PainWeek®

A Face in the Crowd: Trigeminal Neuralgia & Atypical Facial Pain

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Phoenix, AZ

Disclosure

- Contracted Research (Principal Investigators must provide information, even if received by the institution): Eli Lilly site principal investigator (no payment)

Learning Objectives

- Differentiate trigeminal neuralgia from others causes of facial pain
- Cite the differences in pathophysiology of facial pain diagnoses
- Summarize the diagnostic characteristics these diagnoses
- Compare treatment options

Outline

- Trigeminal Neuralgia diagnosis
- Other causes of facial pain
- Pathophysiology
- Treatments

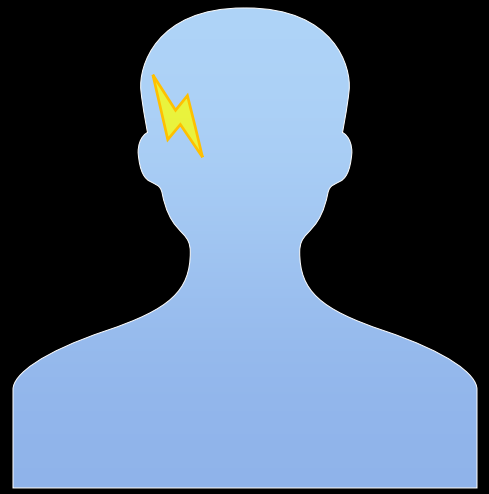
Trigeminal Neuralgia

Epidemiology

- Lifetime prevalence = 0.16 to 0.3%
- F:M = 3:2
- Age of onset = Mid 50s

Bendtsen, L., et al. (2020). "Advances in diagnosis, classification, pathophysiology, and management of trigemin neuralgia." Lancet Neurol **19(9): 784-796.**

Trigeminal Neuralgia = "Recurrent paroxysms of unilateral facial pain in the distribution of…trigeminal nerve with no radiation beyond"



ICHD-3 Criteria	
A.	Pain has all of:
	<1 sec to 2 minutes
	Severe intensity
	Electric shock-like, shooting, stabbing or sharp
B.	Precipitated by innocuous trigeminal stimuli
C.	No better diagnosis

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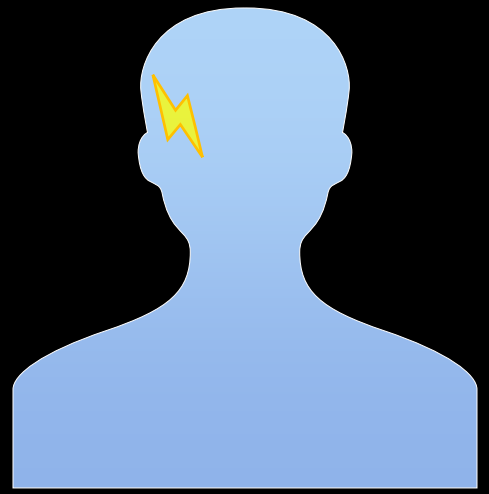
IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Trigeminal Neuralgia



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Can radiate to V1-3 but stays trigeminal

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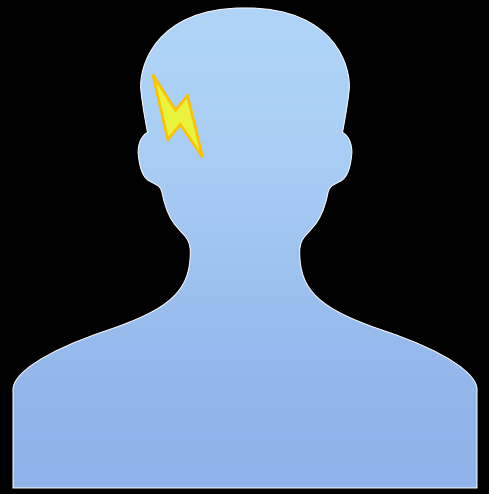
Trigeminal Neuralgia



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Paroxysm duration can increase over time

Train of paroxysms do occur but <1h

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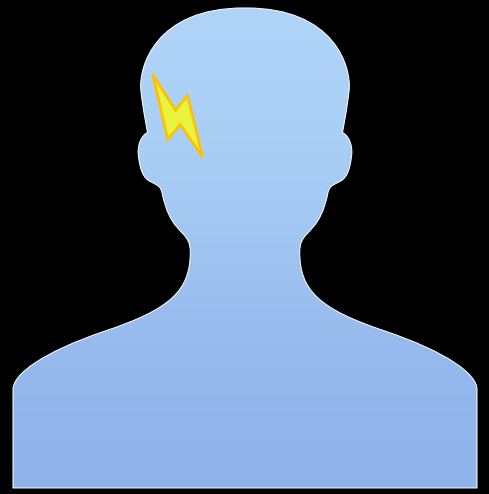
IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**
Robertson C. Cranial Neuralgias. Continuum (Minneap Minn). 2021 Jun 1;27(3):665-685.

Trigeminal Neuralgia



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Severity can increase over time

±Trigger muscle contraction
"Tic Douloureux"

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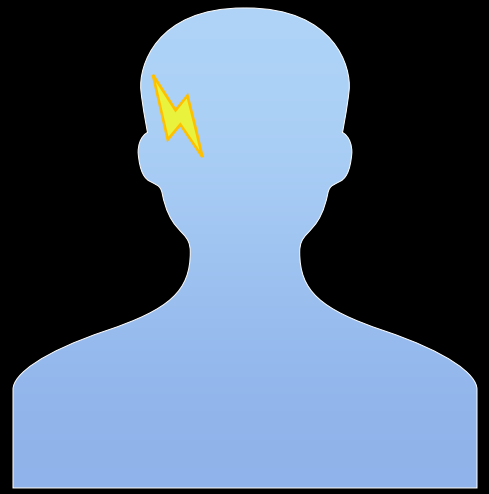
Trigeminal Neuralgia



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May seem spontaneous but 99% have a trigger (often followed by refractory period)

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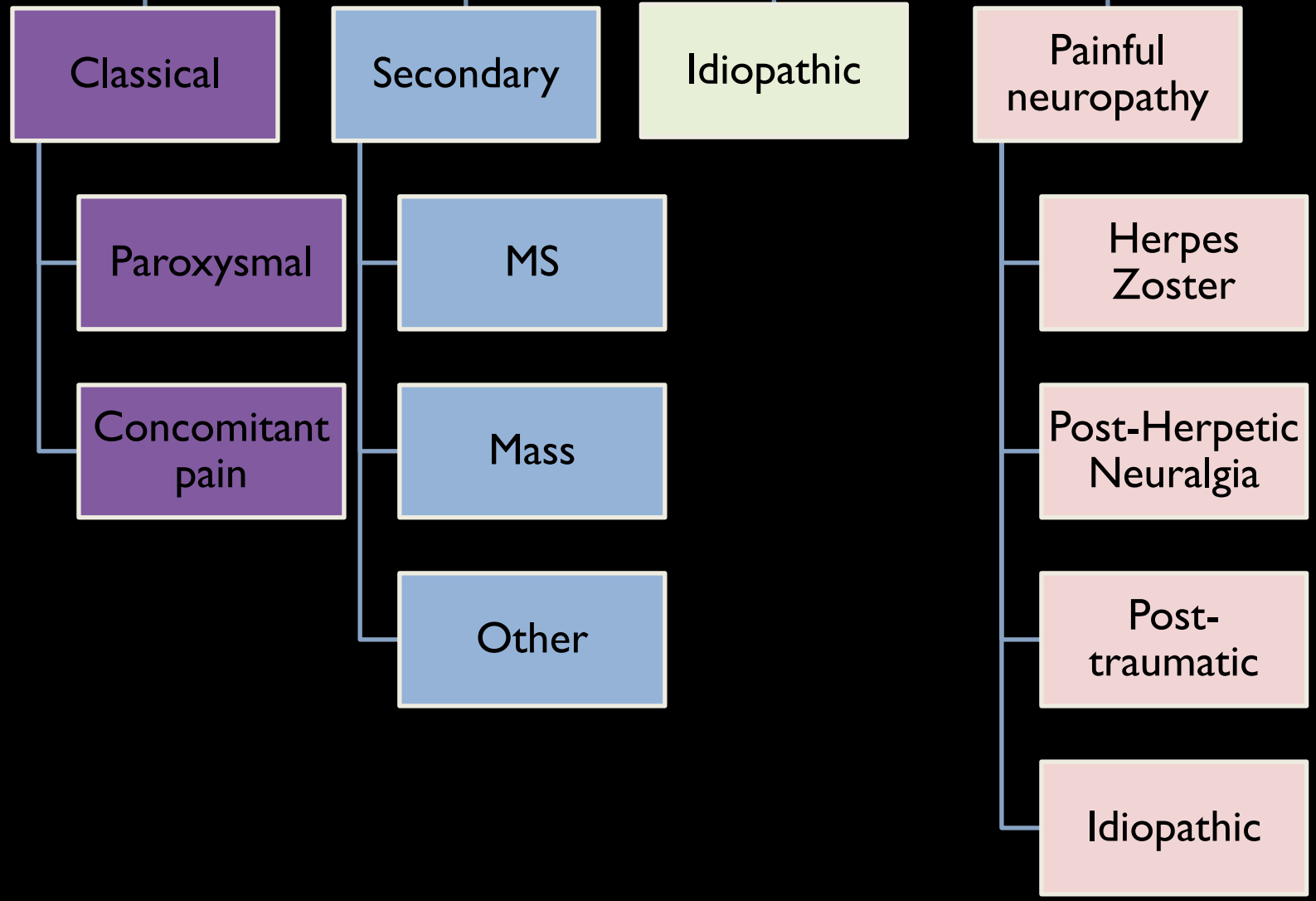
Trigeminal Neuralgia



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Cruccu G, Finnerup NB, Jensen TS, Scholz J, Sindou M, Svensson P, Treede RD, Zakrzewska JM, Nurmikko T. Trigeminal neuralgia: New classification and diagnostic grading for practice and research. Neurology. 2016 Jul 12;87(2):220-8.
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Trigeminal Neuralgia

Classical

Neurovascular compression

https://radiopaedia.org/cases/neurovascular-compression-of-trigeminal-nerve?lang=us

IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**
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Look for:

Nerve Atrophy	Nerve Displacement

97% specificity

100% at root entry!

CAVEAT

87.5% of trigeminal nerves in one study of 100 **asymptomatic** people (200 nerves) showed contact with a vessel

--but--

Neurovascular conflict can be absent despite symptoms

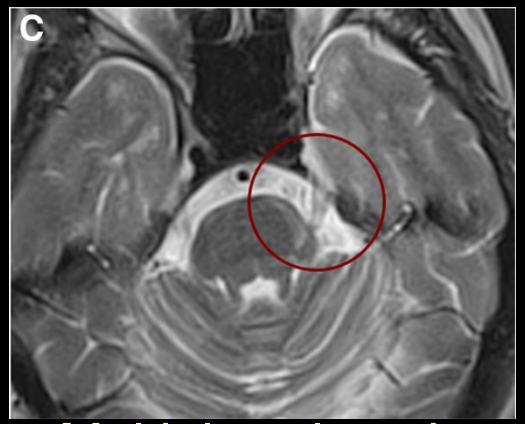
Cruccu G, Finnerup NB, Jensen TS, Scholz J, Sindou M, Svensson P, Treede RD, Zakrzewska JM, Nurmikko T. Trigeminal neuralgia: New classification and diagnostic grading for practice and research. Neurology. 2016 Jul 12;87(2):220-8.

Peker S, Dinçer A, Necmettin Pamir M. Vascular compression of the trigeminal nerve is a frequent finding in asymptomatic individuals: 3-T MR imaging of 200 trigeminal nerves using 3D CISS sequences. Acta Neurochir (Wien) 2009;151(9): 1081-1088.

Trigeminal Neuralgia

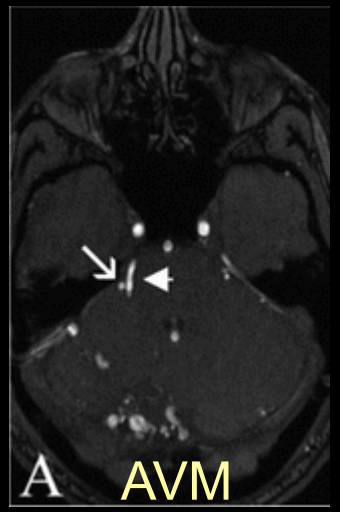
Secondary

Trigeminal neuralgia from a secondary cause other than neurovascular compression (~15%)



Multiple sclerosis

Meningioma



AVM

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Di Stefano, G., et al. (2019). "Trigeminal neuralgia secondary to multiple sclerosis." The Journal of Headache and Pain **20(1): 20.**
Lesley W. Resolution of Trigeminal Neuralgia Following Cerebellar AVM Embolization With Onyx. *Cephalalgia*. 2009;29(9):980-985.
Shulev Y, Trashin A, Gordienko K. Secondary trigeminal neuralgia in cerebellopontine angle tumors. Skull Base. 2011 Sep;21(5):287-94.

Trigeminal Neuralgia

Idiopathic

→ No neurovascular compression or secondary cause identified (~11%)

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Cruccu G, Finnerup NB, Jensen TS, Scholz J, Sindou M, Svensson P, Treede RD, Zakrzewska JM, Nurmikko T. Trigeminal neuralgia: New classification and diagnostic grading for practice and research. Neurology. 2016 Jul 12;87(2):220-8.
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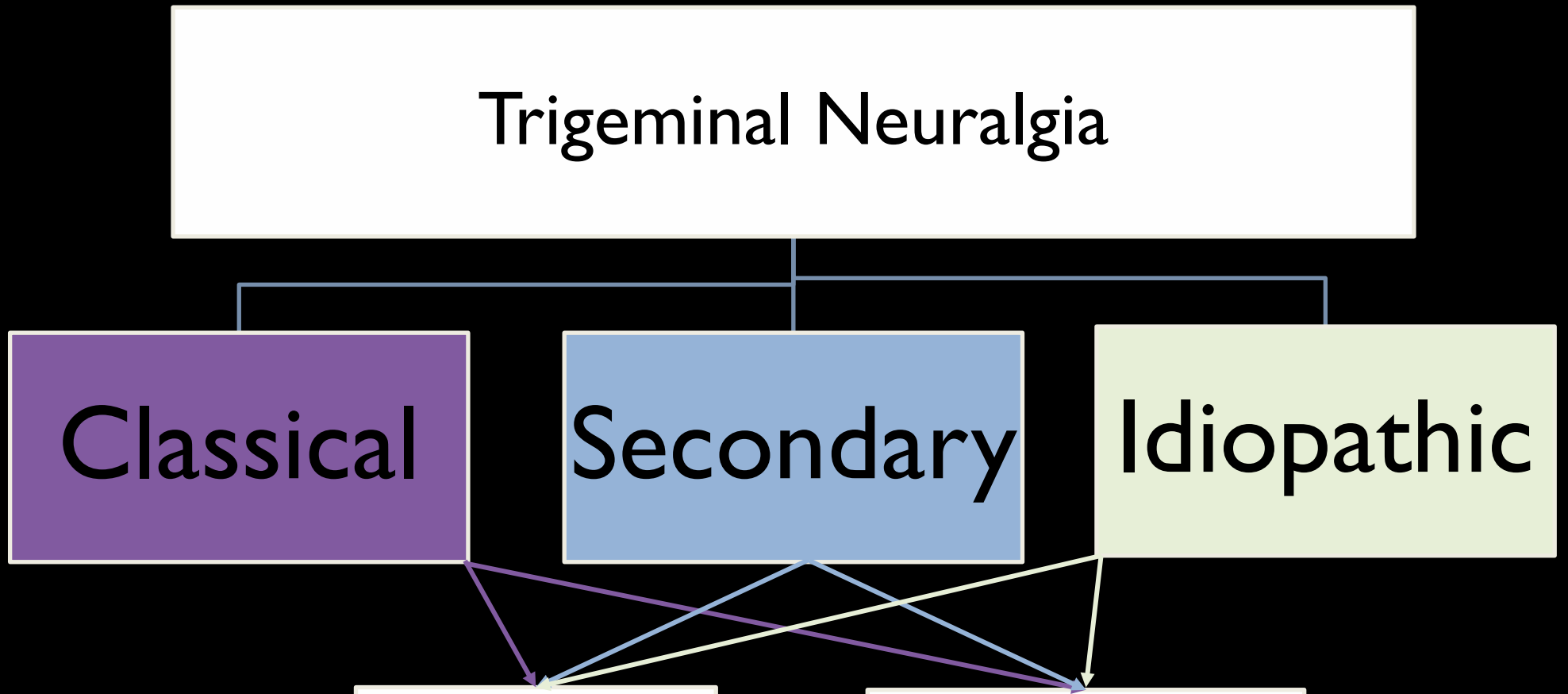
Trigeminal Neuralgia



Pain free between paroxysms

Constant pain underlying paroxysms*

*Dull, burning, tingling
?Query poorer outcomes
14-50% of TN

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Trigeminal Neuralgia

- Painful neuropathy
  - Herpes Zoster
  - Post-Herpetic Neuralgia
  - Post-traumatic
  - Idiopathic

Nerve damage causing:

Continuous pain
(often burning, tingling, squeezing)
+
Sensory deficits
+
Allodynia
(rather than trigger zones)
+/-
overlying brief paroxysms

IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Trigeminal Neuralgia

- Painful neuropathy
  - Herpes Zoster → AKA. “Shingles” in a V1, V2, and/or V3 distribution
  - Post-Herpetic Neuralgia
  - Post-traumatic
  - Idiopathic

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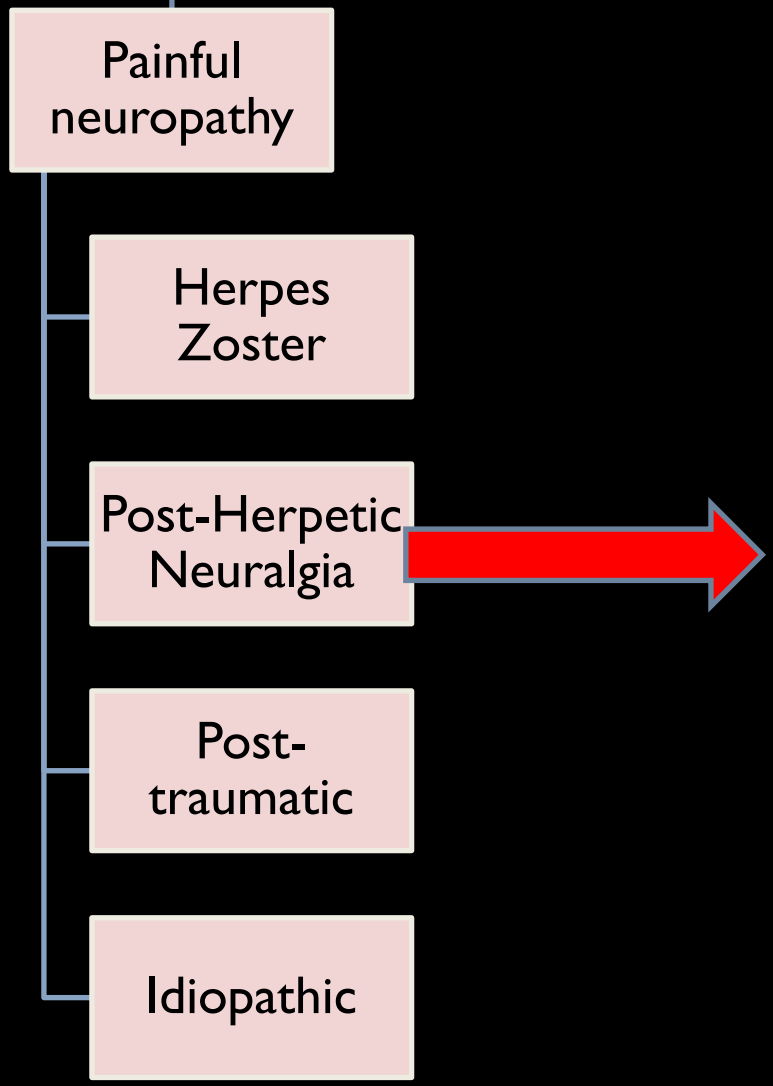
Trigeminal Neuralgia



Pain persisting >3mo after “Shingles” in a V1, V2, and/or V3 distribution

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IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Trigeminal Neuralgia

*Onset can be delayed by >3mo

- Painful neuropathy
  - Herpes Zoster
  - Post-Herpetic Neuralgia
  - Post-traumatic
  - Idiopathic

AKA. Anesthesia dolorosa

Trauma can be mechanical, chemical, thermal or radiation* including post-neuroablative procedures for trigeminal neuralgia

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IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Trigeminal Neuralgia

- Painful neuropathy
  - Herpes Zoster
  - Post-Herpetic Neuralgia
  - Post-traumatic
  - Idiopathic

*Positive = Hyperalgesia and/or allodynia

**Negative = Numb and/or reduce pain sensation

A. Unilateral or bilateral pain in trigeminal distribution
B. Positive* or negative** signs of trigeminal dysfunction
C. No other cause identified

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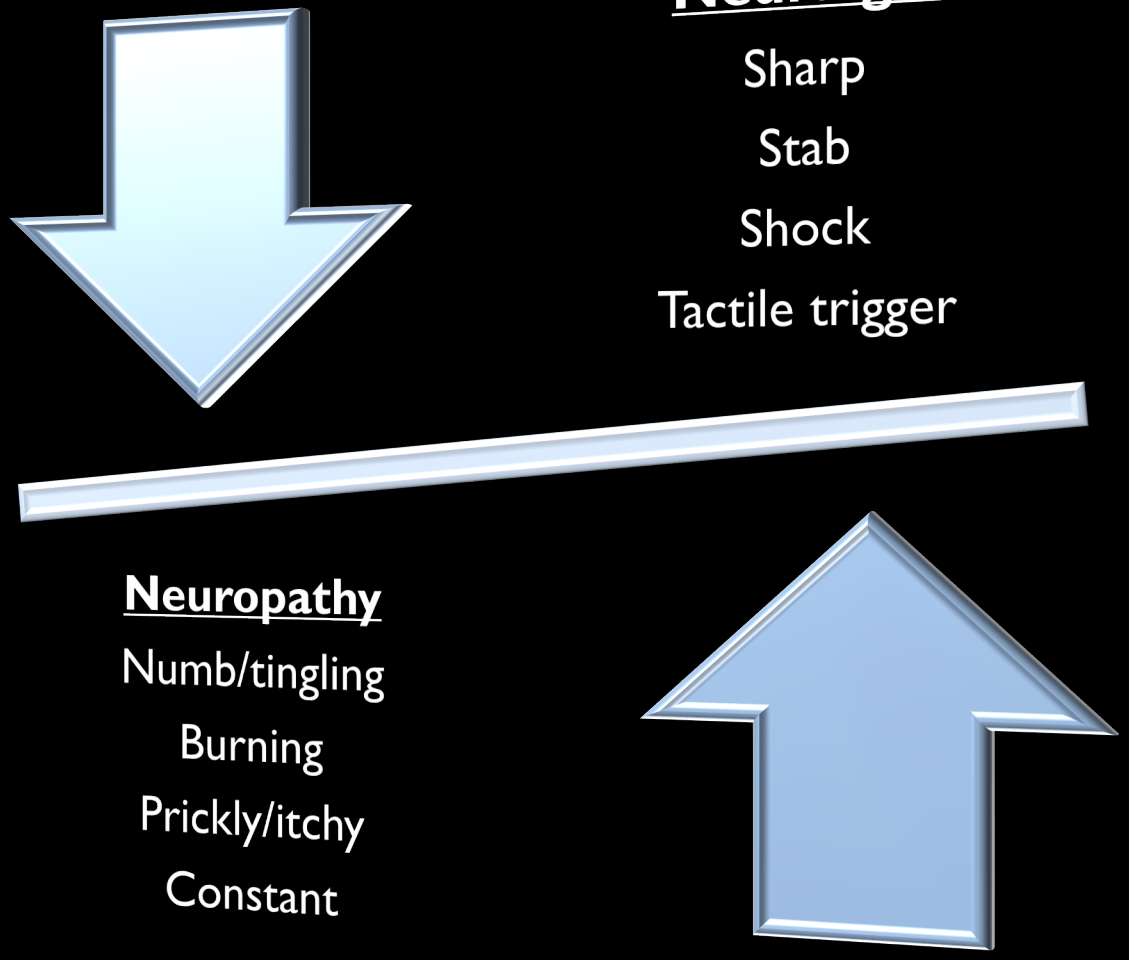
IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Neuralgia vs Neuropathy



Robertson C. Cranial Neuralgias. Continuum (Minneap Minn). 2021 Jun 1;27(3):665-685.

REMISSION?

Up to 63% lasting weeks to years!

Cruccu G, Finnerup NB, Jensen TS, Scholz J, Sindou M, Svensson P, Treede RD, Zakrzewska JM, Nurmikko T. Trigeminal neuralgia: New classification and diagnostic grading for practice and research. Neurology. 2016 Jul 12;87(2):220-8.

Facial Pain Differential Diagnosis

1) Migraine

- Migraine can cause facial pain!
- Migraine can have autonomic symptoms!

- "PIN the diagnosis"
  - –P = Photophobia
  - –I = Impairment
  - –N = Nausea

2/3 = 93% PPV
3/3 = 98% PPV

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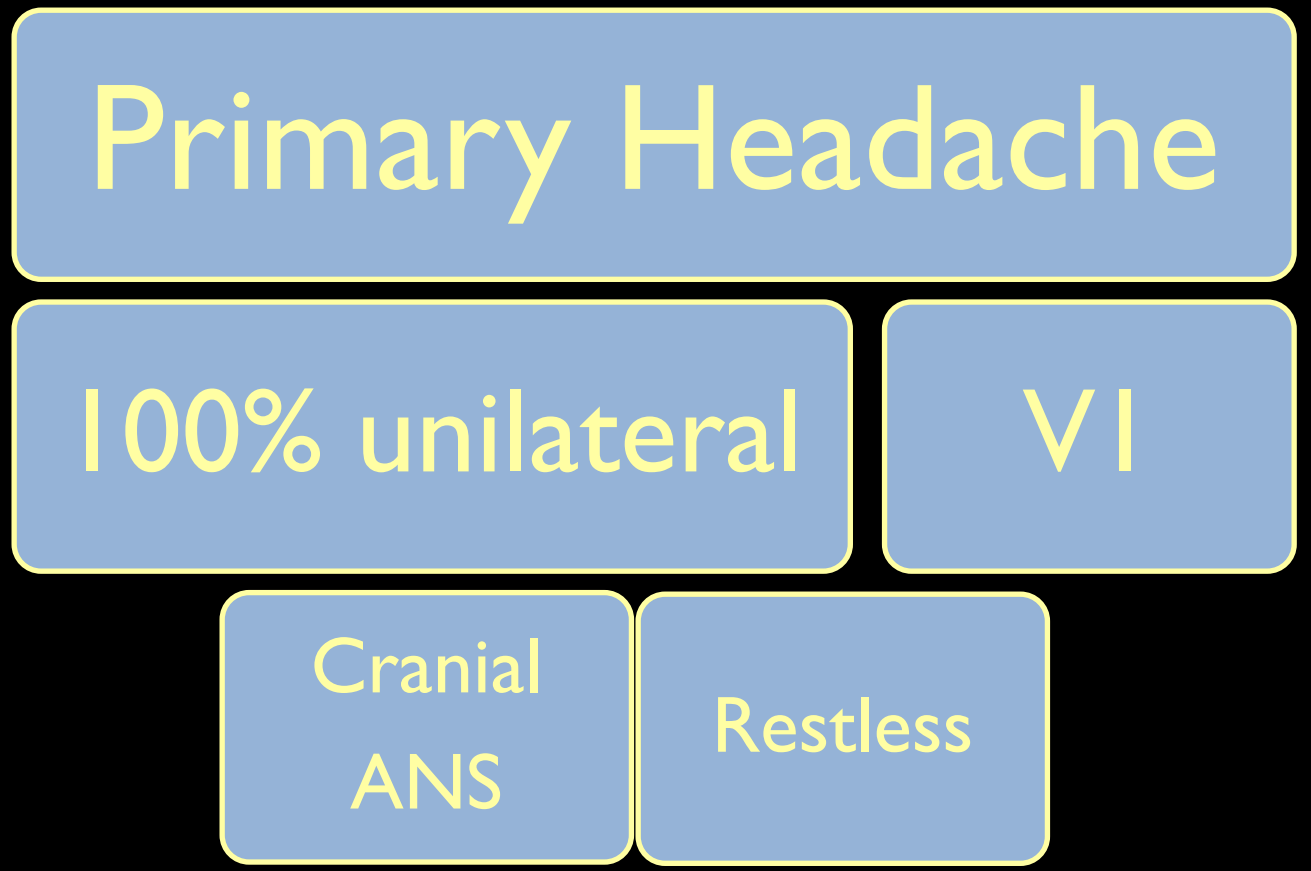
Lipton, R. B., et al. (2003). "A self-administered screener for migraine in primary care: The ID Migraine validation study." Neurology **61(3): 375-382.**

2) Trigeminal Autonomic Cephalgia (TAC)



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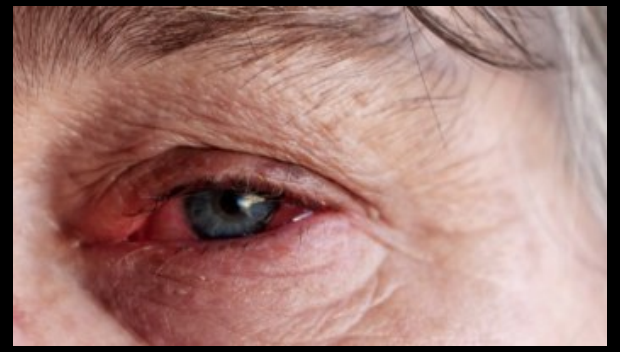
Cranial Autonomic Signs



- Red eye &/or Tearing
- Congestion &/or Rhinorrhea
- Eyelid edema
- Facial Sweating
- Miosis &/or Ptosis

±Restlessness

Mild lacrimation is common in trigeminal neuralgia!

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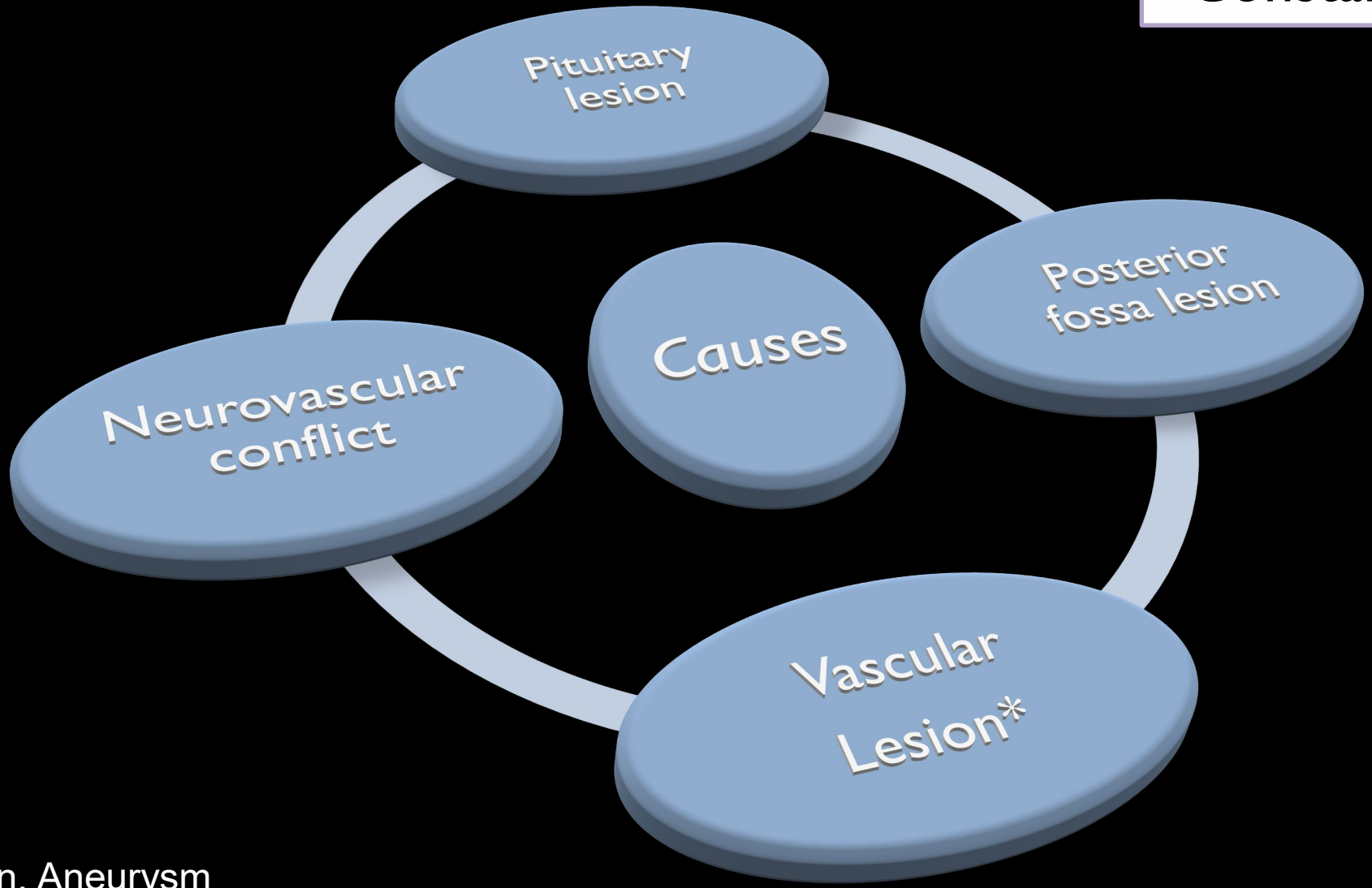
IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

Secondary TACS

±Atypical features
Constant or episodic



*E.g. Dissection, Aneurysm

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Chowdhury D. Secondary (Symptomatic) Trigeminal Autonomic Cephalalgia. Ann Indian Acad Neurol. 2018 Apr;21(Suppl 1):S57-S69.

3) Persistent Idiopathic Facial Pain (PIFP)

- Old term = Atypical facial pain
- Isolated to tooth = Atypical odontalgia

Diagnostic Criteria
A. Facial / Oral pain
B. Daily (>2h/d) for >3 months
C. Both of:
Poorly localized (not nerve territory)
Dull / Achy / Nagging
D. Normal neuro exam
E. Dental cause excluded
F. No better diagnosis

Pathophysiology unclear -
but often trigger from mild injury with disproportion pain reaction

Common triggers = minor procedure in region of onset without visible damage

Often treatment refractory

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Benoliel, R. and C. Gaul (2017). "Persistent idiopathic facial pain." Cephalalgia **37(7): 680-691.**

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Can start focal (non-dermatomal)

Spread over time

40% Bilateral

**Can be burning, sharp or throbbing as well*

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→ Neuropathic pain/dysesthesia should be diagnosed as painful trigeminal neuropathy

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→ Some studies have some hypoesthesia on quantitative testing despite normal exam

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DDx =
1) Migraine
2) TCAs
3) Regional myofascial pain
4) Atypical or early trigeminal neuralgia

Common comorbidities:
1) Widespread chronic pain
2) IBS
3) Psychiatric disorders
4) Psychosocial disability

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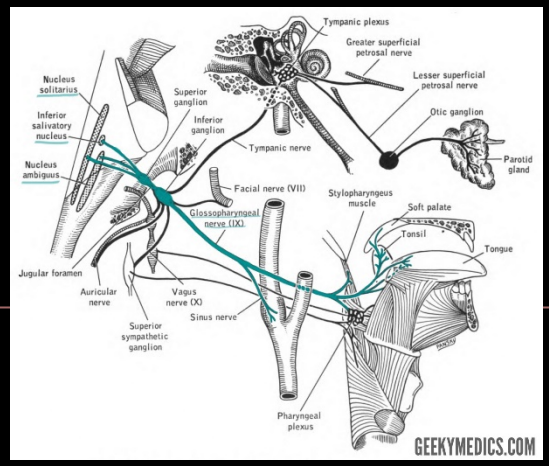
Benoliel, R. and C. Gaul (2017). "Persistent idiopathic facial pain." Cephalalgia **37(7): 680-691.**

4) Glossopharyngeal neuralgia



Pain Locations	Symptoms	Triggers
• Posterior tongue • Tonsillar fossa • Pharynx • Angle of jaw • Ear	• Weight loss • Cough • Hoarseness • Syncope • Bradycardia/asystole	• Swallow • Cough • Talk • Yawn

25% = Bilateral

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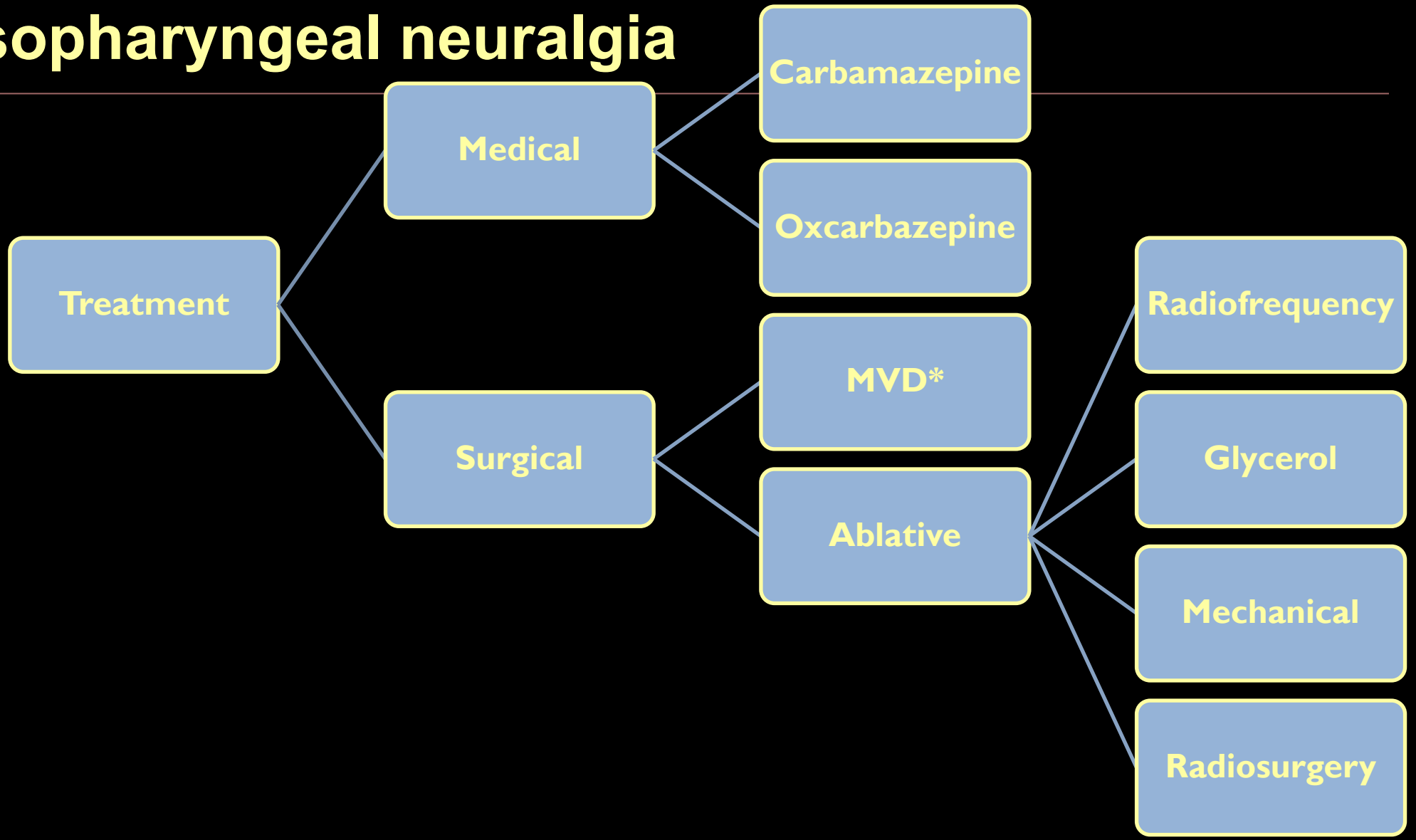
IHS (2018). "The Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**
Reddy & Viswanathan. Trigeminal and glossopharyngeal neuralgia. Neurol Clin. 2014 May;32(2):539-52.

*70-80% long-term success
PICA > AICA

4) Glossopharyngeal neuralgia



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Reddy & Viswanathan. Trigeminal and glossopharyngeal neuralgia. Neurol Clin. 2014 May;32(2):539-52.

*AKA Geniculate neuralgia

5) Nervus intermedius neuralgia*

Distribution

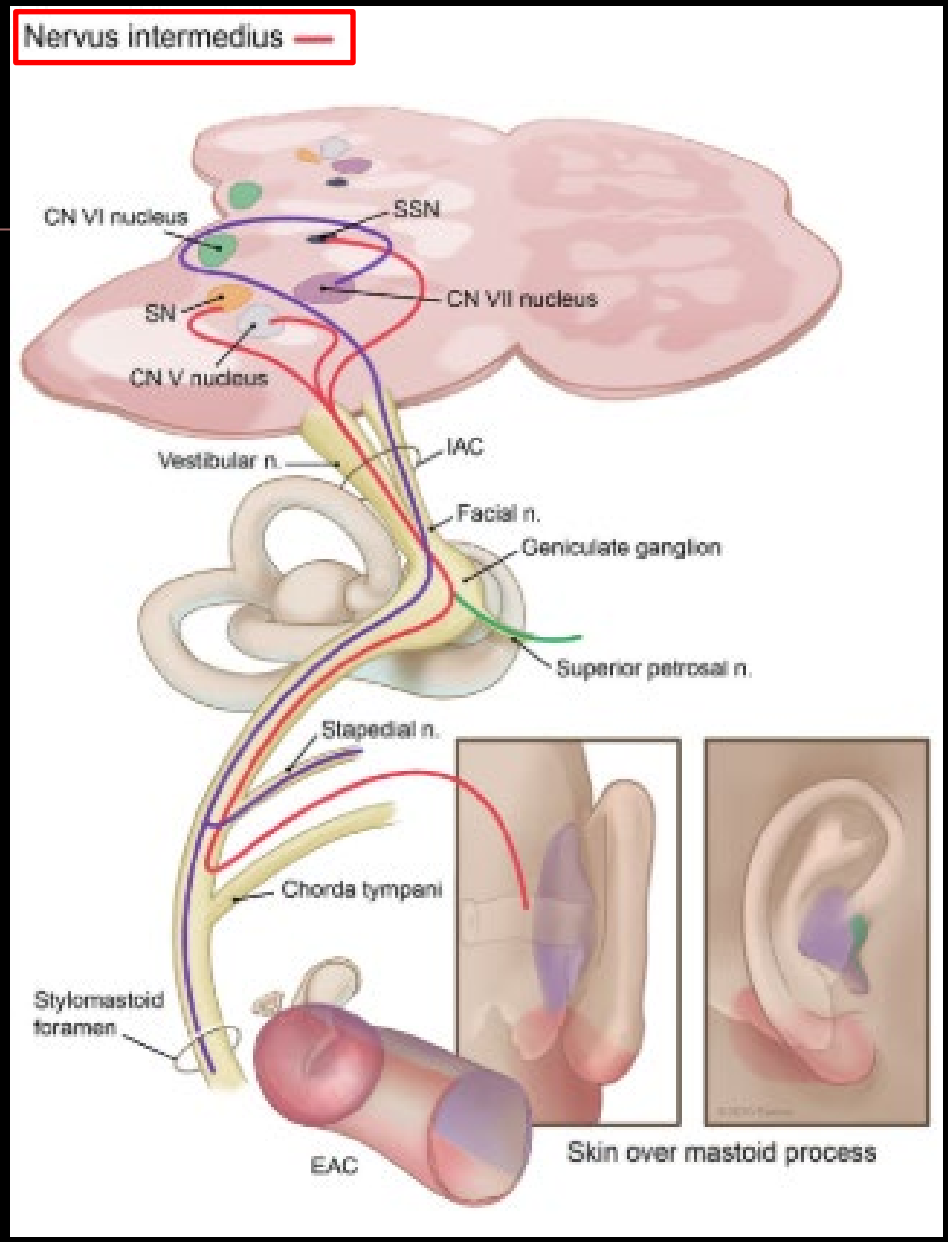
DEEP EAR ± radiation to parieto-occipital, mastoid, soft palate, temporal, or angle of jaw

Features

Trigger (2/3), Hearing loss (1/3), tinnitus (1/4), Vertigo (1/5), Unclear frequency cranial ANS

Etiology

50% Neurovascular conflict (esp AICA)



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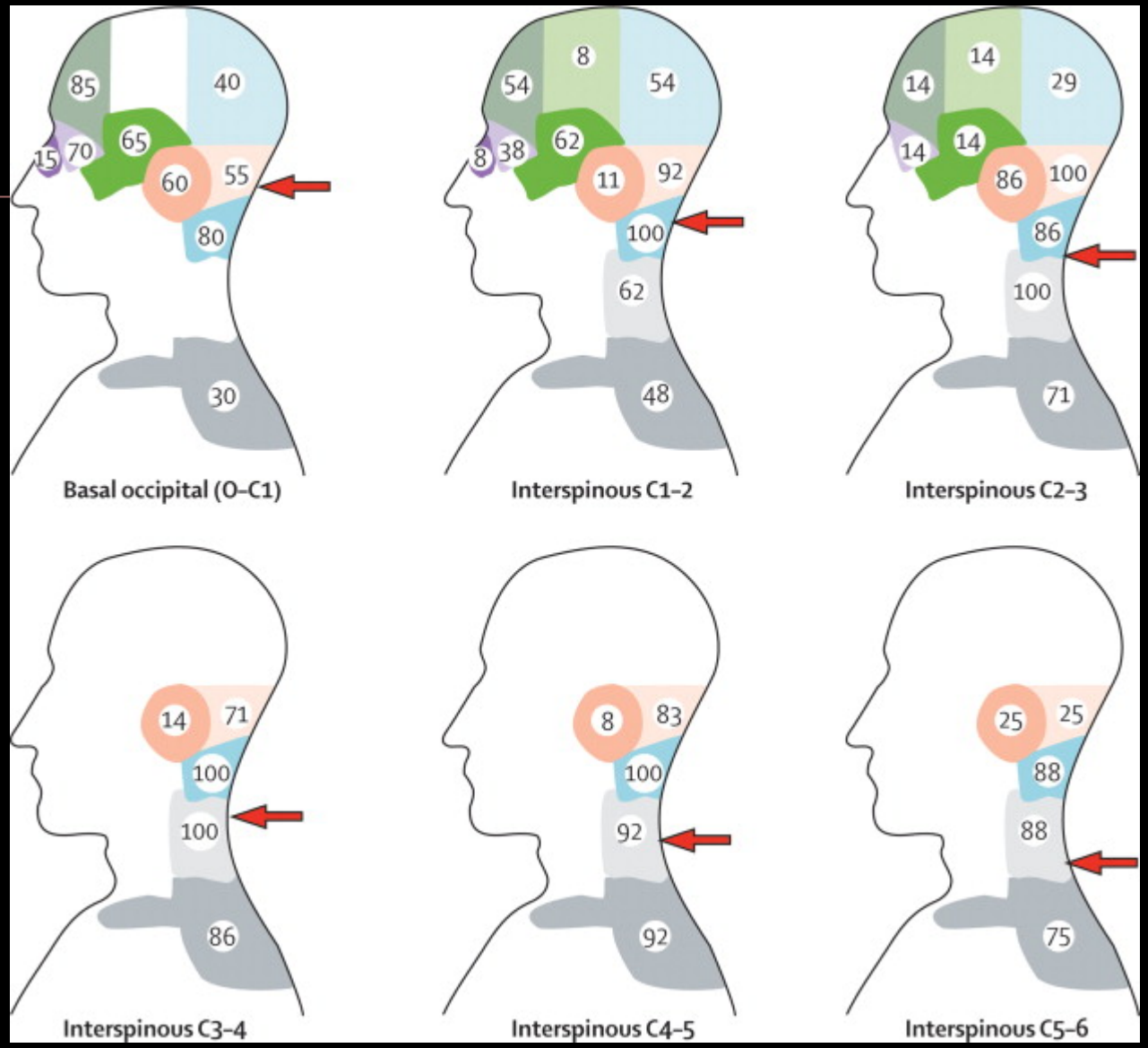
Robblee, J. (2021). "A pain in the ear: Two case reports of nervus intermedius neuralgia and narrative review." Headache **61(3): 414-421.**
IHS (2018). "The International Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

5) Cervicogenic Headache

Cervicogenic Headache can radiate to the upper face!

(esp 0 & C1-3)



***Numbers are % pain location from noxious stimulus*

Bogduk, N. and J. Govind (2009). "Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment." Lancet Neurol **8(10): 959-968.**

6) Headache attributed to TMD

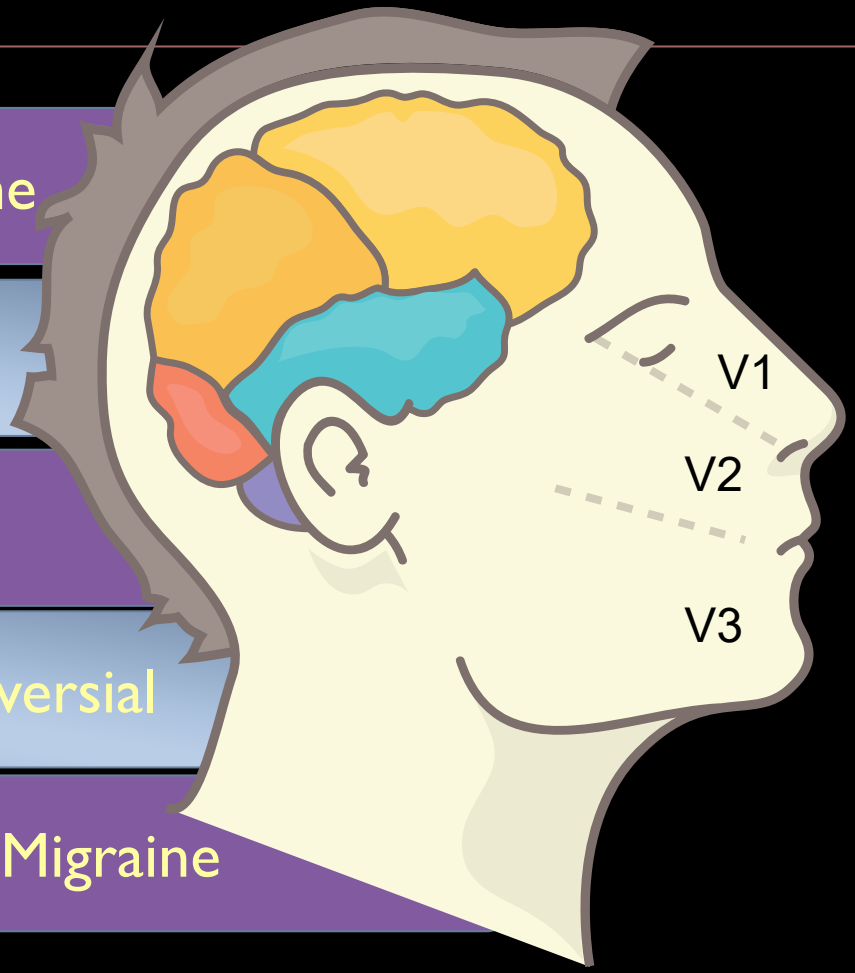
1. **TMD pain** = jaw, temple, in ear or anterior to ear
   - Affected by jaw movement

2. **Headache from TMD** = temporalis pain
   - Affected by jaw movement -&/or- Temporalis palpation
   - Known TMD diagnosis

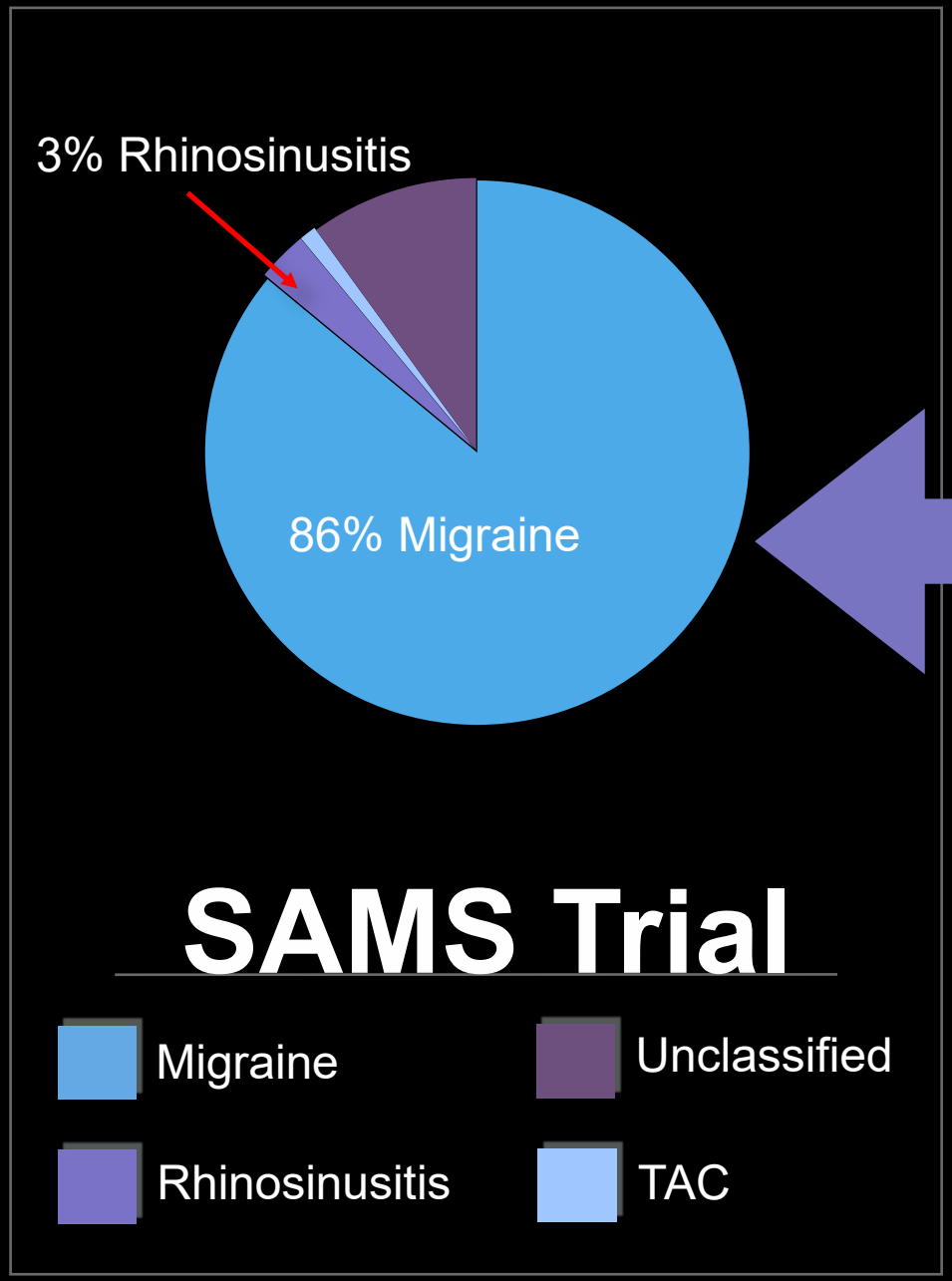
Schiffman, E., et al. (2014). "Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network* and Orofacial Pain Special Interest Group†." Journal of Oral & Facial Pain and Headache **28(1): 6-27.**

7) “Sinus” Headache

- Congestion = common in migraine
- CN5 innervates the sinuses
- Acute sinusitis is painful
- Chronic sinusitis = pain is controversial
- Runny nose & face pain → Think Migraine



Eross, E., et al. (2007). "The Sinus, Allergy and Migraine Study (SAMS)." Headache **47(2): 213-224.**



100 People self-diagnosed with sinusitis

Re-diagnosed based on IHS criteria

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Eross, E., et al. (2007). "The Sinus, Allergy and Migraine Study (SAMS)." Headache **47(2): 213-224.**

8) Periorbital pain

- Optic neuritis
- Trochlear Headache
- Optic ischemia
- Refractive error
- Recurrent painful ophthalmoplegic neuropathy
- Tolosa-Hunt Syndrome
- Ophthalmologic disorders (glaucoma, uveitis, etc)

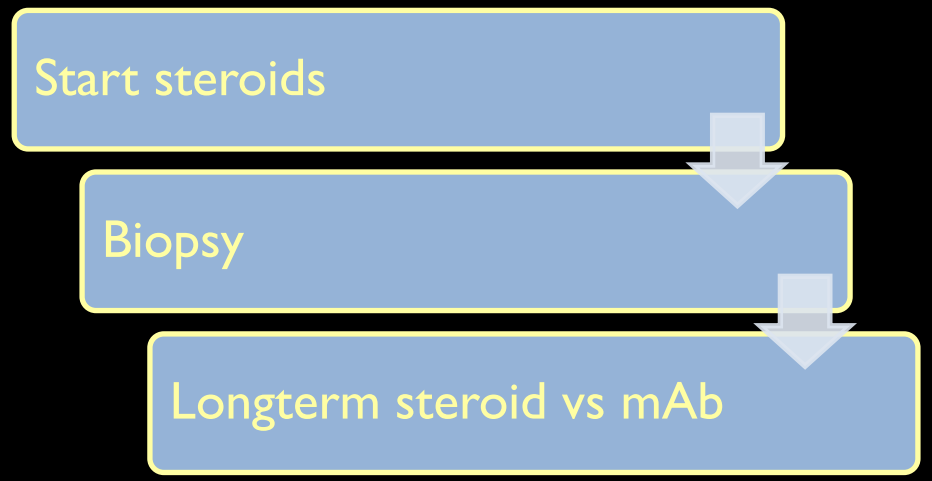
Van Deun, L., et al. (2020). "Facial Pain: A Comprehensive Review and Proposal for a Pragmatic Diagnostic Approach." European Neurology **83(1): 5-16.**

*JAW CLAUDICATION
-Muscle not TMJ pain
-Delayed after ++chewing

9) Giant Cell Arteritis

- Consider if:
  1) Age > 50y
  2) New onset headache
  3) Temporal artery tender, swollen or reduced pulsating
  4) ESR> 50
  5) Jaw claudication*
  6) PMR
  7) Constitutional symptoms

MANAGEMENT



Van Deun, L., et al. (2020). "Facial Pain: A Comprehensive Review and Proposal for a Pragmatic Diagnostic Approach." European Neurology **83(1): 5-16.**

10) Dental Related

Tooth Pain versus TN

Dentists are often the first point of contact
50% present to dentist first
50% of odontalgia TN → invasive procedures

-Cracked tooth: *shooting pain with hard food*

-Caries/pulpitis: *min-hrs pain with sweet/hot/cold*

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von Eckardstein KL, Keil M, Rohde V. Unnecessary dental procedures as a consequence of trigeminal neuralgia. Neurosurg Rev. 2015 Apr;38(2):355-60

11) Other

Neck-Tongue Syndrome

- Unilateral neck pain with turning + ipsilateral tongue sensation

Burning Mouth Syndrome

- Daily superficial tongue burning sensation despite normal appearance

Central Pain

- Post stroke or MS in craniocervical region (fitting CNS lesion) often with impaired sensation

IHS (2018). "The Classification of Headache Disorders, 3rd edition." Cephalgia **38(1): 1-211.**

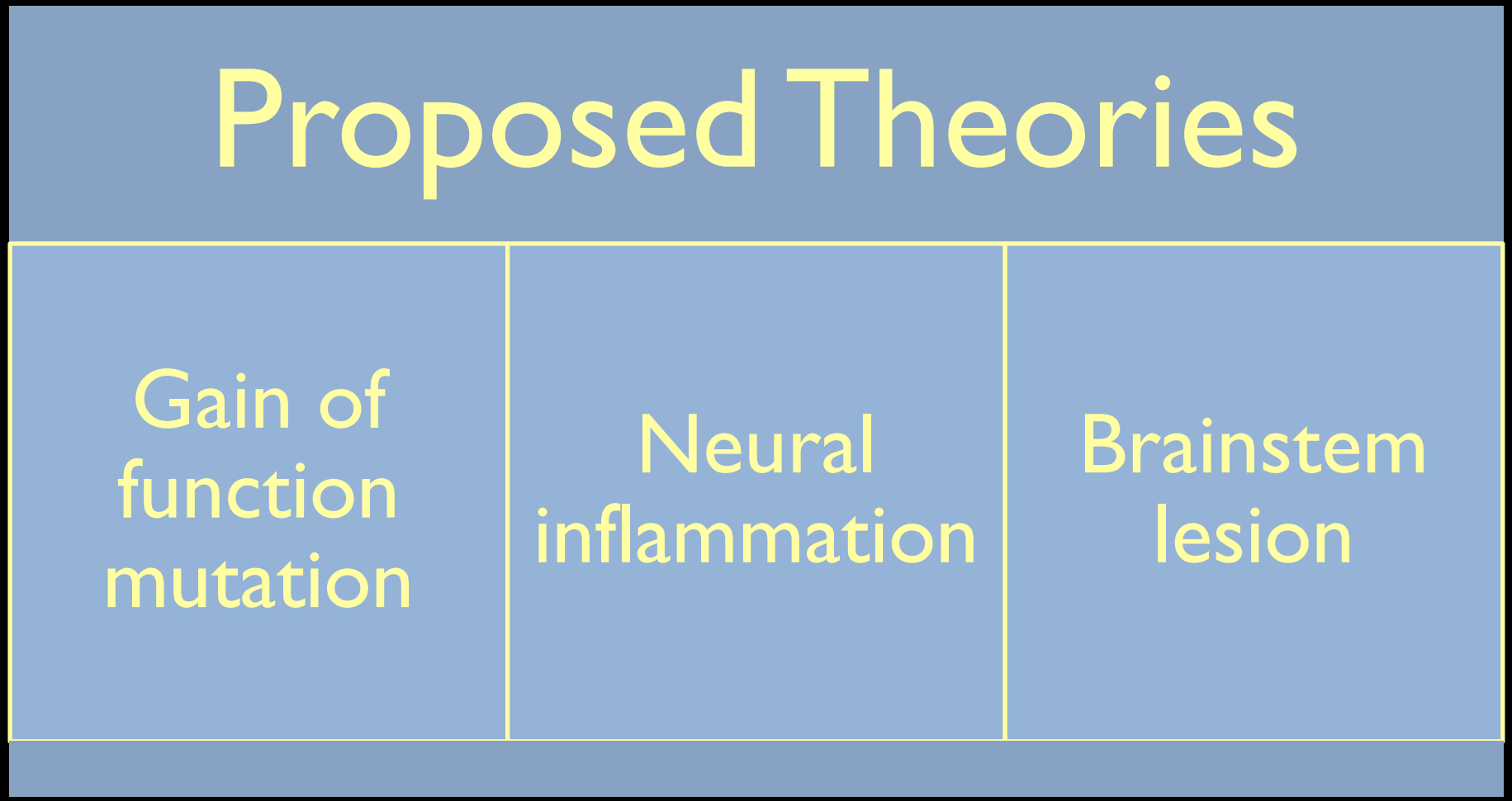
Trigeminal Neuralgia Pathophysiology

Classical Trigeminal Neuralgia Pathophysiology

- Usually targets root zone entry
  - Transition between Schwann cells & oligodendroglia
- Biopsy findings:
  - De- / Dys- / Re-myelination
  - Atrophied nerve
  - Displaced by vessel
- Demyelination → Hyperexcitability → Ectopic impulses → Pain
- Theory for tactile trigger =
  - Ephaptic connection between Aβ & Aδ fibers

Bendtsen, L., et al. (2020). "Advances in diagnosis, classification, pathophysiology, and management of trigemin neuralgia." Lancet Neurol **19(9): 784-796.**

Idiopathic Trigeminal Neuralgia Pathophysiology



Possible factors:

1) *Central nociceptive contribution*
2) *Reduced descending inhibition*

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Trigeminal Neuralgia Treatment

Acute Treatment

- ***Summary = No great options***

Pills	Procedures	Admission
• Ø Opioids • Too slow • No evidence	• Bridging blocks? • SPG Block?	• IV Lidocaine • IV fosphenytoin

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Other considerations:
-Pregabalin
-Phenytoin
-Baclofen

Preventive Treatments

Drug	Dosing	Study	% Response	NNT	NNH
- - FIRSTLINE - -					
Carbamazepine	200-1800mg	RCT x 3	73-100%	1 to 2.1	11.1
Oxcarbazepine	300-2700mg	RCT x 1	100%	1	-
- - SECONDLINE - -					
Lamotrigine	25-800mg	RCT x 1	85%	-	-
Gabapentin	600-3600mg	Meta-analysis	= CBZ	-	-
OnabotA	50-100u	RCT x 1	77%	2	5.9

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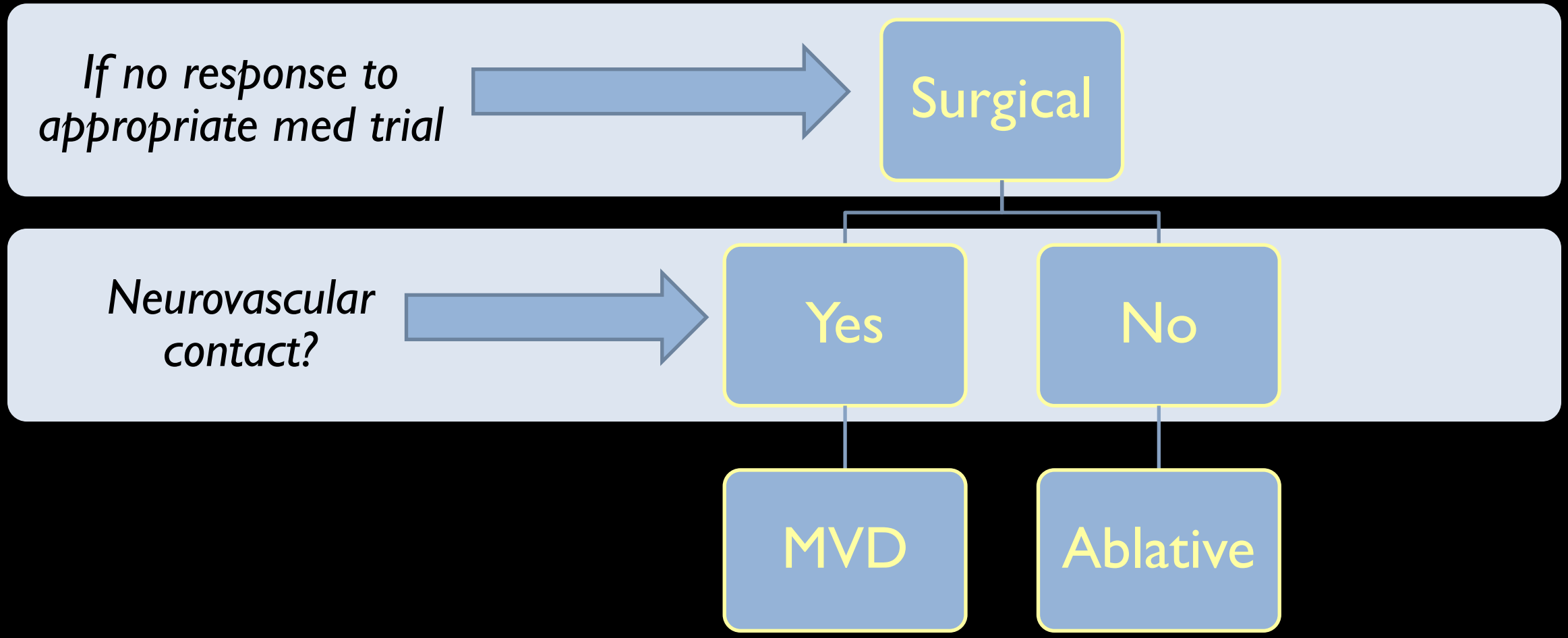
Surgical Treatment



Microvascular Decompression (MVD)

- Indication = Neurovascular compression / displacement of CNV
- Non-destructive
- Craniotomy to decompress vessel from nerve
- Success rate = 62-89% pain free
- Complications:
  - Common = cranial nerve palsy (4%), Hearing loss (1.8%), & facial numbness (3%)
  - Rare (<1%) = Meningitis, Post-traumatic TN, Stroke, ICH, Death

Neuro-ablative Procedures

Balloon compression	Radiofrequency thermocoagulation	Glycerol injection	Gammaknife Surgery
55-80% response	**26-82% response**	**19-58% response**	**30-66% response**

Facial (19%) & Corneal (5%) numbness. <1% of trigeminal weakness, meningitis, post-traumatic TN

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Non-pharmacologic Considerations

- Behavioral management
- Dental care
- Drug monitoring (liver, renal, Na+)

Summary

Diagnosis

Other DDx

Treat

Diagnostic Criteria	
A.	Facial / Oral pain
B.	Daily (>2h/d) for >3 months
C.	Both of:
	Poorly localized
	Dull / Achy / Nagging
D.	Normal neuro exam
E.	Dental cause excluded
F.	No better diagnosis

1. Migraine	7. "Sinus" HA
2. TAC	8. Peri-oribital
3. PIFP	9. GCA
4. GN	10. Dental
5. NIN	11. Neck/tongue
5. Cervicogenic	12. BMS
6. TMD	13. Central pain

Medical	Surgical
Carbamazepine	MVD
Oxcarbazepine	Ablative
Lamotrigine	-Mechanical
Gabapentin	-Chemical
OnabotA	-Thermocoag
-Other	-Gammaknife

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Thank You!

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