Nerves Block in Headache

Jasem Al-Hashel MD, FRCPC, FAHS

Consultant Neurologist, Ibn Sina Hospital

President, Kuwait Neurological Society

Associate professor, Faculty of Medicine

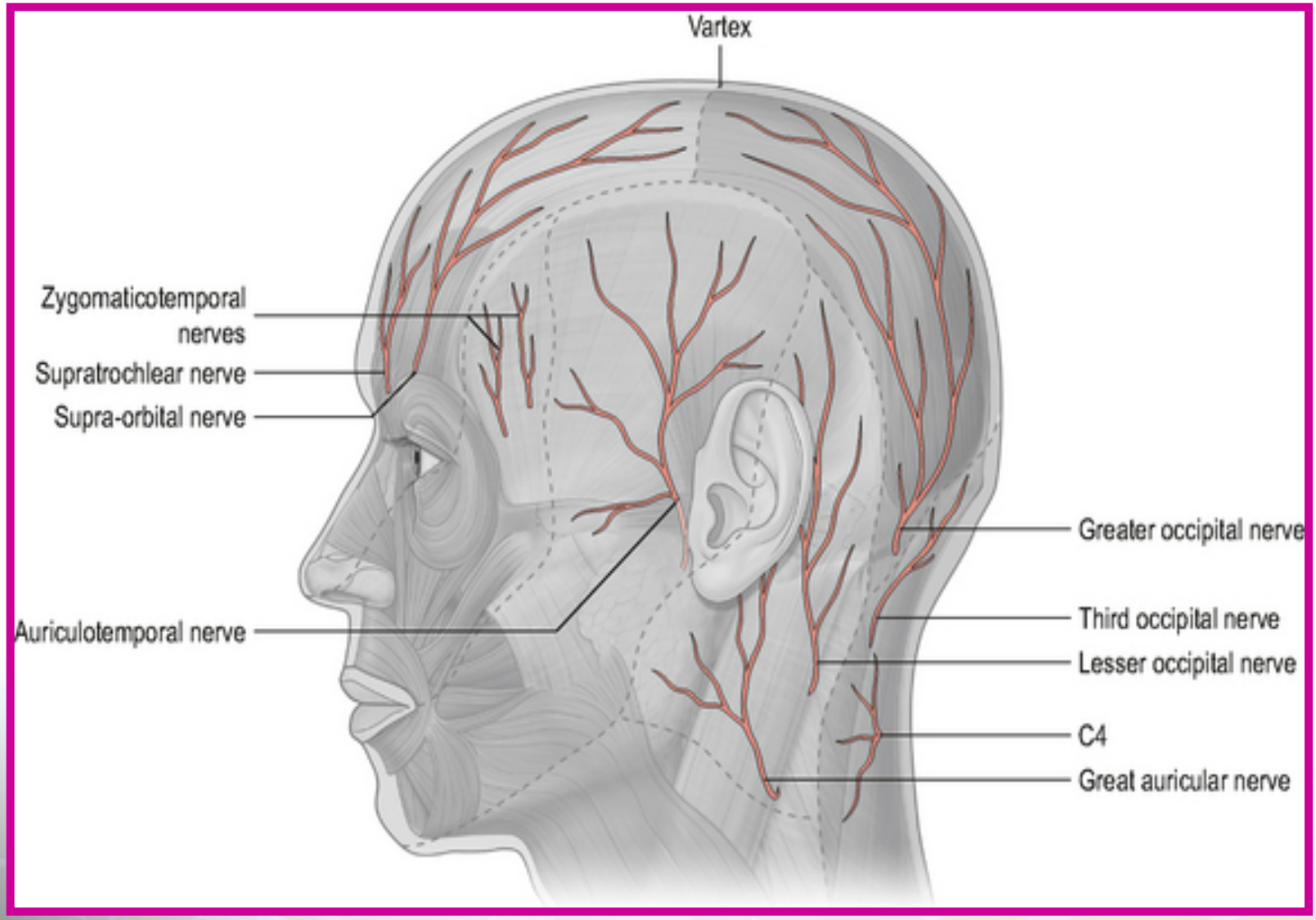
Chair of the Faculty of Neurology

Disclosure

- None

Overview

- **Greater occipital nerve block:**
- Anatomy
- Rational in the treatment of headache and mechanism of action
- Effect on cutaneous allodynia
- Technical aspects
- The (questionable) role of corticosteroids
- Clinical studies
- **Other nerve blocks:**
  Auriculotemporal nerve, Supraorbital nerve,
  Supratrochlear nerve and Infraorbital nerve



Headache
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ISSN 0017-8748
doi: 10.1111/j.1526-4610.2010.01676.x
Published by Wiley Periodicals, Inc.

Research Submission

Patterns of Use of Peripheral Nerve Blocks and Trigger Point Injections Among Headache Practitioners in the USA: Results of the American Headache Society Interventional Procedure Survey (AHS-IPS)

Andrew Blumenfeld, MD; Avi Ashkenazi, MD; Brian Grosberg, MD; Uri Napchan, MD; Samer Narouze, MD; MSc, Bob Nett, MD; Traci DePalma, MD; Barbara Rosenthal, MD; Stewart Tepper, MD; Richard B. Lipton, MD

Background.—Many clinicians use peripheral nerve blocks (NBs) and trigger point injections (TPIs) for the treatment of headaches. Little is known, however, about the patterns of use of these procedures among practitioners in the USA.

Objectives.—The aim of this study was to obtain information on patterns of office-based use of peripheral NBs and TPIs by headache practitioners in the USA.

Methods.—Using an Internet-based questionnaire, the Interventional Procedures Special Interest Section of the American Headache Society (AHS) conducted a survey among practitioners who were members of AHS on patterns of use of NBs and TPIs for headache treatment.

Results.—Electronic invitations were sent to 1230 AHS members and 161 provided useable data (13.1%). Of the responders, 69% performed NBs and 75% performed TPIs. The most common indications for the use of NBs were occipital neuralgia and chronic migraine (CM), and the most common indications for the use of TPIs were chronic tension-type headache and CM. The most common symptom prompting the clinician to perform these procedures was local tenderness at the intended injection site. The most common local anesthetics used for these procedures were lidocaine and bupivacaine. Dosing regimens, volumes of injection, and injection schedules varied greatly. There was also a wide variation in the use of corticosteroids when performing the injections. Both NBs and TPIs were generally well tolerated.

Conclusions.—Nerve blocks and TPIs are commonly used by headache practitioners in the USA for the treatment of various headache disorders, although the patterns of their use vary greatly.

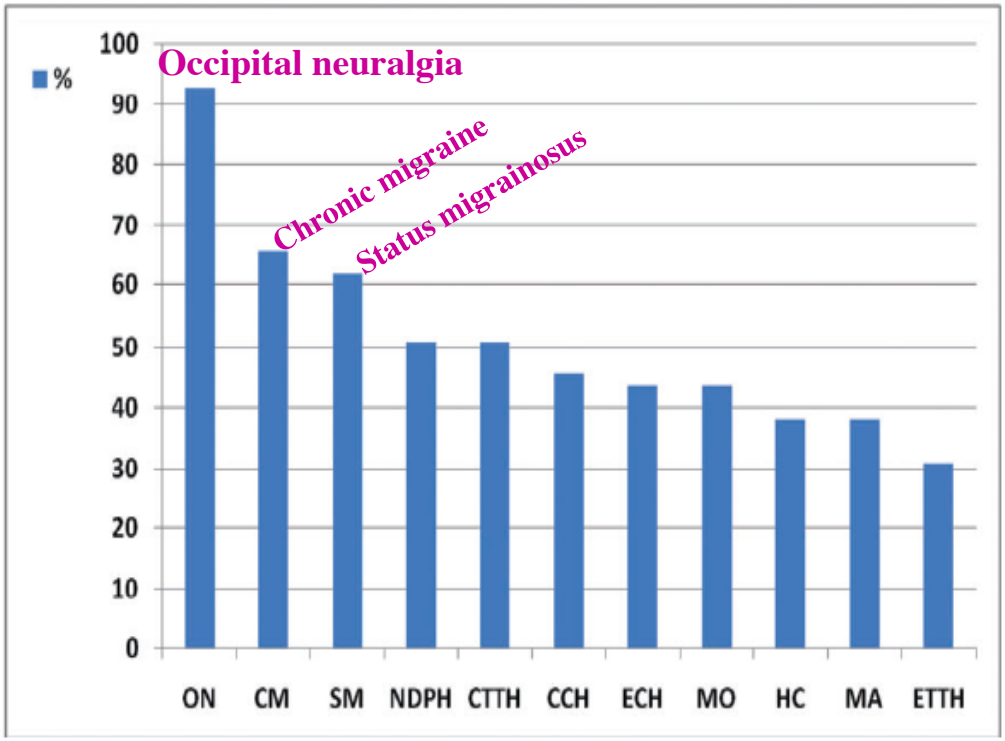
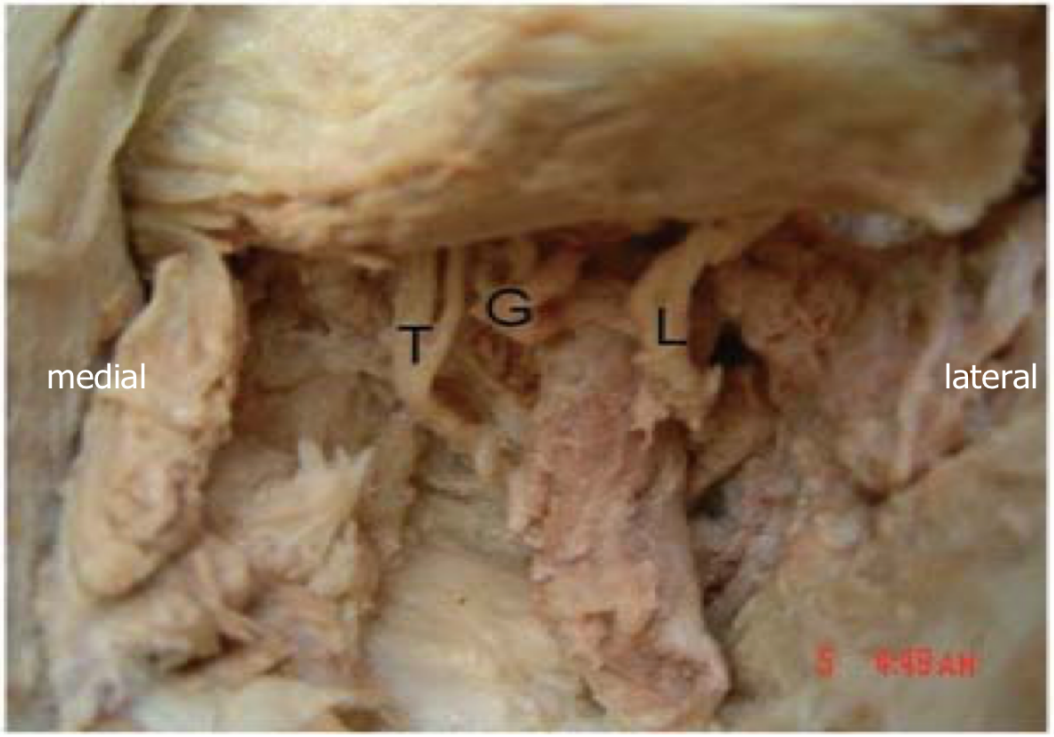


Fig 1.—Indications for the use of nerve blocks, by headache diagnosis. CCH = chronic cluster headache; CM = chronic migraine; CTTH = chronic tension-type headache; ECH = episodic cluster headache; ETTH = episodic tension-type headache; HC = hemicrania continua; MA = migraine with aura; MO = migraine without aura; NDPH = new daily persistent headache; ON = occipital neuralgia; SM = status migrainosus.

Local Anesthetics – adverse effects

- **Local:**
- Infection
- Hematoma
- Damage to adjacent structures (depending on the specific injection site)
- **Systemic:**
- **Common**: Dizziness & Nausea
- **Rare**:
- Arrhythmias
- Seizures
- Respiratory depression
- Hypersensitivity reactions

The Greater, Lesser and Third Occipital Nerves



Human dissection. G= greater occipital nerve; L=lesser occipital nerve; T= third occipital nerve

Greater occipital nerve (GON)

- Commonest used block
- Arises from the dorsal ramus of the **C2** spinal nerve.
- Supplies the posterior part of the head up to the vertex.
- Becomes superficial 3-5 cm infero-lateral to the external occipital protuberance (adjacent to the occipital artery).

GON

- Rational for using it as a treatment for headache:
- *Convergence of sensory input from both upper cervical and trigeminal afferents into trigeminal nucleus caudalis **(TNC)** neurons.*

GON: effect on cutaneous allodynia

- GON block effectively decreases cutaneous allodynia in patients with migraine.
- The effect on allodynia can occur even earlier than its effect on head pain.
- The effect of GON block on allodynia can involve both trigeminal and cervical territories.

Ashkenazi A and Young WB, Headache 2005

Headache
© 2010 American Headache Society

ISSN 0017-8748
doi: 10.1111/j.1526-4610.2010.01675.x
Published by Wiley Periodicals, Inc.

Review Article

Peripheral Nerve Blocks and Trigger Point Injections in Headache Management – A Systematic Review and Suggestions for Future Research

Avi Ashkenazi, MD; Andrew Blumenfeld, MD; Uri Napchan, MD; Samer Narouze, MD, MSc; Brian Grosberg, MD; Robert Nett, MD; Traci DePalma, MD; Barbara Rosenthal, MD; Stewart Tepper, MD; Richard B. Lipton, MD, on behalf of the Interventional Procedures Special Interest Section of the American Headache Society

Peripheral Nerve Blocks for Migraine

Study design	n	Intervention	Results	Reference
Retrospective	97	A single or repeated GON block(s) using lidocaine and methylprednisolone	Headache improvement in 54% of subjects for up to 6 months	Gawel and Rothbart[5]
Retrospective	27	Repeated GON and SON blocks using bupivacaine	Headache improvement in 85% of subjects for up to 6 months	Caputi and Firetto[6]
Retrospective	14	A single GON block with or without SON block using lidocaine and epinephrine	Head pain reduction in 6% of subjects at 30 minutes	Bovim and Sand[3]
Prospective, non-controlled	19	A single GON block using lidocaine and triamcinolone, and TPIs using lidocaine	A significant decrease in head pain in 90% of subjects	Ashkenazi and Young[2]

Cluster

Table 2.—Peripheral Nerve Blocks for Cluster Headache

Study design	n	Intervention	Results	Reference
Double blind, placebo controlled	23	A single GON block using lidocaine and betamethasone	85% of subjects became attack free within a week. 61% remained attack free for 4 weeks	Ambrosini et al[7]
Retrospective	14	A single GON block using lidocaine and triamcinolone	64% of subjects became attack free for 3-70 days	Peres et al[8]
Retrospective	16	A single GON block using methylprednisolone *No local*	31% became headache free	Bigo et al[9]
Case series	15	A single GON block using prilocaine *No steroid*	60% had minor headache improvement	Busch et al[10]
Case series	19	GON injection using lidocaine and methylprednisolone	53% had complete and 16% had partial pain relief	Afridi et al[11]

Chronic daily headache

Table 3.—Peripheral Nerve Blocks for Chronic Daily Headache

Study design	n	Intervention	Results	Reference
Prospective, non-controlled	112	Repeated injections to the vicinity of occipital nerves using lidocaine and betamethasone	65% experienced headache relief lasting at least one week; 56% experienced relief for more than 4 weeks	Saadah and Taylor[12]
Case series	101	GON injection using lidocaine and methylprednisolone	22% had complete response (pain free) and 31% had partial response	Afridi et al[11]
Prospective, randomized controlled	37	GON block and TPIs using lidocaine, bupivacaine + either saline or triamcinolone	Headache severity decreased significantly at 20 minutes in both groups, with no significant between-group difference	Ashkenazi et al[13]
Open label	15	GON block using prilocaine and dexamethasone	No change in headache severity in 73% of subjects; worsening of headache in 20%	Leinisch-Dahlke et al[15]

Cervicogenic headache

Table 4.—Peripheral Nerve Blocks for Cervicogenic Headache

Study design	n	Intervention	Results	Reference
Case series	180	GON and LON block using methylprednisolone	94% experienced complete pain relief lasting a mean of 24 days	Anthony[16]
Double blind, placebo controlled	50	GON and LON block, with or without facial nerve block, using lidocaine, epinephrine, bupivacaine, fentanyl, and clonidine	Significant head pain improvement at 2 weeks, with decreased analgesic use	Naja et al[17]
Case series	47	GON and LON block, with or without facial nerve block, using lidocaine, epinephrine, bupivacaine, fentanyl, and clonidine	96% achieved 6 months of pain freedom; 87% required repeated injection	Naja et al[18]
Prospective, comparative	28	GON block *or* C_2/C_3 nerve block using lidocaine and bupivacaine	Both treatments resulted in decreased frequency and duration of pain, with no significant between-group differences	Inan et al[19]
Prospective, non-controlled	41	GON block using bupivacaine	A significant reduction in mean head pain during 1 week post injection	Vincent et al[20]
Retrospective	24	A single GON block with or without SON block using lidocaine and epinephrine	77% of those who received GON block had pain relief of >40%. Those who received SON block had 28% pain relief	Bovim and Sand[3]

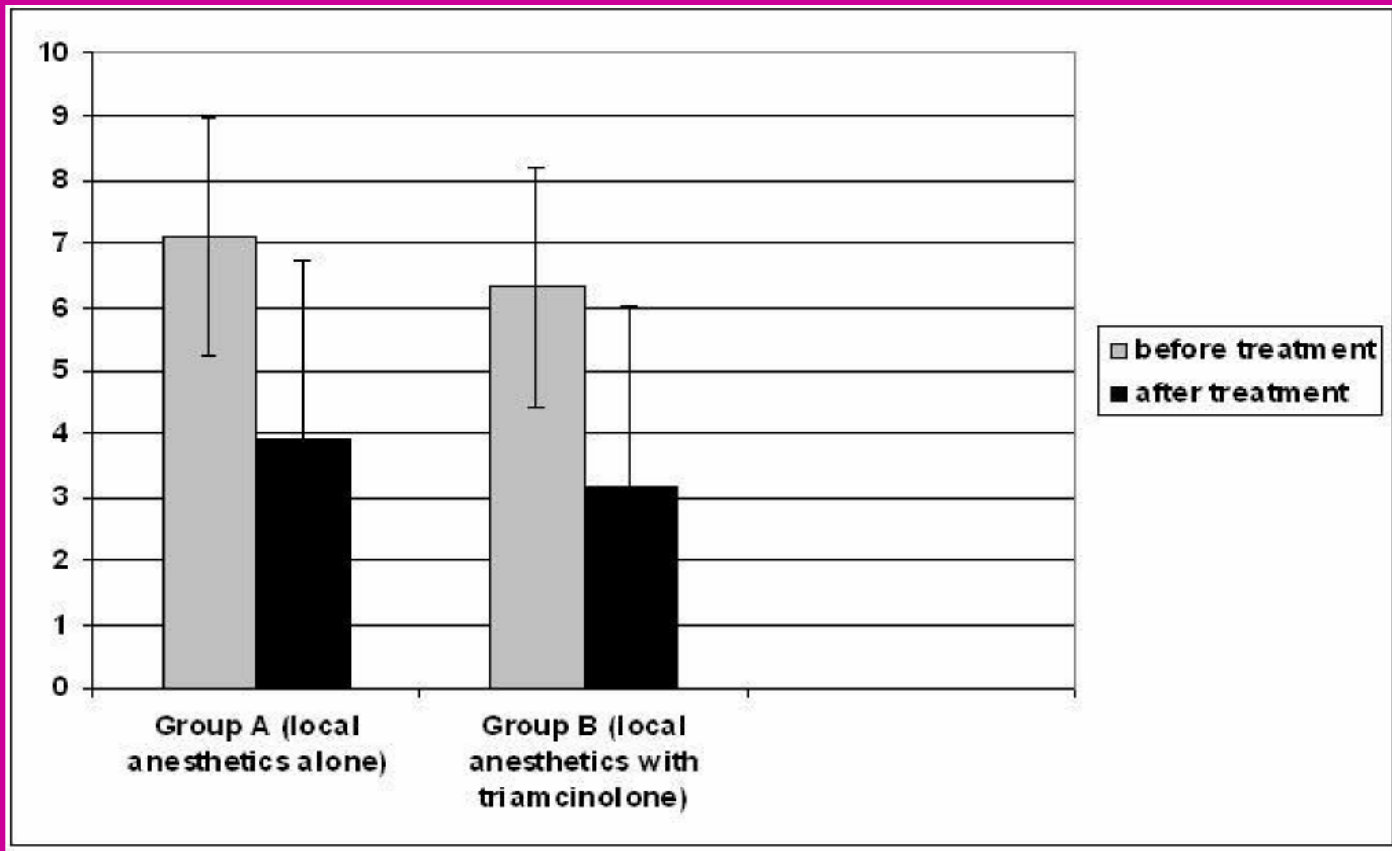
GON

- Some clinicians add a corticosteroid (e.g. triamcinolone, methylprednisolone) to the mixture, although evidence for their efficacy is lacking (with the exception of cluster headache).

Greater occipital nerve block using local anesthetics alone or with triamcinolone for transformed migraine: A randomized comparative study

Avi Ashkenazi, Rebecca Matro, James W Shaw, Muhammad A Abbas and Stephen D Silberstein

J. Neurol. Neurosurg. Psychiatry 2008;79:415-417



CONCLUSIONS:

Adding triamcinolone to local anaesthetics when performing GONB and TPIs was **not associated** with improved outcome in this sample of patients with **Transformed Migraine**.

GON Blocks: Randomized Trials for Migraine

- Occipital nerve block for the short-term preventive treatment of episodic and chronic migraine.
  Cephalalgia 2015; 35:959–968. 28.

- Bupivacaine + Methylpred 20 mg **VS** normal saline
- **Conclusion:** Greater ONB does not reduce the frequency of moderate to severe migraine days in patients with episodic or chronic migraine compared to placebo.

Suboccipital injection with a mixture of rapid- and long-acting steroids in cluster headache: A double-blind placebo-controlled study

Anna Ambrosini,* Michel Vandenheede, Paolo Rossi, Fulvio Aloj,
Enzo Sauli, Francesco Pierelli, Jean Schoenen

- A prospective controlled study.
- Patients with cluster headache were injected with either lidocaine+betamethasone or lidocaine+saline.
- At **1 week**: **85%** of patients who were treated with lidocaine+betamethasone were attack free, compared with none of those who were given lidocaine+saline.
- **61%** of patients who were given lidocaine + betamethasone had a sustained headache relief (**4 weeks**), compared with none of those who were given lidocaine+saline.

Ambrosini A. et al. Pain 2005

Headache
© 2013 American Headache Society
ISSN 0017-8748
doi: 10.1111/head.12053
Published by Wiley Periodicals, Inc.

Review Article

Expert Consensus Recommendations for the Performance of Peripheral Nerve Blocks for Headaches – A Narrative Review

Andrew Blumenfeld, MD; Avi Ashkenazi, MD; Uri Napchan, MD; Steven D. Bender, DDS; Brad C. Klein, MD; Randall Berliner, MD; Jessica Ailani, MD; Jack Schim, MD; Deborah I. Friedman, MD, MPH; Larry Charleston IV, MD; William B. Young, MD; Carrie E. Robertson, MD; David W. Dodick, MD; Stephen D. Silberstein, MD; Matthew S. Robbins, MD

Use of Steroids:

- Equivocal in Occipital nerve blocks (but relatively acceptable)
- Discouraged in trigeminal sensory blocks secondary to adverse effects (cutaneous atrophy)

Table 3.—Corticosteroids Commonly Used in Peripheral Nerve Blocks for the Treatment of Headache Disorders – Approximate Dose Equivalents (to Triamcinolone 1 mg) and Half-Life[44]

Corticosteroid	Equivalent to Triamcinolone 1 mg (mg)	Biologic Half-Life (Hours)	Dose Range Reported Per Individual GON Block (mg)
Triamcinolone	1.0	18-36 (intermediate)	5 mg-40
Methylprednisolone	1.0	18-36 (intermediate)	20 mg-160
Betamethasone	0.15	36-54 (long)	18
Dexamethasone	0.19	36-54 (long)	4

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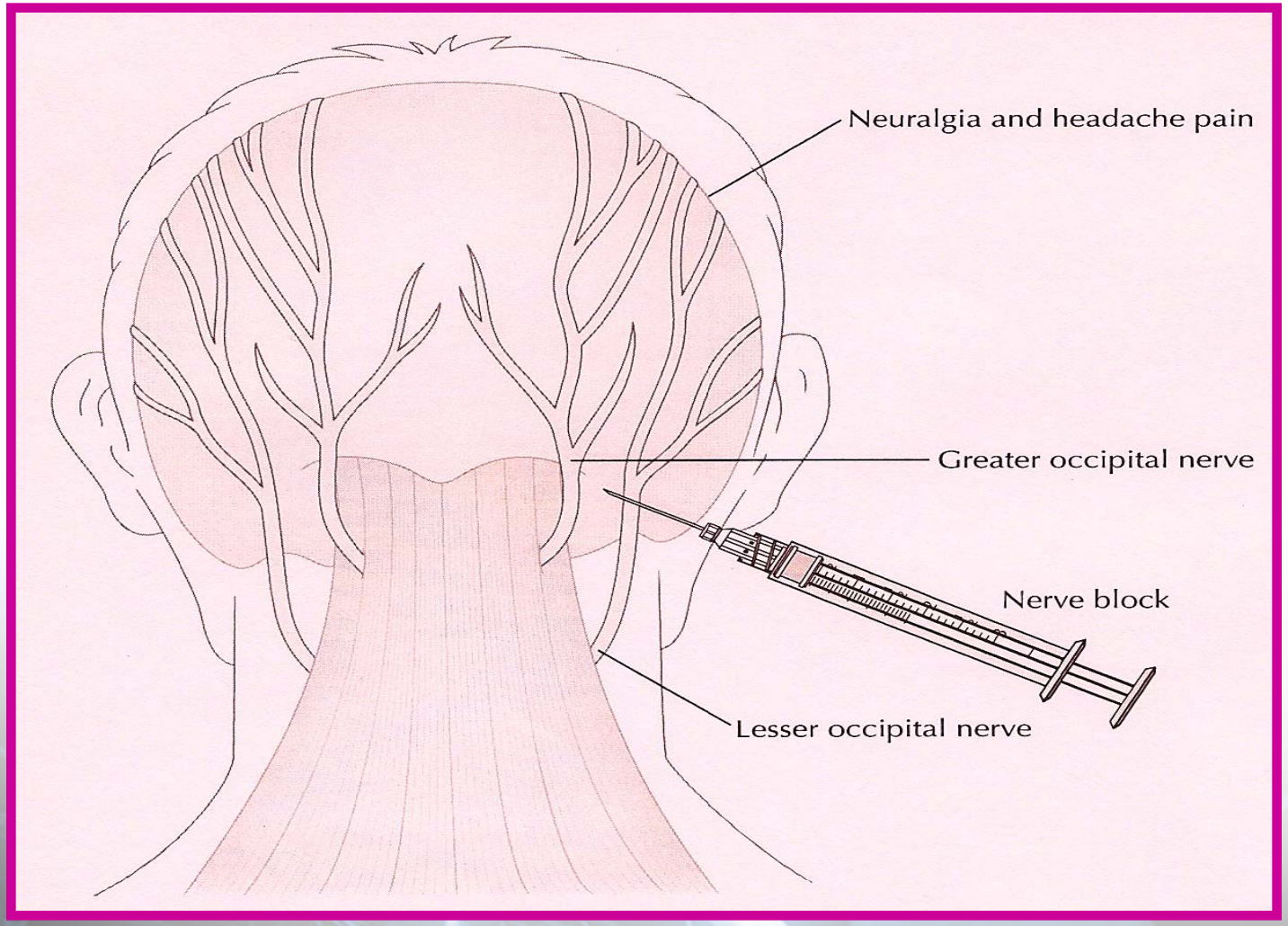
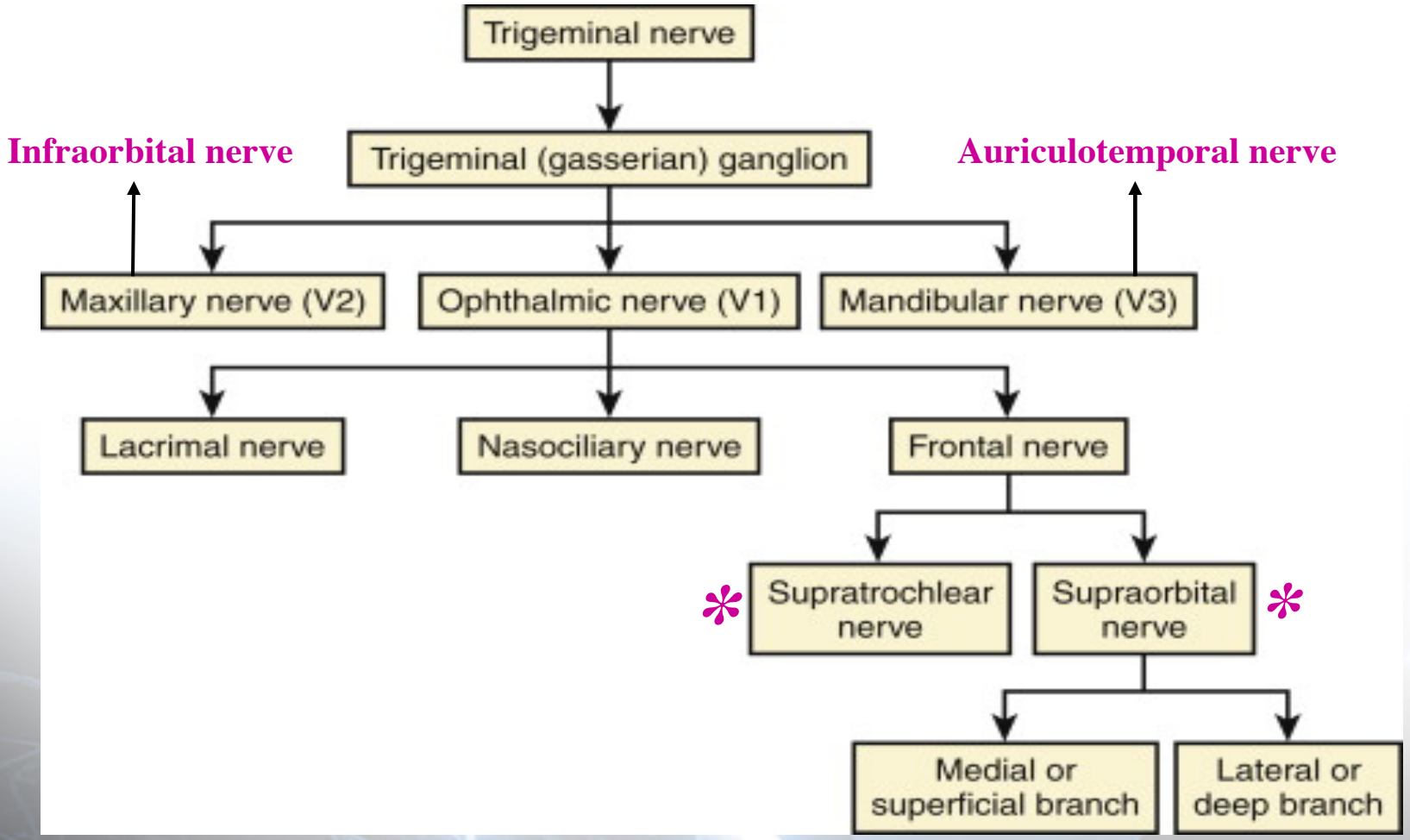

Neuralgia and headache pain
Greater occipital nerve
Nerve block
Lesser occipital nerve

Other nerve blocks



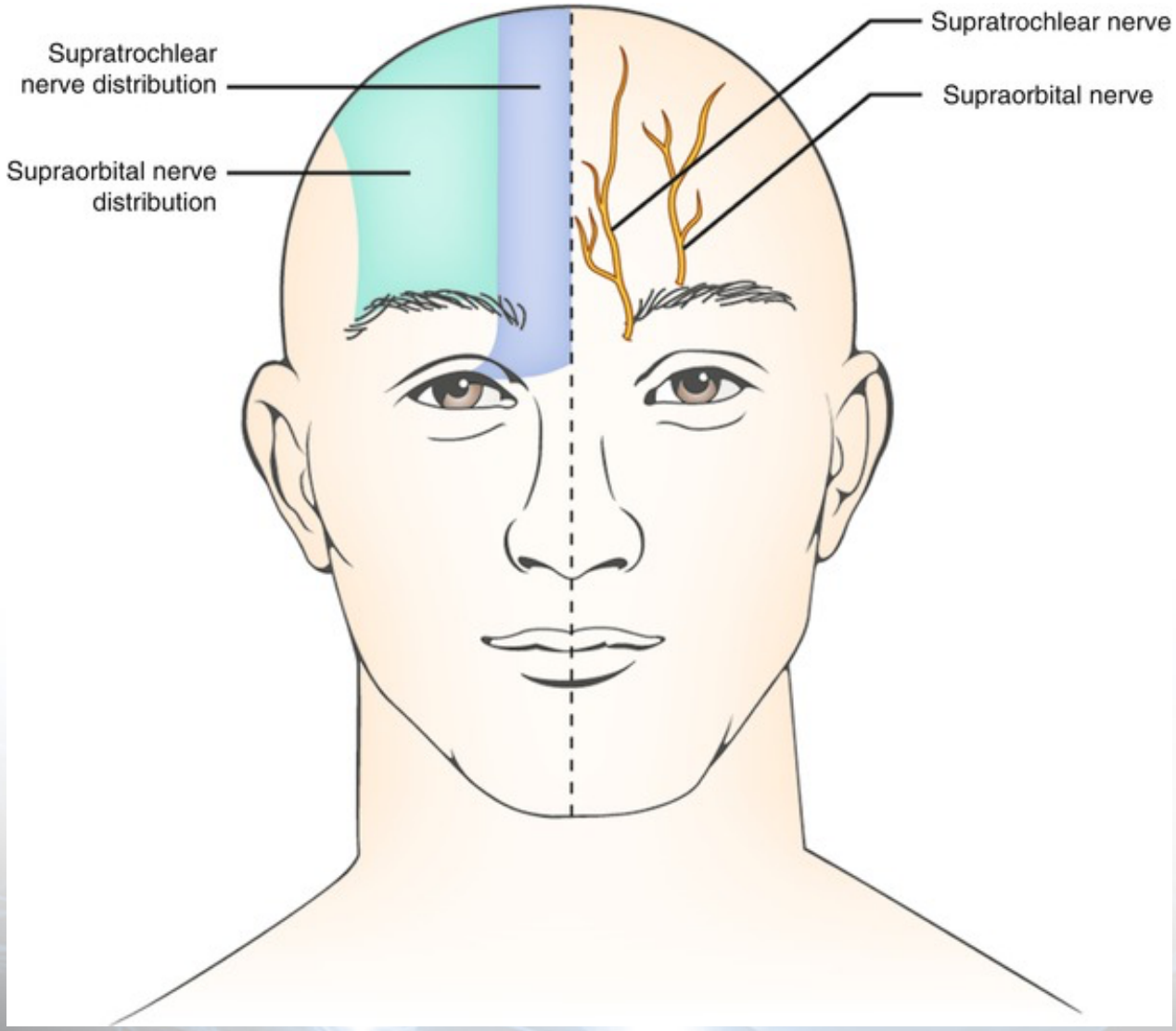
Supratrochlear nerve

- Branch of the ophthalmic division of the trigeminal nerve.
- Passes at the superomedial rim of the orbit.
- Supplies skin sensation to the lower-medial part of the forehead and to the eyelid.

Supraorbital nerve

- Branch of the ophthalmic division of the trigeminal nerve.
- Passes at the superior rim of the orbit, approximately at the mid-pupillary line. Supplies skin sensation to the forehead.

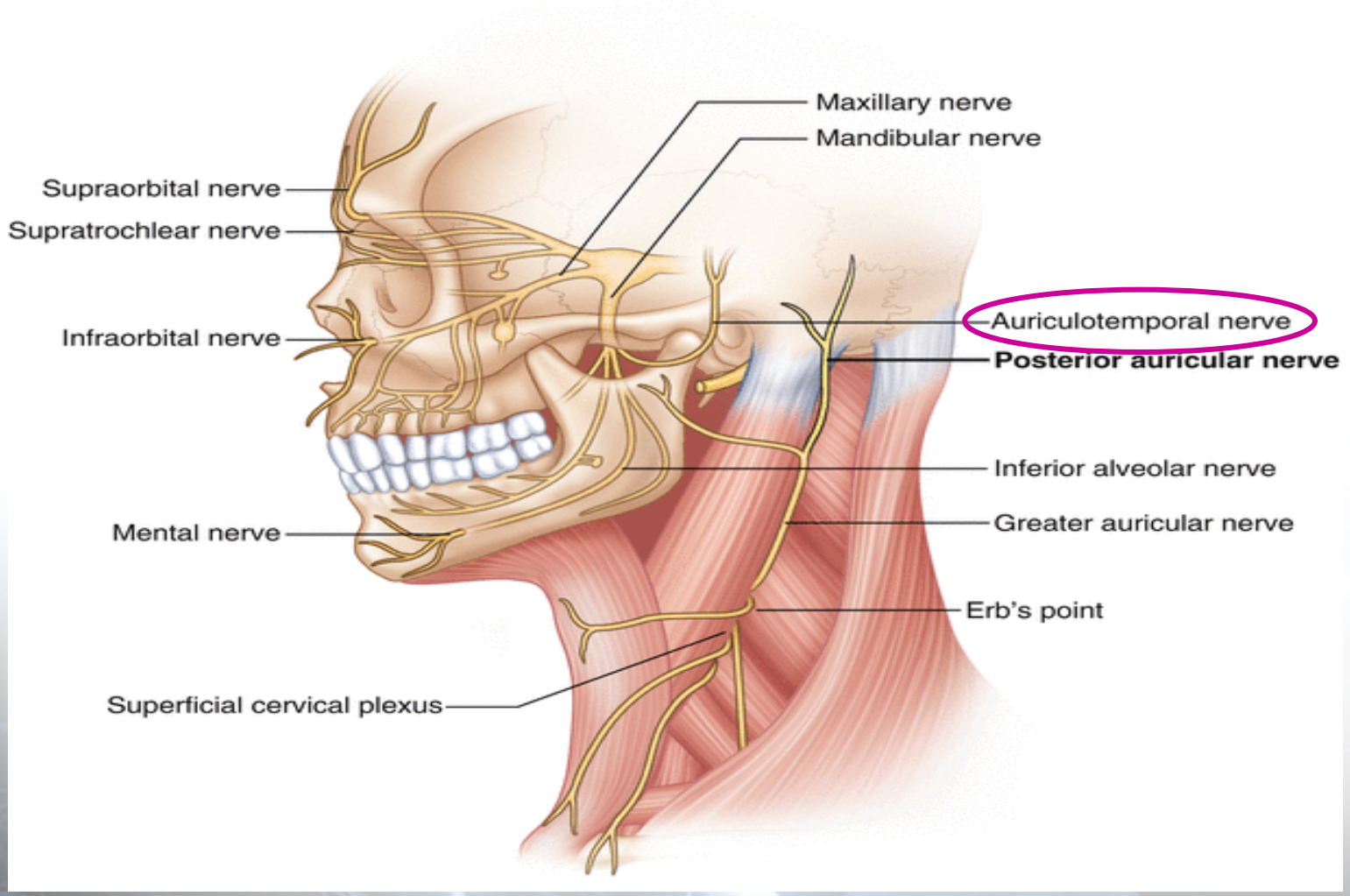
Supraorbital nerve



Supratrochlear and supraorbital nerve blocks -

- **Supratrochlear nerve block:** using a 30 gauge needle, inject 0.5 -1 mL of a mixture of lidocaine 2% and bupivacaine 0.25% (1:1 volume ratio) at the superior-medial corner of he orbit, just above the eyebrow.
- **Supraorbital nerve block:** using the same injection site, redirect the needle 2 cm laterally and inject 0.5-1 mL of the solution OR alternatively, inject at or just above the eyebrow, on the mid-pupillary line.

Auriculotemporal nerve

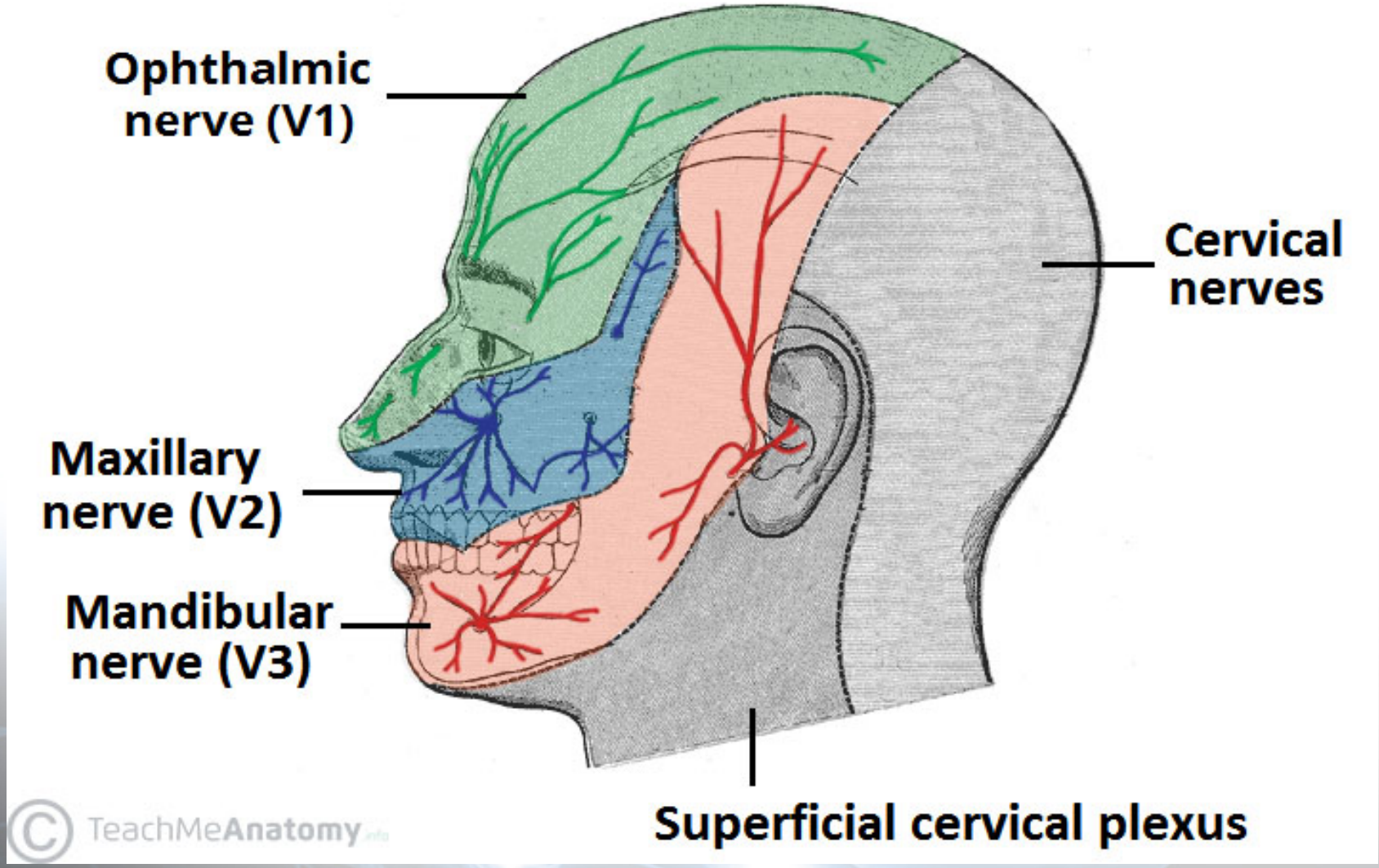


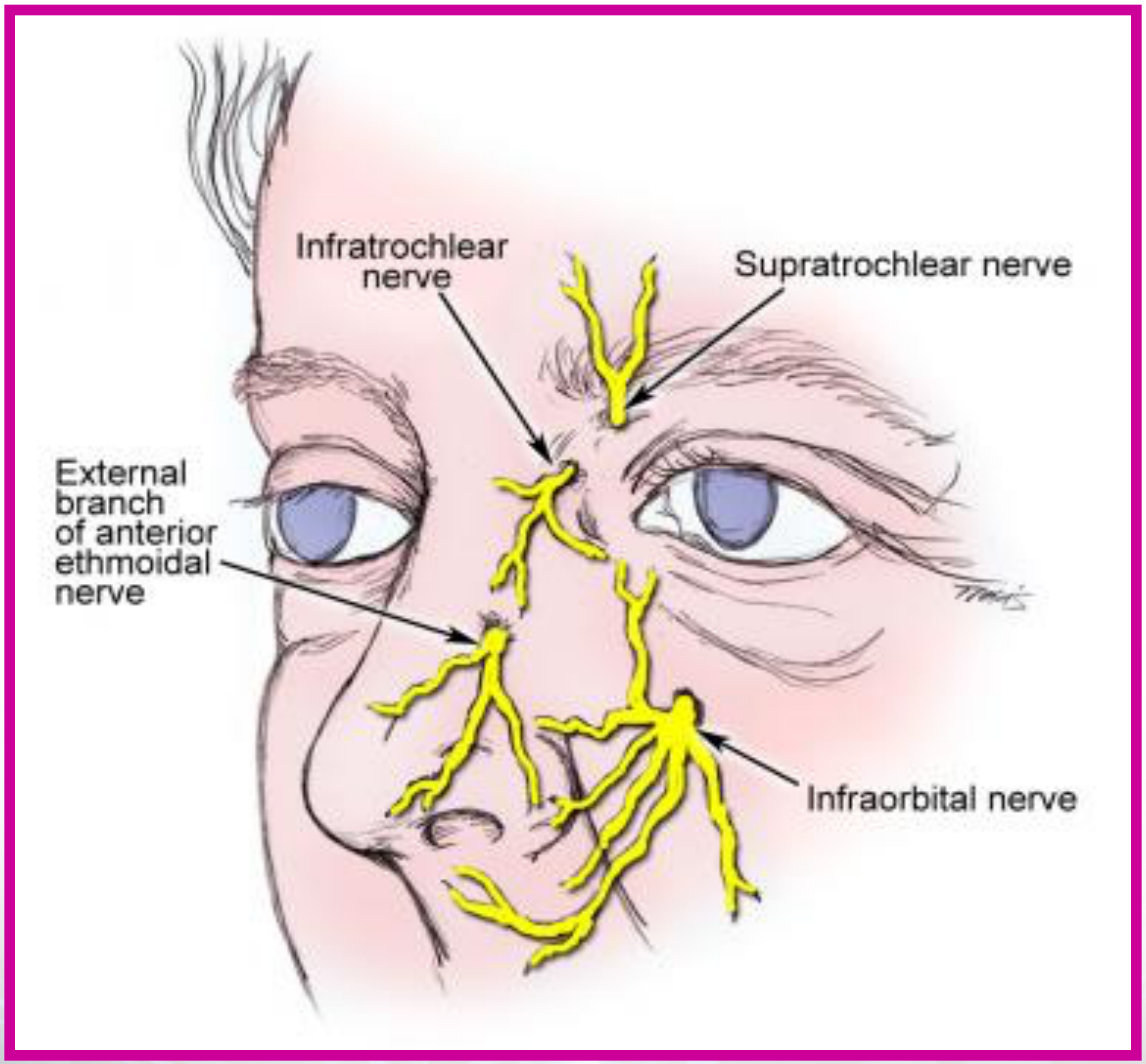
Auriculotemporal nerve

- Branch of the mandibular division of the trigeminal nerve.
- Skin sensation over the ear and the temporal area.
- Adjacent to the superficial temporal artery *(caution when injecting!).*
- Blockade of the nerve may be particularly useful in migraine, since many of these patients have pain in the temporal area. Block can be done also for patients with pain in this region.
- Controlled studies are lacking.

Auriculotemporal nerve

- 30 gauge needle
- 1-2 mL of a mixture of lidocaine 2% and bupivacaine 0.25% (1:1 volume ratio) above the posterior part of the zygoma, just anterior to the ear. *Feel for the pulse of the temporal artery and go 3 mm anterior to it.*
- Additional injections can be given superiorly, to block the branches of the nerve that fan around the temporal area.


Ophthalmic nerve (V1)
Maxillary nerve (V2)
Mandibular nerve (V3)
Cervical nerves
Superficial cervical plexus
© TeachMeAnatomy


Infratrochlear nerve
Supratrochlear nerve
External branch of anterior ethmoidal nerve
Infraorbital nerve

Infraorbital nerve

- Branch of the maxillary division of the trigeminal nerve.
- Exits the skull through the infraorbital foramen, 1 cm inferior to the infraorbital ridge, approximately at the mid-pupillary line.
- Supplies skin sensation to the lower eyelid, medial aspect of the cheek, lateral part of the nose and upper lip.
- **Technique:** 30 gauge needle, 0.5 -1 mL of a mixture of lidocaine 2% and bupivacaine 0.25% (in a 1:1 volume) just below the lower orbital rim at the mid-pupillary line.

Medication Used

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GON/LON

- **Technique**: 5 ml syringe, 25-30 gauge 0.5-1 inch needle. Depth of 3-4 mm
- **Med:** 1-2% Lidocaine or 0.25-0.5% Bupivacaine or combination in 1:1 – 1:3
- **Volume**: 1.5-3cc per GON and 1-2cc per LON
- **Steroids**: evidence is strongest for CH

SON/STN/ATN

- **Technique**: 1 ml syringe, 30 gauge 0.5 inch needle. Depth of 3-4 mm for SON/STN and 4-6 mm for ATN
- **Med:** 1-2% Lidocaine or 0.25-0.5% Bupivacaine or combination in 1:1 – 1:3
- **Volume**: 0.2-1cc per nerve
- **Steroids**: Not recommended

Conclusion:

- Headache practitioners should build their experience in this field.
- GONB and Trigeminal branches block can be very helpful in managing patients with different types of headache (*especially in the acute phase*).
- The highest evidence for steroid in GONB in cluster headache.
- No steroid in Trigeminal nerves block because of cutaneous atrophy.
- Knowing the anatomy of these nerves is very important to avoid any vascular injury.
- Randomized trials are still lacking in the field.