Interventional Therapies *for* *Chronic Head and Facial Pain*

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COI

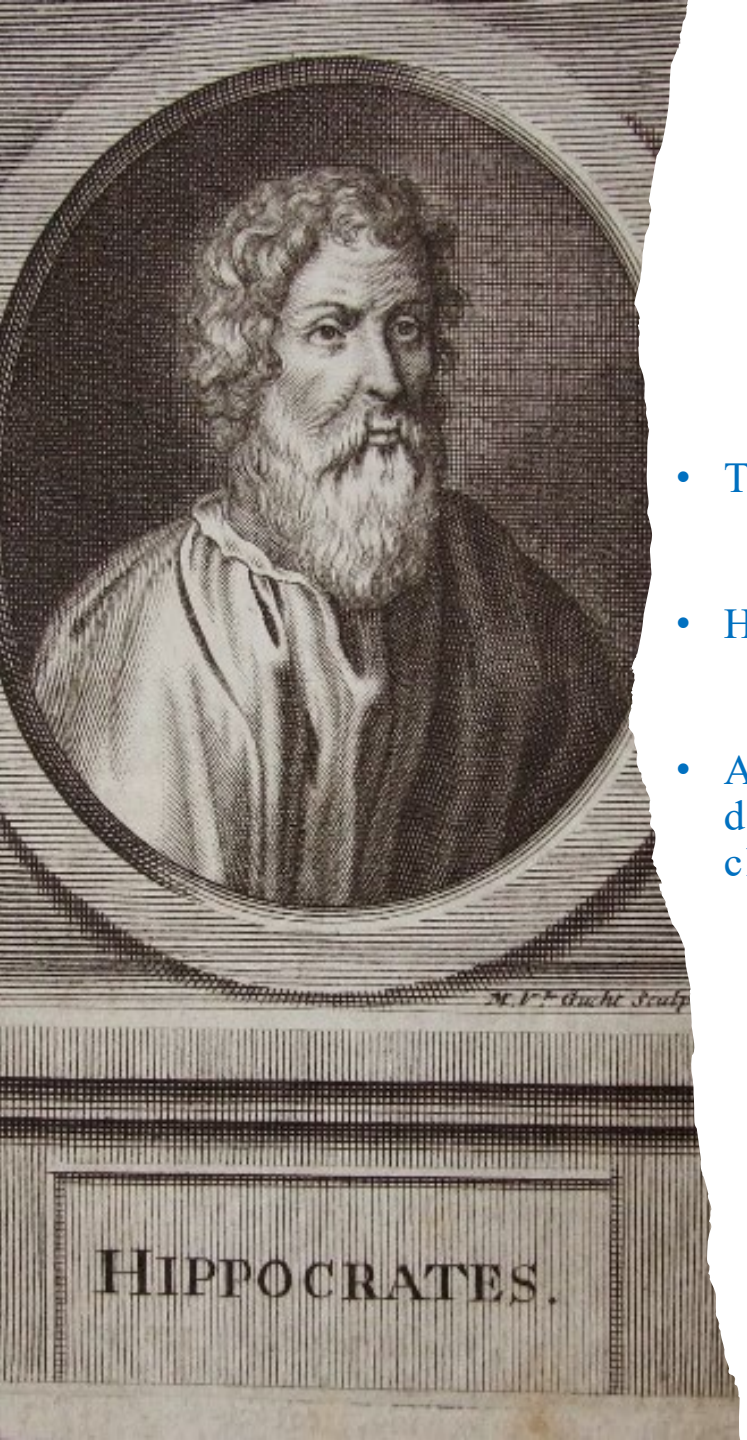
- None

DISCLOSURE (and gratitude)

- This presentation is completely pulled from Dr. Yashar Eshraghi (my mentor and the Yoda of Facial/ Headache pain) with my own personal spins/ thoughts

Learning Objectives

- Identify and Differentiate Headache Syndromes
- Understand and Apply Advanced Interventional Treatments for Chronic Craniofacial Pain
- Comprehend Neuromodulation for Chronic Craniofacial Pain and Evaluate Current Evidence



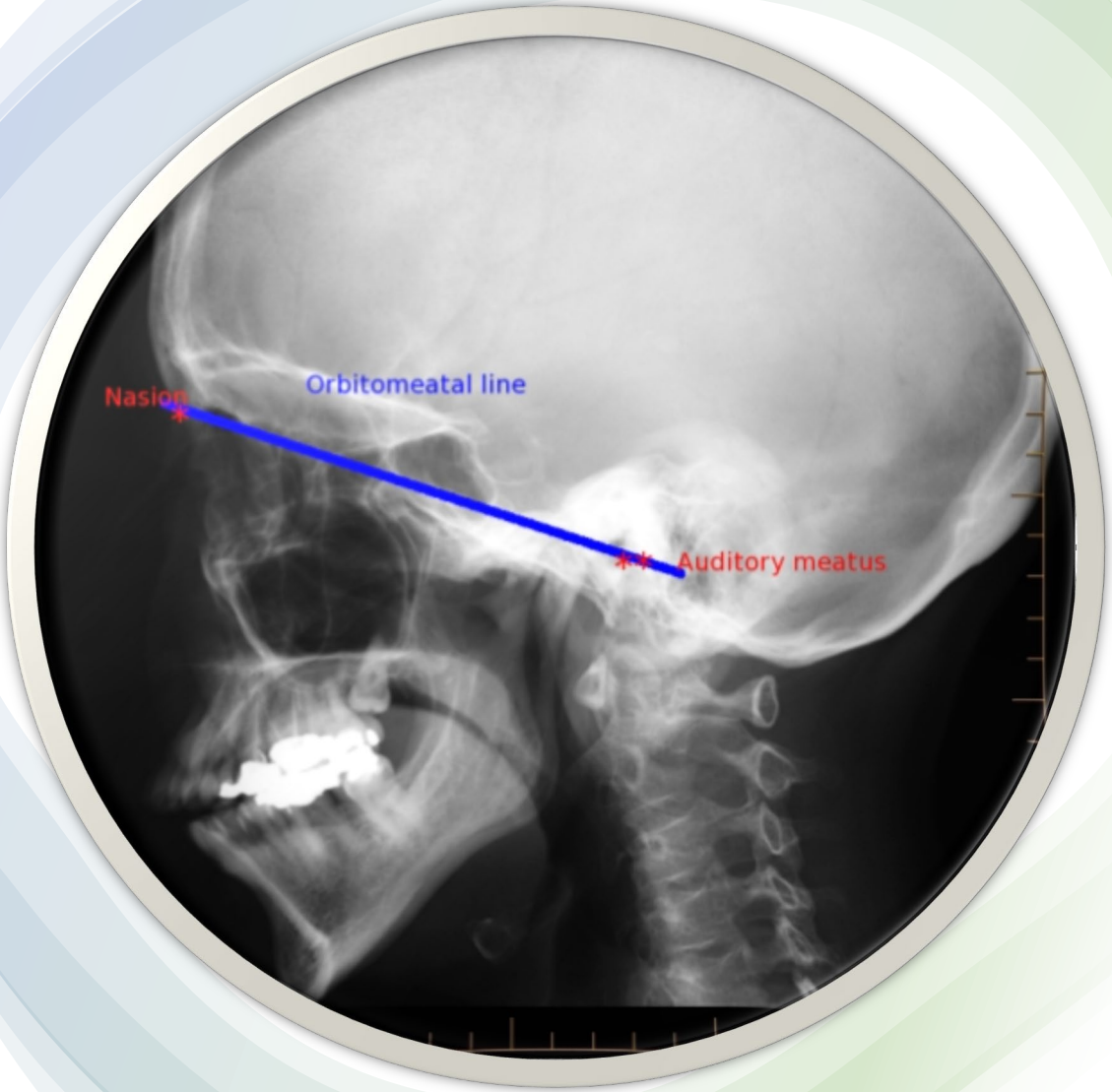
HISTORY

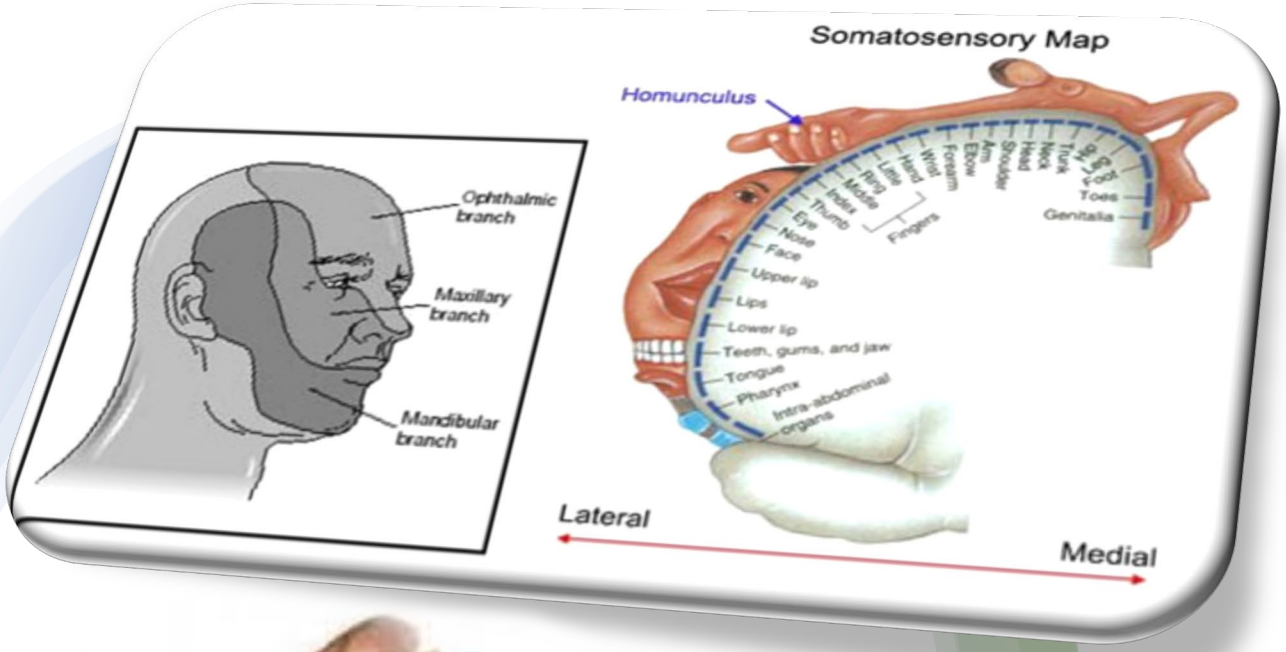
- The first headache notation can be found 6,000 years ago.
- Hippocrates who first gave detailed description of migraine.
- Aretaeus of Cappadocia, being a migraineur himself described his own headaches and developed first headache classification.

Aretaeus, the Cappedocian.

Definitions

- Facial pain:
  - ❑Pain below the orbitomeatal line/ plane, above the neck, and anterior to the pinnae.
- Headache:
  - ❑Pain located above the orbitomeatal line.





Approach to Craniofacial Pain

ESTABLISH THE CORRECT DIAGNOSIS

Careful detailed pain history

- Location
- Duration
- Temporal characteristics
- Quality
- Severity
- Circumstances of onset
- Influencing factors
- Neurological symptoms
- Response to medications

Headache Syndromes

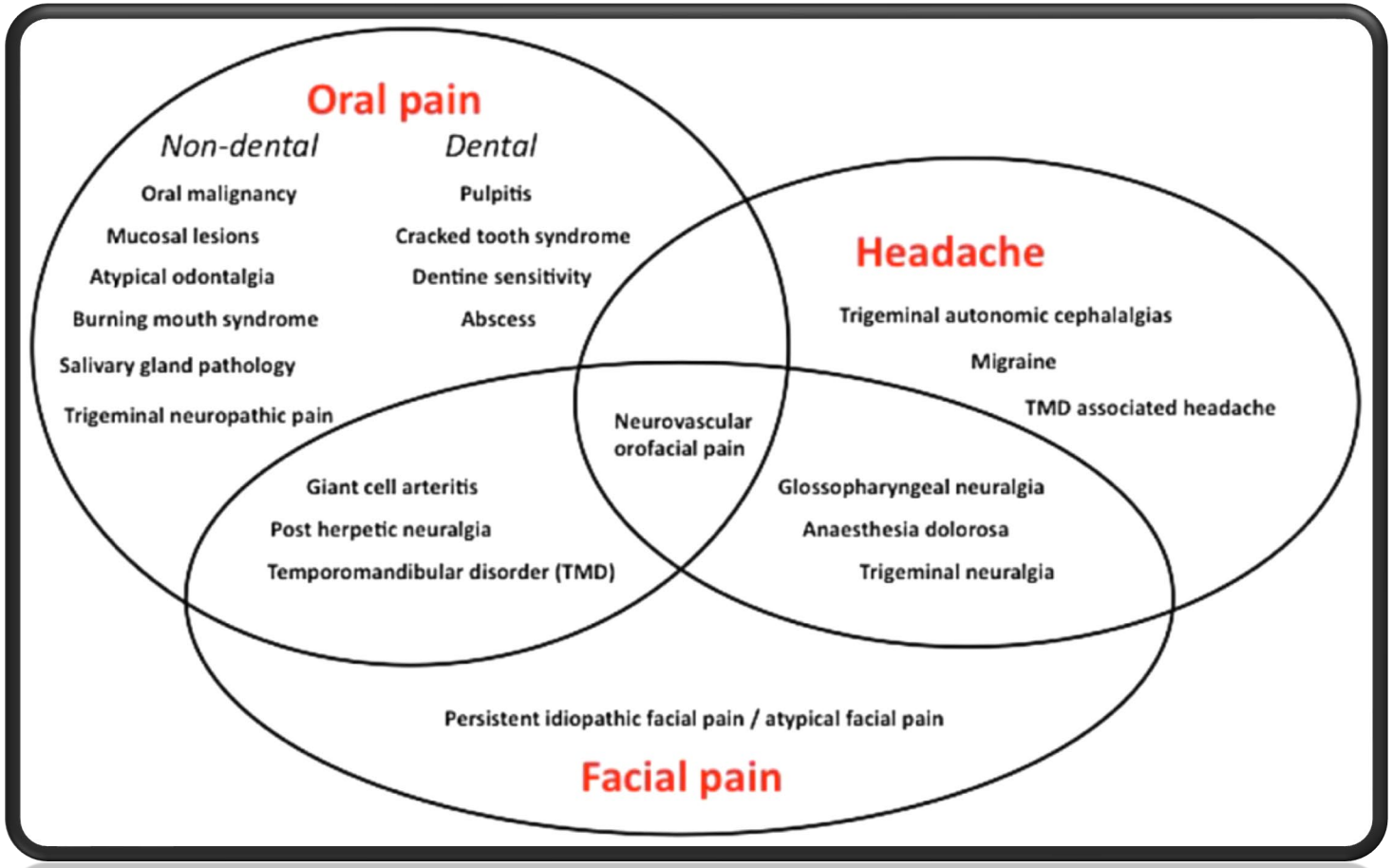
Primary Headaches

- Migraines
- Tension Type headache
- Trigeminal Autonomic Cephalalgias: Cluster, Paroxysmal Hemicrania, SUNCT, SUNA, Hemicrania Continua.
- Other primary headache disorders: NDPH, Primary cough headache, exercise induced, headache associated with sexual activity, primary stabbing headache, hypnic headache.

Secondary Headaches

- Attributed to various causes such as trauma, vascular disorders, infections, or psychiatric conditions.

Classification of Facial Pain



Pharmacological Therapy

Acute/Rescue Medications

Treatment Options

- **NSAIDs**
  - Ibuprofen, naproxen, diclofenac, ketorolac
  - Inhibit COX enzyme
- **Triptans**
  - Sumatriptan, rizatriptan, eletriptan, naratriptan
  - Serotonin receptor agonists

Treatment Options

- **Fioricet**
  - Acetaminophen, butalbital, caffeine
- **Ergotamine/Caffeine**
  - Acts on serotonin, dopamine, and alpha receptors (agonist)
- **Lasmiditan**
  - 5-HT1F agonist

Treatment Options

- **CGRP Antagonists**
  - Ubrogepant
- **Prednisone (steroids)**
  - Avoid in hyperglycemia
- **Antiemetics**
  - Ondansetron, etc
- **Muscle Relaxants**
  - Tizanidine, baclofen, etc
  - Sometimes preventative

Preventative Medications

Treatment Options

- **Antidepressants**
  - Nortriptyline
    - TCA
  - Venlafaxine
    - SNRI
- **Antihypertensives**
  - Propranolol
    - Beta Blocker
  - Verapamil (CCB)

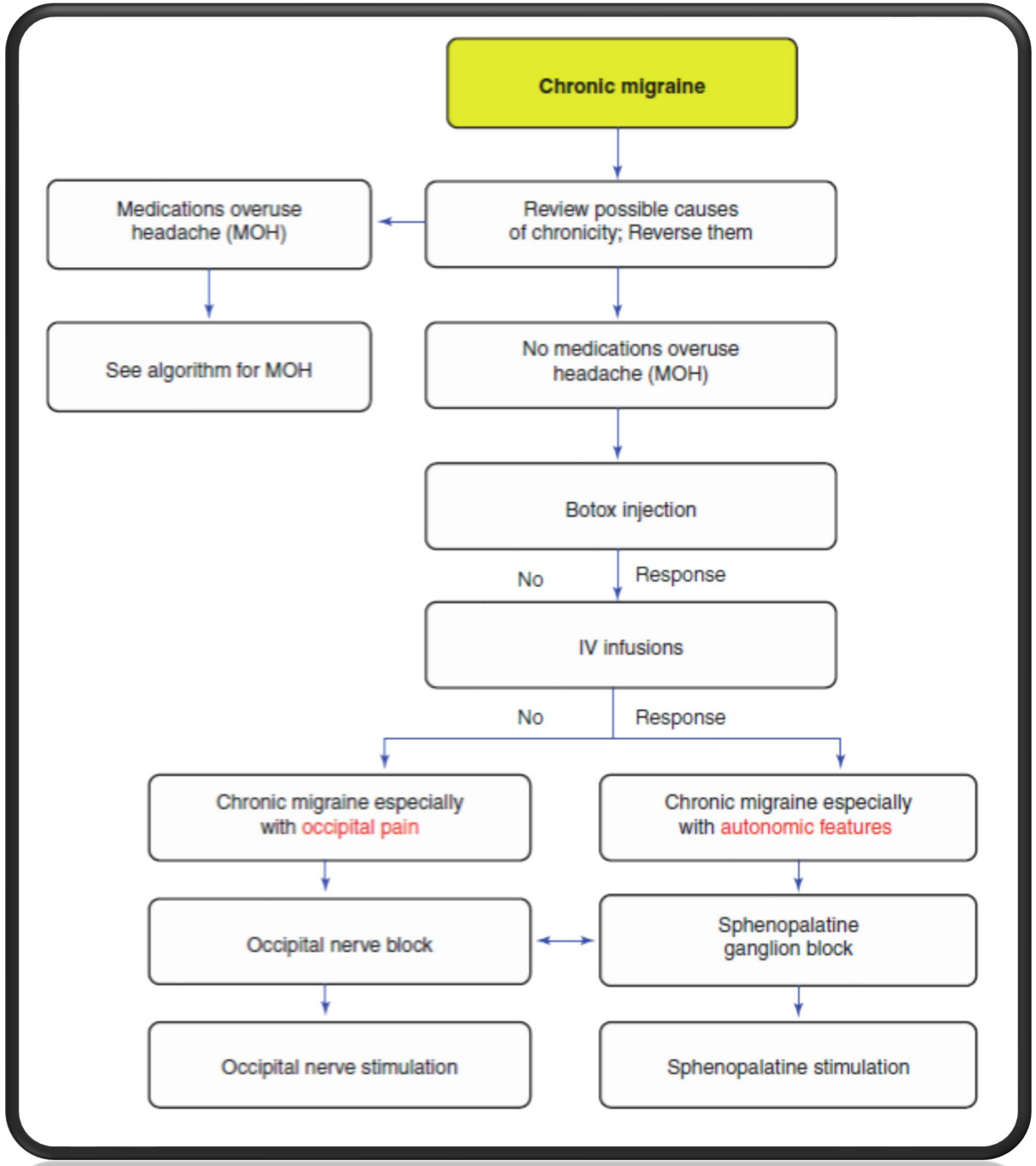
Treatment Options

- **Antiepileptics**
  - Topiramate
    - Stimulates GABA-A
  - Valproic Acid
    - Increase GABA levels
- **CGRP Antagonists**
  - Galcanezumab
    - Monoclonal antibody
  - Rimegepant

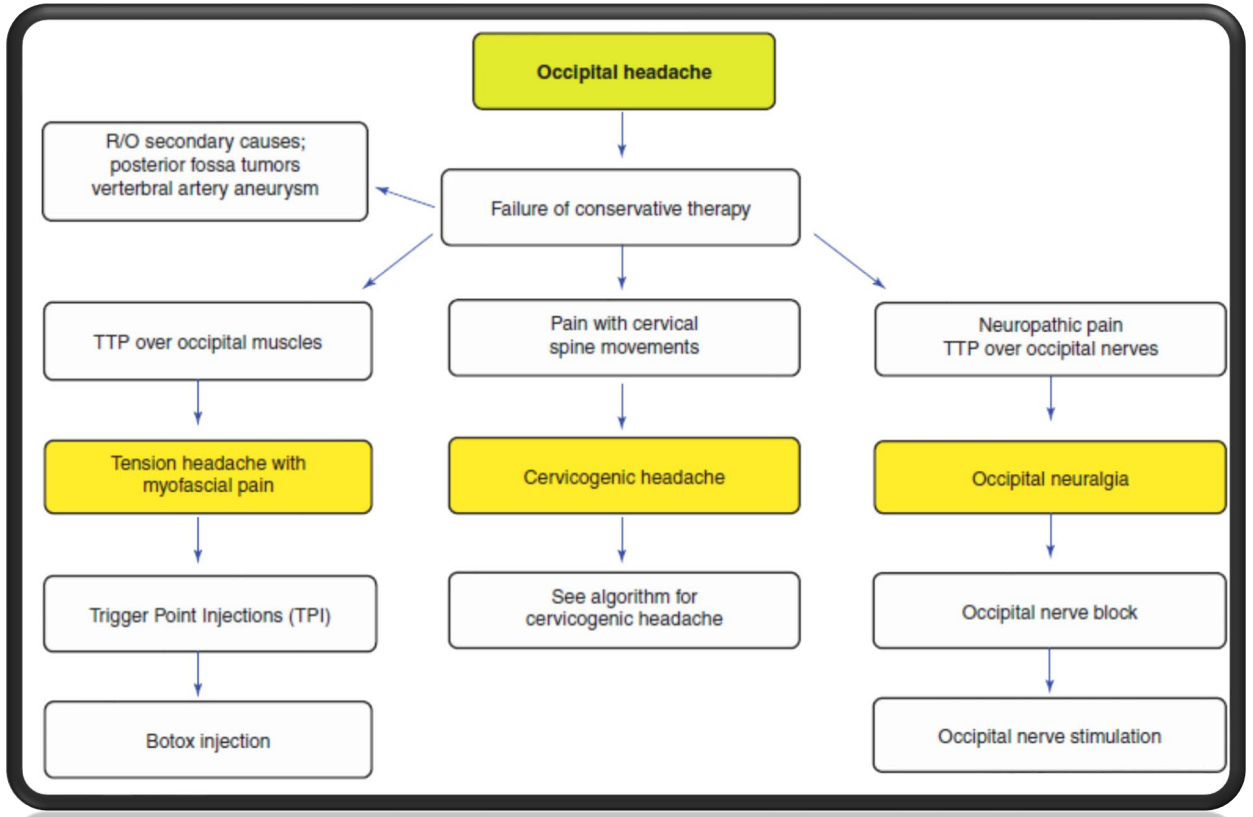
Treatment Options

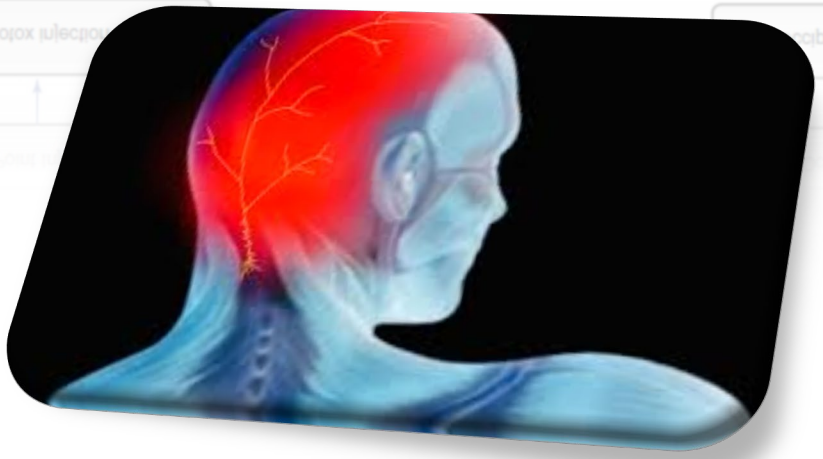
- **Botox**
  - Injected into 31 spots on the head and neck every 3 months
  - Effective for chronic migraines without relief from other treatments
  - Can cause head & neck pain, eyelid weakness

Algorithm for Diagnosis and Procedural Management of Chronic Migraine



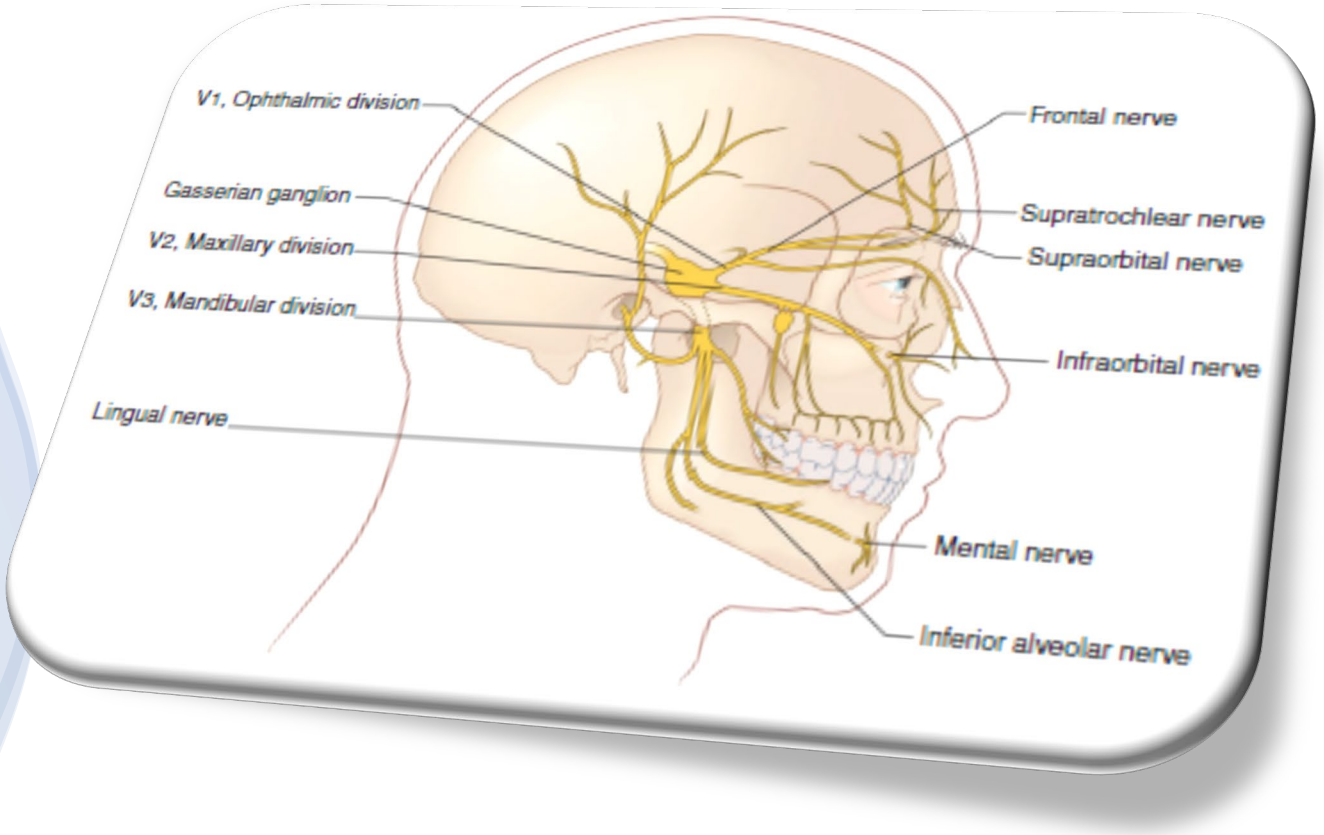
Algorithm for Diagnosis and Management of Occipital Headache





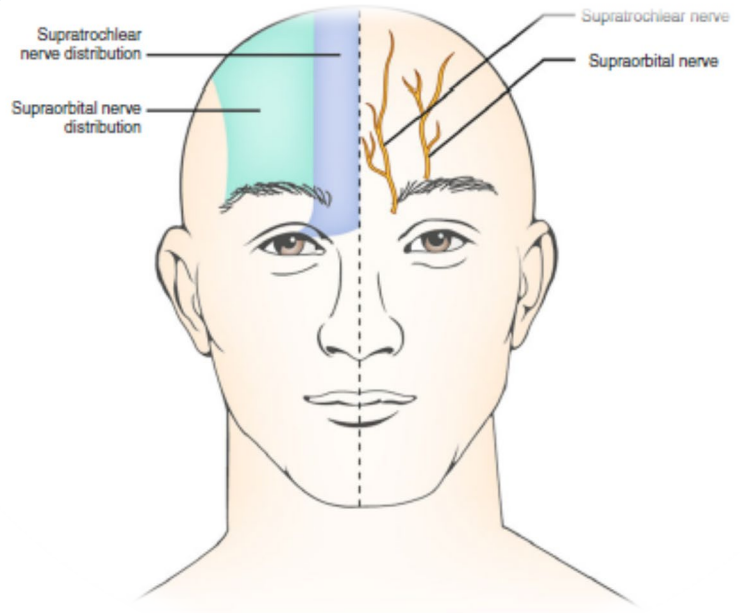
Algorithm for Diagnosis and Management of Cervicogenic Headache

Peripheral Nerve Blocks

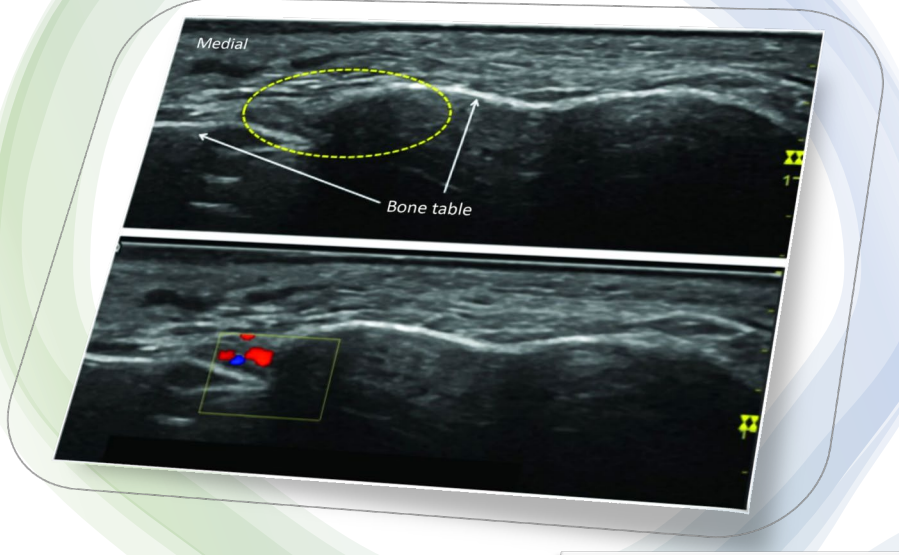


Supraorbital Nerve Block

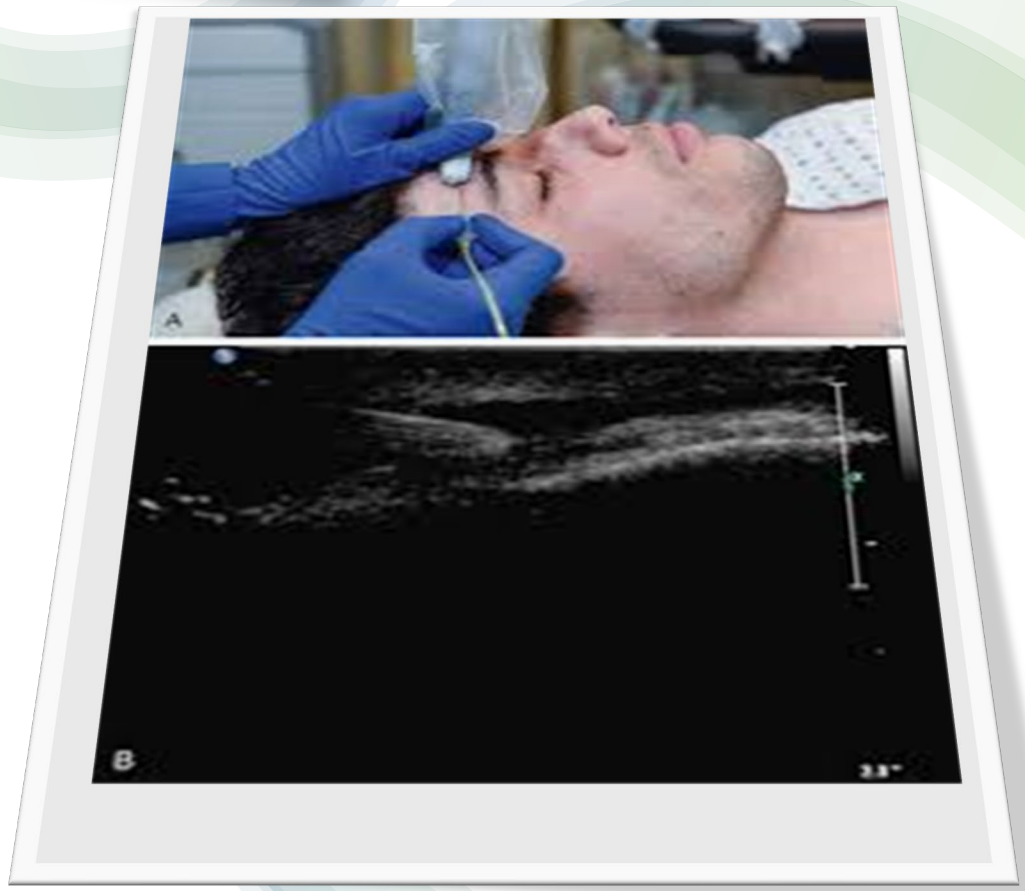
- Indications:
  - Supraorbital neuralgia
  - Pain due to herpes zoster in V1 distribution
  - Facial bone fractures
  - Facial malignancies



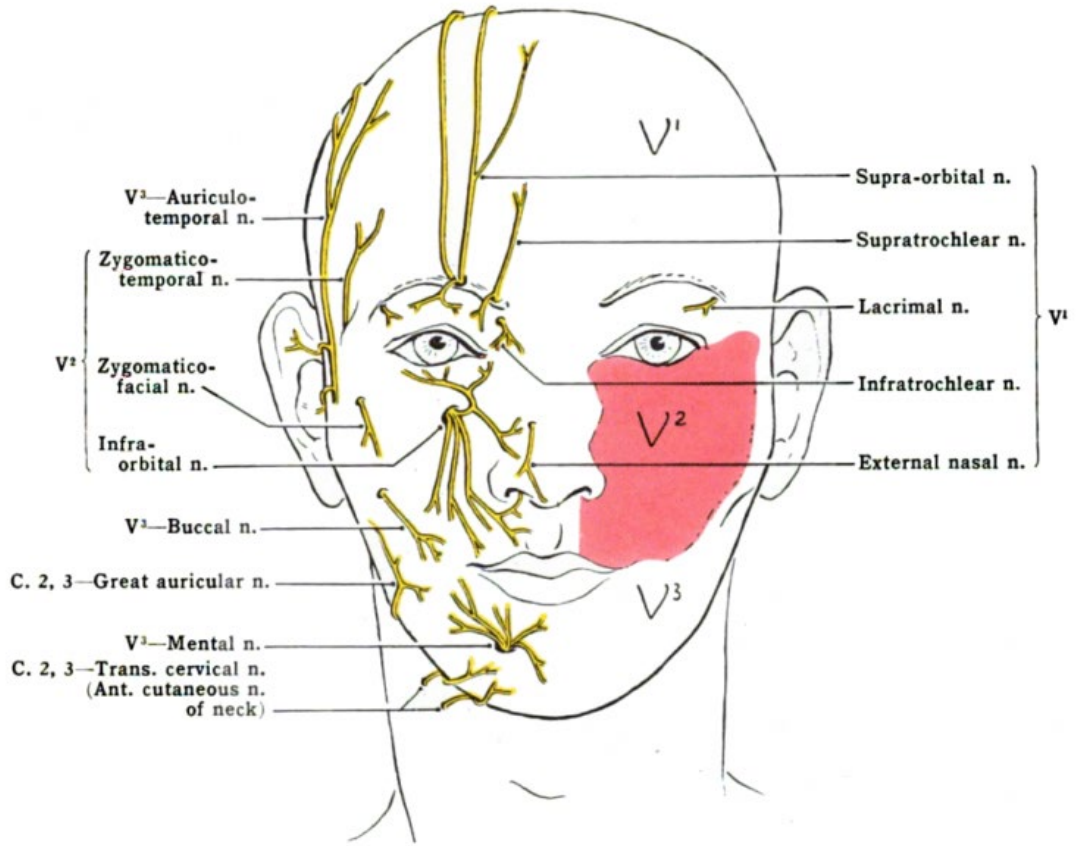
Ultrasound Technique



- Position: Supine or seated.
- Probe: Along the supraorbital ridge in a transverse orientation.
- A defect along the supraorbital ridge.
- In plane or out-of-plane.
- 1-2 ml of solution.
- Avoid entering in the foramen.

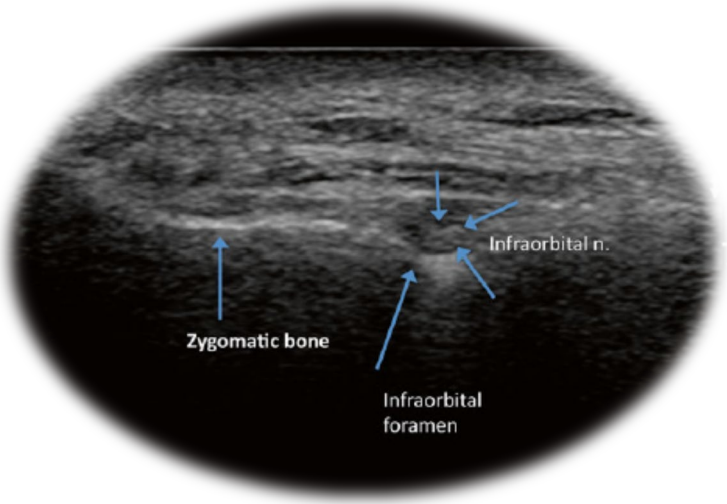


Infraorbital Nerve

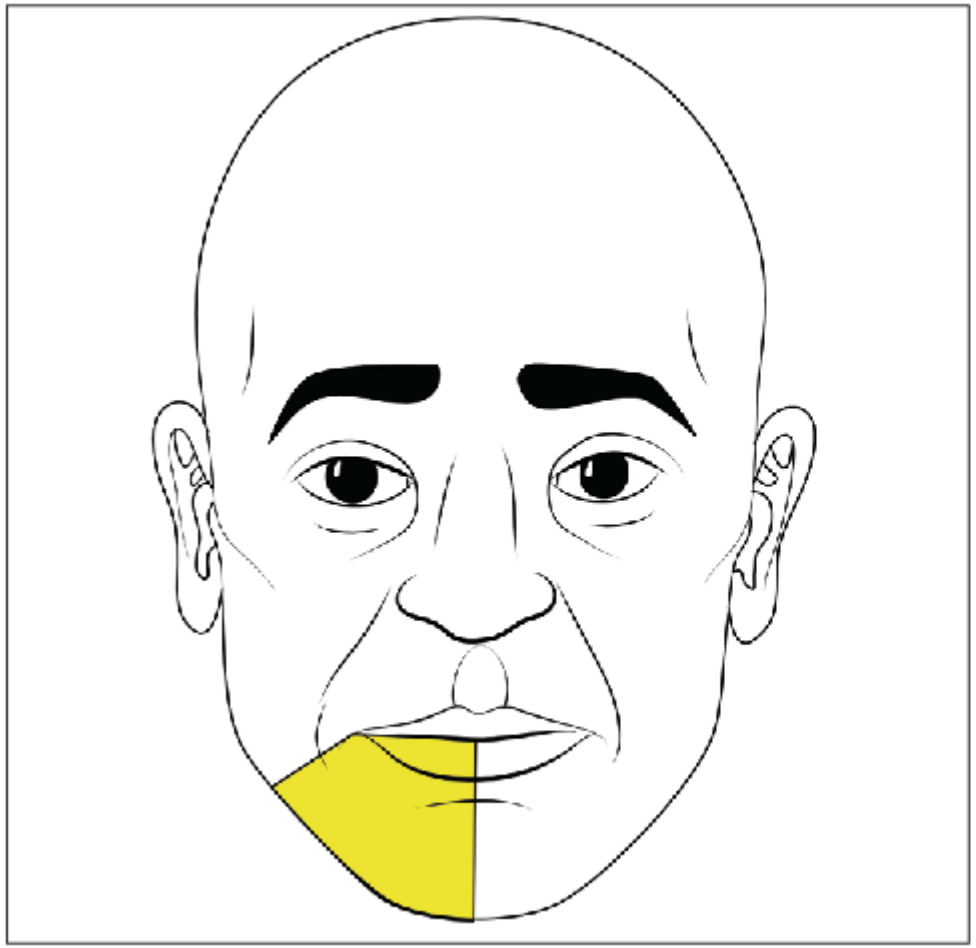


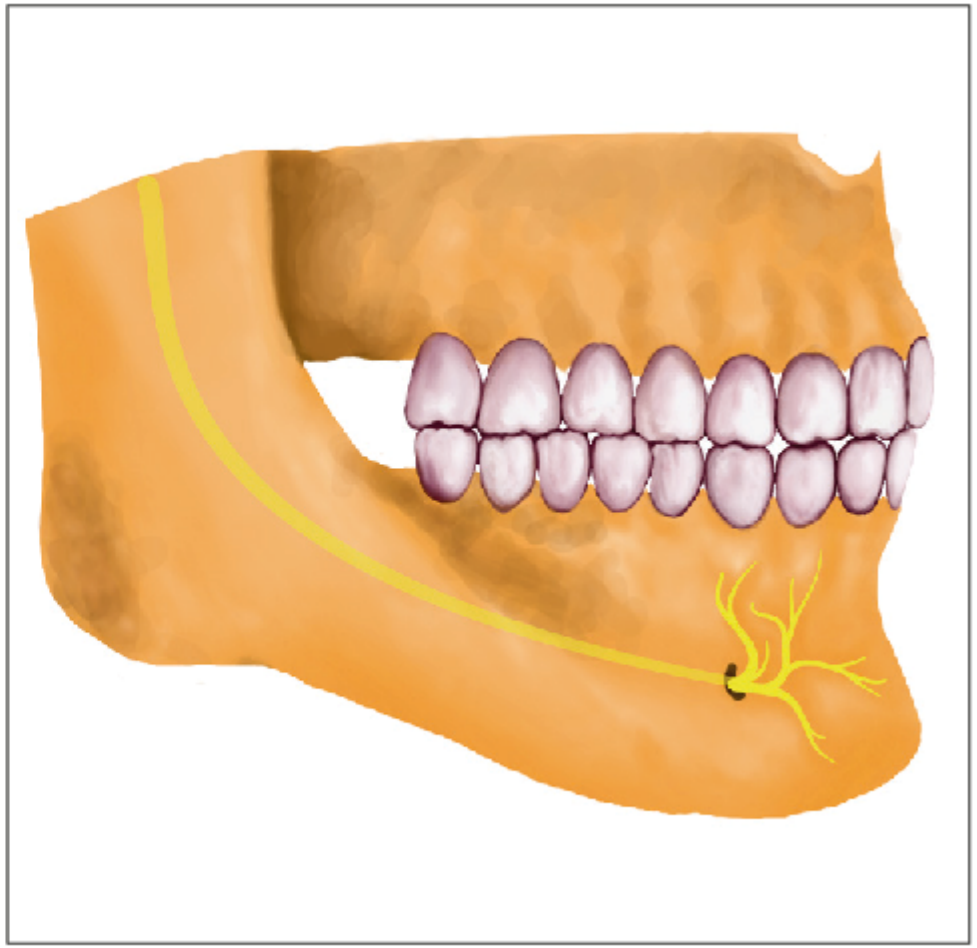
Infraorbital Nerve Block

- Position: Supine or seated.
- Probe: Along the zygomatic bone (transverse/ oblique orientation).
- Infraorbital notch is visualized within the maxilla.
- 2–3 ml of solution
- Avoid entering in the foramen.



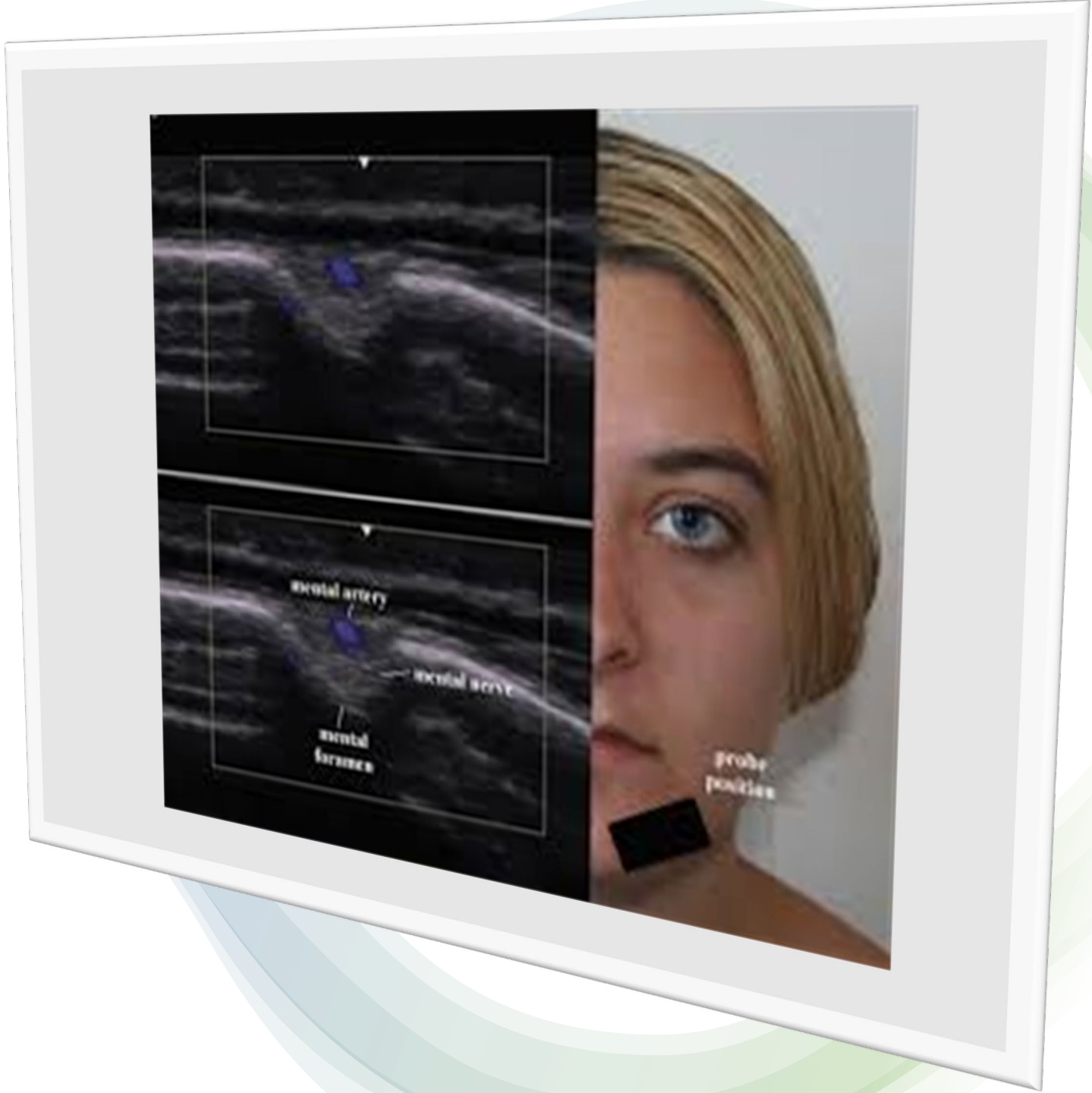
Submental Nerve



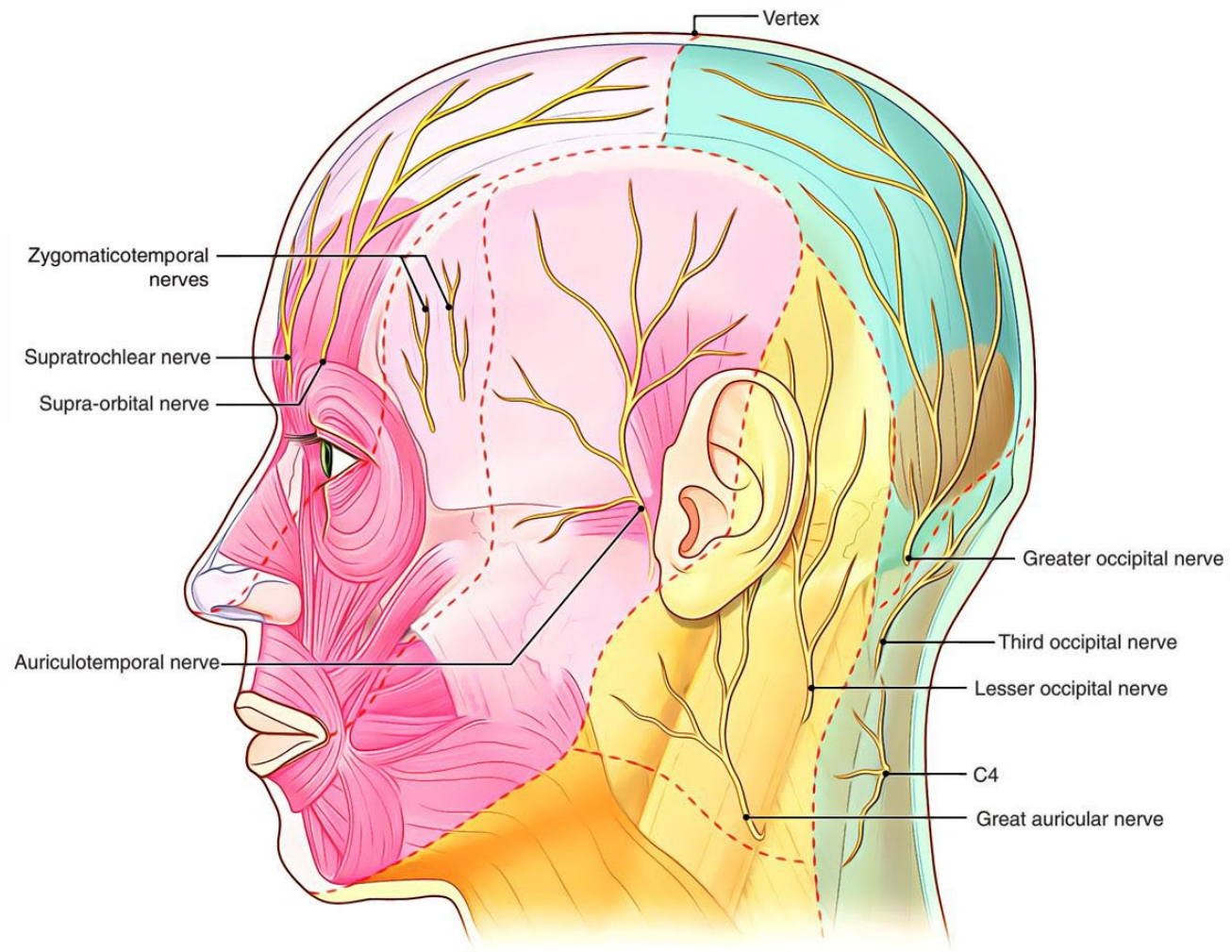


Mental Nerve Block

- Position: supine or seated.
- Probe: Lower border of the mandible in a transverse orientation.
- The mental foramen in the mandible.
- 2-3 ml of solution.
- Avoid entering the foramen.

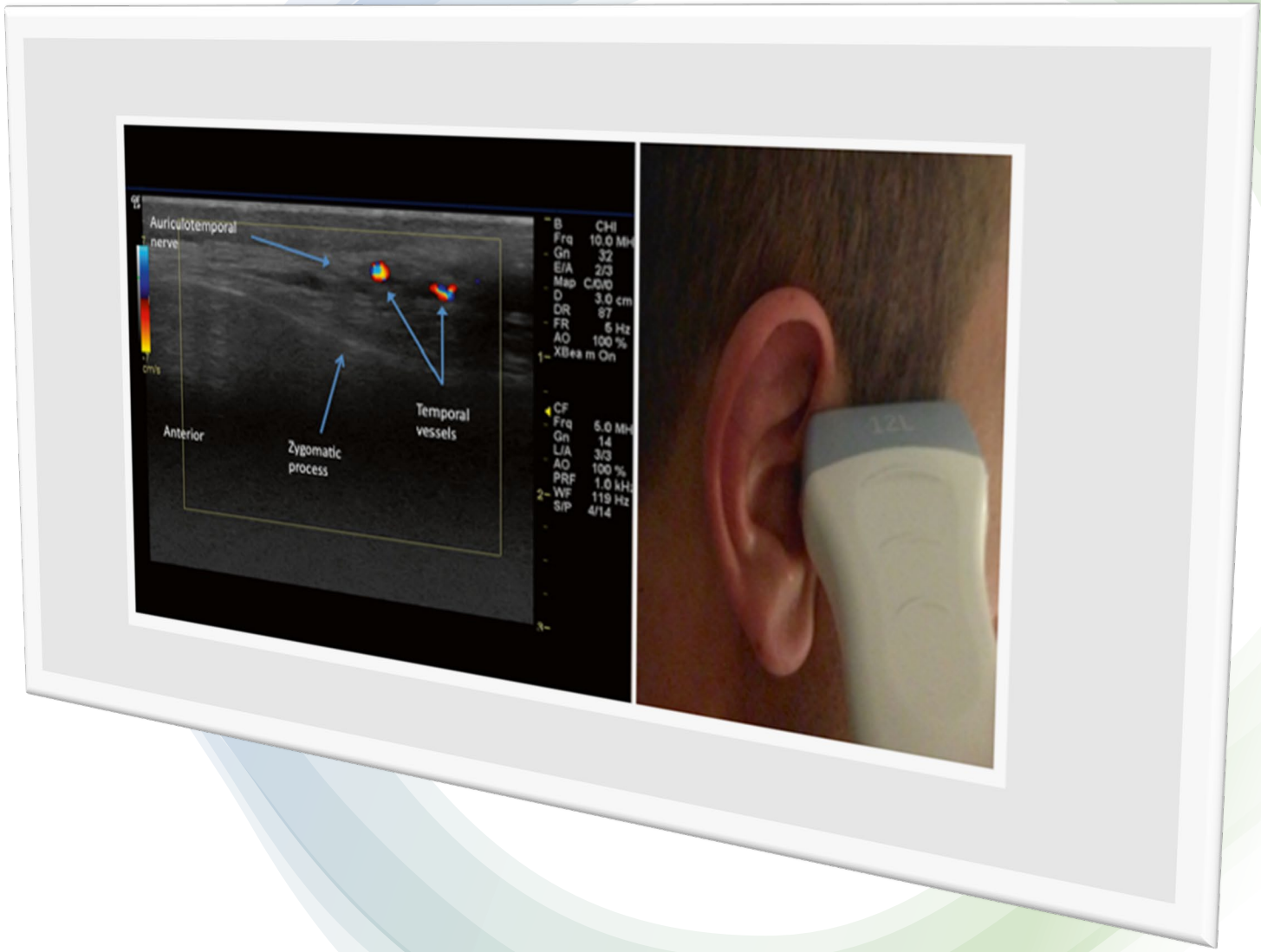


Auriculotemporal and Greater Auricular Nerve



Auriculotemporal Nerve Block

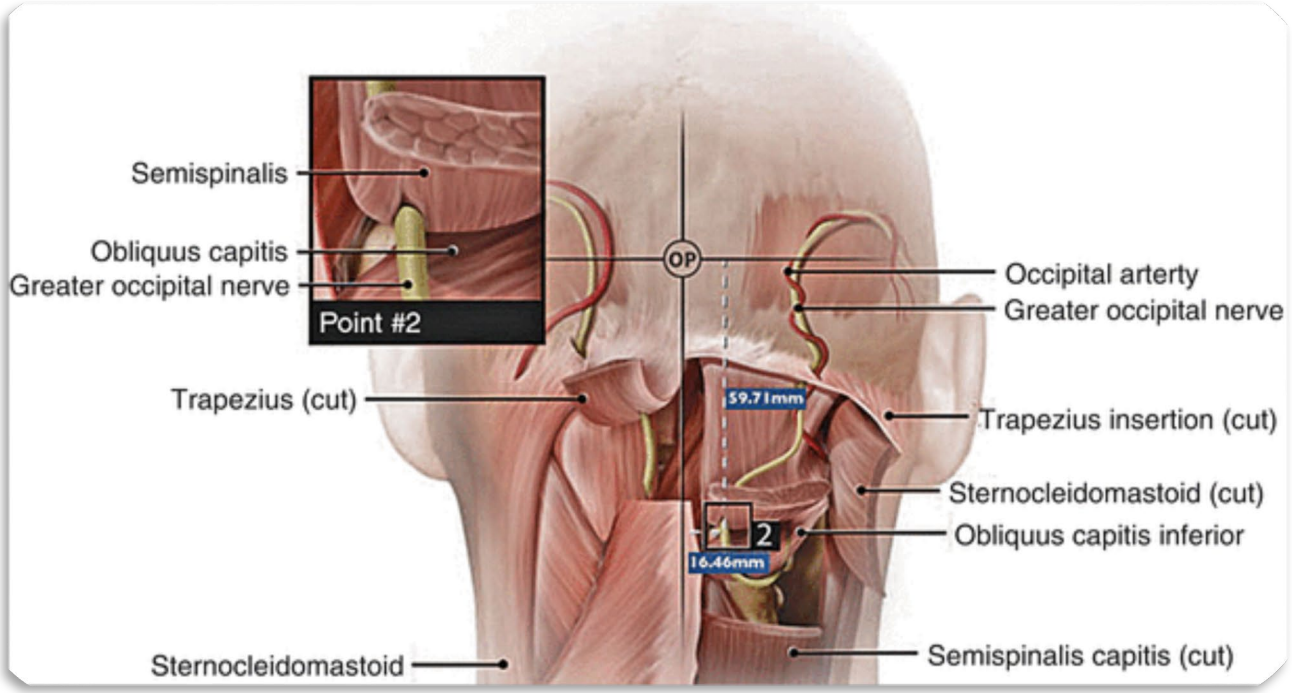
- Position: Supine or seated.
- Probe: Situated just above the origin of the zygomatic process.
- The temporal artery is visualized as pulsating structure and confirmed by color Doppler.
- The auriculotemporal nerve is visualized anterior to the vessels.
- 2–3 ml of solution.



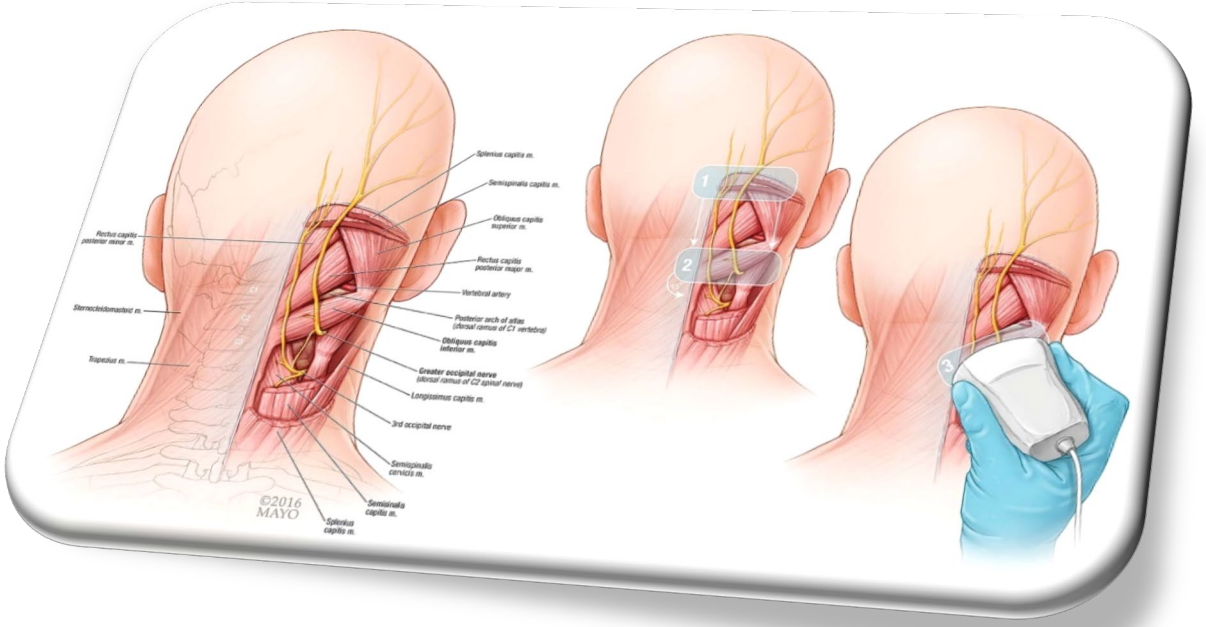
Greater Auricular Nerve Block

- Position: Supine or lateral position.
- Probe: Transverse oblique orientation along the sternocleidomastoid muscle.
- Visualized on the superior and lateral aspect of the sternocleidomastoid.
- 3–5 ml of solution.

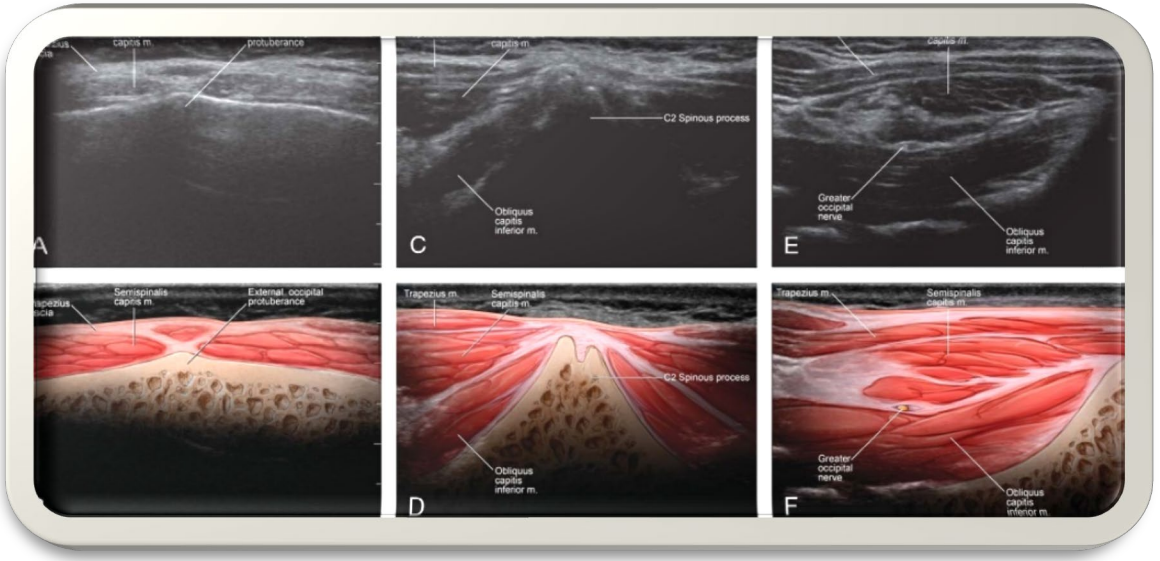
Ultrasound Guided Occipital Nerve Block



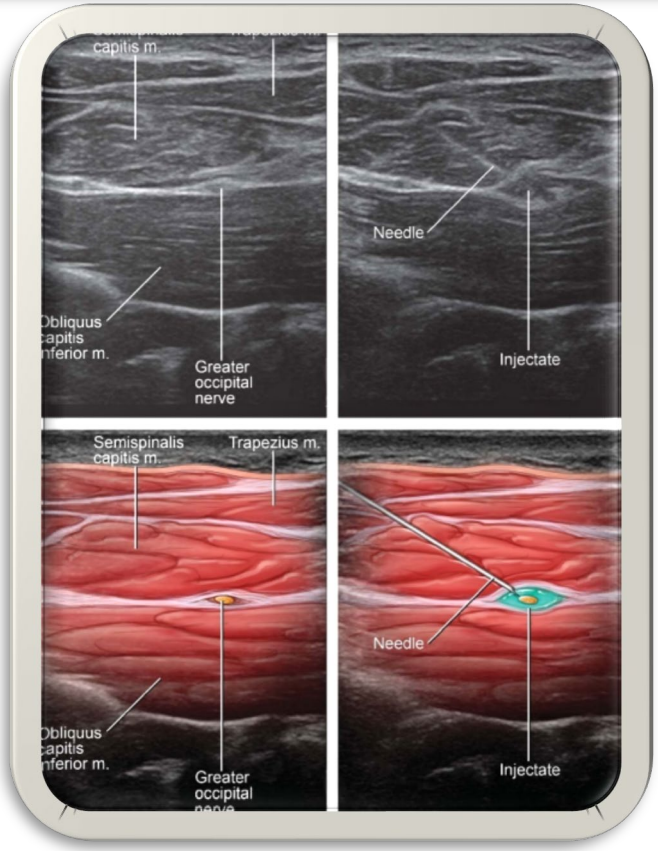
- Position: Prone with head and neck flexed
- Probe: The ultrasound transducer is placed in the transverse orientation at midline to identify the EOP.
- Transducer was moved caudally to locate the C2 spinous process as identified by its bifid appearance.



Occipital Nerve Block



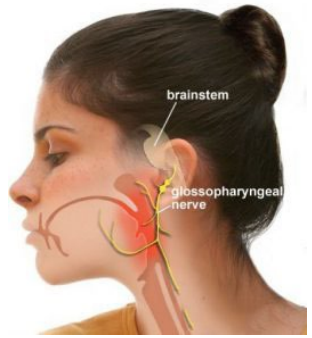
- C2 identified.
- The transducer was moved laterally to identify the OCI muscle.
- The GON visualized superficial to the OCI.
- The needle is advanced in-plane with the transducer from medial to lateral.
- The fascial plane between the OCI and SC.
- Warning:
  - Damage to the vertebral artery.
  - Intrathecal injection into the foramen magnum.



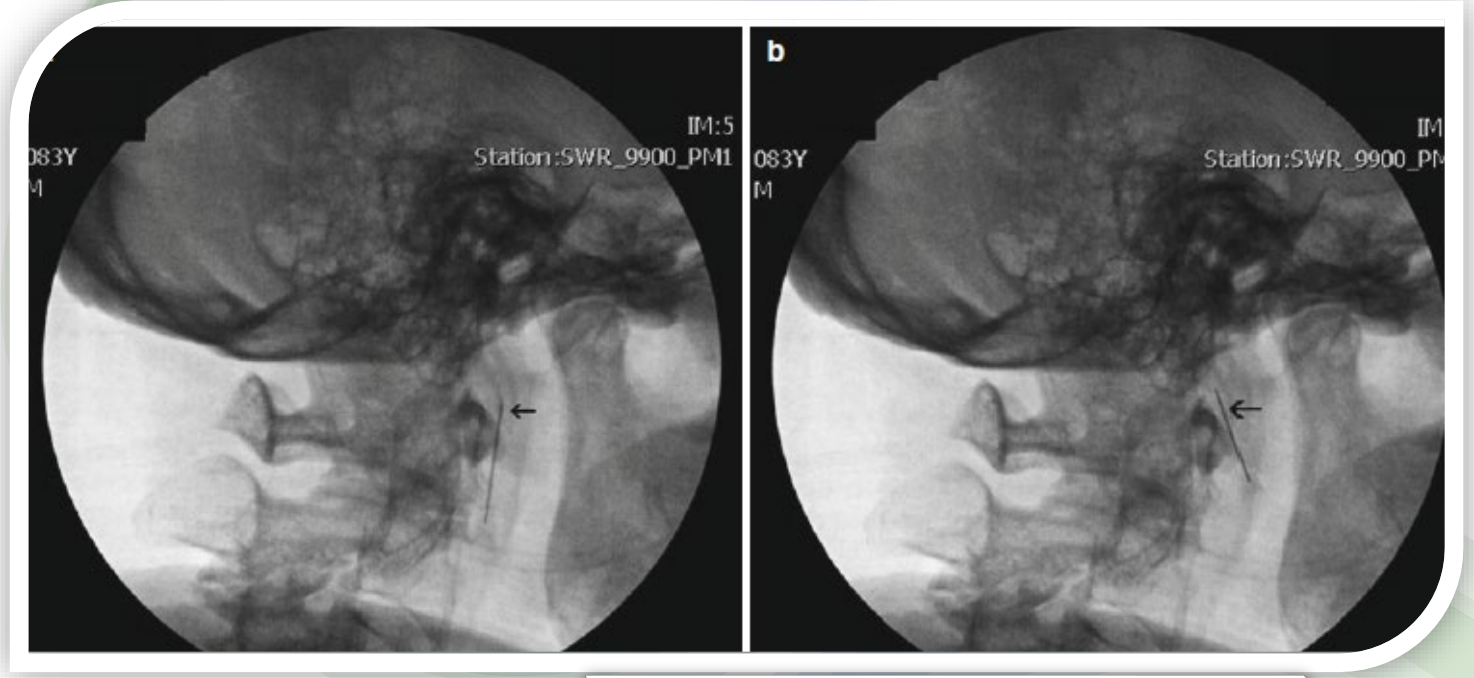
Glossopharyngeal Nerve Block

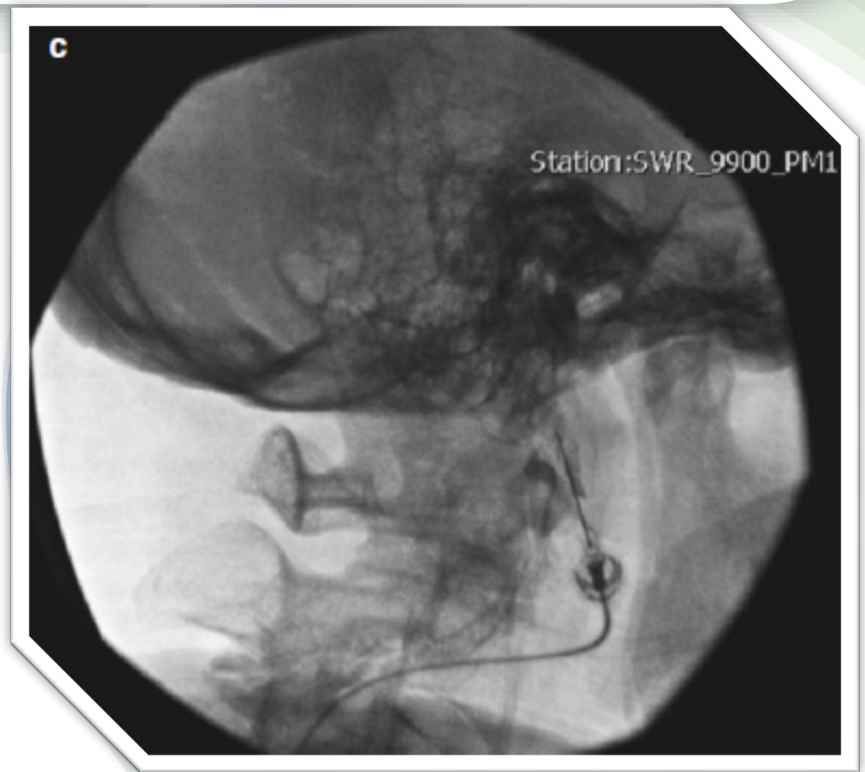
❑Indications:

- Diagnostic:
  - ➢Diagnostic role in the evaluation of head and facial pain.
  - ➢Confirm the diagnosis of Eagle's syndrome.
- Therapeutic:
  - ➢Pain due to orofacial cancer.
  - ➢Glossopharyngeal neuralgia refractory to medical management.



Fluoroscopy Guided Approach



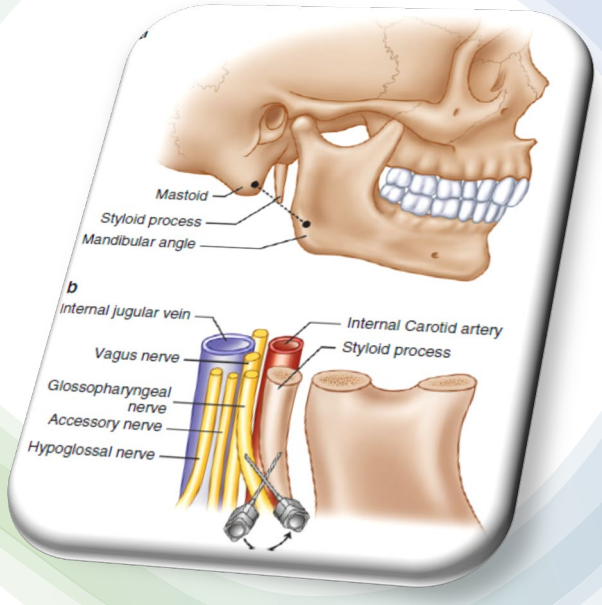


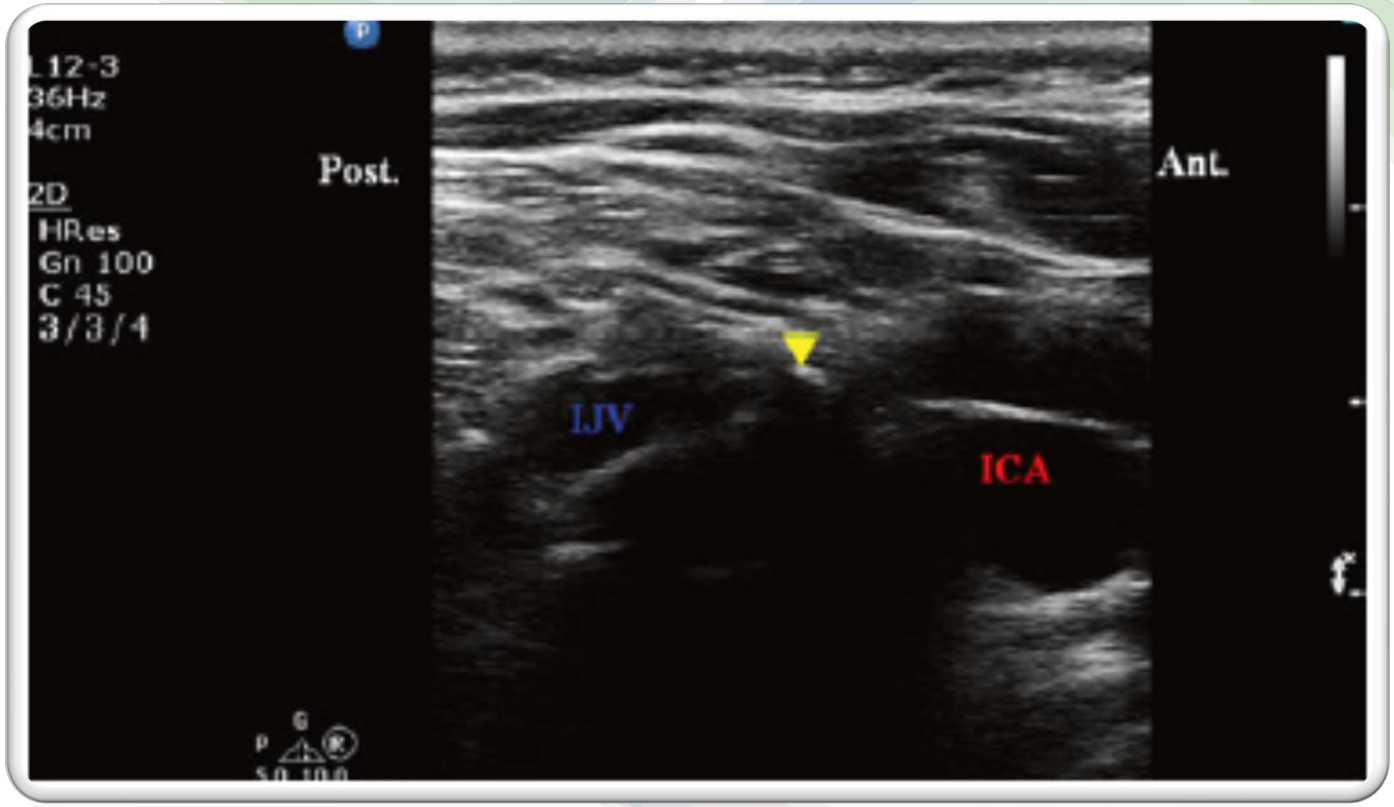
- The styloid process is the landmark.
- Position: Supine with the head slightly turned away from the affected side.
- Lateral view is obtained to visualize the angle of the mandible and the mastoid process.
- The needle is advanced until the styloid process is encountered.
- The needle is then withdrawn and walked off posteriorly.

Ultrasound Approach

- Probe: Inferior to the earlobe in a transverse oblique orientation between the mastoid and the angle of the mandible.

- The styloid process is a small hyperechoic shadow medial to the mastoid process.





Complications

- Accidental puncture of the ICA or the IJV.
- Dysphagia
- Blockade of the vagus nerve: bradycardia, asystole, reflex tachycardia.
- Dysphonia secondary to vocal cord paralysis.
- Temporary weakness of the trapezius muscle and the tongue.

Trigeminal Neuralgia

Classical trigeminal neuralgia characteristics:

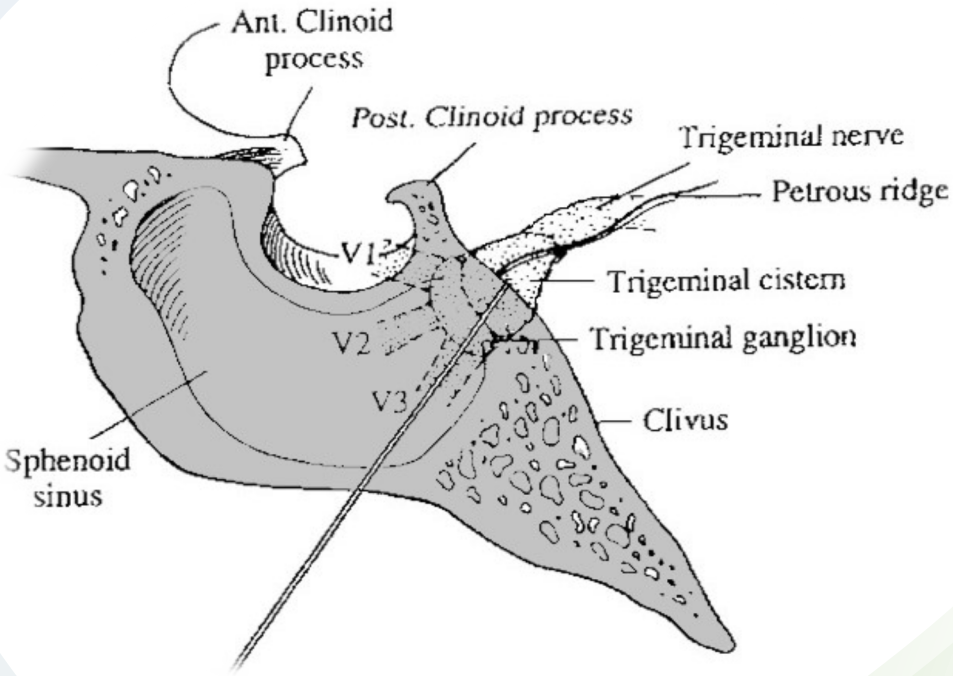
- Unilateral
- Paroxysmal, brief, electric-like painful shocks
- Usually limited to one trigeminal distribution
    - > 95% in V2 or V3 distribution
- Can be evoked or spontaneous
- NO NEUROLOGICAL DEFICITS
- Vascular compression by SCA > AICA

Anatomy

- The dural pouch that lies just behind the ganglion is called the *trigeminal cistern* and contains cerebrospinal fluid (CSF).

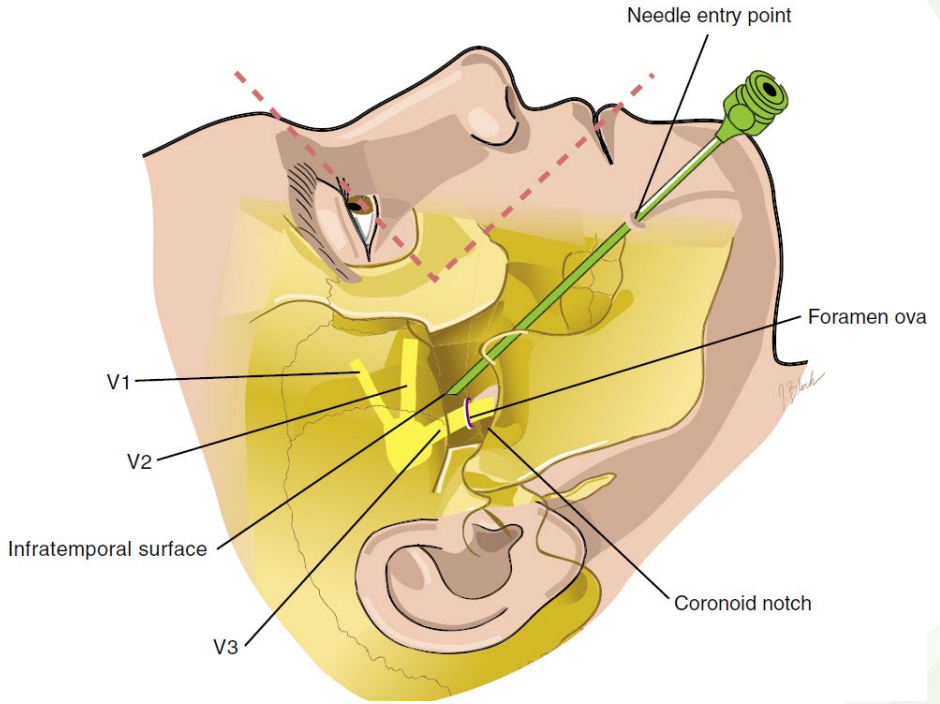
- Meckel's cave
  - Posterior 2/ 3 of the ganglion are covered by dura
  - Anterior 1/ 3 are not covered by dura; where V1, V2, V3 exit

- Ophthalmic Nerve (V1): Passes into the orbit via superior orbital fissure
- Maxillary Nerve (V2): Exits cranial cavity via foramen rotundum
- Mandibular Nerve (V3): Exits cranial cavity via foramen ovule

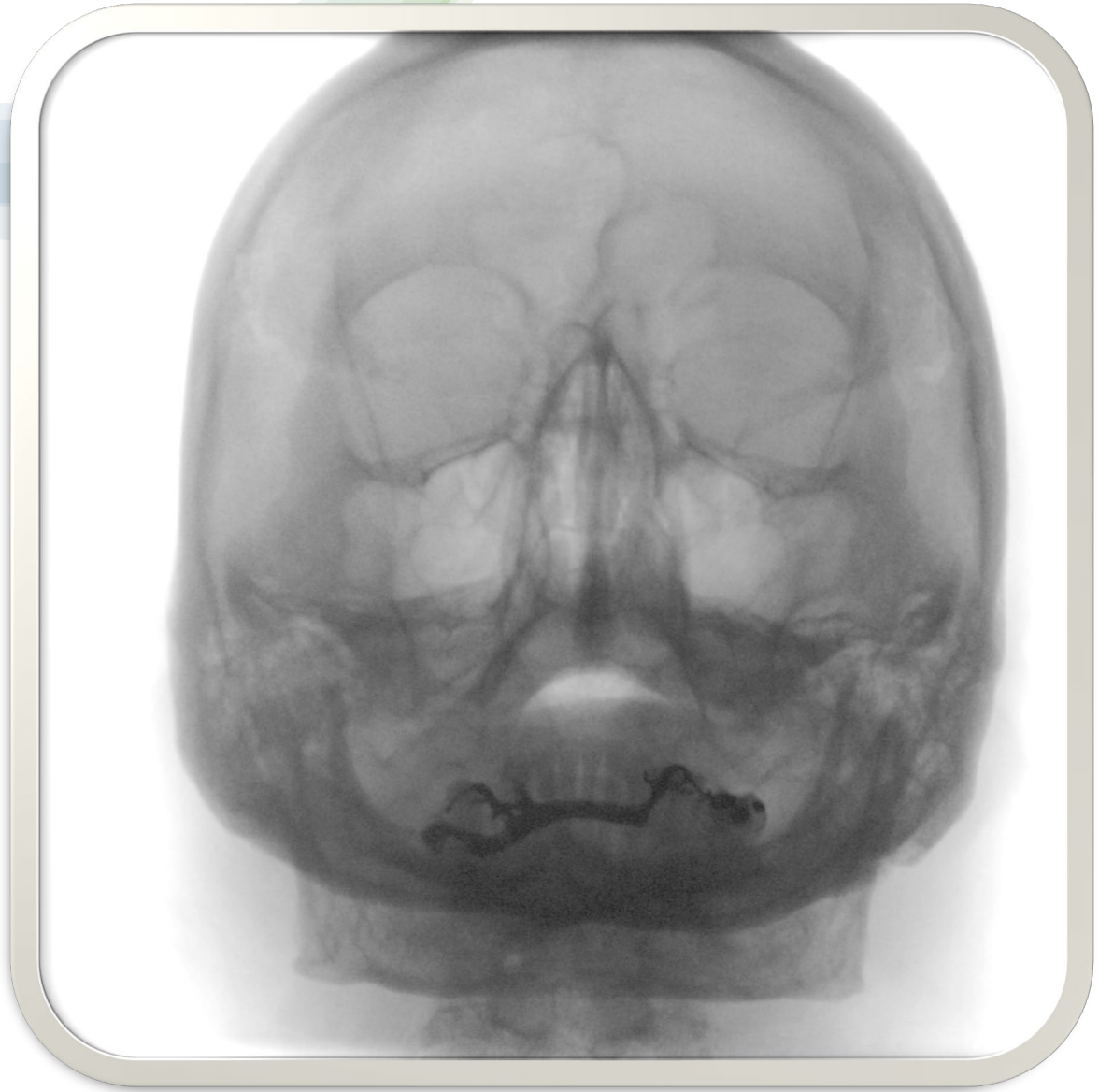


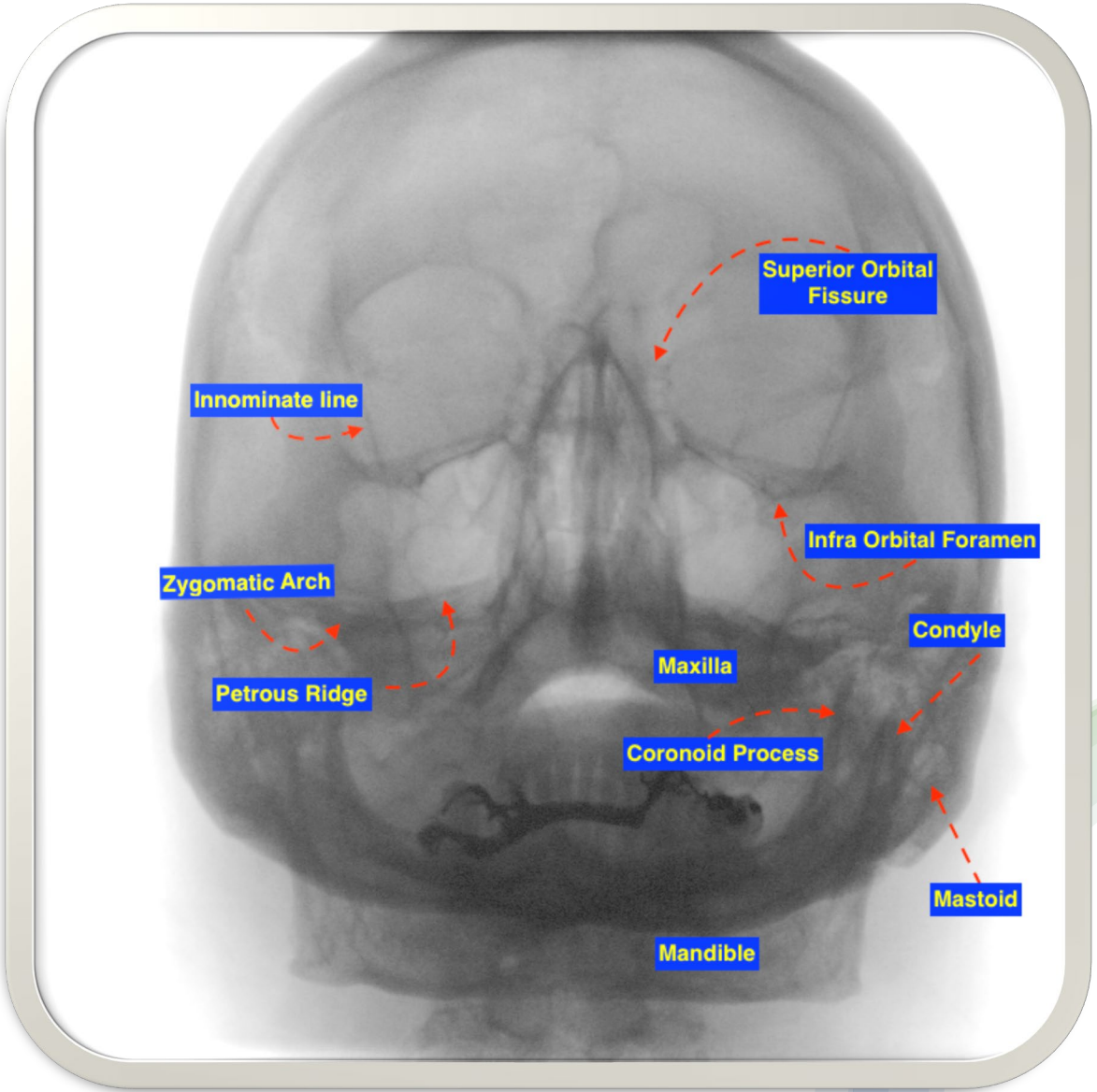
Trigeminal Ganglion Block

- Needle is advanced perpendicular to the pupil.
- Cephalad toward the acoustic auditory meatus.
- Contact is made with the base of the skull.
- The needle is withdrawn slightly and is “walked” posteriorly into the foramen ovale.



Fluoroscopic Technique for Trigeminal Block





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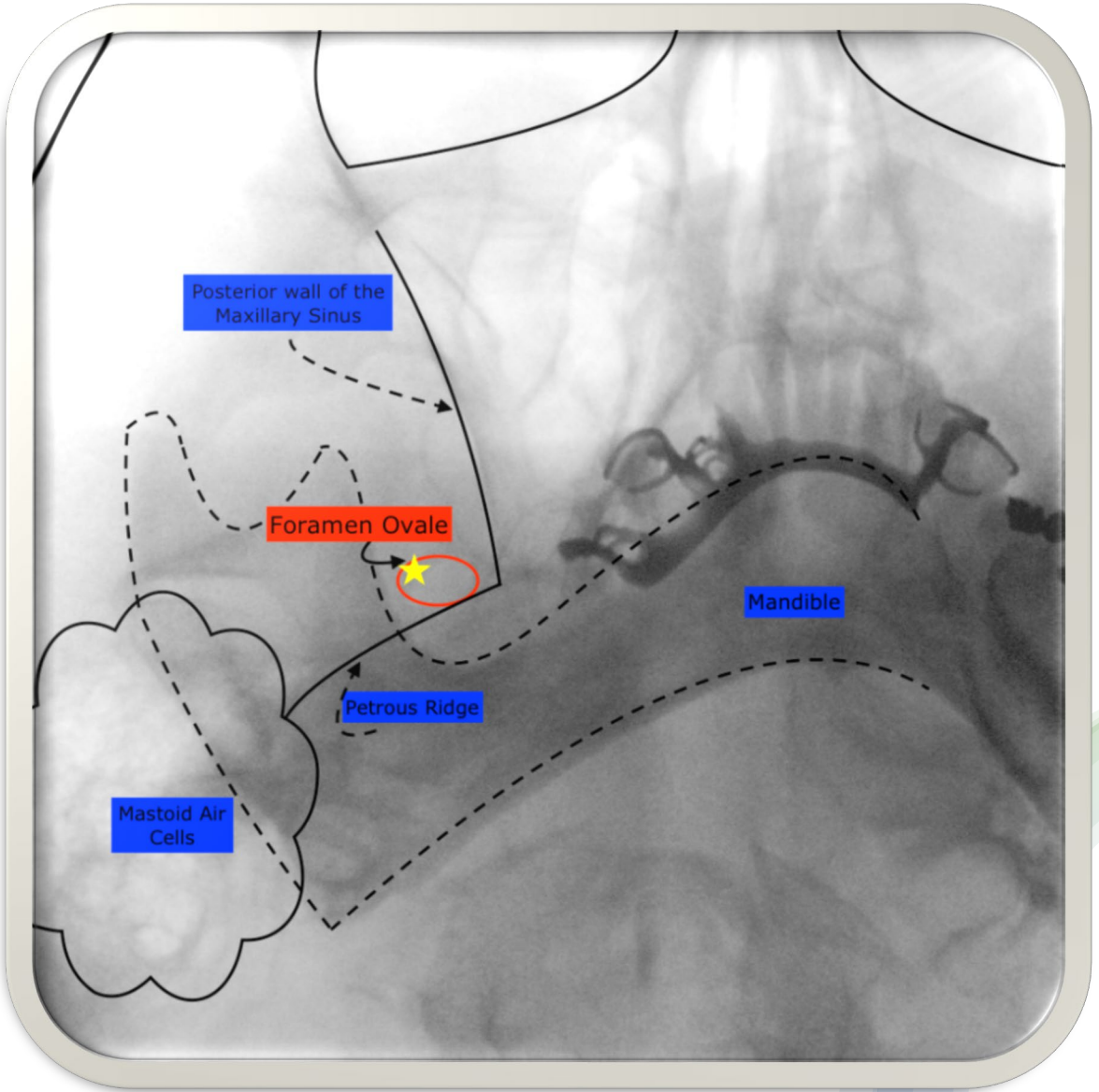

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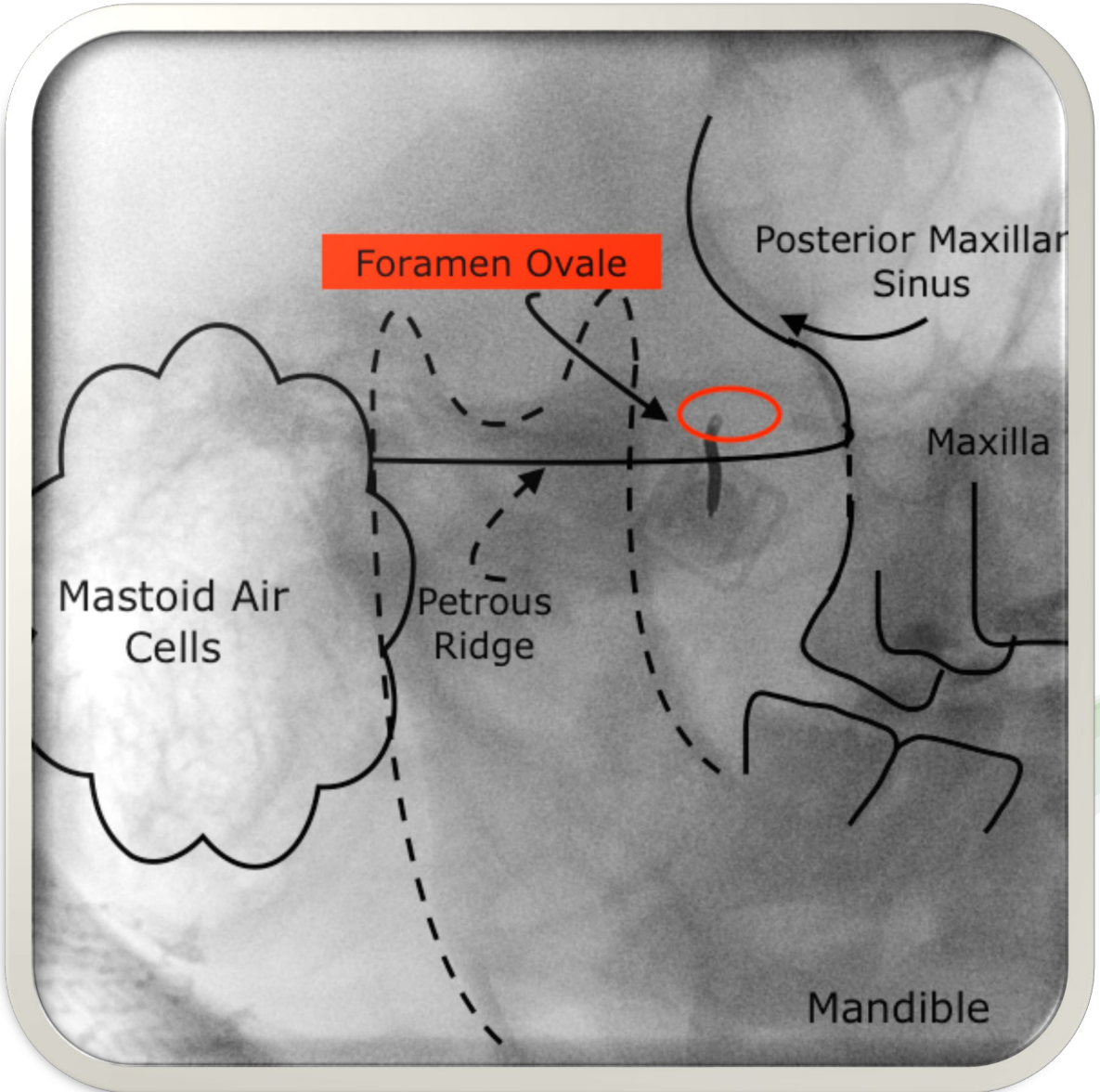

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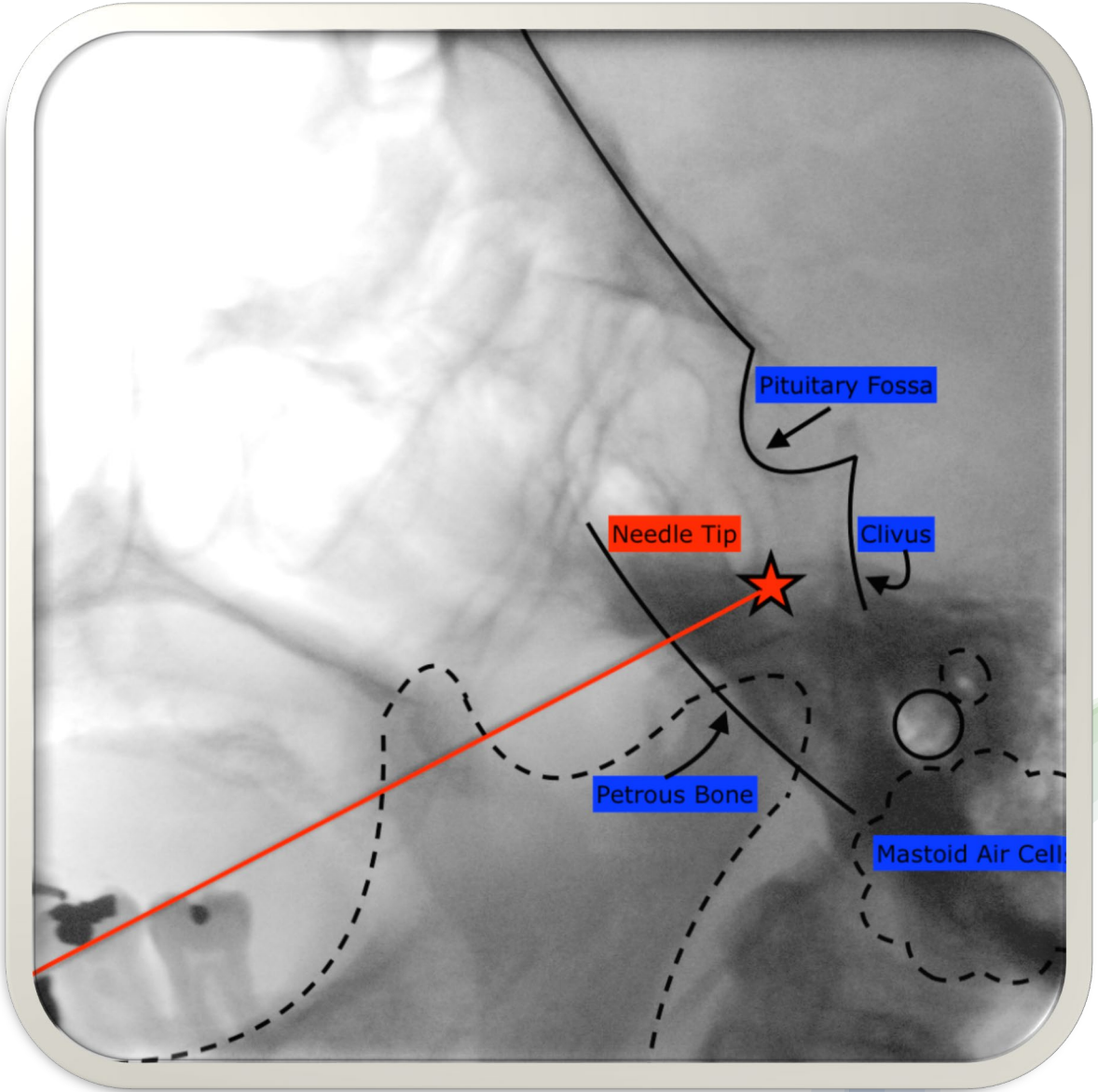
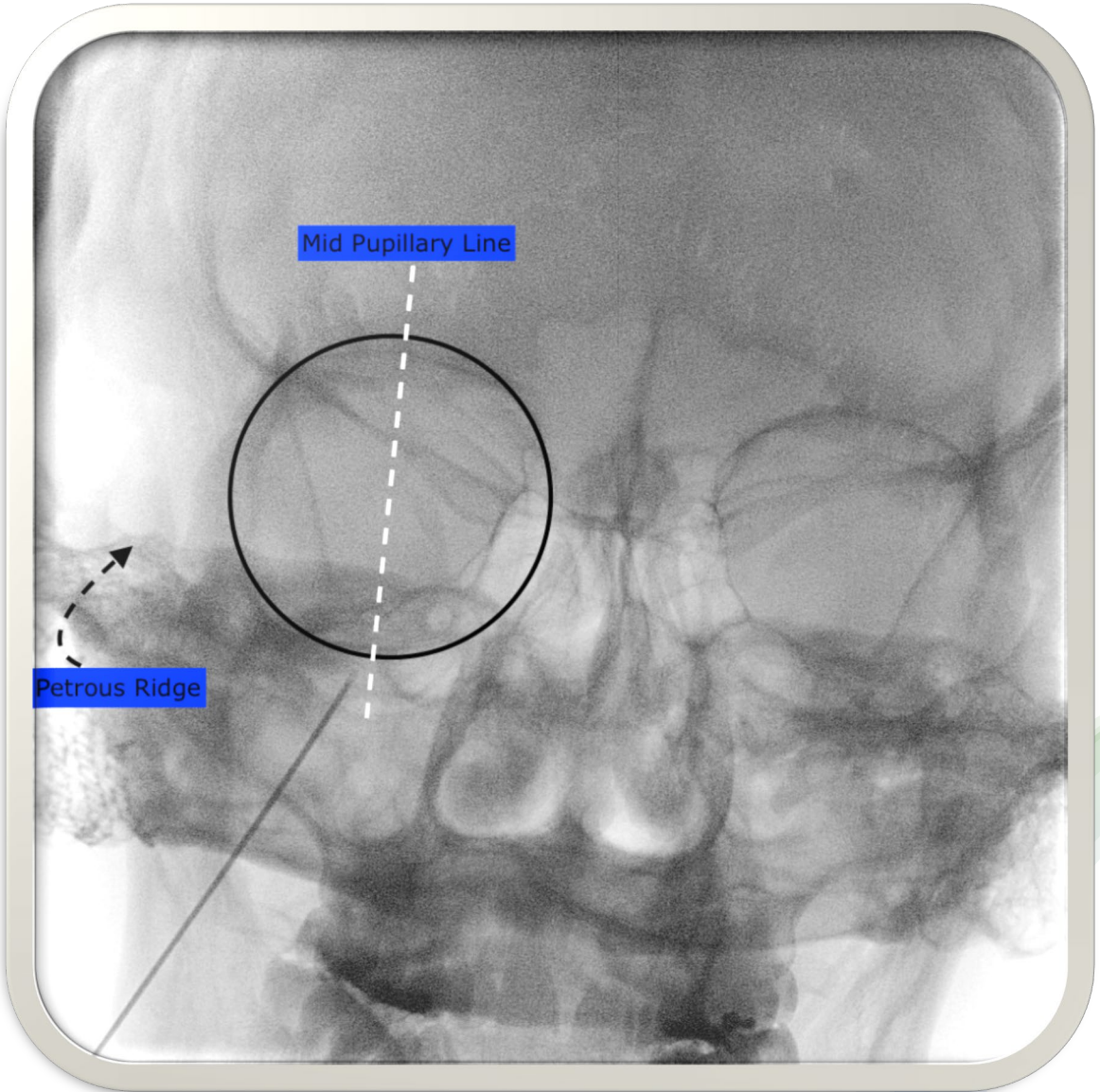


Fluoroscopic Technique for Trigeminal Block

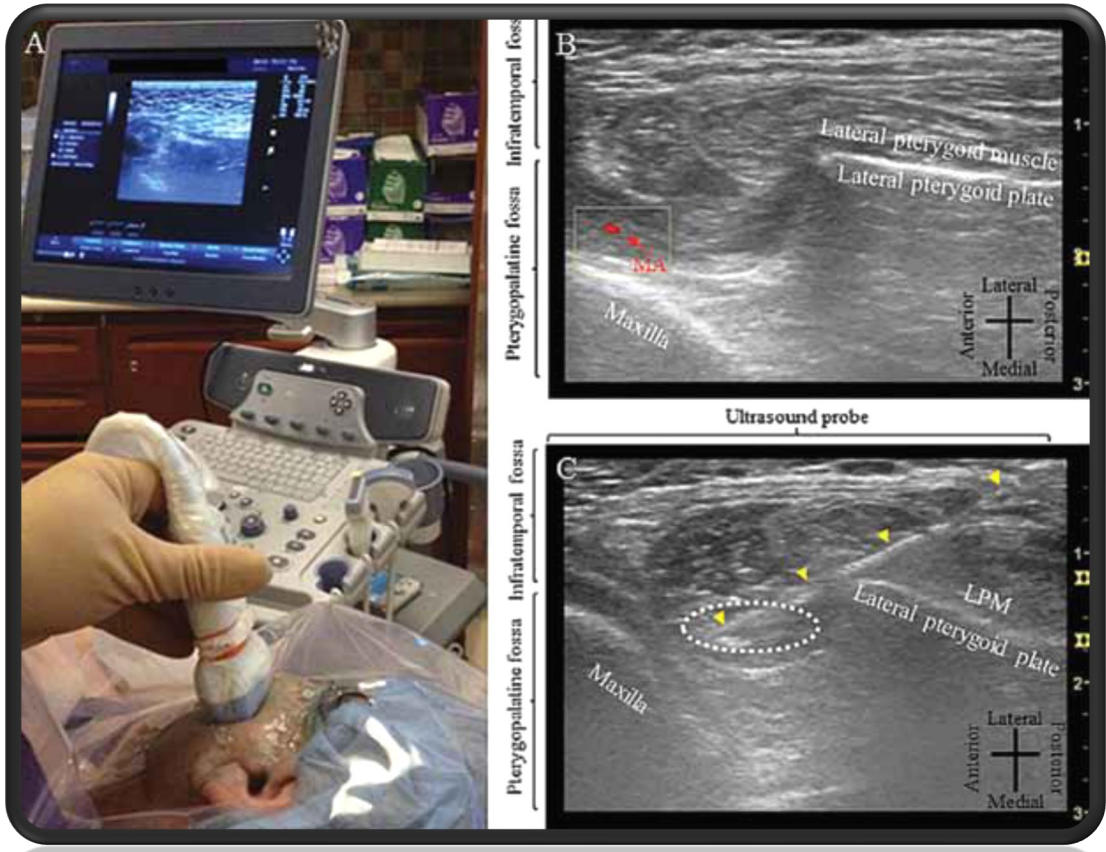


Ultrasound Guided Trigeminal Nerve Block

- Probe:
  - Below the zgyomatic bone
  - Superior to the mandibular notch
  - Anterior to the mandibular condyle

- Insert needle in-plane and advanced from a lateral to medial and posterior to anterior direction towards the pterygopalatine fossa.

- The injectate was deposited deep to the lateral pterygoid muscle and plate.



Approaches to SPG Block

Infrazygomatic Approaches

- Anterior Approach

- Inferior to the zygomatic arch, anterior to the mandible, between the mandibular ramus and the posterior border of the zygomatic bone.
- No need to walk the needle off the lateral pterygoid plate (which is usually very painful).
- Easier to steer the needle (cephalad-caudad or anterior-posterior)

- Coronoid Approach

- Needle entry through the coronoid notch.
- Needle is advanced to the lateral pterygoid plate first and then walked off the bone anteriorly.
- Hard to manipulate the needle once it is inside the fossa.

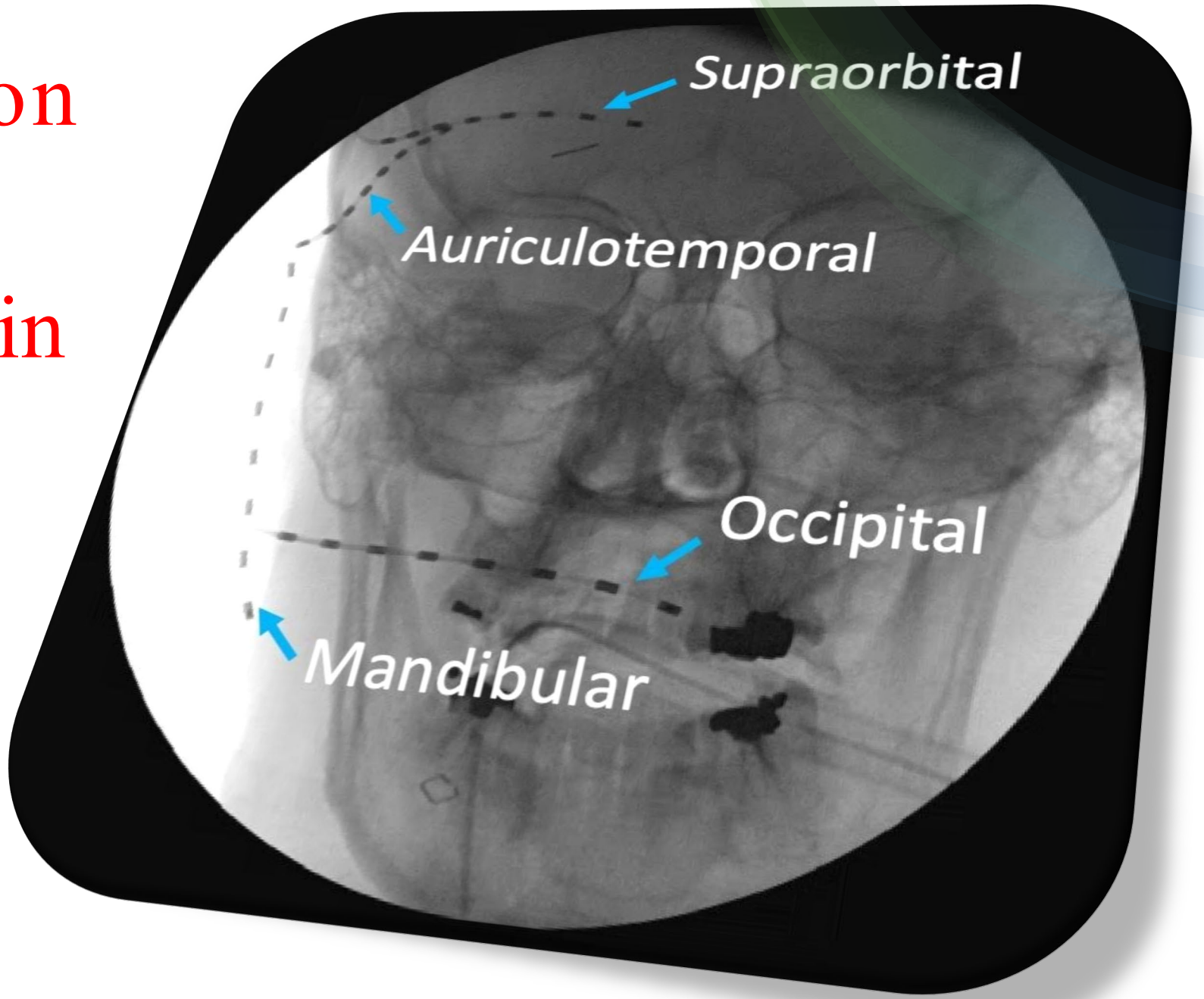
Anterior vs Coronoid Approach

Anterior View

When blocks fail, consider ablations

- Radiofrequency ablations
  - Continuous
  - Pulsed
  - Predominately Trigeminal and Occipital, but others have been described (sphenopalatine)
- Chemical ablations
  - Glycerol
- Stereotactic Radiosurgery (Gamma Knife)
- Caution: May cause anesthesia dolorosa

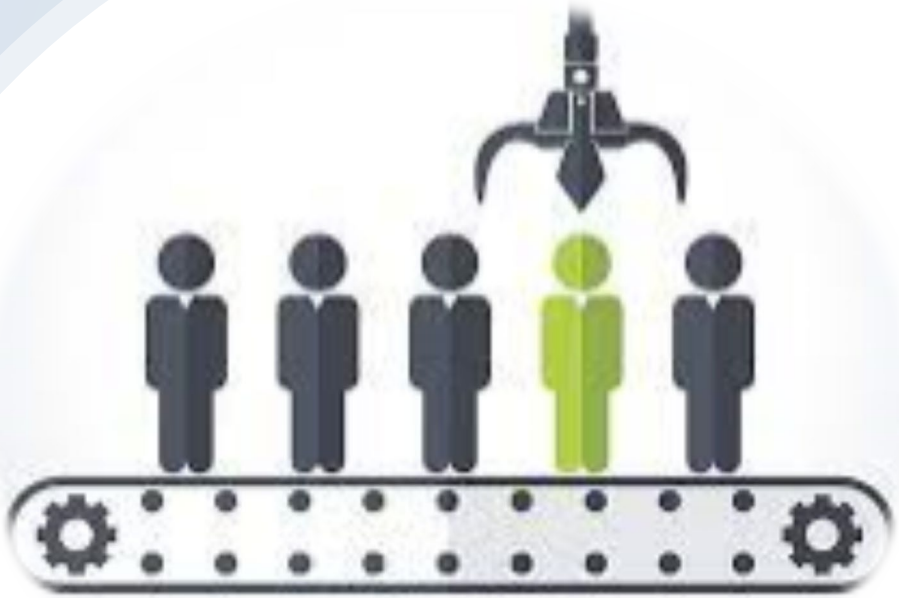
Neuromodulation for Craniofacial Pain



Patient Selection!

Local anesthetic blocks

- Does not necessarily predict success.
- Used for confirmation of the targeted nerves.



Complications

- Analysis of 157 patients:
  - Persistent pain or numbness at the IPG or lead site (17.8%)
  - Lead migrations (16.6%)
  - Undesirable or unintended changes in stimulation (10.8%)
  - Battery failure or passivation (7.0%)
  - Infection (6.4%)
- Other complications:
  - Lead fractures
  - Skin erosions
  - Allergic reactions
  - Normal battery depletions

ELSEVIER

Neuromodulation: Technology at the Neural Interface

Volume 18, Issue 4, June 2015, Pages 305-312

Clinical Research

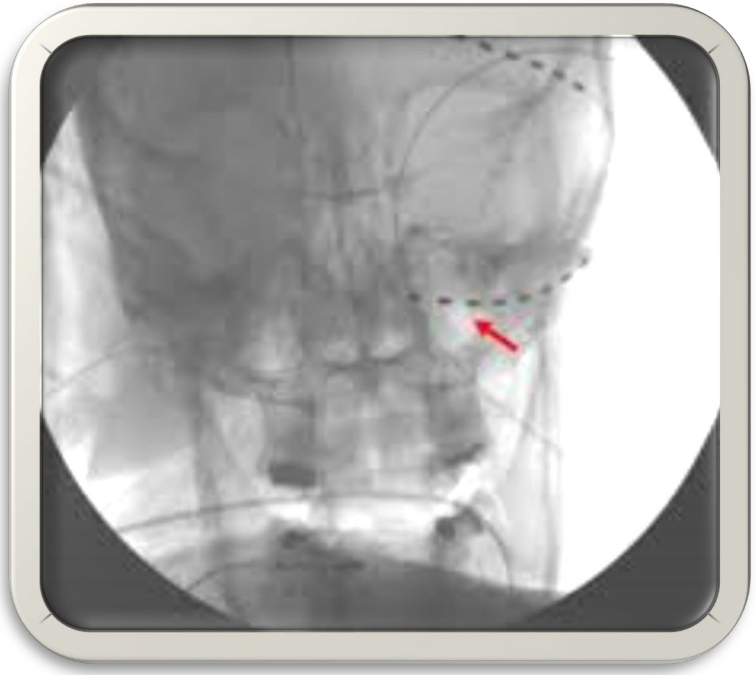
Analysis of Adverse Events in the Management of Chronic Migraine by Peripheral Nerve Stimulation

Ashwini Sharan MD *, Billy Huh MD, PhD †, Samer Narouze MD, PhD ‡, Terrence Trentman MD §, Alon Mogilner MD, PhD ¶, Julien Vaisman MD **, Joe Ordia MD ††, Timothy Deer MD ††, Lalit Venkatesan PhD ‡‡, Konstantin Slavin MD §§

Contraindications

- Medical allergies
- Local infections
- Coagulopathies!
- Immunocompromised status
- Comorbidities like uncontrolled DM
- Patient refusal

Trigeminal Nerve Stimulation



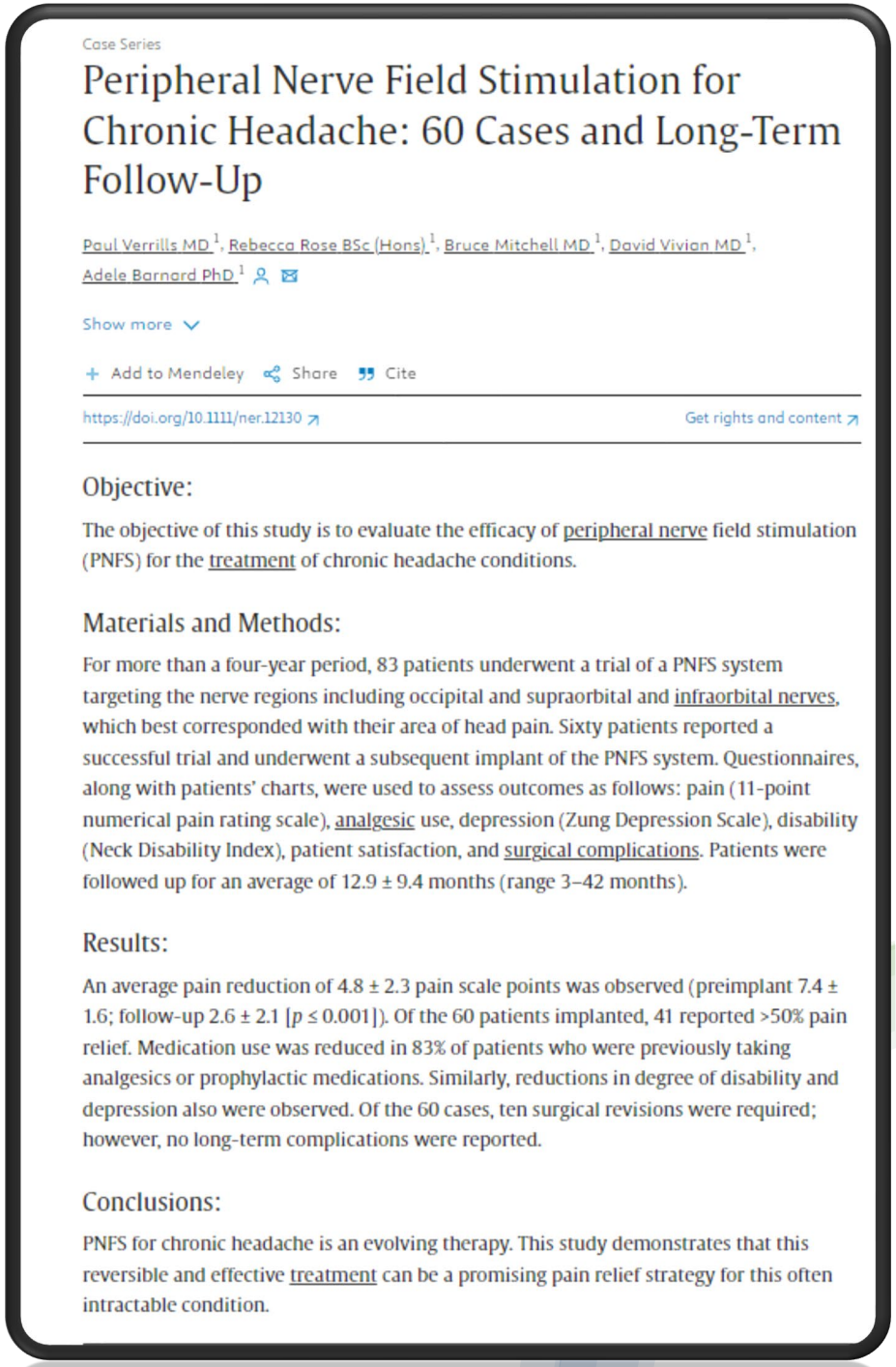
- Good targets for PNS:
  - Ophthalmic
  - Maxillary
  - Mandibular
- More distal branches:
  - Supraorbital
  - Infraorbital
  - Auriculotemporal

Peripheral Nerve Field Stimulation

- Targets subcutaneous small fiber nerve endings.

- Not necessarily correlating with the distribution of a single “named” nerve.
- Verrills et al reported 60 patients with chronic daily headache, occipital neuralgia or CM:

  - 50 targeting the occipital
  - 3 the supraorbital and infraorbital
  - 7 were a combination of these 3 nerves
  - Average reduction in pain scores of 4.8
  - 41 out of the 60 patients with at least 50% reduction in pain.
- Prospective trials are lacking
- Promising for debilitating refractory facial pain



Case Series

Peripheral Nerve Field Stimulation for Chronic Headache: 60 Cases and Long-Term Follow-Up

Paul Verrills MD[1], Rebecca Rose BSc (Hons)[1], Bruce Mitchell MD[1], David Vivian MD[1], Adele Barnard PhD[1]

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Objective:

The objective of this study is to evaluate the efficacy of peripheral nerve field stimulation (PNFS) for the treatment of chronic headache conditions.

Materials and Methods:

For more than a four-year period, 83 patients underwent a trial of a PNFS system targeting the nerve regions including occipital and supraorbital and infraorbital nerves, which best corresponded with their area of head pain. Sixty patients reported a successful trial and underwent a subsequent implant of the PNFS system. Questionnaires, along with patients' charts, were used to assess outcomes as follows: pain (11-point numerical pain rating scale), analgesic use, depression (Zung Depression Scale), disability (Neck Disability Index), patient satisfaction, and surgical complications. Patients were followed up for an average of 12.9 ± 9.4 months (range 3–42 months).

Results:

An average pain reduction of 4.8 ± 2.3 pain scale points was observed (preimplant 7.4 ± 1.6; follow-up 2.6 ± 2.1 [$p \leq 0.001$]). Of the 60 patients implanted, 41 reported >50% pain relief. Medication use was reduced in 83% of patients who were previously taking analgesics or prophylactic medications. Similarly, reductions in degree of disability and depression also were observed. Of the 60 cases, ten surgical revisions were required; however, no long-term complications were reported.

Conclusions:

PNFS for chronic headache is an evolving therapy. This study demonstrates that this reversible and effective treatment can be a promising pain relief strategy for this often intractable condition.

Trigeminal Branch Peripheral Nerve Stimulation

- Ellis et al reported on 35 patients who underwent trigeminal branch lead-based stimulation.
- 17 responded to the trial stimulation.
- 15 of the responders had permanent hardware implantation.
- Average 15 months of follow-up.
- 11/ 15 patients reported improved pain

JNS

CLINICAL ARTICLE

J Neurosurg 123:283–288, 2015

Trigeminal branch stimulation for the treatment of intractable craniofacial pain

Jason A. Ellis, MD, Juan C. Mejia Munne, BS, and Christopher J. Winfree, MD

Department of Neurological Surgery, Columbia University Medical Center, New York, New York

OBJECT Trigeminal branch stimulation has been used in the treatment of craniofacial pain syndromes. The risks and benefits of such an approach have not been clearly delineated in large studies, however. The authors report their experience in treating craniofacial pain with trigeminal branch stimulation and share the lessons they have learned after 93 consecutive electrode placements.

METHODS A retrospective review of all patients who underwent trigeminal branch electrode placement by the senior author (C.J.W.) for the treatment of craniofacial pain was performed.

RESULTS Thirty-five patients underwent implantation of a total of 93 trial and permanent electrodes between 2006 and 2013. Fifteen patients who experienced improved pain control after trial stimulation underwent implantation of permanent stimulators and were followed for an average of 15 months. At last follow-up 73% of patients had improvement in pain control, whereas only 27% of patients had no pain improvement. No serious complications were seen during the course of this study.

CONCLUSIONS Trigeminal branch stimulation is a safe and effective treatment for a subset of patients with intractable craniofacial pain.

http://thejns.org/doi/abs/10.3171/2014.12.JNS14645

KEY WORDS headache; neuromodulation; neuropathic pain; peripheral nerve stimulation; trigeminal nerve

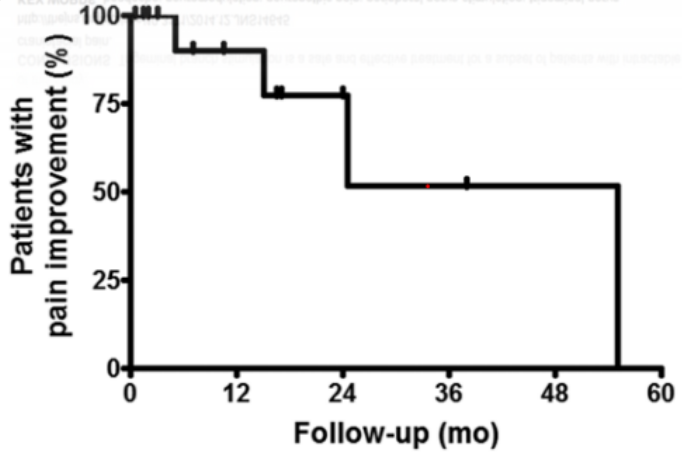


FIG. 3. Kaplan-Meier curve showing pain improvement after trigeminal branch stimulation. A total of 15 patients underwent implantation of permanent stimulators. At 12, 24, and 36 months postoperatively, the survival analysis predicts continued benefit in 90%, 77%, and 51% of patients, respectively.

Supraorbital and Supratrochlear Stimulation

- Amin et al published a case series of supraorbital PNS in 2008:
  - Opioid consumption and headache scores were monitored preoperatively and at timed intervals for 30 weeks.
  - Headache scores decreased.
  - Opioid consumption was reduced in half.
  - Beneficial accomplishments maintained up to 30 weeks.

Peripheral nerve stimulator for the treatment of supraorbital neuralgia: a retrospective case series

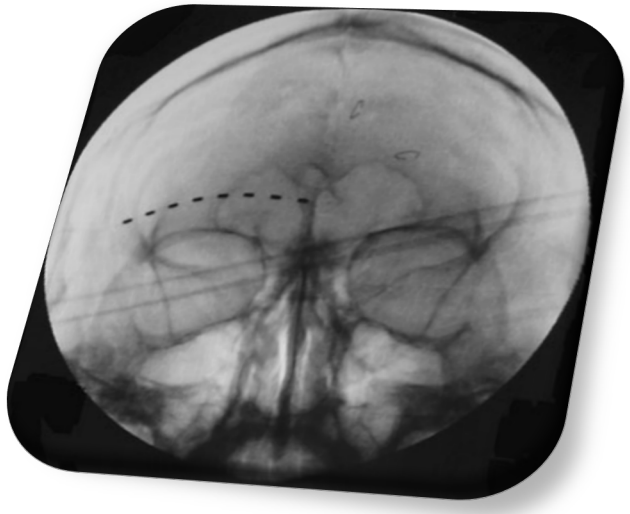
S Amin, A Buvanendran, K-S Park, JS Kroin & M Moric
Department of Anesthesiology, Rush Medical College at Rush University Medical Center, Chicago, IL, USA

Cephalalgia

Amin S, Buvanendran A, Park K-S, Kroin JS & Moric M. Peripheral nerve stimulator for the treatment of supraorbital neuralgia: a retrospective case series. Cephalalgia 2008; 28:355–359. London. ISSN 0333-1024

Peripheral nerve blocks of the supraorbital, supratrochlear or occipital nerve have been utilized for the relief of headaches, although relief may be short-lasting. The purpose of this study was to evaluate the efficacy of supraorbital nerve stimulation for treatment of intractable supraorbital neuralgia. Patients presenting to the pain clinic with refractory frontal headaches who responded to a diagnostic supraorbital nerve block were selected for this case series. Patients underwent a trial of supraorbital nerve stimulation, and efficacy was assessed after 5–7 days ($n = 16$). From the trial, 10 patients consented to undergo permanent implantation of the stimulator. Opioid consumption and headache scores were monitored preoperatively and at timed intervals for 30 weeks. Headache scores decreased, and opioid consumption was reduced in half, and these beneficial accomplishments were maintained up to 30 weeks after implantation. In selected patients, supraorbital nerve stimulation for the treatment of chronic frontal headaches appears to be efficacious. ☐*Peripheral nerve stimulator, refractory headache, supraorbital neuralgia*

Asokumar Buvanendran, MD, Department of Anesthesiology, 1653 W. Congress Parkway, Rush University Medical Center, Chicago, IL 60612, USA. Tel. +1 312 942 3685, fax +1 312 942 8858, e-mail asokumar@aol.com Received 25 June 2007, accepted 9 November 2007



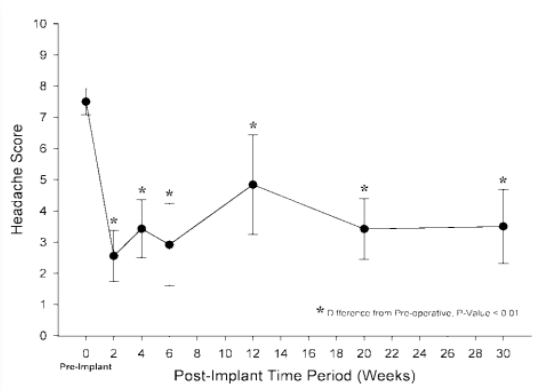


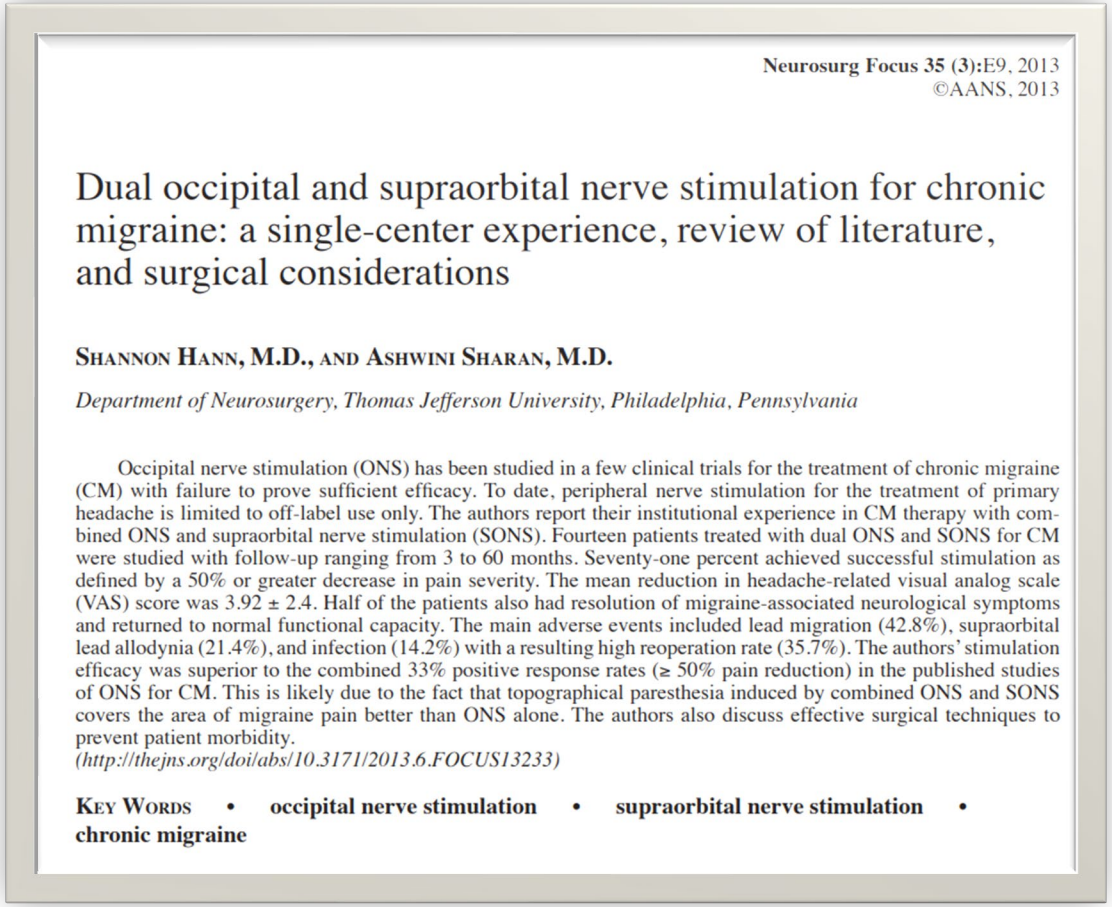
Figure 1 Headache score over postimplantation time of the permanent supraorbital nerve stimulator in 10 patients followed for 30 weeks. Data shown as mean ± S.E.

Dual Occipital and Supraorbital Stimulation

- Hann et al reported a case series
- 14 patients who underwent dual supraorbital and ONS for CMs.

- Majority of patients reported:
  - Marked improvement in headache severity and frequency (71%)
  - Resolution of associated neurologic symptoms (50%)
  - Resumption of a normal functional lifestyle (50%).

- Complications included:
  - Lead migration (42.8%)
  - Lead site allodynia (21.4%)
  - Infection secondary to exposed hardware (14.2%)
  - Five patients (35.7%) needed one or more reoperations due to infection, incomplete coverage from stimulation, or near electrode exposure.



Neurosurg Focus 35 (3):E9, 2013

Dual occipital and supraorbital nerve stimulation for chronic migraine: a single-center experience, review of literature, and surgical considerations

SHANNON HANN, M.D., AND ASHWINI SHARAN, M.D.

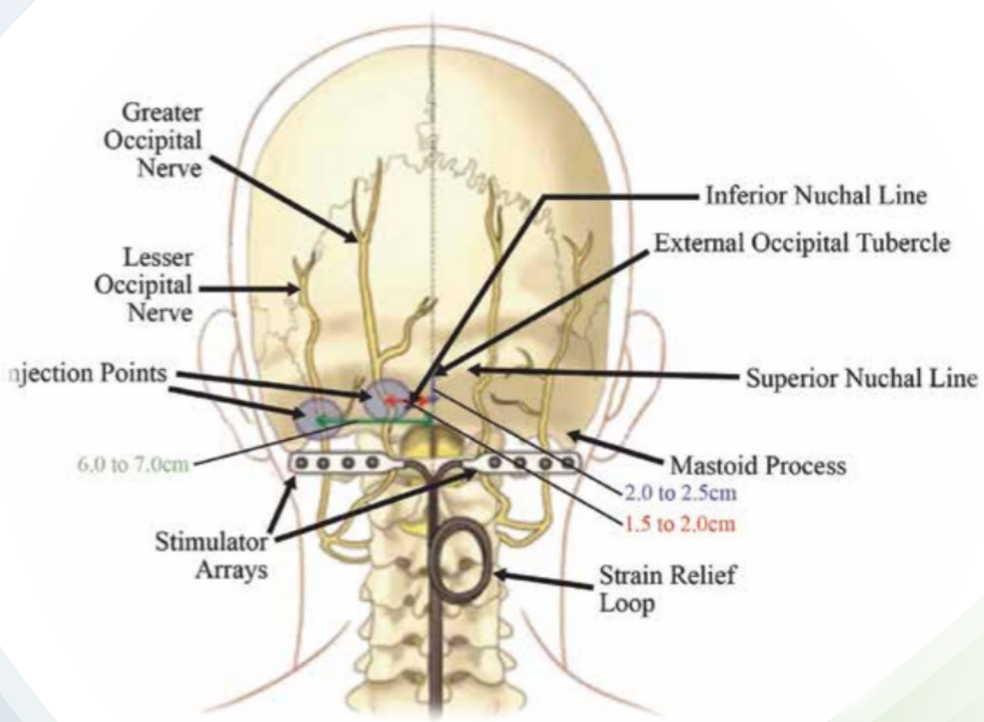
Department of Neurosurgery, Thomas Jefferson University, Philadelphia, Pennsylvania

Occipital nerve stimulation (ONS) has been studied in a few clinical trials for the treatment of chronic migraine (CM) with failure to prove sufficient efficacy. To date, peripheral nerve stimulation for the treatment of primary headache is limited to off-label use only. The authors report their institutional experience in CM therapy with combined ONS and supraorbital nerve stimulation (SONS). Fourteen patients treated with dual ONS and SONS for CM were studied with follow-up ranging from 3 to 60 months. Seventy-one percent achieved successful stimulation as defined by a 50% or greater decrease in pain severity. The mean reduction in headache-related visual analog scale (VAS) score was 3.92 ± 2.4. Half of the patients also had resolution of migraine-associated neurological symptoms and returned to normal functional capacity. The main adverse events included lead migration (42.8%), supraorbital lead allodynia (21.4%), and infection (14.2%) with a resulting high reoperation rate (35.7%). The authors' stimulation efficacy was superior to the combined 33% positive response rates (≥ 50% pain reduction) in the published studies of ONS for CM. This is likely due to the fact that topographical paresthesia induced by combined ONS and SONS covers the area of migraine pain better than ONS alone. The authors also discuss effective surgical techniques to prevent patient morbidity.
(http://thejns.org/doi/abs/10.3171/2013.6.FOCUS13233)

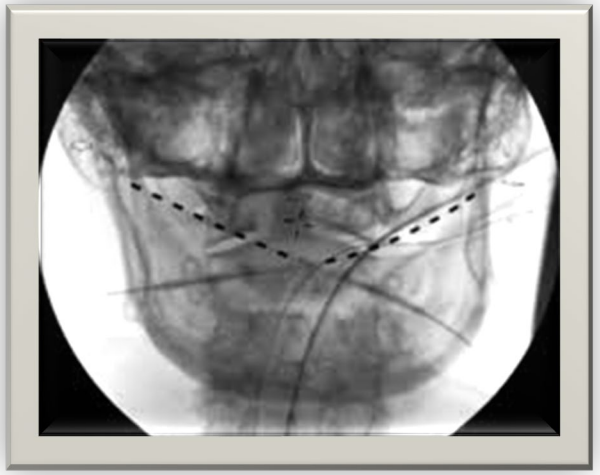
KEY WORDS • **occipital nerve stimulation** • **supraorbital nerve stimulation** • **chronic migraine**

Occipital Nerve Stimulation

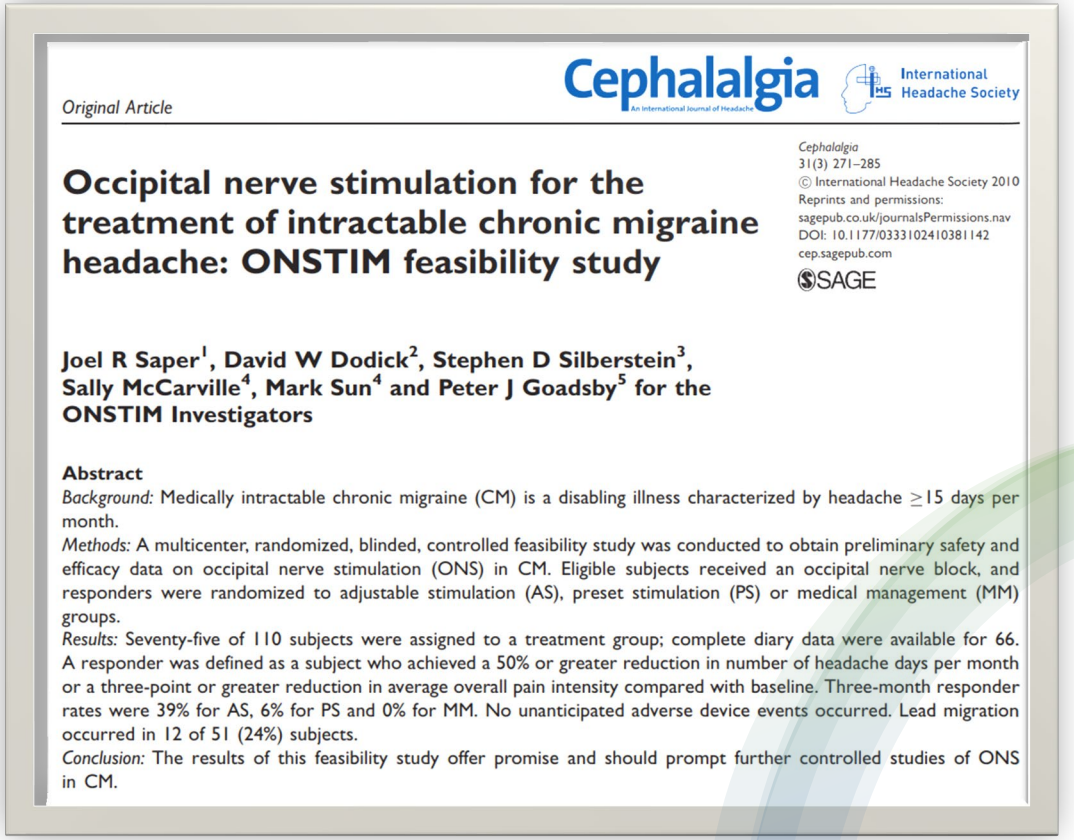
- One of the most studied targets for head and neck.
- Modulation of peripheral and central nociceptive inputs.
- Regional cerebral blood flow has also been shown to increase after ONS in migraineurs.
- Encouraging finding in the treatment of neurovascular headache.



Occipital Nerve Stimulation



- The ONSTIM trial was a prospective, multicenter, single blinded, feasibility RCT using ONS for chronic intractable migraine.
- Patients were randomized into:
  - Adjustable stimulation (n = 28)
  - Preset stimulation (n = 16)
  - Medical management (n = 17) groups
- At 3 months after implantation:
  - 39% of patients in the adjustable stimulation group showed a reduction in headache days per month or a > 3point reduction in pain scores.
- 24% of implanted patients were noted to have lead migration in the study.



Original Article

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SAGE

Occipital nerve stimulation for the treatment of intractable chronic migraine headache: ONSTIM feasibility study

Joel R Saper[1], David W Dodick[2], Stephen D Silberstein[3], Sally McCarville[4], Mark Sun[4] and Peter J Goadsby[5] for the ONSTIM Investigators

Abstract

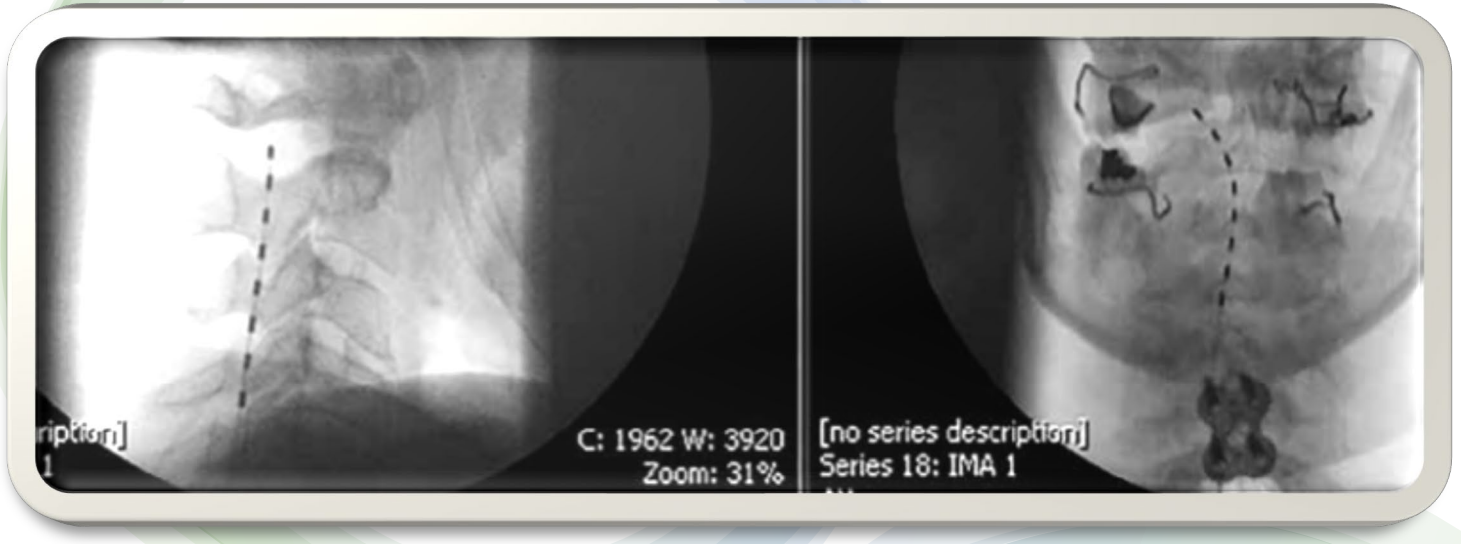
Background: Medically intractable chronic migraine (CM) is a disabling illness characterized by headache ≥15 days per month.

Methods: A multicenter, randomized, blinded, controlled feasibility study was conducted to obtain preliminary safety and efficacy data on occipital nerve stimulation (ONS) in CM. Eligible subjects received an occipital nerve block, and responders were randomized to adjustable stimulation (AS), preset stimulation (PS) or medical management (MM) groups.

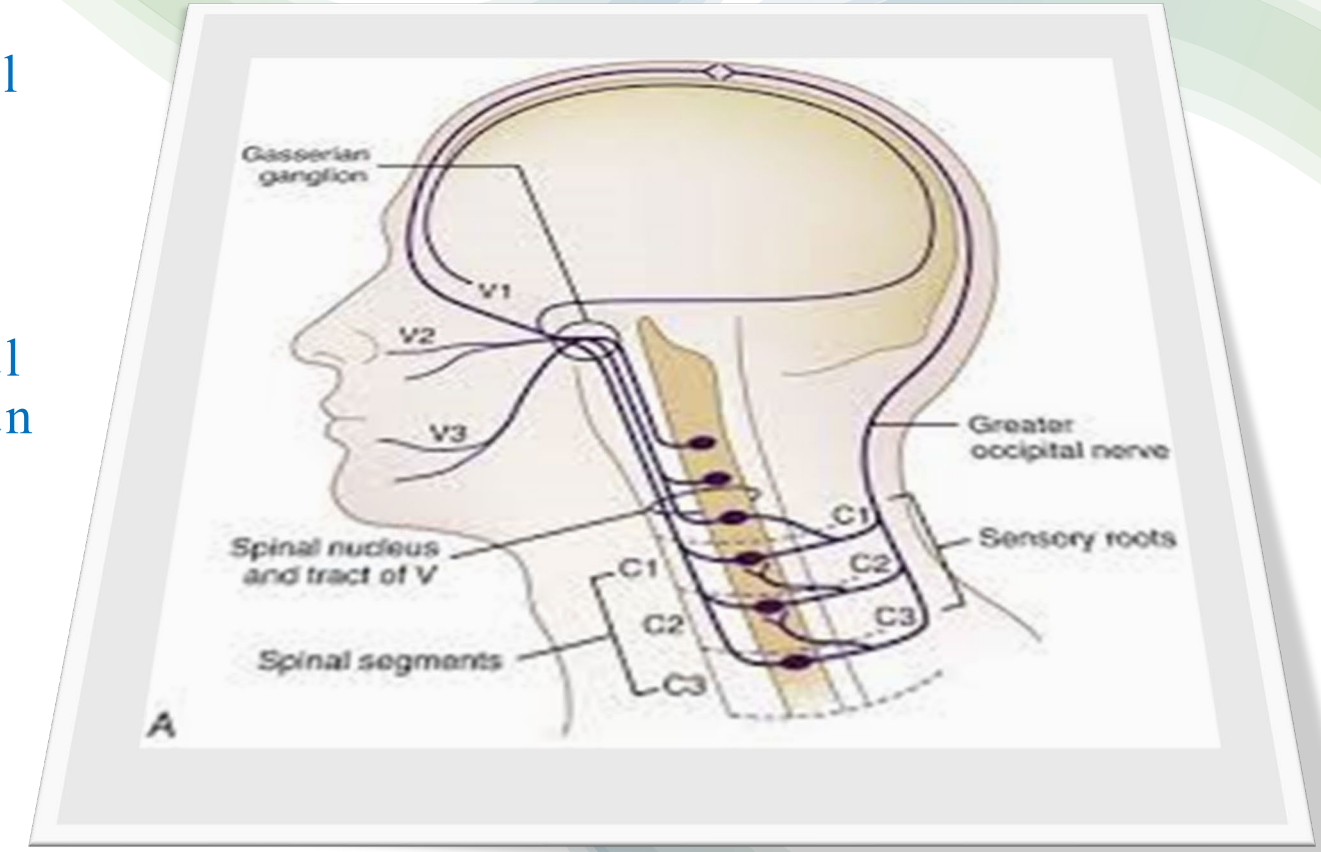
Results: Seventy-five of 110 subjects were assigned to a treatment group; complete diary data were available for 66. A responder was defined as a subject who achieved a 50% or greater reduction in number of headache days per month or a three-point or greater reduction in average overall pain intensity compared with baseline. Three-month responder rates were 39% for AS, 6% for PS and 0% for MM. No unanticipated adverse device events occurred. Lead migration occurred in 12 of 51 (24%) subjects.

Conclusion: The results of this feasibility study offer promise and should prompt further controlled studies of ONS in CM.

High Cervical Spinal Cord Stimulation



- Dorsal column stimulation in the high cervical region has been used to treat headache and facial pain.
- Neurons projecting from the trigeminocervical complex to the trigeminal nucleus caudalis can be stimulated at C2-C3.
- Potentially covering both facial and occipital pain.

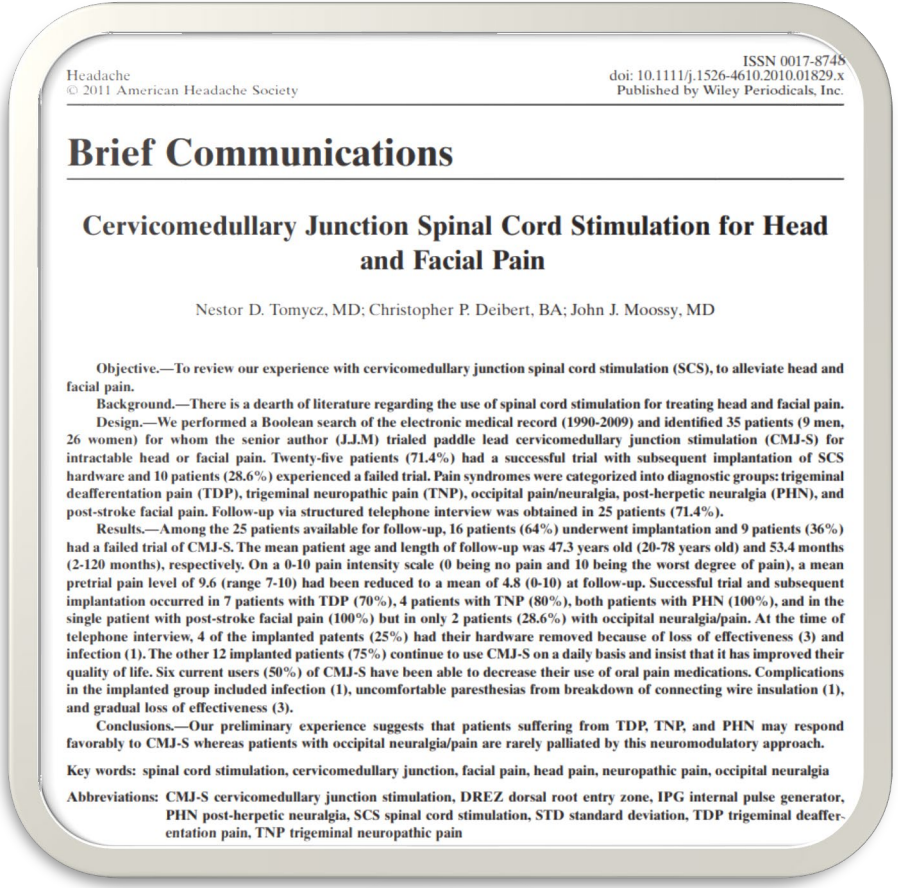


Spinal Cord Stimulation

- Stimulation of the cervicomedullary junction (CMJ) was explored for head and facial pain.
- A retrospective case series 25 patient
- 64% implanted 36% failed trial.

- Pain level 9.6 (range 7-10) reduced to a mean of 4.8 (0-10)
- Successful trial and subsequent implantation:
  - 7 with Trigeminal deafferentation pain (70%)
  - 4 with trigeminal neuropathic pain (80%)
- 25% explant 2/ 2 loss of effectiveness (3) and infection (1)
- 75% continue to use CMJ-S
- 50% decreased use of oral pain medications

- CMJ stimulation may have promise in refractory post-traumatic TN and post-herpetic neuralgia.



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Brief Communications

Cervicomedullary Junction Spinal Cord Stimulation for Head and Facial Pain

Nestor D. Tomycz, MD; Christopher P. Deibert, BA; John J. Moossy, MD

Objective.—To review our experience with cervicomedullary junction spinal cord stimulation (SCS), to alleviate head and facial pain.

Background.—There is a dearth of literature regarding the use of spinal cord stimulation for treating head and facial pain.

Design.—We performed a Boolean search of the electronic medical record (1990-2009) and identified 35 patients (9 men, 26 women) for whom the senior author (J.J.M) trialed paddle lead cervicomedullary junction stimulation (CMJ-S) for intractable head or facial pain. Twenty-five patients (71.4%) had a successful trial with subsequent implantation of SCS hardware and 10 patients (28.6%) experienced a failed trial. Pain syndromes were categorized into diagnostic groups: trigeminal deafferentation pain (TDP), trigeminal neuropathic pain (TNP), occipital pain/neuralgia, post-herpetic neuralgia (PHN), and post-stroke facial pain. Follow-up via structured telephone interview was obtained in 25 patients (71.4%).

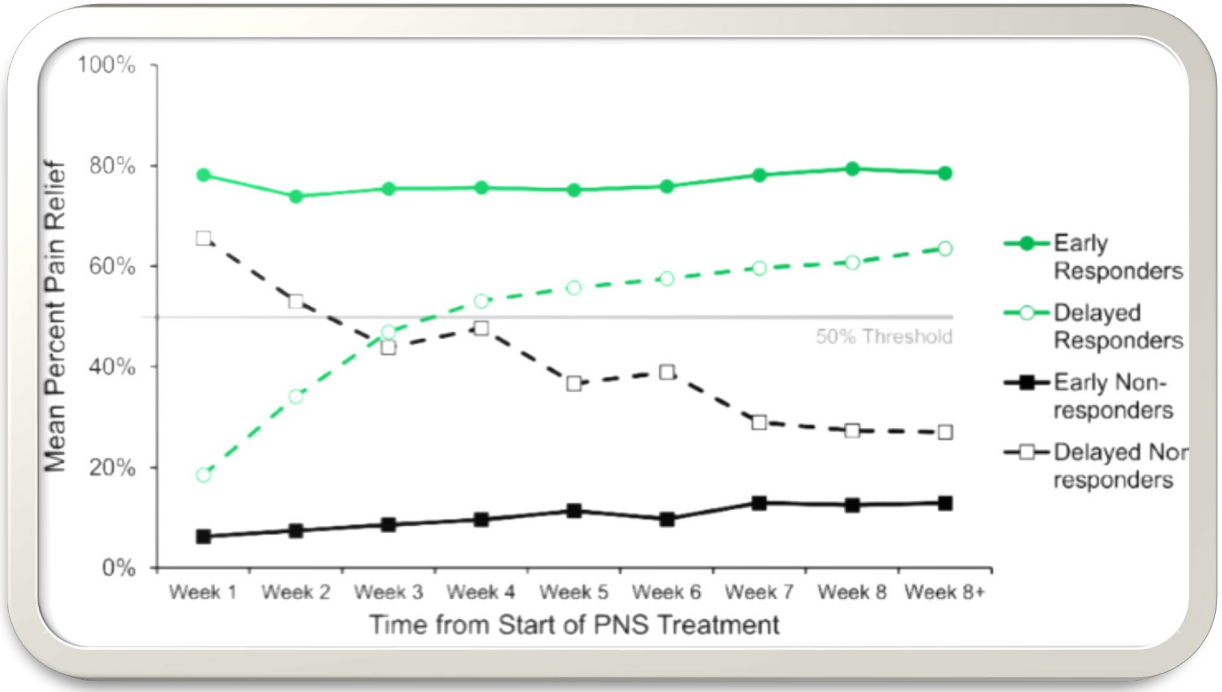
Results.—Among the 25 patients available for follow-up, 16 patients (64%) underwent implantation and 9 patients (36%) had a failed trial of CMJ-S. The mean patient age and length of follow-up was 47.3 years old (20-78 years old) and 53.4 months (2-120 months), respectively. On a 0-10 pain intensity scale (0 being no pain and 10 being the worst degree of pain), a mean pretrial pain level of 9.6 (range 7-10) had been reduced to a mean of 4.8 (0-10) at follow-up. Successful trial and subsequent implantation occurred in 7 patients with TDP (70%), 4 patients with TNP (80%), both patients with PHN (100%), and in the single patient with post-stroke facial pain (100%) but in only 2 patients (28.6%) with occipital neuralgia/pain. At the time of telephone interview, 4 of the implanted patents (25%) had their hardware removed because of loss of effectiveness (3) and infection (1). The other 12 implanted patients (75%) continue to use CMJ-S on a daily basis and insist that it has improved their quality of life. Six current users (50%) of CMJ-S have been able to decrease their use of oral pain medications. Complications in the implanted group included infection (1), uncomfortable paresthesias from breakdown of connecting wire insulation (1), and gradual loss of effectiveness (3).

Conclusions.—Our preliminary experience suggests that patients suffering from TDP, TNP, and PHN may respond favorably to CMJ-S whereas patients with occipital neuralgia/pain are rarely palliated by this neuromodulatory approach.

Key words: spinal cord stimulation, cervicomedullary junction, facial pain, head pain, neuropathic pain, occipital neuralgia

Abbreviations: CMJ-S cervicomedullary junction stimulation, DREZ dorsal root entry zone, IPG internal pulse generator, PHN post-herpetic neuralgia, SCS spinal cord stimulation, STD standard deviation, TDP trigeminal deafferentation pain, TNP trigeminal neuropathic pain

Temporary vs Permanent



- Temporary Device:
  - ❑Long trial benefit
  - ❑Possible long washout period
- Permanent Device:
  - ❑MRI compatibility!!
  - ❑Bigger commitment

Results: Implantation Sites

Case 11: TN, Classic

Case 16 TN, Neuropathy

Case 15 TN, Idiopathic

Conclusions

- Interventional treatments can be utilized as an effective treatment for craniofacial pain.
- Limited literature for level one evidence!
- Novel technologies will pave the way for novel, more effective, and less invasive therapies

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Questions?