Case Presentation:

Trigeminal Neuralgia (TN)

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APPE Formal Presentation
Novant Health Care Connections
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Objectives

- Describe the pathophysiology/etiology/diagnosis parameters of TN
- Describe treatment and surgical options for TN
- Review primary literature and how it relates to the patient case

Patient Case - ZZ

HPI	71 year old female; presenting with TN along with T2DM, HTN and Dyslipidemia
PMH	Cardiac & Vascular: HTN, Dyslipidemia Endocrine & Metabolic: T2DM Neuro: TN of Right Side of Face
Allergies	Thimerosal → Redness & Swelling
SH	Current Smoker: • Reports that she has never smoked. • She has never used smokeless tobacco. Current Alcohol Use: • Reports no history of alcohol use.
Symptoms	The patient describes the pain as "boring" and "burning." It used to not be present in the morning, but now it is present constantly and increases over time from a 3-4 in the morning to a 7-8 in the evening. At night it can become very severe.

Pertinent Medications

Trigeminal Neuralgia
Clonazepam 1 mg Take ½ - 1 tablet PO TID PRN
Duloxetine 60 mg Take 1 capsule PO Daily
Gabapentin 600 mg Take 1 capsule PO TID
Tizanidine 4 mg Take 1 tablet PO QHS PRN

T2DM
Empagliflozin 10 mg Take 1 tablet PO Daily

HTN
Hydrochlorothiazide 12.5 mg Take 1 tablet PO Daily
Losartan Potassium 100 mg Take 1 tablet PO Daily

Dyslipidemia
Atorvastatin 20 mg Take 1 tablet PO Daily

Pertinent Labs

Date	Blood Pressure
10-23-19	138/74
11-8-19	138/86
11-14-19	156/90

Date	Hgb A1C (%)
5-22-19	6.9
9-20-19	6.9

Basic Metabolic Panel (BMP)

Component	Latest Ref Rng & Units	5/22/2019	9/21/2017	8/25/2016
Glucose	65 - 99 mg/dL	**130 (H)**	98	97
BUN	6 - 24 mg/dL	**17**	13	9
Creatinine	0.57 - 1.00 mg/dL	**0.82**	**0.46 (L)**	0.60
eGFR Non-African American	>59 mL/min/1.73	**80**	113	104
eGFR, African American	>59 mL/min/1.73	**93**	130	120
BUN/Creatinine Ratio	9 - 23	**21**	**28 (H)**	15
Sodium	134 - 144 mmol/L	**137**	139	137
Potassium	3.5 - 5.2 mmol/L	**5.0**	4.5	4.7
Chloride	96 - 106 mmol/L	**98**	96	99
CO2	20 - 29 mmol/L	**24**	24	24
Calcium	8.7 - 10.2 mg/dL	**9.7**	9.8	9.2

Epidemiology/Etiology/Pathogenesis/Diagnosis

TN

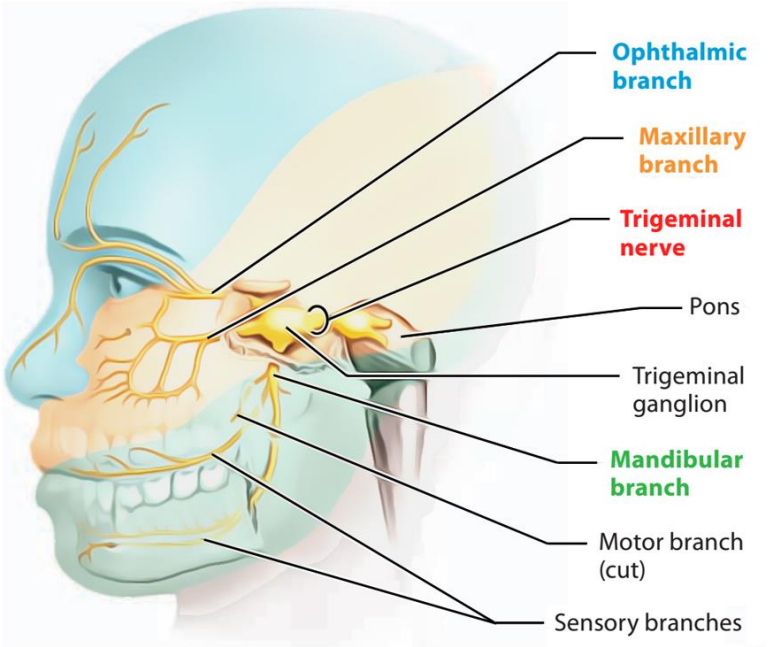
TN: Epidemiology

- The annual incidence of TN is 4 to 13 per 100,000 people (U.S)
- The incidence increases gradually with age; most idiopathic cases begin after age 50, although onset may occur in the second and third decades or, rarely, in children.
- TN is a rare condition that affects women more than men.
  - The male-to-female prevalence ratio of TN ranges from 1:1.5 to 1:1.7
  - The female predominance may be related to the increased longevity of women compared with men.

Typical TN: Etiology

Most cases of TN are caused by compression of the trigeminal nerve root [Typical TN], usually within a few millimeters of entry into the pons (the root entry zone)

- Compression of an aberrant artery or vein is thought to account for 80 to 90 percent of cases



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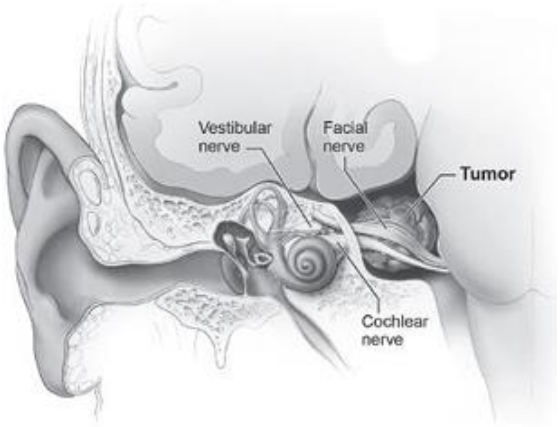
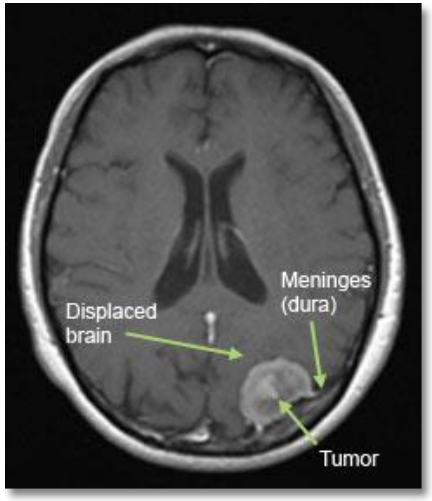
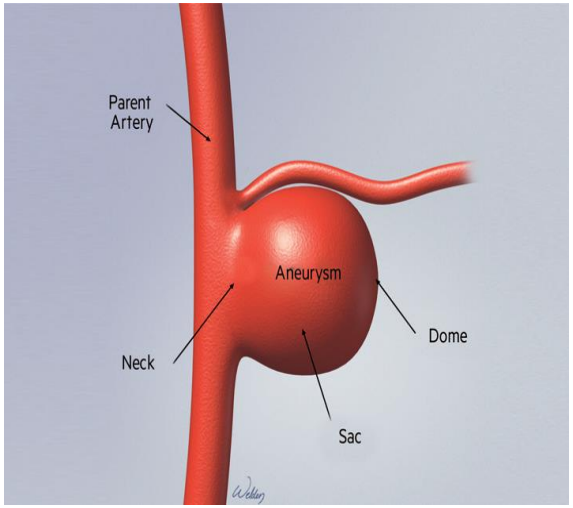
Atypical TN: Etiology Continued

Other Causes of TN:

- Vestibular Schwannoma
- Meningioma
- Saccular Aneurysm [RARE]







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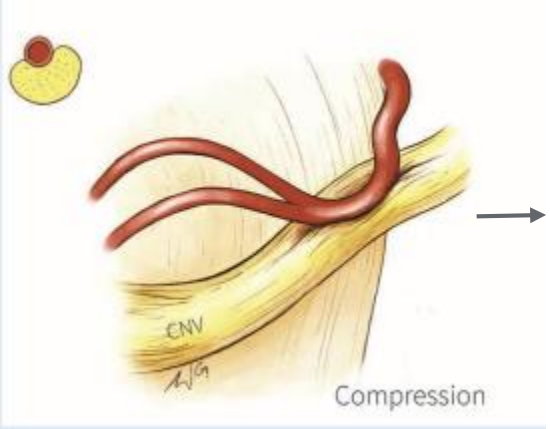
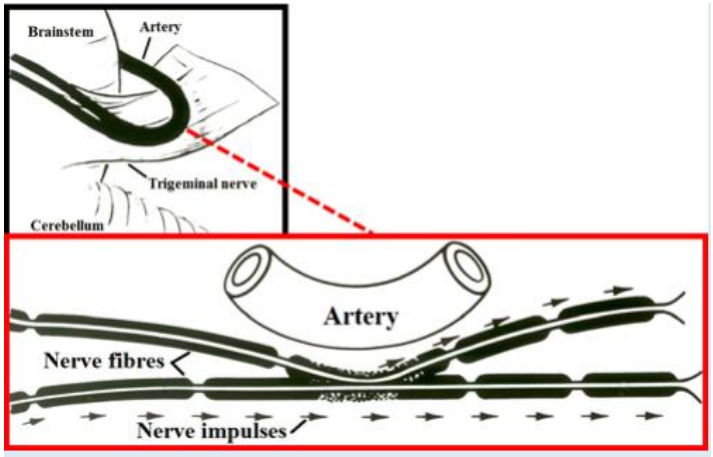
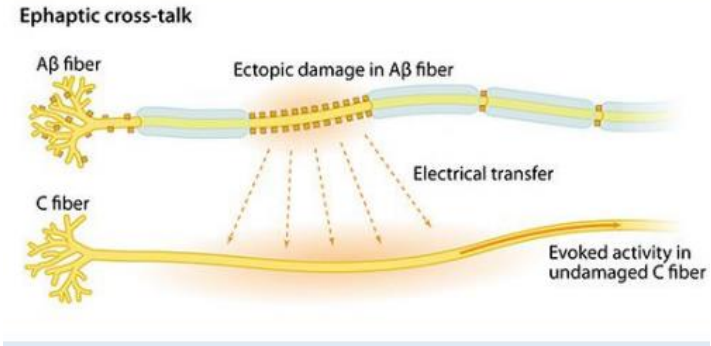
Pathophysiology of Typical TN

Step-By Step
Atherosclerotic blood vessel pressing on the root of Trigeminal Nerve
Focal demyelination
Increased firing of the afferent or sensory fibers
TN



→ Focal Demyelination →





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TN: Classification

Typical (Type 1) TN	Atypical (Type 2) TN
• Encompasses cases related to vascular compression • Symptoms include sudden or sporadic periods of intense facial pain or burning. • Attacks can last from a few seconds to a few minutes. • Painful episodes occur in rapid succession and may continue for a few hours, but there are generally pain-free periods between attacks.	• Encompasses cases caused by an underlying disease such as multiple sclerosis or a tumor along the trigeminal nerve. • Characterized by constant pain, with stabbing, burning or aching sensations that may be less intense but more widespread than those associated with Type 1.

TN: Diagnosis

The International Classification of Headache Disorders, Third Edition (ICHD-3) diagnostic criteria for TN
Recurrent paroxysms of unilateral facial pain in the distribution(s) of one or more divisions of the trigeminal nerve, with no radiation beyond, **and** fulfilling criteria **B and C**
(A) Pain has all of the following characteristics: • Lasting from a fraction of a second to two minutes • Severe intensity • Electric shock-like, shooting, stabbing or sharp in quality
(B) Precipitated by innocuous stimuli within the affected trigeminal distribution
(C) Not better accounted for by another ICHD-3 diagnosis

Signs and Symptoms

Trigeminal Neuralgia

TN: Signs and Symptoms

Signs & Symptoms
Episodes of severe, shooting or jabbing pain that may feel like an electric shock
Spontaneous attacks of pain or attacks triggered by things such as touching the face, chewing, speaking or brushing teeth
Pain affecting one side of the face at a time, though may rarely affect both sides of the face
Pain in areas supplied by the trigeminal nerve, including the cheek, jaw, teeth, gums, lips, or less often the eye and forehead
Constant aching, burning feeling that may occur before it evolves into the spasm-like pain of trigeminal neuralgia

Risk Factors

Trigeminal Neuralgia

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Aortic Dissection: Risk Factors

Advanced Age

The risk of TN is higher among older people, especially between 50 to 60 years of age

Female Sex

Women are at a higher risk than men to be affected by TN

Multiple Sclerosis

TN is known to be associated with multiple sclerosis, a condition that causes degeneration of the myelin sheath of nerves.

Initial Management

Trigeminal Neuralgia

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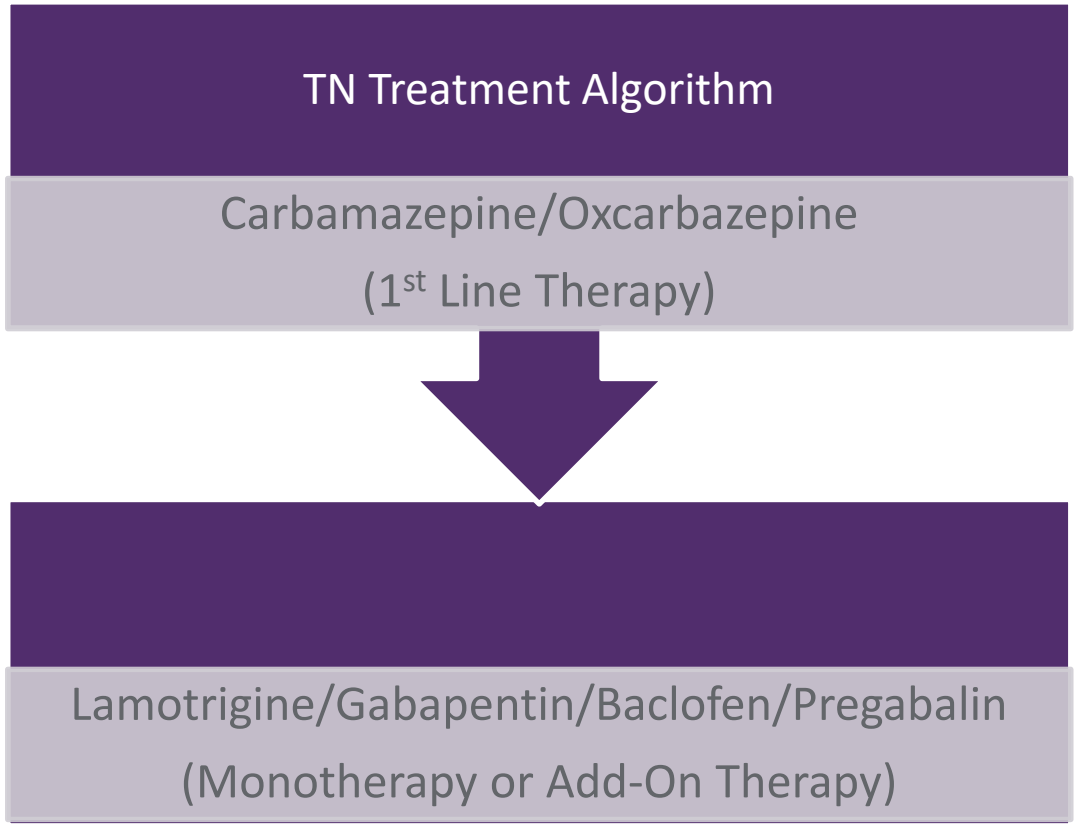

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TN: Surgical Options

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Guideline Summary
European Academy of Neurology - 2019
Trigeminal Neuralgia

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Guideline Summary

- In 2019, the European Academy of Neurology (EAN) developed guidelines for daily clinical management of patients with trigeminal neuralgia (TN).
- Recommendations include the following:
  - All TN patients should undergo MRI
  - Carbamazepine and Oxcarbazepine should be used as **first-line prophylactic** treatments of TN
  - Lamotrigine, Gabapentin, Botulinum toxin type A, Pregabalin, Baclofen, and Phenytoin may be used either alone or as add-on therapy
  - Patients should be offered surgery if pain is not sufficiently controlled medically or if medical treatment is poorly tolerated
  - In patients with Typical TN, microvascular decompression is recommended as first-line surgery

TN: Treatment Dosing Chart

Carbamazepine	Start: 100-200 mg twice daily Maintenance: 600-800 mg daily in divided doses Max: 1,200 mg daily
Oxcarbazepine	Start: 600 mg daily in divided doses Max: 1,200-1,800 mg daily
Lamotrigine	Start: 25 mg daily for first 2 weeks, 50 mg for week 3-4 Maintenance: Increase by 50 mg daily every 1-2 week until 400 mg daily is reached in 2 divided doses.
Baclofen	Start: 15 mg daily in 3 divided doses Maintenance: 50-600 mg daily
Gabapentin	Start: 300 mg daily, can be increased by 300 mg every 2-3 days as tolerated. Max: 1,800 mg daily

Primary Literature

Trigeminal Neuralgia

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Defining the role for gabapentin in the treatment of trigeminal neuralgia: A retrospective study * **

William P. Cheshire Jr

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https://doi.org/10.1054/jpai.2002.122944

Design

Purpose

This was a retrospective study to prove that gabapentin can be effective as first or second line treatment of trigeminal neuralgia, even in cases resistant to traditional treatment modalities. This study surveyed the cumulative experience with gabapentin for patients with trigeminal neuralgia seen at the Mayo Clinic in Jacksonville, Florida.

Methods

This retrospective review examined 194 consecutive cases of trigeminal neuralgia, many of whom had paroxysmal facial pain resistant to previous surgical interventions or treatment with multiple medications.

Baseline Characteristics

Table 1. Clinical Characteristics of Patients

Characteristic	Pain relieved by gabapentin (%)	Pain not relieved by gabapentin (%)	Did not receive gabapentin (%)
Mean age (y)	68	65	69
Duration of pain (mo)	8.2	6.8	8.2
Right-sided pain	24 (56)	24 (49)	51 (51)
Left-sided pain	17 (40)	22 (45)	42 (42)
Bilateral pain	2 (4)	3 (6)	7 (7)
Single nerve division pain	21 (50)	26 (53)	62 (64)
Multiple nerve division pain	21 (50)	23 (47)	35 (36)
Underlying etiology	6 (14)	9 (18)	8 (8)
Multiple sclerosis	1 (2)	3 (6)	4 (4)
Brain stem infarction	0 (0)	2 (4)	0 (0)
Tumor	1 (2)	2 (4)	2 (2)
Cluster-tic syndrome	2 (5)	1 (2)	1 (1)
Evaluated by the author	25 (58)	27 (55)	33 (32)
Total patients	43	49	102

Results

Table 2. Comparison of Medication and Surgical Groups

Group	Pain relieved by gabapentin	Pain not relieved by gabapentin
Medication group		
No previous drug	4	0
One previous drug	8	7
Multiple previous drug trials	31	42
Total patients	43	49
Surgery group		
No previous surgery	25	21
One previous surgery	12	15
Multiple previous surgical procedures	6	13
Total patients	43	49

- Of the 194 patients treated for trigeminal neuralgia, 92 received a trial of gabapentin.
- Of these 92 patients, pain relief on gabapentin was complete in 16 (17%) and nearly complete in 9 (10%), whereas pain reduction was moderate in 12 (13%) and partial in 6 (7%).
- Pain was not relieved in the remaining 49 (53%).
- Of the 43 (47%) who benefited from gabapentin, reduction of pain was sustained during follow-up (mean follow-up time ~ 8 months) in 27 (63%).

Results Continued

Initial Dose: 100 mg TID

- Some patients were started on 100 mg daily

Depending on the rate of dose titration, pain relief was usually achieved within 1 to 3 weeks.

Maximum effective daily doses were distributed as follows:

- 100 mg in 3 patients
- 200 to 300 mg in 10 patients
- 400 to 600 mg in 6 patients
- 900 mg in 9 patients
- 1,000 to 1,600 mg in 8 patients
- 1,800 to 3,200 mg in 6 patients

Dose increase was limited by side effects of mild dizziness or somnolence in 7 (16%) of patients who benefited and in 13 (27%) of those who did not.

Conclusions

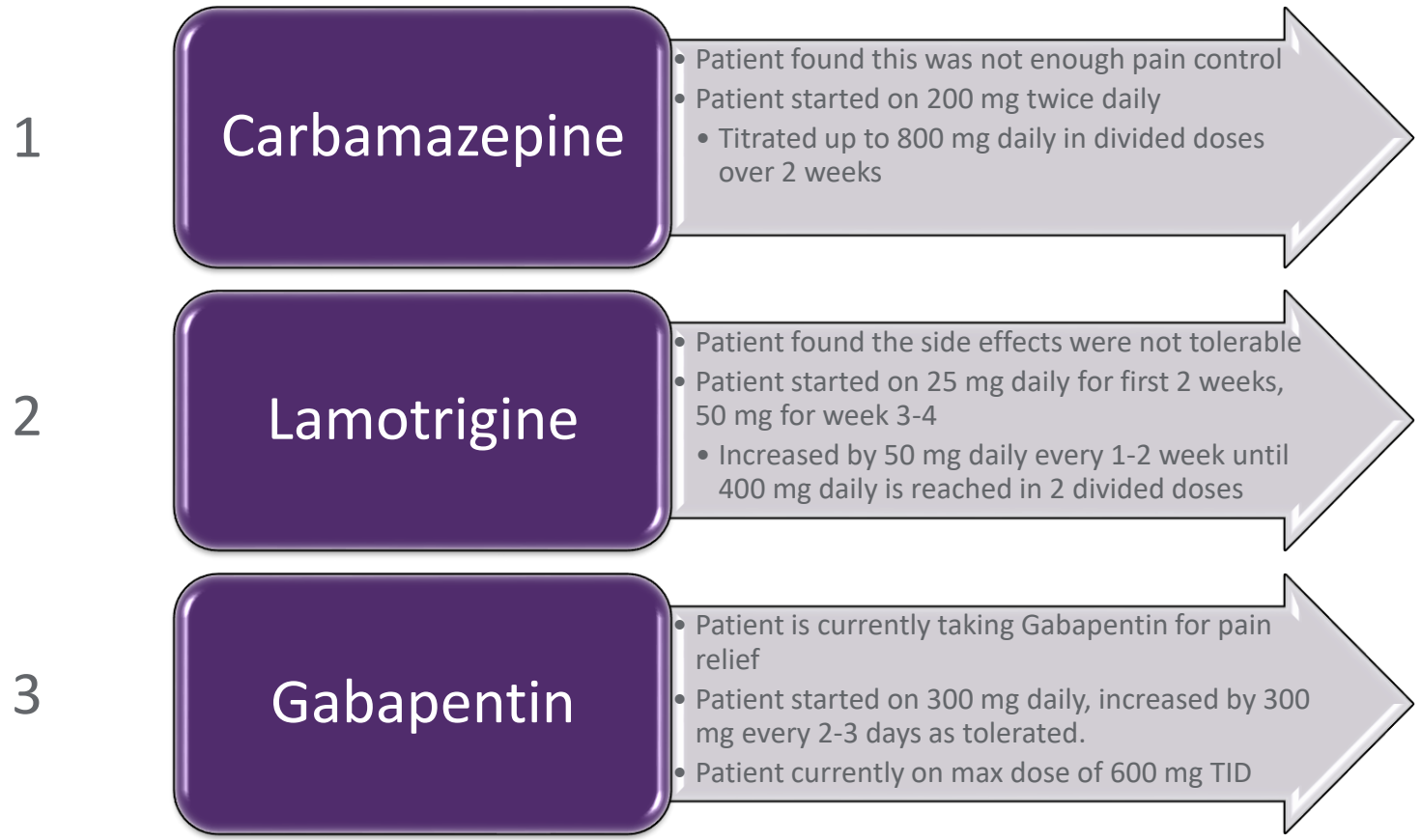
This retrospective study of 194 patients with trigeminal neuralgia found that gabapentin was effective in relieving or reducing paroxysmal pain in nearly half of the 92 patients who underwent a trial of therapy.

Onset of pain relief in most cases occurred within 1 to 3 weeks.

The range of effective stable daily dosing varied greatly among patients, from 100 to 2,400 mg divided 3 times a day, with a mean of 930 mg.

Of the patients who reported pain relief, this benefit was sustained in approximately two thirds.

Patient Case - ZZ



The patient currently goes to:
Neurological Surgery, Neurology, Psychiatrist, Palliative Care Specialist, Family Medicine

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Summary

Trigeminal neuralgia (TN) is characterized by recurrent brief episodes of unilateral electric shock-like pains, abrupt in onset and termination, in the distribution of one or more divisions of the fifth cranial (trigeminal) nerve that typically are triggered by innocuous stimuli

TN is a rare disease but often associated with debilitating pain and disability. Various neurological and infectious causes can mimic its symptoms, and the exact diagnosis is recommended prior to initiation of treatment.

Future Research

There is a great need for future research in the pathophysiology and prognosis of TN and for development of more standardized outcomes, including quality of life, to allow for a more reliable comparison of results from different studies.

Prospective studies are needed to evaluate outcome after surgery using independent assessors as well as studies comparing the various surgical procedures, and studies comparing these to pharmacological management.

Resources

1. Bendtsen L, Zakrzewska JM, Abbott J, Braschinsky M, Di Stefano G, Donnet A, et al. European Academy of Neurology guideline on trigeminal neuralgia. *Eur J Neurol*. 2019 Jun. 26 (6):831-849.
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