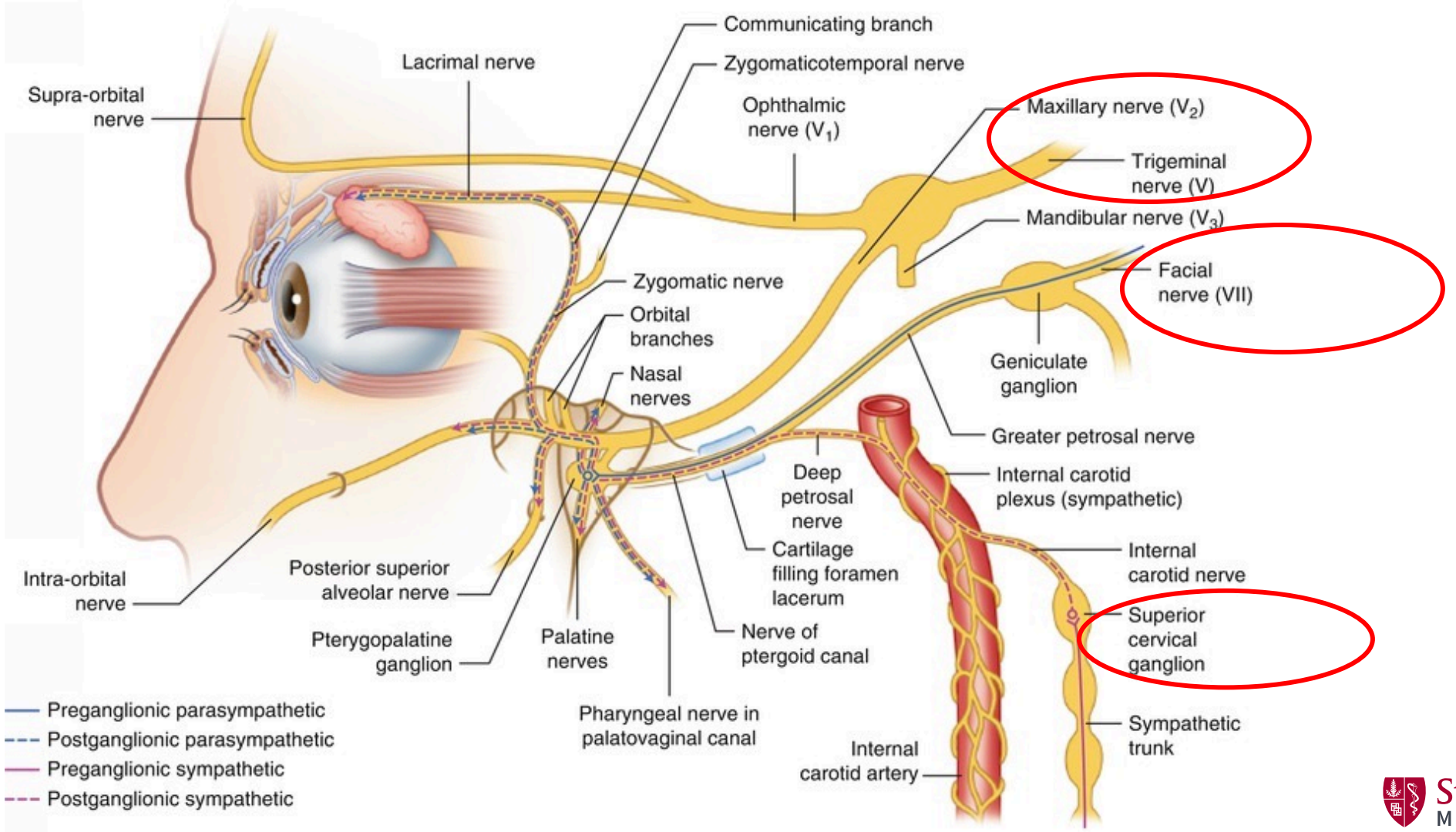
Sphenopalatine Ganglion (SPG)

- Forms multiple autonomic, sensory, and motor neural connections
  - It receives a **sensory** (from TN V2), **a parasympathetic** (from the nervus intermedius/ facial nerve, through the greater petrosal nerve), and **a sympathetic** (superior cervical ganglion , carotid plexus, and deep petrosal nerve) root.
  - Axonal fibers project to the lacrimal, nasal, and palatine glands, through the facial nerve
  - Afferent fibers cross the ganglion, originating from the nasal cavity, the soft palate, and the pharynx on their way to the Gasserian ganglion through the maxillary nerve
- Role in the innervation of the **brain vascularization**
  - Involved in migraine, cluster headache, vascular headaches and atypical facial pain





Sphenopalatine Ganglion (SPG)



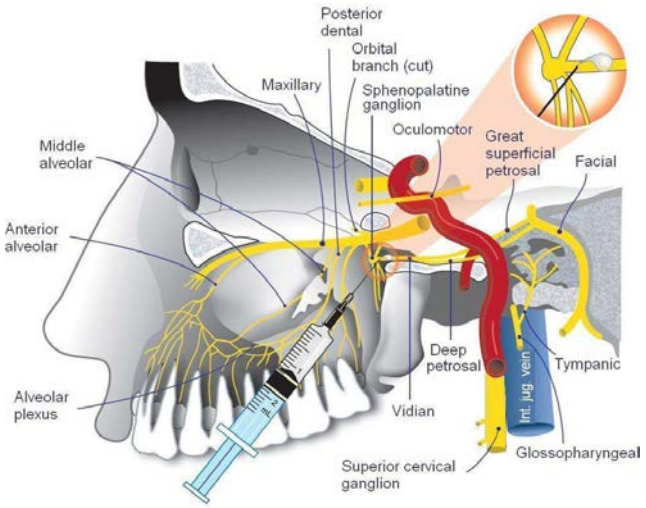
Sphenopalatine Ganglioneuralgia (SPGN)

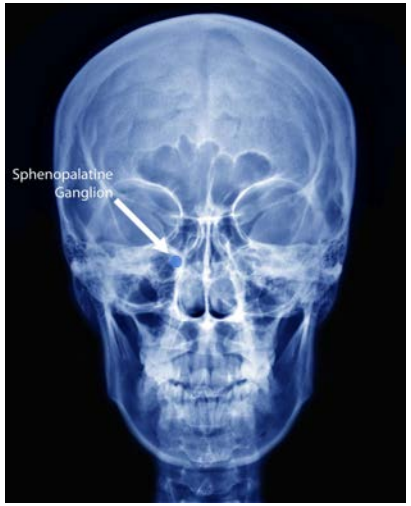
1. Also known as **"Sluder's neuralgia, SN** (1908)", characterised by mostly unilateral, moderately severe, burning, boring or nagging headache, starting around the eye and the root or lateral side of the nose, radiating to the maxillary region and associated teeth, zygoma, mastoidal area and occiput, or even as far as the shoulder and arm. Either episodic, with attacks lasting hours to days, or continuous.

2. Possible causes for SN: infection of the posterior ethmoid and sphenoidal sinus, trauma, demyelinisationm, the presence of intranasal contact points such as a spine of the septum impacting on the middle turbinate, et al.

3. **Cluster headache (CH):** very severe, strictly unilateral pain attacks in the retro- or supraorbital region and/or the temporal region, lasting 15–180 min and occurring from once every other day to many times per day. a/w one or more of the following: conjunctival injection, lacrimation, nasal congestion, rhinorrhea, eyelid oedema, forehead and facial sweating, miosis and/or ptosis.

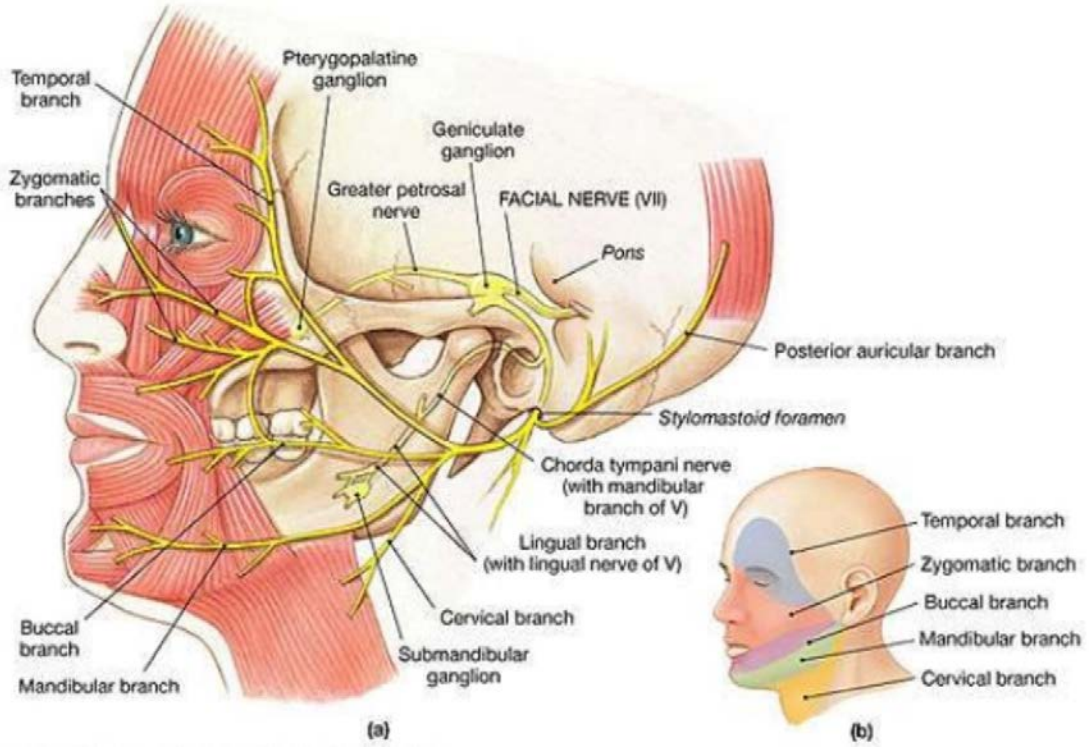
4. SN and CH can be regarded as being part of the same clinical entity. **Both could be trigeminal autonomic cephalalgia (TAC),** characterized by headache with autonomic features. CH can be the TAC with the longest duration, and SN possibly be a TAC with longer attack duration than CH.



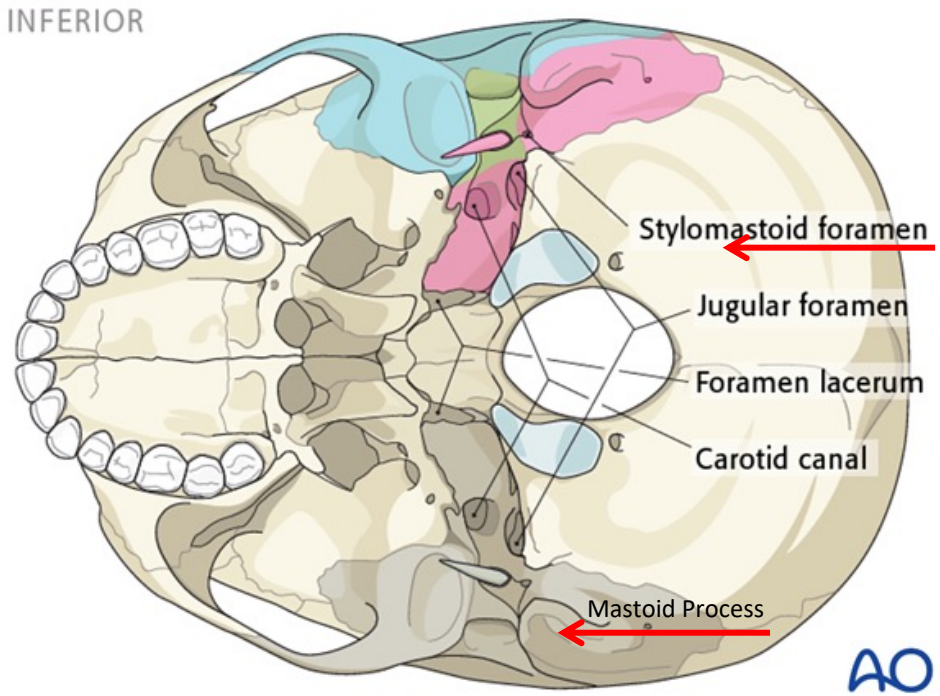


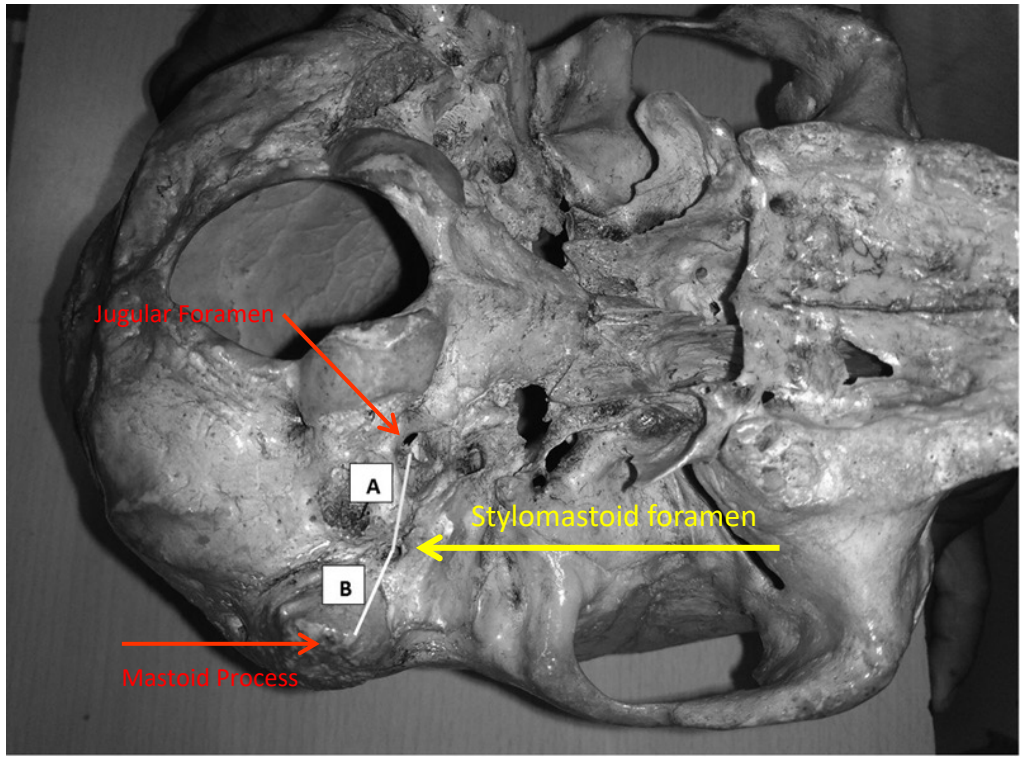
CN VII Facial Nerve

- Innervates muscles of facial expression and transmits sensory input from around the concha of the auricle and the anterior tongue
- Large motor root and smaller sensory root arising from the Pons
- Roots travel through the internal acoustic meatus in the temporal bone, then fuse to form the facial nerve and the geniculate ganglion (genu of facial nerve) distally
- The **facial nerve** exits the **facial** canal (and the cranium) via the **stylomastoid foramen**. This is an exit located just posterior to the styloid process of the temporal bone.



CN VII Facial Nerve





CN VII Facial Nerve-Hemifacial Spasm

1. Brief or persistent, intermittent twitching of the muscles innervated by the facial nerve. Begins mainly in the orbicularis oculi muscle (90%), brief repetitive contractions of which lead to sudden, involuntary eye closure. Typically a/w elevation of the eyebrows — **the 'other Babinski sign**; Persist during sleep; with paroxysmal clicking sounds in the ear - stapedius muscle; later on may progress to involve the perioral, platysma and other muscles of facial expression.

2. Increase during stress, reading, speaking, eating; less with relaxation; chronic one with gradual worsening, spontaneous resolution in less than 10% of cases.

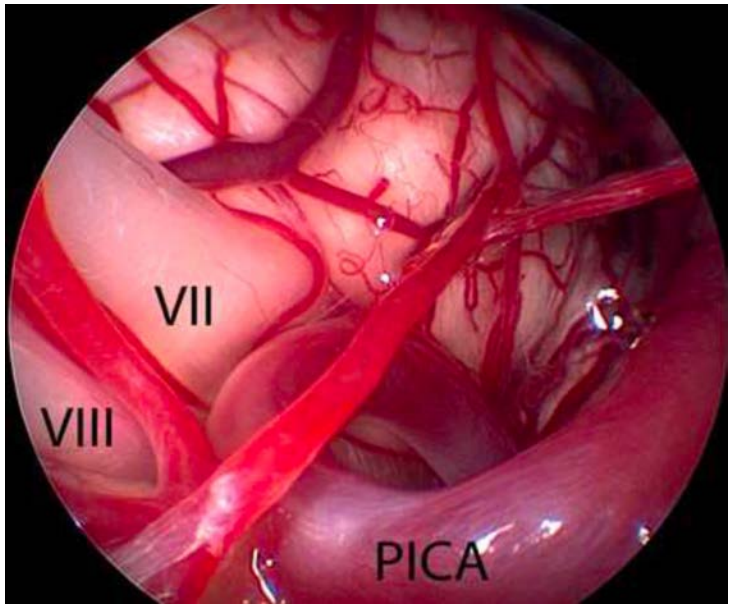
3. **Not painful**; although benign illness, embarrassment and social withdrawal; in severe cases may progress to functional blindness due to involuntary eye closure, spontaneous resolution in less than 10% of cases

4. Prevalence 10-11 per 100,000; 2:1 female: male; begins in fifth to sixth decades; usually sporadic, and familial rare, and bilateral rare (1%)

Hemifacial Spasm-Etiology

1. Primary HFS: vascular compression; motor analogue of trigeminal neuralgia

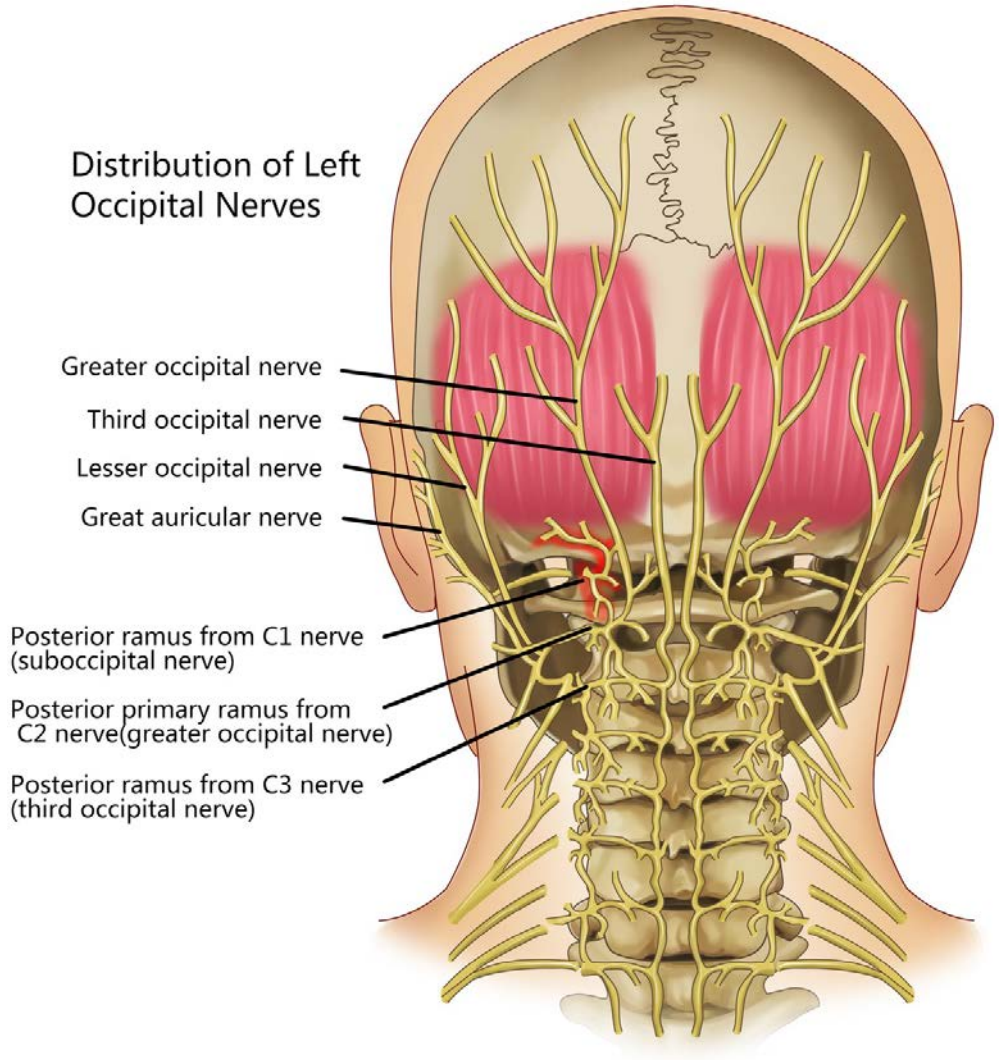
2. Secondary HFS:
   -Tumor : Cerebellopontine angle tumor; acoustic neuroma; meningioma; epidermoid, arachnoid cyst, lipoma;
   -Arteriovenous malformations — fistulas, arterial aneurysms
   -Brainstem lesions — stroke, trauma, demyelinating disorders
   -Infections — otitis media, tubercular meningitis.
   -Bell's palsy



Aykut Üren. Clinical case: Malignancy along facial nerve. 2020

Occipital Nerves

- Group of nerves that arise from the C2 and C3 spinal nerves
  - Greater Occipital Nerve
  - Lesser Occipital Nerve
  - Third Occipital Nerve
- Sensory innervation of posterior scalp and cranial surface of the pinna
- Often implicated in **<u>cervicogenic headache and migraine</u>**

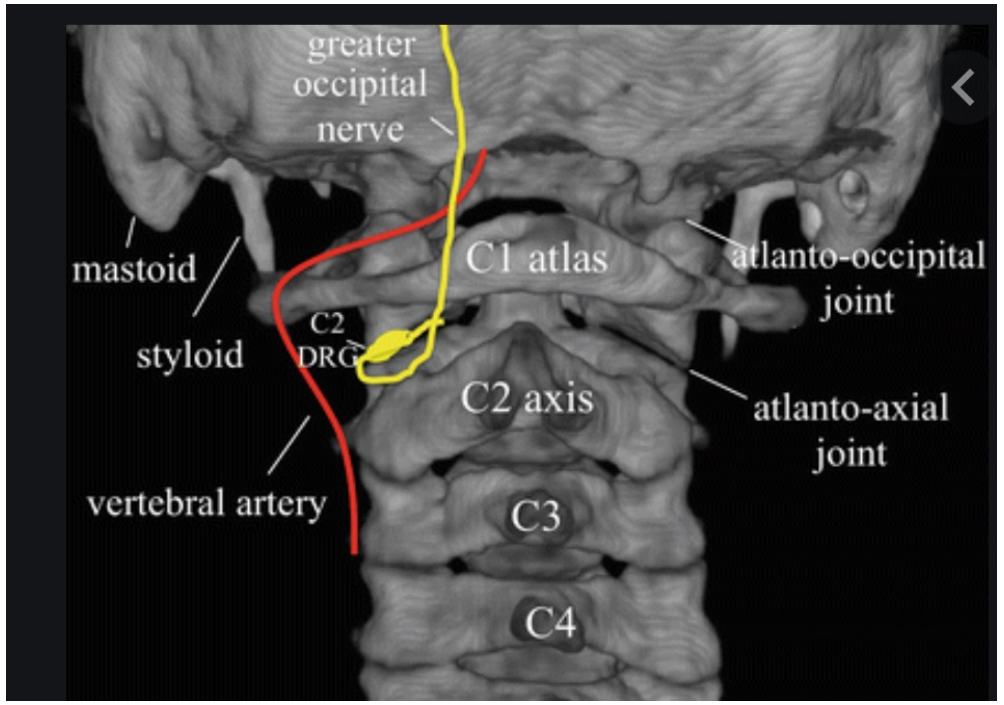


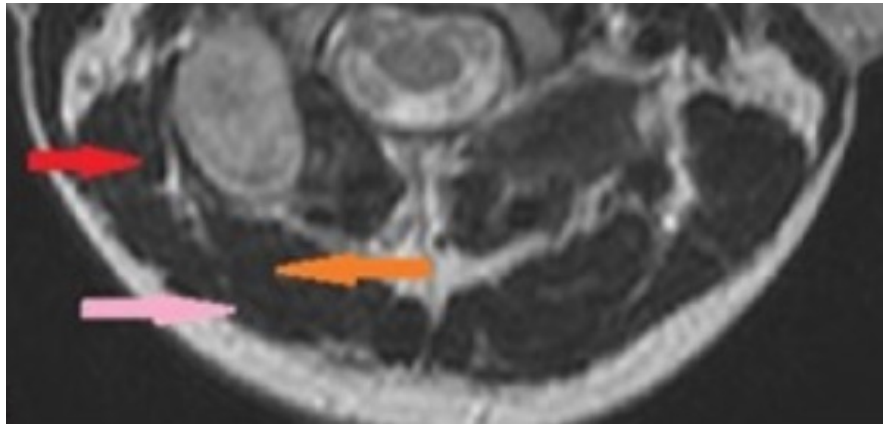
Yang et al. *BMC Surg* 19, 96 (2019)

Occipital Nerve Relevant Pathology

Occipital neuralgia is usually due to trauma to the **occipital nerve** (ON), often caused by an auto-accident where the head impacts the headrest.

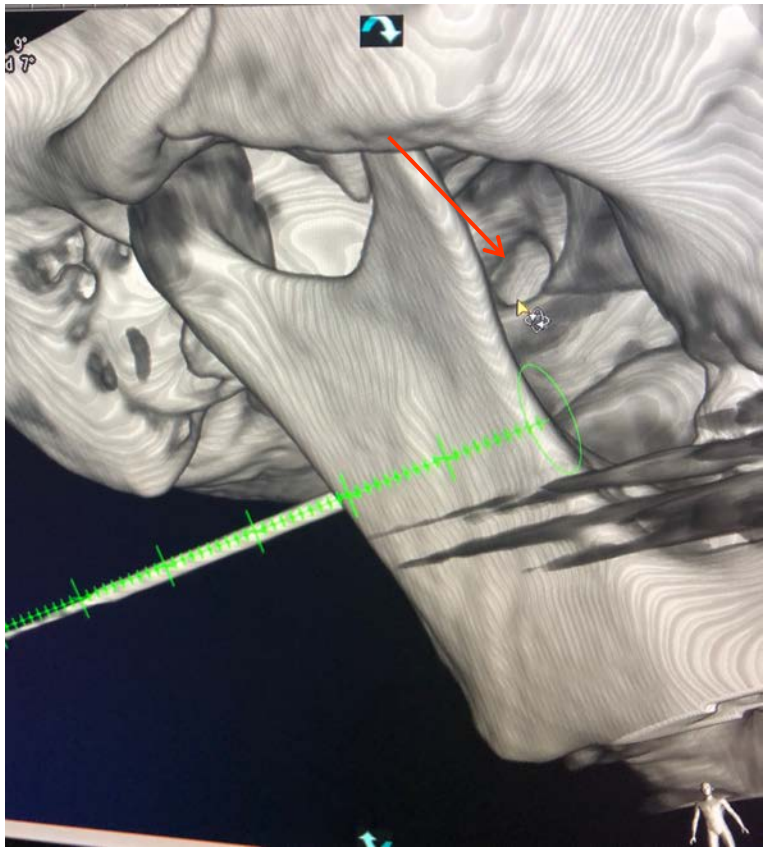
Other causes are spondylosis of the upper cervical spine (C1-C2), or sometimes focal neuropathies due to diabetes or **tumor**



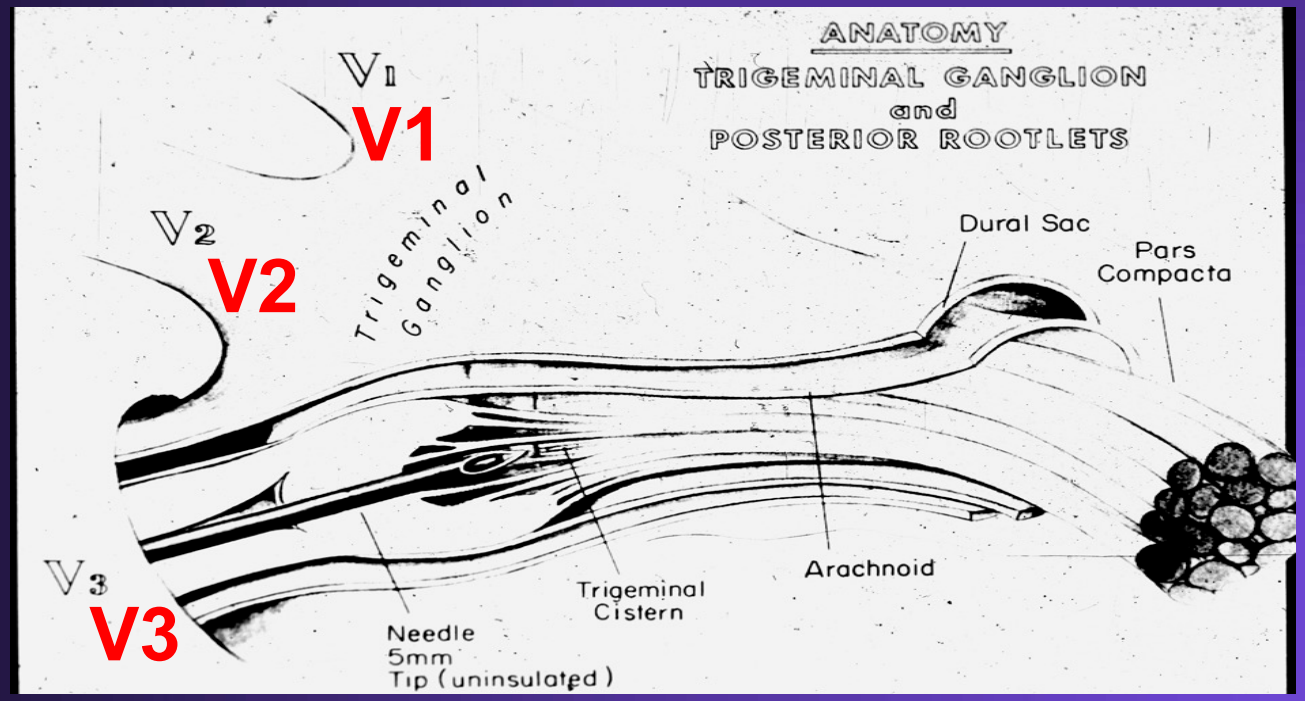


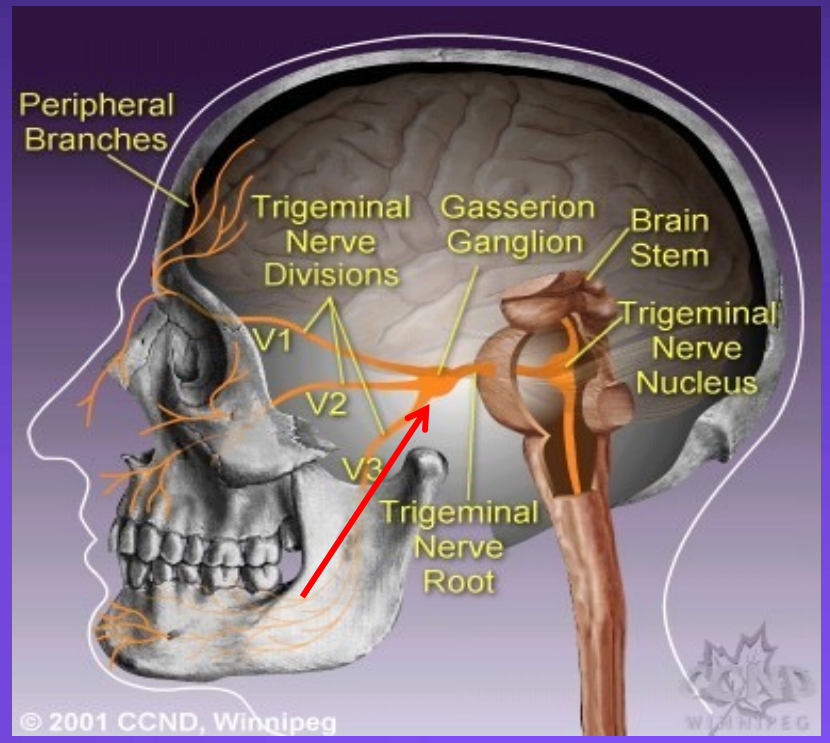
Head and Neck Interventions For Facial Pain and HFS

1. Trigeminal Gasserian Ganglion RFA, Balloon Compression Rhizotomy, and Glycerin Neurolysis
2. Trigeminal V2 Rhizotomy at **Foramen Rotundum**
3. Glossopharyngeal Nerve Rhizotomy at **Styloid Process**
4. Facial Nerve Awake Rhizotomy at **Stylomastoid Foramen**
5. Endoscopy-guided SPG block at intra nasal **SPG Foramen**



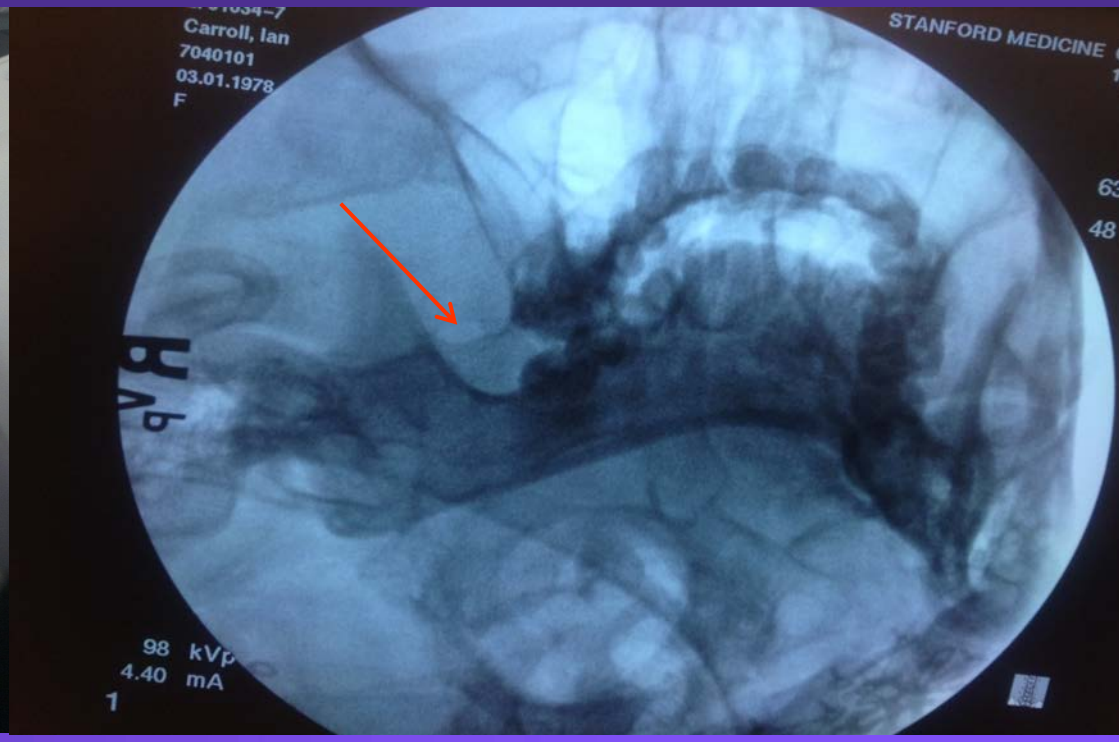
Trigeminal Nerve: Percutaneous Procedure





Classical Trans-*foramen ovale* Hartel Technique

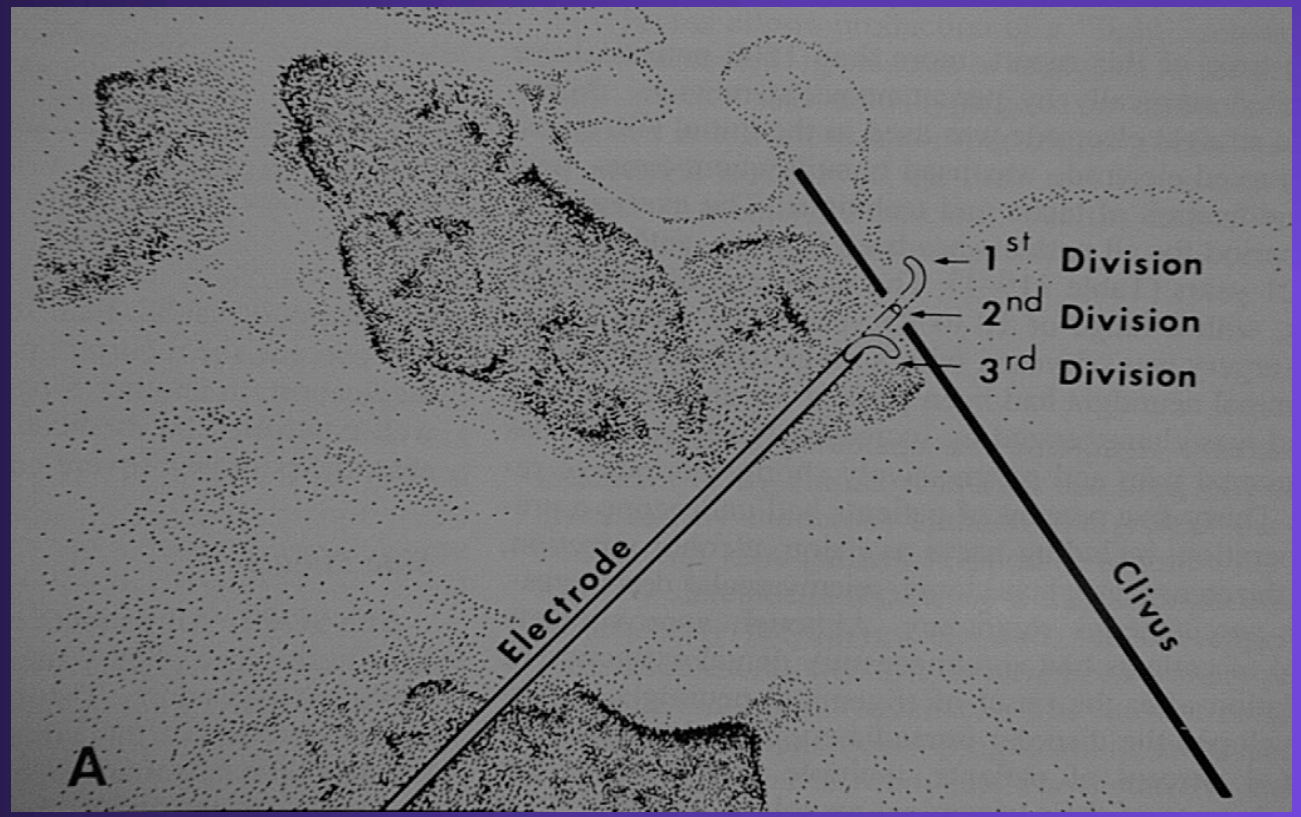
Trigeminal Nerve: Percutaneous FO Procedure



Classical Trans-*foramen ovale* Hartel Technique

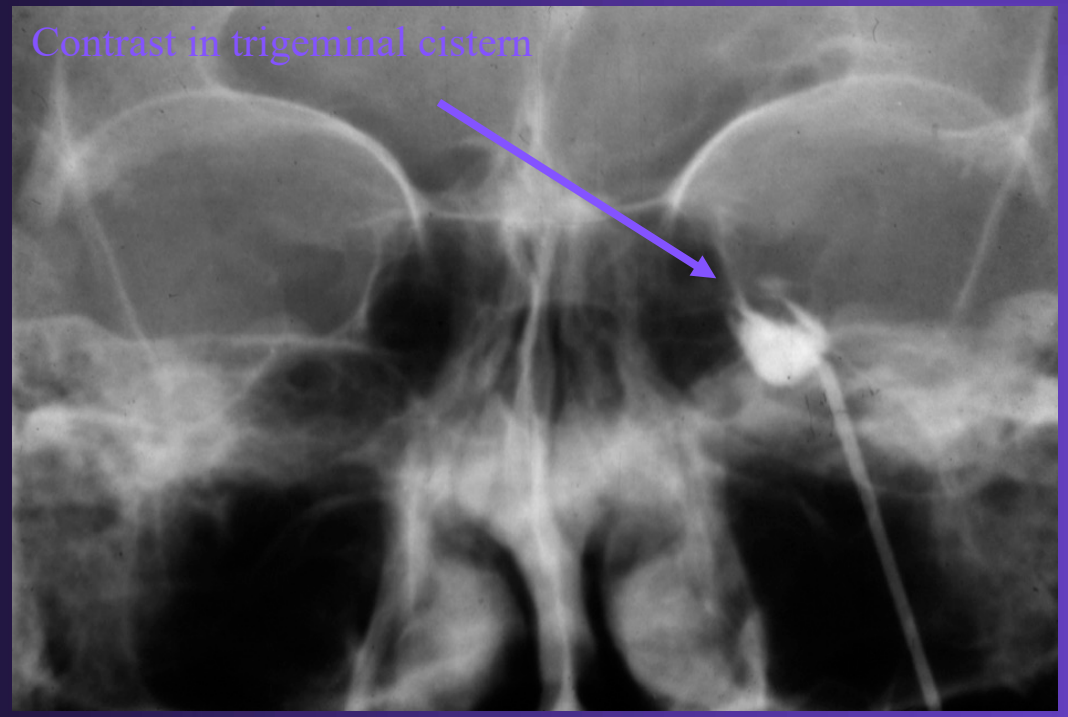
Trigeminal Neuralgia: Percutaneous FO Procedure

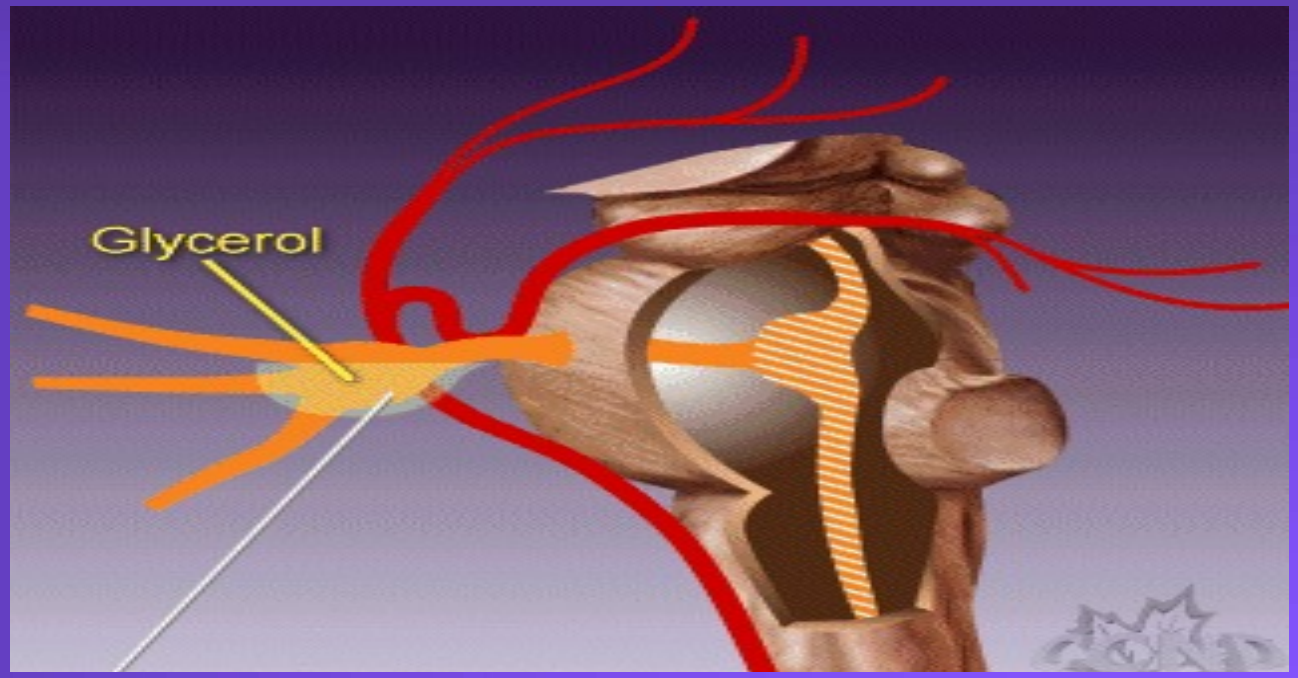
Radiofrequency Lesion



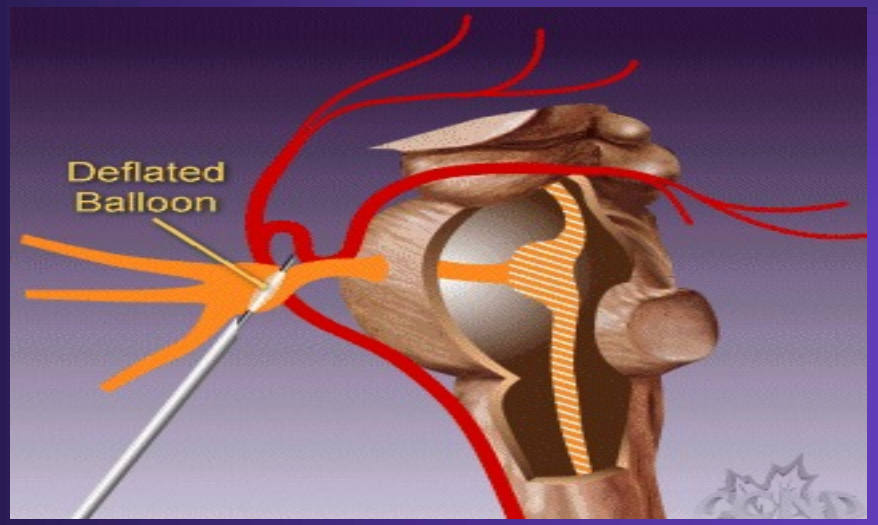
Trigeminal Neuralgia: Percutaneous FO Procedure

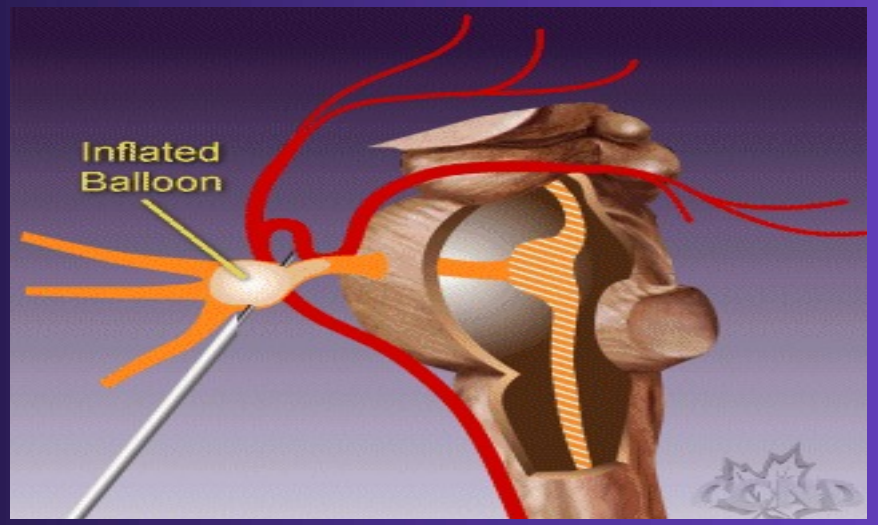
Glycerol Injection

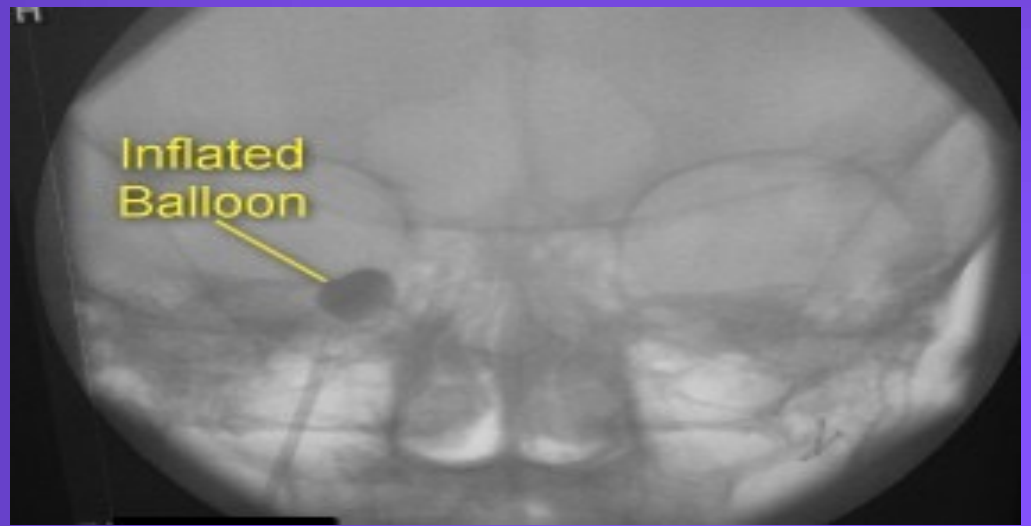




Trigeminal Neuralgia: Percutaneous FO Procedure







Trigeminal Neuralgia: Percutaneous FO Procedure

Advantages

- It is widely used technique for treatment of TN; easy to do
- Needle is introduced percutaneously and passed through the foramen ovale (**FO Approach**); minimally invasive
- Then lesion is applied
- Success rate reported >80% (RFA for example)

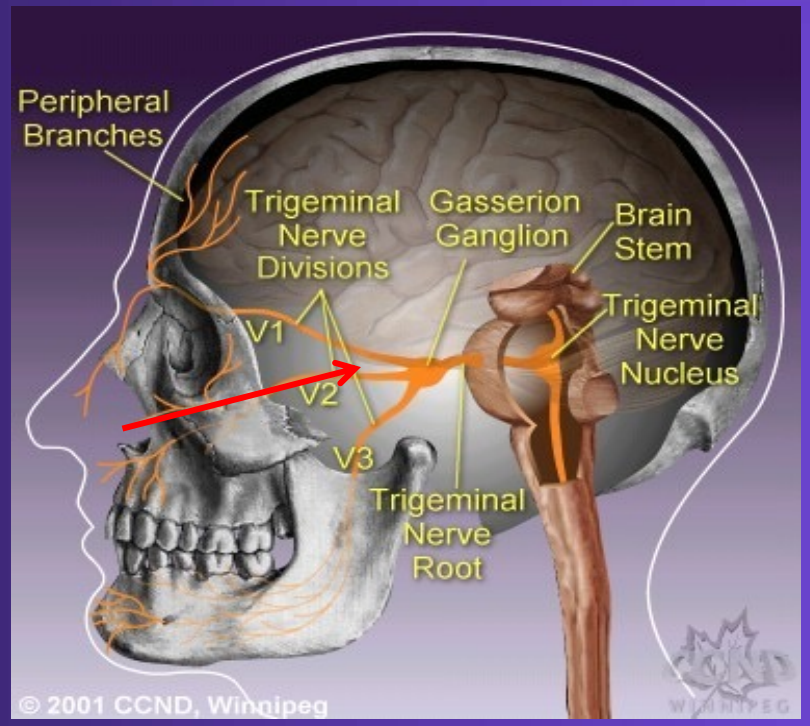
Trigeminal Neuralgia: Percutaneous FO Procedure

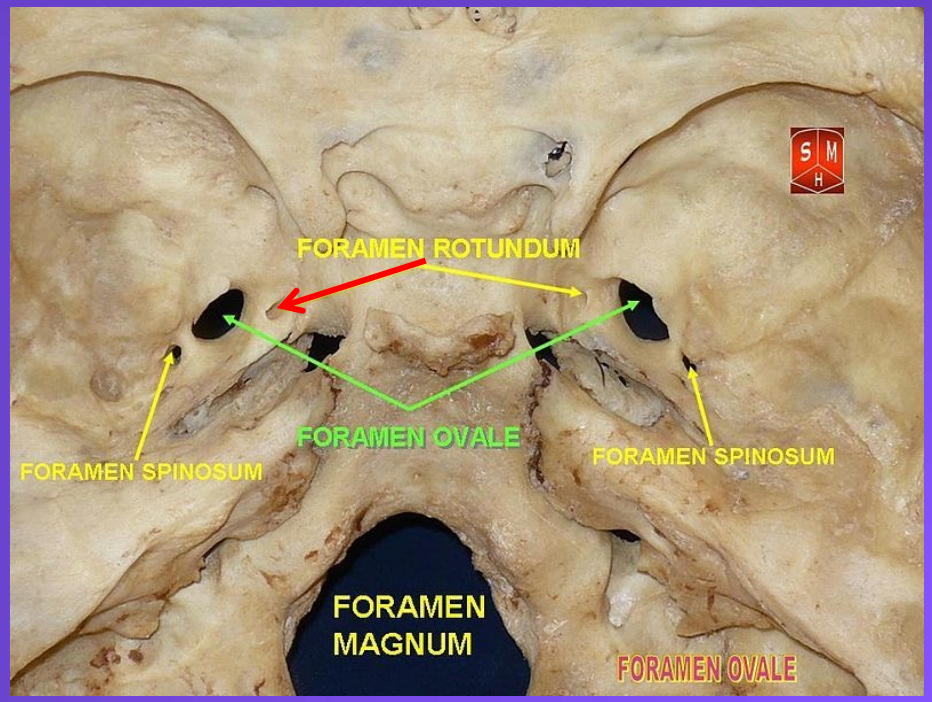
Disadvantages

- Technically challenging when individual trigeminal sub-branch nerve block is desired; Not uncommon that V1 and V3 branches are affected when the V2 branch is being treated
- Prolonged needle exploration to identify the V2 branch in Meckel's cave significantly increase risk for dural puncture, CSF leak, infection, bleeding, and procedural time
- Do not always know the ideal position for the needle tip in Meckel's cave

Trigeminal Nerve: Percutaneous **FR** Procedure

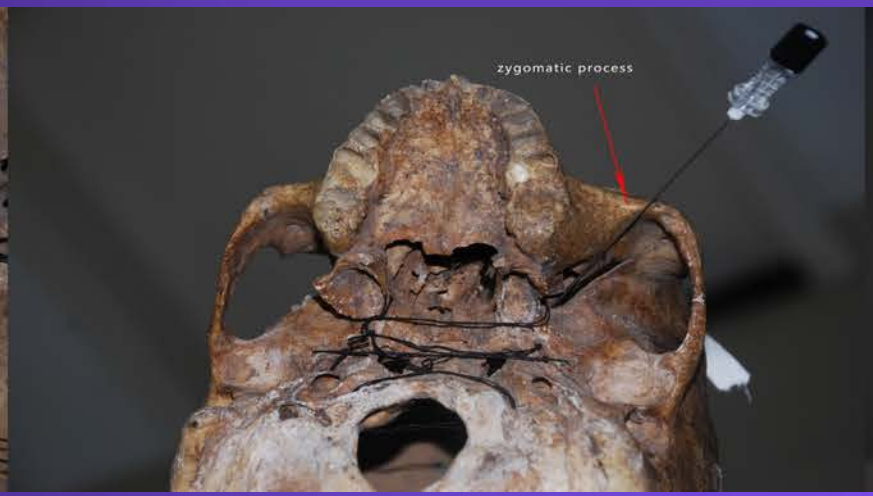
A novel technique has been developed to selectively block the V2 trigeminal nerve with high precision and with minimal complications





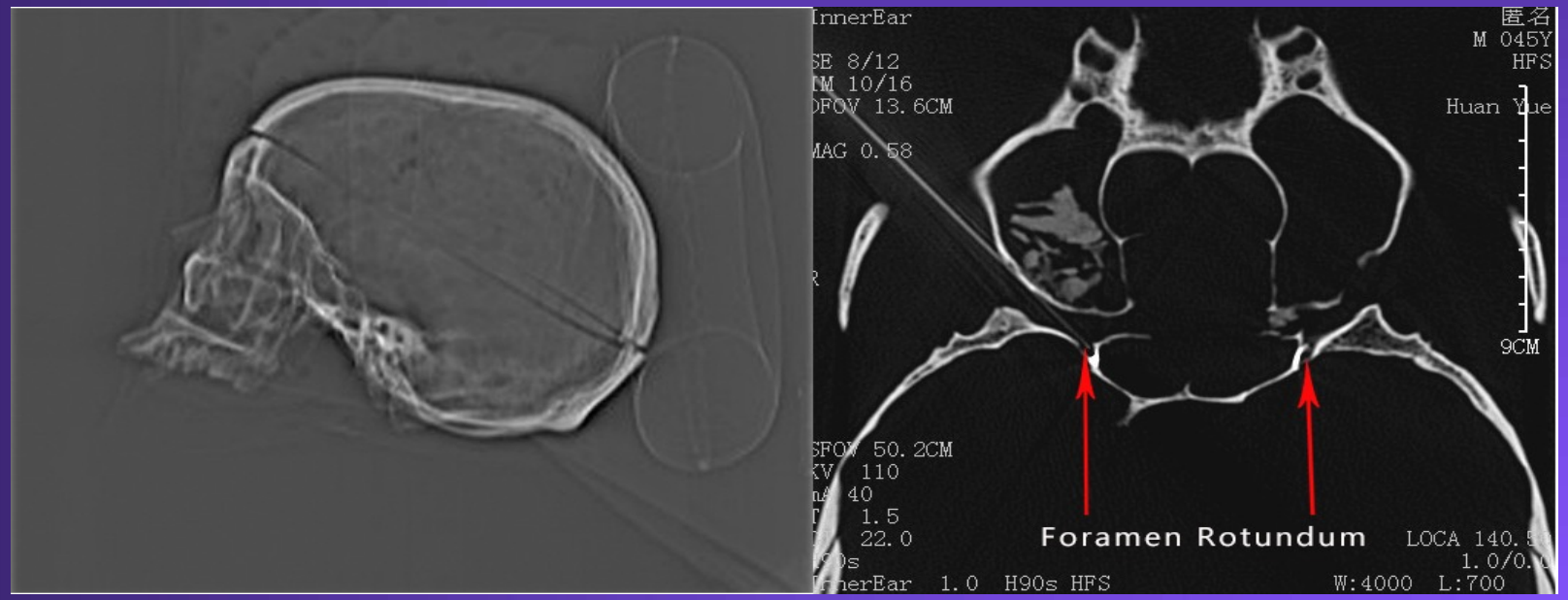
Trigeminal Nerve: Percutaneous FR Procedure

Infrazygomatic Needle Access To Foramen Rotundum In Human Skull Specimen Is Feasible



Trigeminal Nerve: Percutaneous FR Procedure

Infrazygomatic Needle Access To Foramen Rotundum In Human Skull Specimen



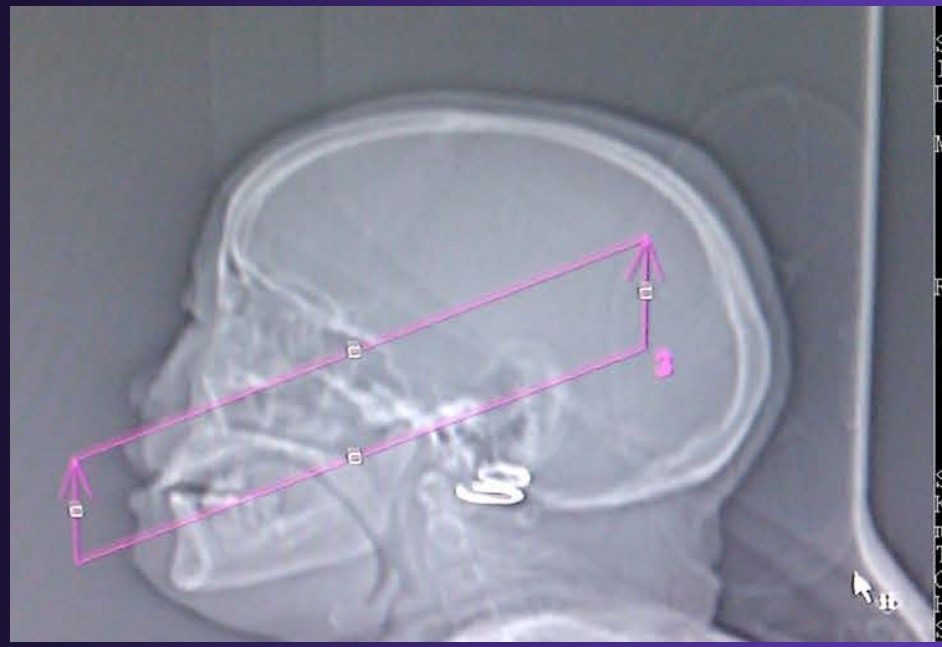
A series of CT images of *infrazygomatic needle placement of foramen rotundum in* human skull specimen were obtained to help build a reference image database to guide clinical practice on patients

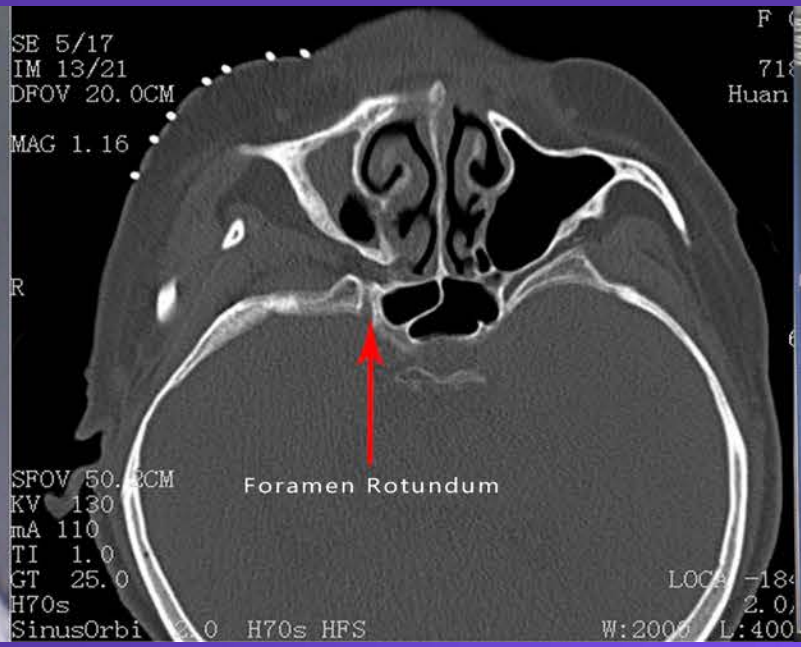
Trigeminal Nerve: Percutaneous **FR** Procedure

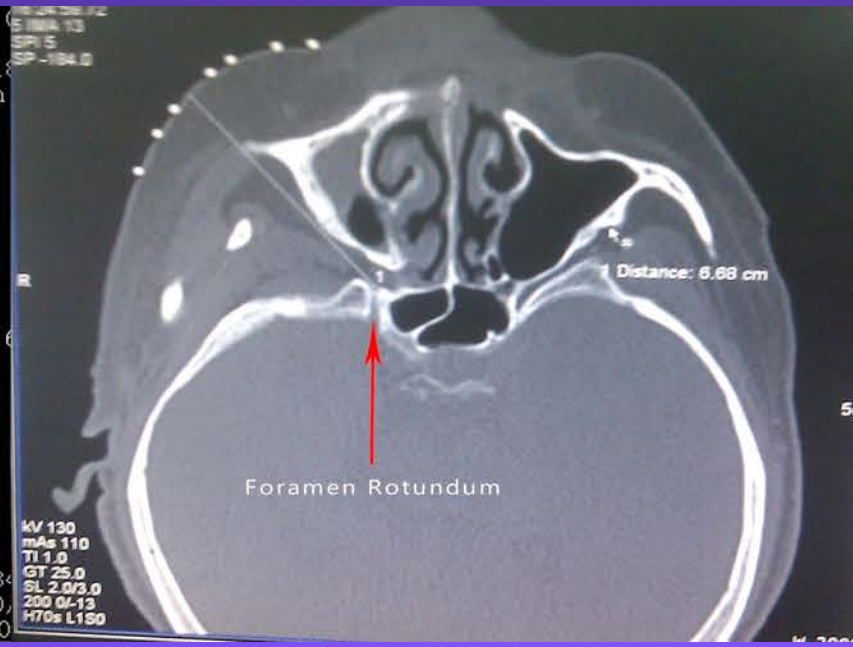
A study of 27 patients with isolated V2 trigeminal neuralgia was conducted to compare clinical outcomes and complications between FR and FO approaches.

Trigeminal Nerve: Percutaneous FR Procedure

Infrazygomatic Needle Access To Foramen Rotundum In V2 Trigeminal Neuralgia Patients







With this image database, we were able to obtain 100% success in accessing the foramen rotundum via percutaneous i*nfrazygomatic* approach for the 15 patients in the FR group with isolated V2 trigeminal neuralgia

Trigeminal Neuralgia: Percutaneous FR Procedure

Comparison of Outcome and Complications Between FR And FO Group

Table 3. Summary of operation time, number of times required to adjust the needle, complications, and clinical outcome

Group	Operation Time (min)	#Needle Adjustment	Complication				Pain Relief (/total patients)				
			Hematoma	Facial Numbness	Masticatory Weakness	Corneal Perforation	1d	1w	1m	6m	12m
FR	29.2±9.3#	0.27±0.45*	2	15	0	0	15/15	15/15	15/15	13/13	12/12
FO	45.4±22.13	3.17±1.95	2	12	5	1	10/12	12/12	12/12	10/10	9/10

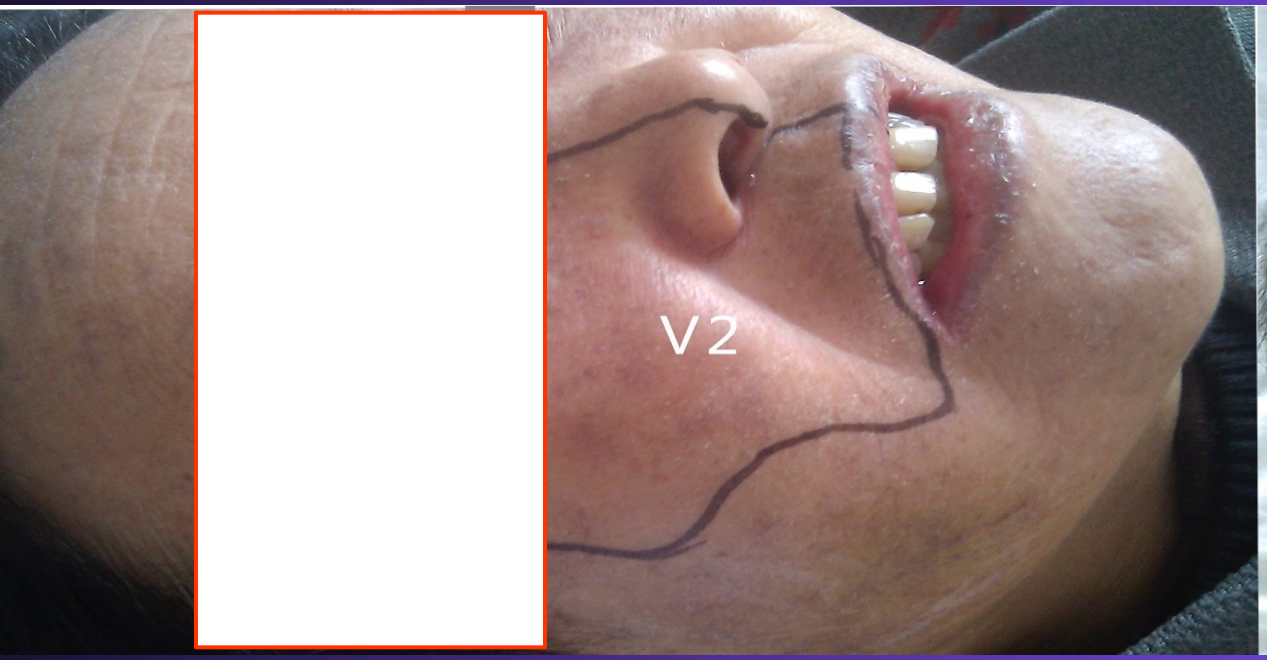
Note: # indicates $P<0.05$, while * indicates $P<0.01$.

CT-guided Trigeminal V2 Block at Foramen Rotundum

Comparison of Outcome and Complications Between FR And FO Group

CT-guided Trigeminal V2 Block at Foramen Rotundum

Comparison of Outcome and Complications Between FR And FO Group



FR Group

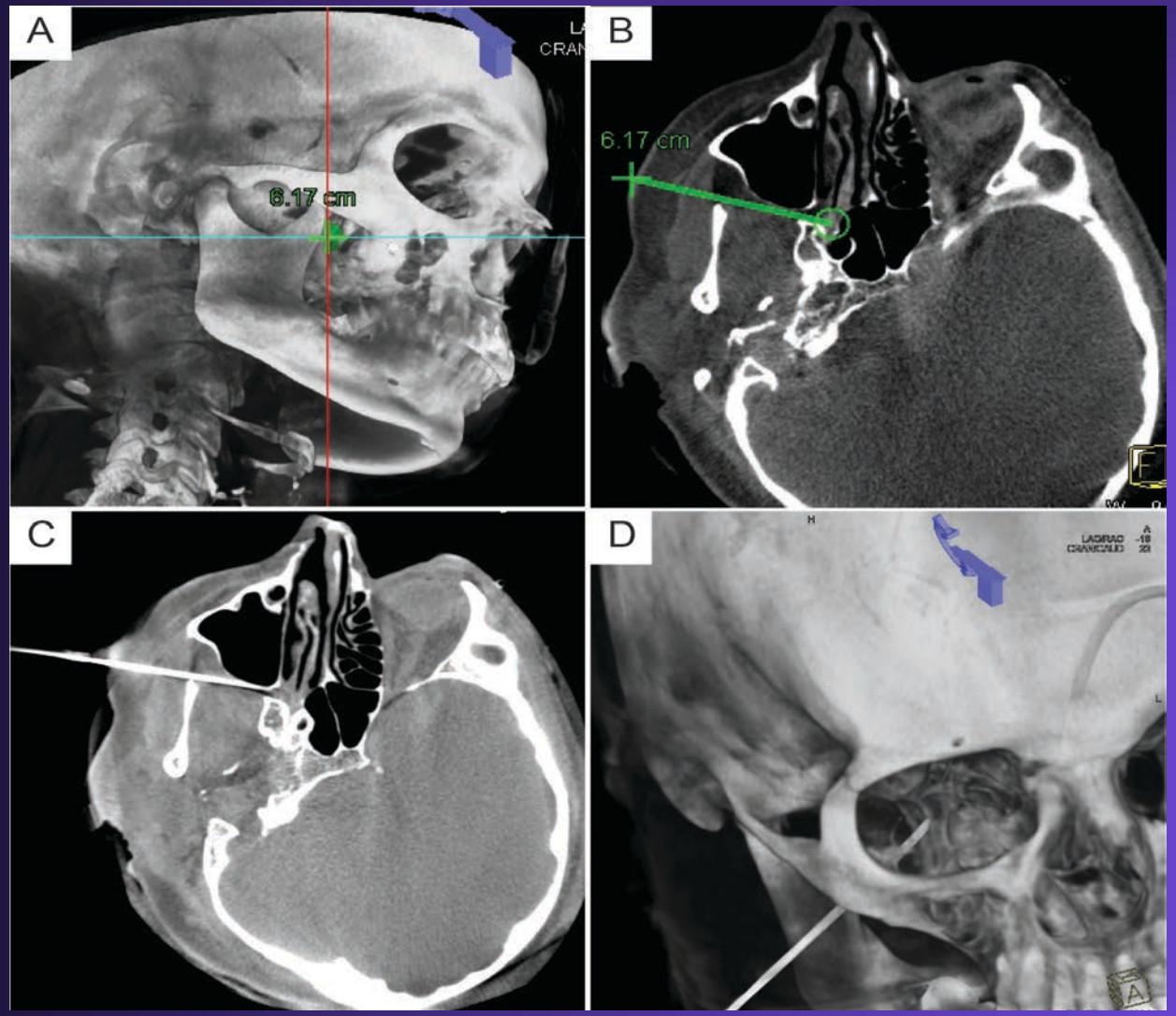
FO Group

CT-guided Trigeminal V2 Block at Foramen Rotundum

This study showed that the FR group, when compared to the conventional FO group, had good clinical outcome associated with less complication, and required much shorter procedural time.

FR approach may be a good alternative when an isolated V2 branch block is desired.

CT-guided Trigeminal V2 Block at Foramen Rotundum



A flat panel DynaCT is performed. The dynaCT is then used to select a needle path to the foramen rotundum using iGuide, and a lesion depth is calculated (A,B). The needle is then positioned in a bulls eye approach targeting the selected depth, with a post positioning

DynaCT performed to confirm the needle location prior to treatment as depicted on this multiplanar reformatted CT image (C). A 3D reconstructed image displays the needle in position within the foramen rotundum (D).

CT-guided Trigeminal V2 Block at Foramen Rotundum

Pain Medicine

Pain Medicine 2014; *: **–**
Wiley Periodicals, Inc.

CT-Guided Percutaneous Infrazygomatic Radiofrequency Neurolysis Through Foramen Rotundum to Treat V2 Trigeminal Neuralgia

Bing Huang, MD,* Ming Yao, MD, PhD,* Zhiying Feng, MD,† Jianguo Guo, MD,* Arzhang Zereshki, MD,‡ Michael Leong, MD,‡ and Xiang Qian, MD, PhD‡

desired through this approach. We have thus developed a novel computed tomograph-guided technique to block the V2 trigeminal nerve through foramen rotundum (FR). With this technique, we

Trigeminal Nerve: Awake Awake CT-guided Percutaneous Balloon Compression of Trigeminal Ganglion

CT-guided balloon catheter delivery. CT images of

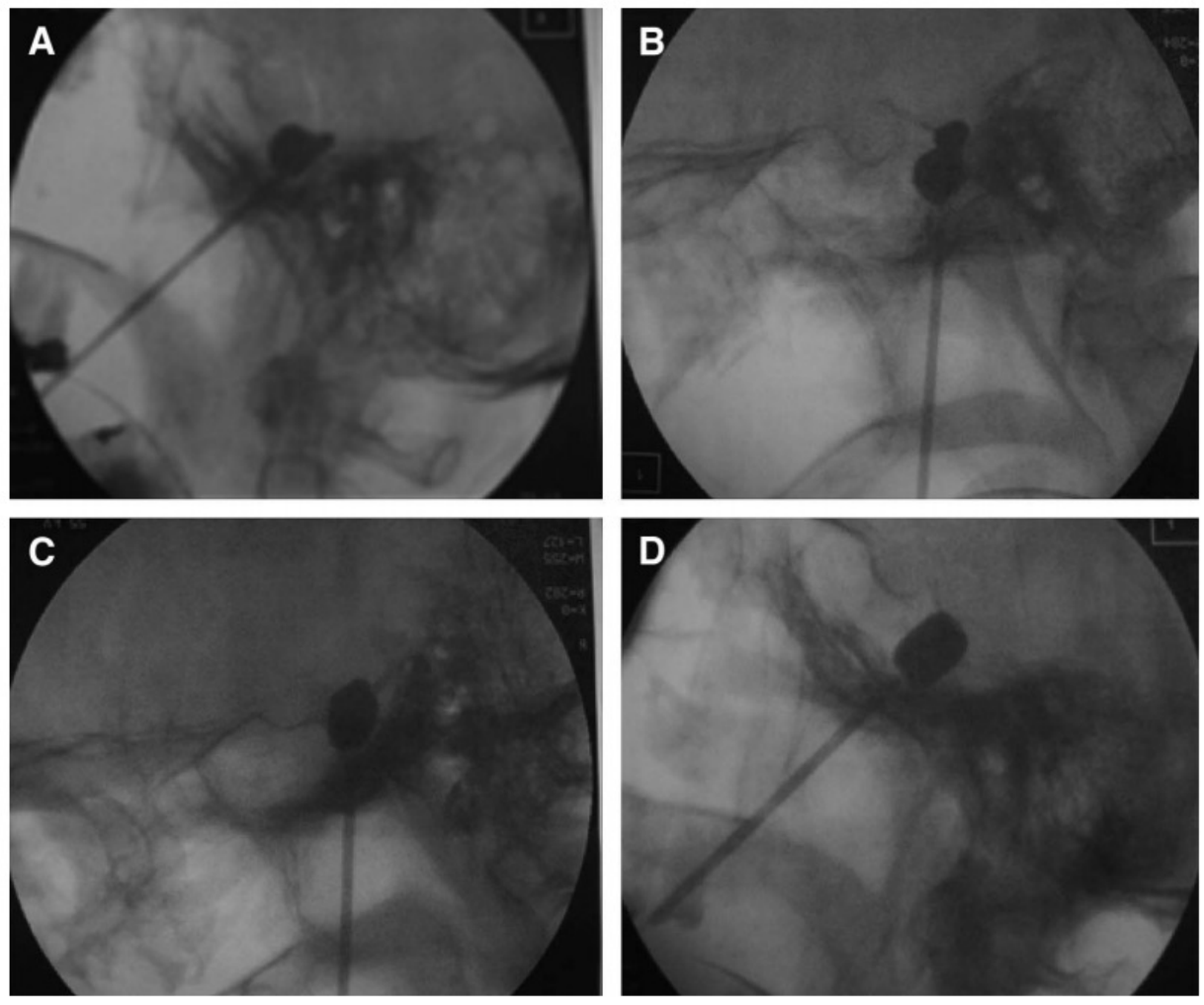
a) straight puncture path design targeting foreman ovale based on CT maxillofacial scan images,

b) insertion of trocar needle past foreman ovale,

c) delivery of the balloon catheter. Note the tip of the catheter being at the petrous portion of temporal bone.

d) CT images of balloon after filled with omnipaque contrast agent. Note the **periform shape of the balloon**, indicating proper compression of trigeminal ganglion within the Meckel's cavity.

Trigeminal Nerve: Awake Awake CT-guided Percutaneous Balloon Compression of Trigeminal Ganglion



Periform shape of the balloon group has close ro ~100% relief; while other shapes from 53% (oval) to 91-93% (dumbell) of relief

Neurosurgery. 2010 Oct;67(4):925-34

Trigeminal Nerve: Awake Awake CT-guided Percutaneous Balloon Compression of Trigeminal Ganglion

Pain Medicine

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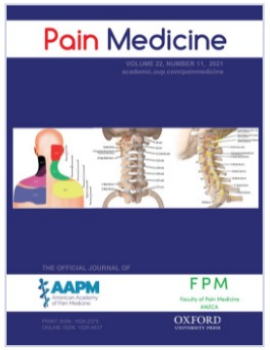


Volume 22, Issue 11
November 2021

Article Contents

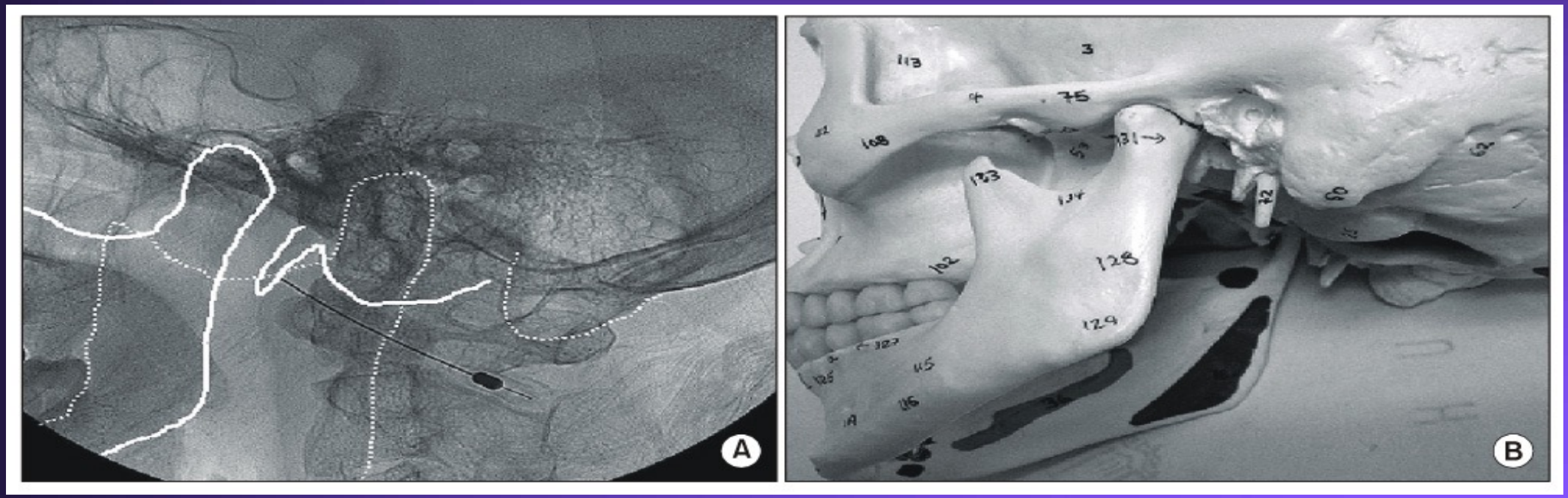
Efficacy and Safety of Awake Computed Tomography–Guided Percutaneous Balloon Compression of Trigeminal Ganglion for Trigeminal Neuralgia

Bing Huang, MD, Ming Yao, MD, QiLiang Chen, MD, PhD, Xindan Du, MD, Zhang Li, MD, Keyue Xie, MD, Yong Fei, MD, Huy Do, MD, Xiang Qian, MD, PhD ✉

Pain Medicine, Volume 22, Issue 11, November 2021, Pages 2700–2707,
https://doi.org/10.1093/pm/pnab228
Published: 28 July 2021

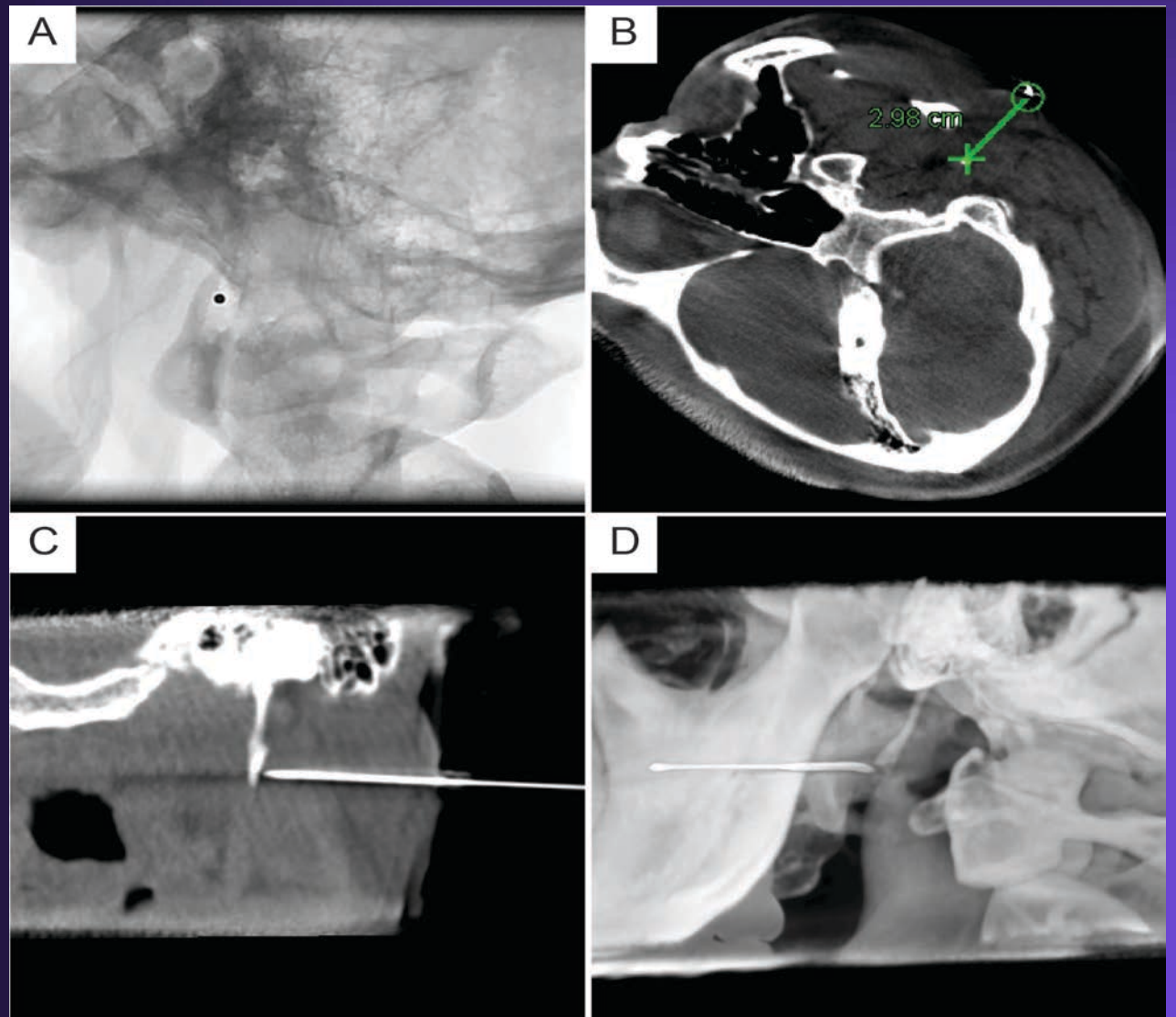
CT-guided Glossopharyngeal Nerve Block at Styloid Process

Conventional fluoroscopy guided GPN block



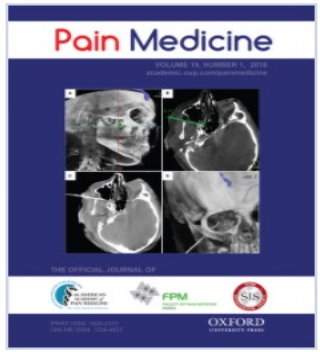
Lee JG, Lee CJ, Ahn JH, Kim KW, Kim YC, Lee SC. *J Korean Pain Soc*. 2004 Dec;17(2):259-261

CT-guided Glossopharyngeal Nerve Block at Styloid Process



A BB marker is placed on the skin (A) and a flat panel DynaCT is performed. The dynaCT is then used to select a needle path using iGuide, and a lesion depth is calculated (B). The needle is then positioned in a bulls eye approach targeting the selected depth, with a post positioning DynaCT performed to confirm the needle location prior to treatment as depicted on this multiplanar reformatted CT image abutting the styloid process (C). A 3D reconstructed image displays the needle in position adjacent to the styloid process (D).

CT-guided Glossopharyngeal Nerve Block at Styloid Process



Volume 19, Issue 1
January 2018

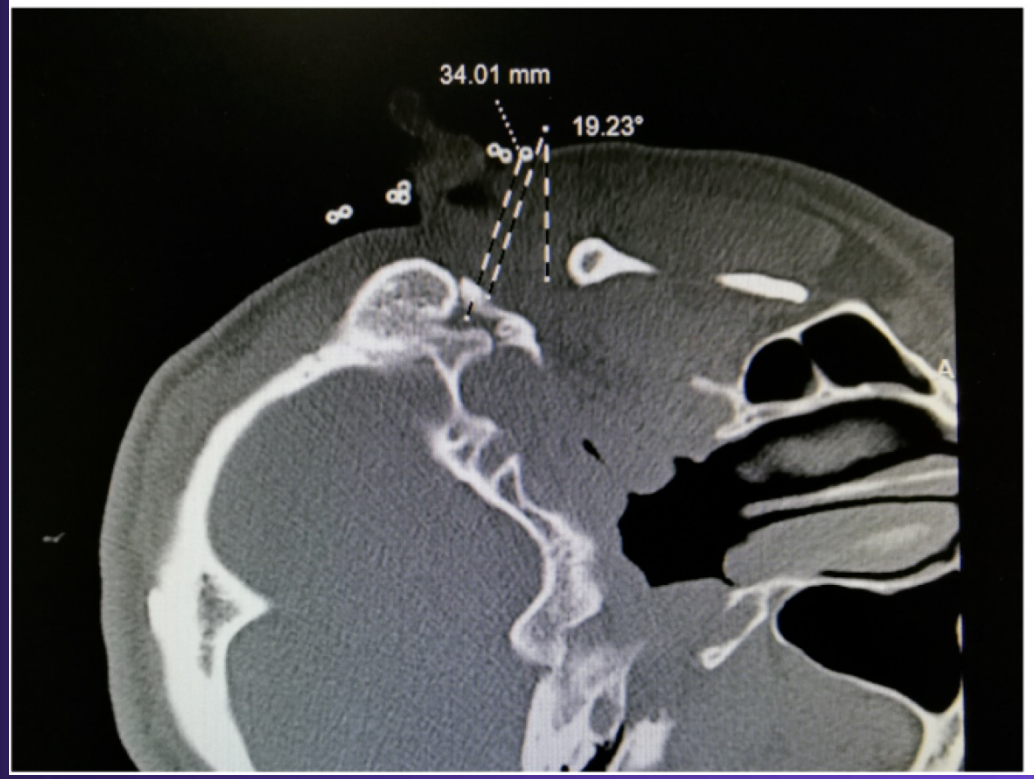
Fluoroscopic C–Arm and CT–Guided Selective Radiofrequency Ablation for Trigeminal and Glossopharyngeal Facial Pain Syndromes

Nicholas A Telischak, MD, Jeremy J Heit, MD, PhD, Lucas W Campos, MD, Omar A Choudhri, MD, Huy M Do, MD ✉, Xiang Qian, MD, PhD ✉

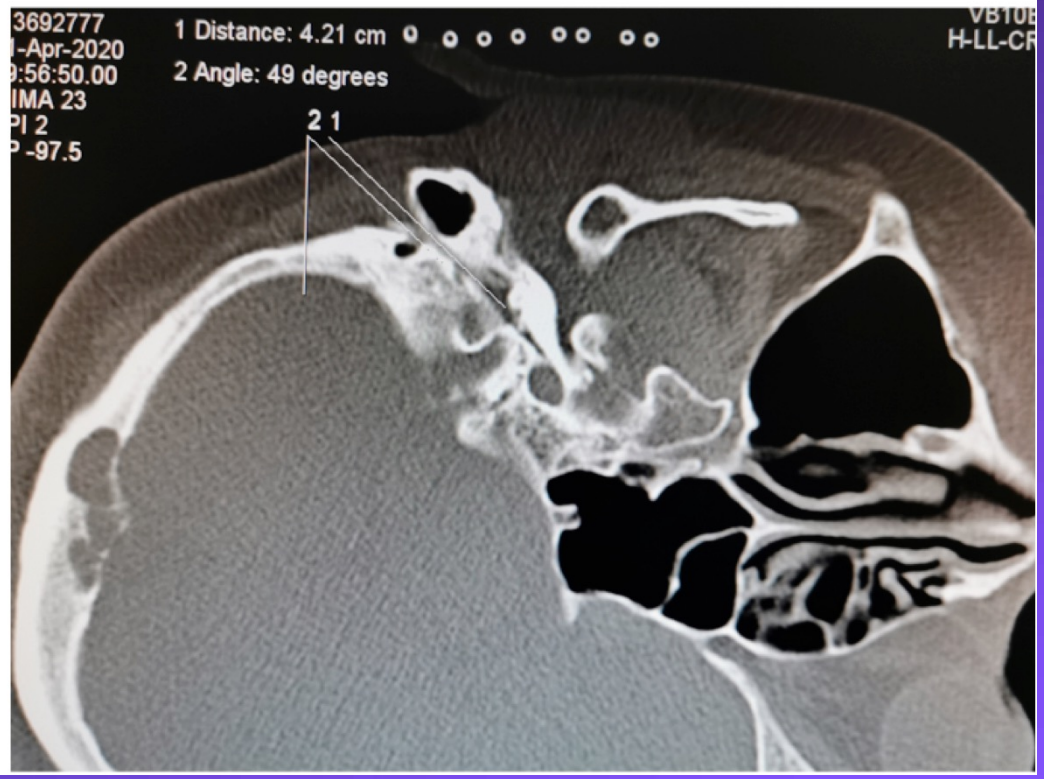
Pain Medicine, Volume 19, Issue 1, 1 January 2018, Pages 130–141,
https://doi.org/10.1093/pm/pnx088
Published: 02 May 2017

CT-guided Facial Nerve Block at Stylomastoid Foramen

a.



b.

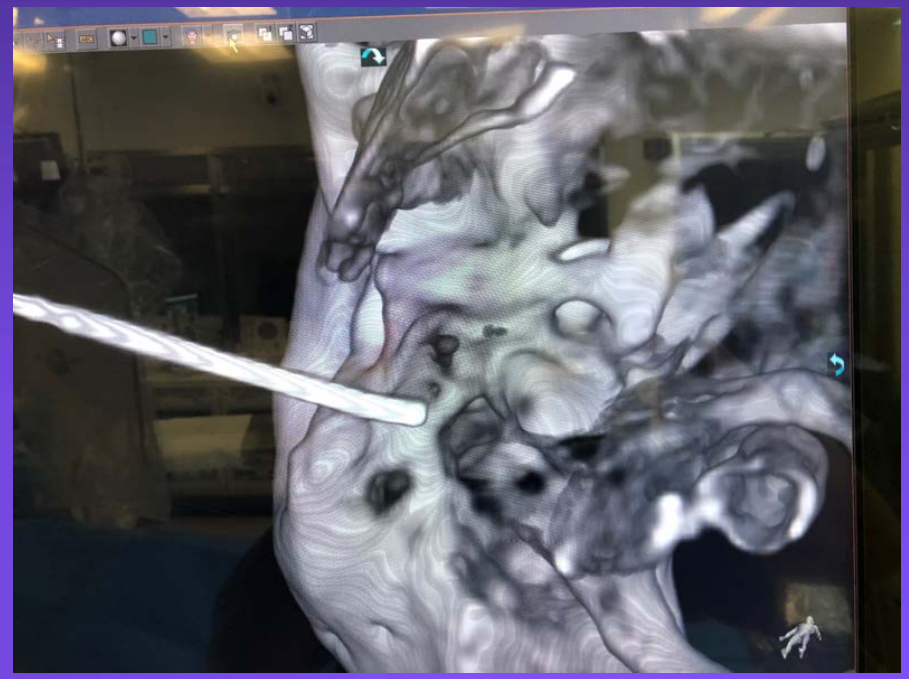


CT-guided Facial Nerve Block at Stylomastoid Foramen

a.

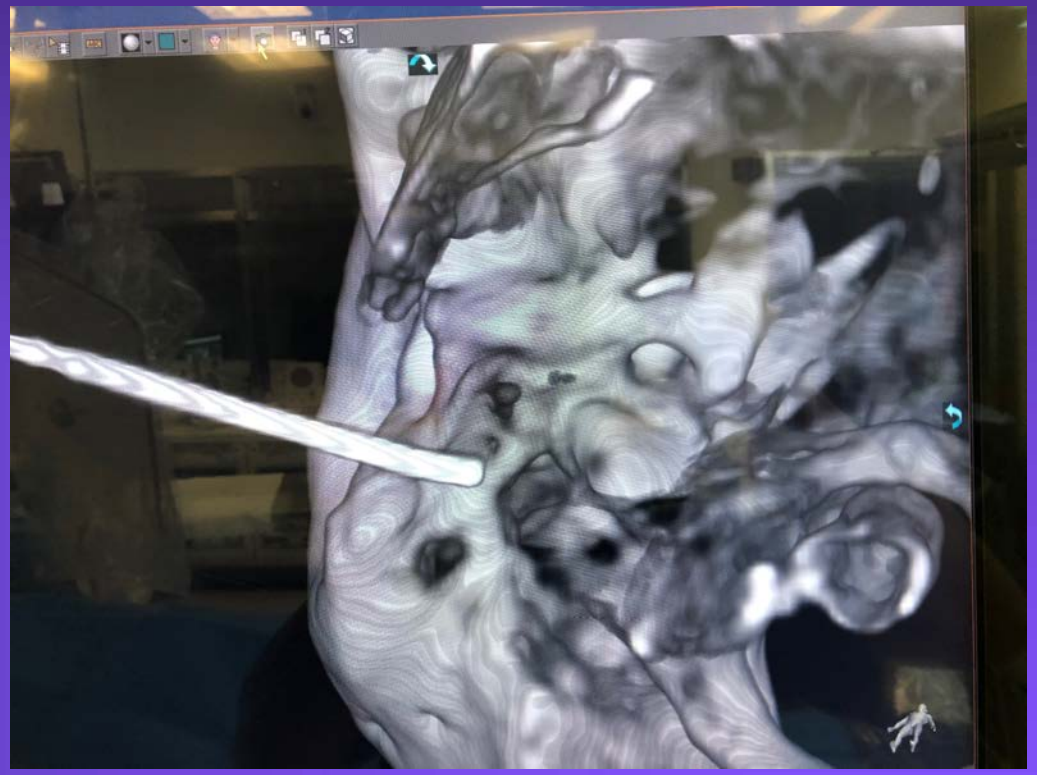
b.

CT-guided Facial Nerve Block at Stylomastoid Foramen



CT-guided Facial Nerve Block at Stylomastoid Foramen

Video:1 Pre Treatment



Video 2: Post Treatment

CT-guided Facial Nerve Block at Stylomastoid Foramen

JNS JOURNAL OF NEUROSURGERY
OFFICIAL JOURNALS OF THE AANS SINCE 1944

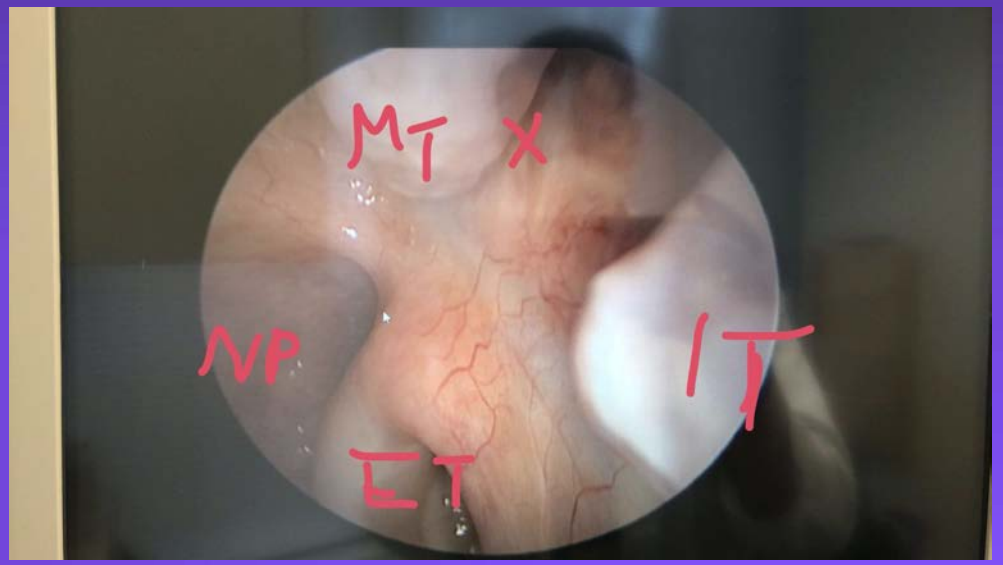
Awake CT-guided percutaneous stylomastoid foramen puncture and radiofrequency ablation of facial nerve for treatment of hemifacial spasm

Bing Huang MD[1], Ming Yao MD[1], QiLiang Chen MD, PhD[2], Huidan Lin MD[3], Xindan Du MD[4], Hao Huang MD[5], Xian Zhao MD[6], Huy Do MD[7], and Xiang Qian MD, PhD[2]

[1] Department of Pain Medicine, The Affiliated Hospital of Jiaxing University, Jiaxing City, Zhejiang, People's Republic of China; | [2] Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University, Palo Alto, California; | [3] Department of Pain Medicine, The First Hospital of Ninbo, Zhejiang; | [4] Department of Pain Medicine, Hangzhou Red Cross Hospital, Hangzhou; | [5] Department of Pain Medicine, The Second Affiliated Hospital of Zhejiang University, Hangzhou; | [6] Department of Pain Medicine, Shulan Hospital, Hangzhou, People's Republic of China; and | [7] Department of Interventional Neuroradiology, Stanford University, Palo Alto, California

View Less —

Endoscopic-guided SPG block at Sphenopalatine Foramen



CT-guided C1-C2 Block

CT-guided C1-C2 Block

C1-2 facet joint with C2 nerve root sleeve injection under CT-guidance for refractory cervicogenic headache

Landman, Z.[1], Wolman, D., Pulli, B. Do, H. [2] , Qian, X.[1]

[1]Stanford University, Department of Anesthesia, Perioperative, and Pain Medicine. [2] Stanford University, Department of Radiology, Neuroimaging and Neurointervention.

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Thank you!

Comprehensive Pain Medicine

Stanford HEALTH CARE
STANFORD MEDICINE

Pain Medicine treats more than 800 chronic pain conditions using a multi-modal approach

- Neck & back pain
- Headache & facial pain
- Abdominal & pelvic pain
- Musculoskeletal pain
- Fibromyalgia
- CRPS
- Peripheral neuropathy
- Pre-operative optimization
- Chronic post-surgical pain
- Chronic CSF leak

Non-opioid medications

There are **200** medications in pain only about **20** are opioids

Non-opioid medications for non-cancer pain management

Psychology

Pain is a product of the brain. It has sensory and emotional components. Psychological skills help individuals modulate pain and engage in life. Psychological treatments reduce depression, anxiety, and helplessness.

- Pain coping skills
- Biofeedback & meditation
- Free support group for individuals, family & friends
- Acceptance and commitment therapy

Physical therapy

Pain therapists prescribe regimens of exercise, tissue manipulation, and other treatments focused on maximizing function to help relieve pain

- Therapy for fear of movement
- Home exercise program
- Restorative movement group

Coordinated care

Dedicated Complex Care Case Managers (CCCMs) to onnect community resources and reduce barriers to care

Self-management

Empowering patients to manage their pain for patient-centered care

Interventional procedures

Pain Medicine specialists master more than **250** types of Interventional procedures

- **Epidural steroid injections** for nerve impingement
- **Radiofrequency nerve ablation for painful nerves** for facet joint neck & back pain and for painful scars after surgery & trauma
- **Cryoneurolysis for painful nerves** for occipital headache
- **Spinal cord stimulation** for failed back surgery syndrome and peripheral neuropathy
- **Intra-spinal medication delivery systems**

Complementary & alternative

Pain acupuncture & evidence-based supplements

Pre-habilitation

Pre-operative conditioning to optimize surgical outcomes with pre-operative nerve and psychology treatments

Precision health care

Outcomes-based care using our open source platform for learning health systms, CHOIR (Collaborative Health Outcomes Information Registry)

CHOIR

Stanford Pain Management Center

650 723 6238 https://stanfordhealthcare.org *and search for "pain"*

The Stanford Pain Management Center **requires completion of interdisciplinary evaluation** before consideration of prescription of opioid medications. For patients struggling with **substance abuse**, ongoing treatment with board-certified addictionologist is a requirement before Pain Clinic evaluation.

Interdisciplinary Pain Programs

- **Orofacial Pain** — Collaboration with Neurosurgery, Neurology, ENT, Dentistry
- **Abdominal Pain** — Collaboration with Gastroenterology
- **Headache & Facial Pain** — Collaboration with Neurology
- **Pelvic Pain** — Collaboration with Gynecology and Colorectal Surgery