

Trigeminal Neuralgia: An Overview of Diagnosis and its Management

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Abstract: According to IHS (International Headache Society) “unilateral disorder characterized by brief electric shock – like abrupt in onset and termination, limited to the distribution of one or more trigeminal nerve”. According to the National Institute of Neurological Disorders and Stroke (NINDS) it notes that trigeminal neuralgia is twice as common in women than in men. Trigeminal neuralgia (TN) occurs when a person is more than 50 years of age. It’s reported that 150000 people are diagnosed with trigeminal neuralgia every year. According to Wikipedia the frequency of Trigeminal neuralgia (TN) is 1 in 8000 people per year. Trigeminal neuralgia (TN) cause is unknown but it’s believed to have a loosening of myelin sheath of trigeminal nerve, compression from a blood vessel might loss a myelin sheet. Trigeminal neuralgia (TN) is a type of a nerve pain. Pain is experienced even doing simple day to day activities like brushing, drinking, talking, shaving, wind blow, touching mouth. Currently medication and surgery are the options available for the treatment. Commonly used drugs are carbamazepine or oxcarbazepine in initial treatment. Nearly 90% of people have found it effective by initial drug treatment. In some case drug withdrawal is the side effect. Patient experiencing trigeminal nerve Trigeminal neuralgia (TN) should keep away from vitamin B and foods, liquids containing vit. B. Stress worsens Trigeminal neuralgia (TN). Maintaining healthy lifestyle including mindfulness, meditation, yoga, regular sleep, aromatherapy, acupuncture and mental health support.

Keywords: Trigeminal neuralgia (TN), national institute of neurological disorders stroke (NINDS), oxcarbazepine.

1. Introduction

Neuralgia means intense, typically intermittent pain along with the nerve, especially in head or face.

Neuralgia has 4 types-

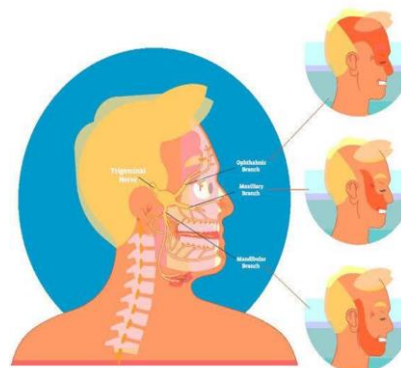
1. Trigeminal neuralgia
2. Gloss pharyngeal neuralgia
3. Occipital neuralgia
4. Post herpetic neuralgia.

There are 12 cranial nerves, cranial nerves are of 2 types

- Sensory - details about smell, sight, taste, touch, sound.
- Motor- refers to the signal that affects the activity of

muscles and glands.

Trigeminal is the 5 nerves in Roman its (V). Trigeminal nerve consists of both sensory and motor. Trigeminal nerve function is for nerve communication, touch, pain, and temperature to the brain. The trigeminal nerve has three branches. It joins at the trigeminal ganglia and branches out to different parts of the face. Each branch division has a slightly different function



1) Ophthalmic division

The ophthalmic division conveys sensory information from the:

- Scalp
- Forehead
- Upper parts of the sinuses
- Upper eyelid and associated mucous membranes
- Cornea of the eye
- Bridge of the nose

2) Maxillary division

Like the ophthalmic division, the maxillary division of trigeminal nerve has a sensory component. It transmits sensory information from the:

- Lower eyelid and associated mucous membranes
- Middle part of the sinuses
- Nasal cavity and middle part of the nose
- Cheeks

- Upper lip
- Some of the teeth of the upper jaw and associated mucous membranes
- Roof of the mouth

3) *Mandibular*

The mandibular division is the only part of the trigeminal nerve that has both sensory and motor functions.

It communicates sensory information from the:

- Outer part of the ear
- Lower part of the mouth and the associated mucous membranes
- Front and middle parts of the tongue
- Teeth of the lower jaw and the associated mucous membranes
- Lower lip
- Chin

It also stimulates movement of the muscles in the jaw and some of the muscles within the inner ear. Trigeminal neuralgia condition reason is unknown, but according to the theory, its believed that due to myelin sheet and compression of the blood nerve give rise to the condition. Issue is with contact between a normal blood vessel and trigeminal nerve at base of the brain.

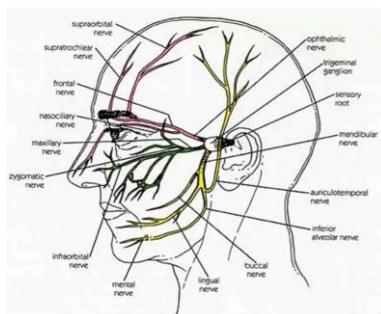
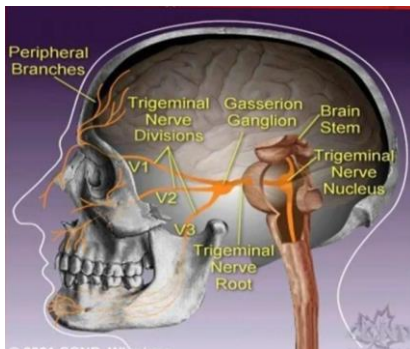
Trigeminal neuralgia is a chronic, neuropathic pain.

4) *Synonyms of Trigeminal Neuralgia are*

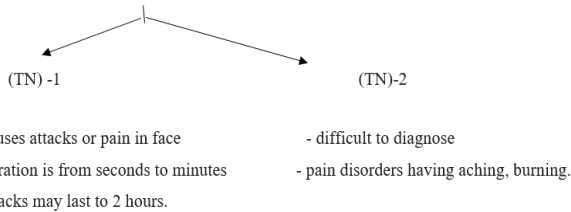
Fothergill Disease, Tic Douloureux, (TN), Trifacial Neuralgia.

2. Ethiology

- Primary demyelination - multiple sclerosis – condition where brain sheaths are damaged.
- Charcot -marie tooth disease (hereditary)- a genetic condition where mutation of genes occurs and affect the legs, hands and sometime it damages the nerve
- Infiltrative disorder of the trigeminal nerve root, ganglion nerve.
- Carcinomatous deposit
- Perineural spread of head and neck cancer.
- Non demyelinating lesion of pons or medulla.
- Familial trigeminal nerve.
- Compression lesion – tumor of cerebral pontine angle- is tumor that convert to a neoplasm
- Posterior cranial fossa tumor- a brain tumor that is located in or near the bottom of skull.
- Schwannomas – a benign tumor affecting the nervous system.
- Meningioma and epidermal cyst.



Trigeminal neuralgia ((TN)) are of two types-



3. Pathogenesis

Superior cerebral artery passing on or grooving the root of nerve cause pressure results in

Focal demyelination and hyperexcitability of nerve fibers.

Experiencing a fire like response to light touching results in intense pain episodes.

1) *Cause*

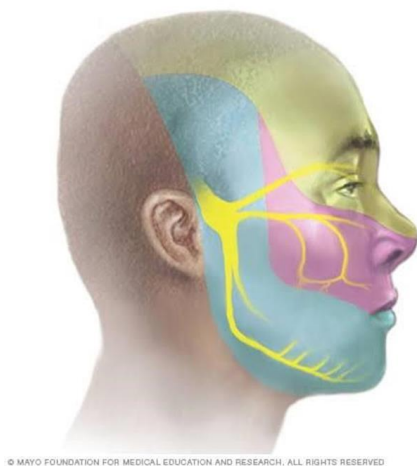
Trigeminal neuralgia usually occurs spontaneously, but is sometimes associated with facial trauma or dental procedures. The condition may be caused by a blood vessel pressing against the trigeminal nerve, also known as vascular compression. Over time, the pulse of an artery rubbing against the nerve can wear away the insulation, which is called myelin, leaving the nerve exposed and highly sensitive. The resulting symptoms can be similar to those caused by dental problems, and sometimes people with undiagnosed trigeminal neuralgia explore multiple dental procedures in an effort to control the pain.

2) *Symptoms*

Trigeminal neuralgia symptoms may include one or more of these patterns:

- 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
- Bouts of pain lasting from a few seconds to several minutes

- Episodes of several attacks lasting days, weeks, months or longer — some people have periods when they experience no pain
- Constant aching, burning feeling that may occur before it evolves into the spasm-like pain of trigeminal neuralgia
- Pain in areas supplied by the trigeminal nerve, including the cheek, jaw, teeth, gums, lips, or less often the eye and forehead
- Pain affecting one side of the face at a time, though may rarely affect both sides of the face
- Pain focused in one spot or spread in a wider pattern
- Attacks that become more frequent and intense over time.



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4. Diagnosis

1) Neurological examination by doctor

Doctor examine by touching the patient face if reflex occurs then trigeminal neuralgia.

2) MRI (Magnetic Resonance Imaging)

Doctor ask for MRI in order to check for multiple sclerosis, in some cases, doctor inject dye into blood vessel to view arteries and veins and highlight the blood flow (magnetic resonance angiogram).

3) Alternative diagnosis is

- Secondary trigeminal neuralgia
- Neuropathic
- Extra-Cranial
- Psychogenic

5. Medication

A. Anticonvulsant

For trigeminal neuralgia anticonvulsant medication are used. First line of medicines - Carbamazepine-

It has a good pain response for any pain relief.

Dose suggested is to have 100mg bid and in case of necessity increase the dose by 50-100 mg every 3-4 days but target dose may range from 400-1000mg/day. one should take a note that dose must be adjusted after 3 weeks as there is reduction in enzyme.

1) Oxcarbazepine

Pain relief is seen in all the patients. 300mg twice a day is a suggested dose. Whereas 600mg weekly could be increased. 600-2400 mg is the targeted dose. Dizziness, fatigue, rash and hyponatraemia are the side effects.

2) Lamotrigine

10/13 patients improved on lamotrigine whereas 8/14 were improved by placebo. 25mg twice a day having increase in 50mg weekly. And 200-600 mg daily will be the targeted dose.

3) Doses of medication

- Carbamazepine- 600-1200mg/day
- Oxcarbazepine- 600-1800mg/day Lamotrigine- 200-1400 mg/ day
- Gabapentin- 1800-4200mg / day.
- If the combination therapy fails, then Baclofenac is given 40-80 mg/ day.

4) Antispasmodic agents

Muscle relaxant such like baclofenac or lamotrigine. - Lamictal both are used alone or in combination of Carbamazepine.

5) Baclofenac/ Baclofen

7/10 people got relief from baclofen and $P = 0.05$, where P is for placebo. Drowsiness, hypotonia are the adverse effect. 10mg three times a day and if necessary, dose is increase by 10mg/day. Targeted dose should be 50-60 mg/day It may be useful for multiple sclerosis patients but antipasticity effect could be harnessed.

Side effects are common like dizziness, nausea, vomiting.

6) Botox injection

In small studies it is shown that Onabotulinumtoxin A (Botox) injection is used to reduce the pain.

7) Diet-

According to Trigeminal Association it recommends that patient should avoid hot eatable things like hot sauce, salsa, black pepper, ginger, nutmeg, cinnamon.

- Easy chewable foods should be taken,
- Have a lukewarm water
- Should have intake of high protein and calorie.
- Have a low saturated fat diet.
- Citrus foods and berries should be taken.

Vegan diet- Vegan people cannot take dairy products, meat, fish, and also honey. Hence, they should intake diet which are rich in carbohydrates, fats, whole grains, nuts.

Precaution- Patient should avoid cold and hot weather.

6. Ayurvedic Treatment and Medication

- Shallaki (*Boswellia serrate*) natural remedy for nerve [pain and act as an analgesic for nerve pain.
- Guggulu (*Commiphora wightii*) act as a nerve tonic and reduce anxieties cause due to intense pain.
- Shunthi (*Zinziber officinate*) act as an analgesic and anti- inflammatory.
- Rasna (*Pluchea lanceolata*) – boost nerve function which reduces (TN) episodes.
- Errand (*Ricinus communis*) relief from nerve pain in teeth, gums and face.

- Guduchi (*Tinospora cordifolia*) analgesic and anti – inflammatory, reduces the intensity and frequency of (TN) attacks.

1) *Nasya therapy*

Nasya therapy can be performed alone also. Whereas it is a part of Panchakarma. As nose has nostril, oil is inserted into the nostril, as it is the gateway to the brain. Medicated or combination of oil is used for Trigeminal neuralgia treatment. In some case Anu tail is taken for Nasya kriya.

2) *Ayurveda intake of food*

- Fresh carrot juice should be taken as it has source of Vitamin A, B, C, B12 and folic acid. It should be taken once a day.
- Intake of almonds or almond milk, which will help in nervous system, help in hormone genesis. almond is rich in antioxidant, Vitamin E, Vitamin B
- Have fruit juice, milk, green leafy vegetables, whole grains, mint.
- 3-4 cloves of garlic with olive oil 2 times a day will reduce the swelling and improves the blood circulation.
- Drink turmeric milk 2 times a day
- Apply castor oil on affected part will reduce swelling and improves the skin elasticity.

7. Surgery-

If Trigeminal neuralgia is not get treated with medication, then surgery is the option.

Microvascular decompression: It is a non-destructive treatment. Craniotomy invasion is done.

Also known as Jannetta procedure.

1) *Procedure*

Surgeon will drill to make a hole and then will make an incision behind the ear or at pain site through a hole which is drilled. Through that hole surgeon will move any artery if in contact with trigeminal nerve or away from the nerve and will place a soft cushion between nerves and arteries. This procedure is done to prevent the malfunction.

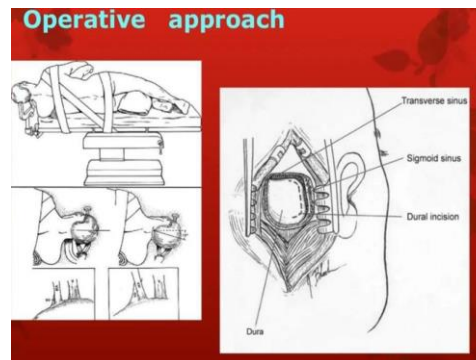
2) *Risk factors*

Facial weakness and facial numbness.

Success rate is 90% hence positive most of the time. Considering the risk there is no facial numbness afterwards.

3) *Effects*

- Average mortality rate ranges from 0.2% to 0.5% up to 4%.
- Patient suffer from cerebro spinal fluid (CSF) leakage, 11% patient suffer from meningitis
- 7% from hearing loss.
- Jaw weakness is 0.2%
- Dysesthesia is ranging from 0.2-4%
 - Ipsilateral deafness -1%
 - Corneal numbness-1.8%

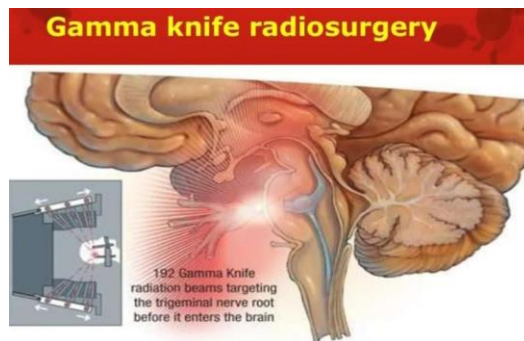


B. *Brain stereotactic radiosurgery (gamma knife surgery)*

Gamma knife is focused array of 201 intercepting beams of gamma radiation, produced by separate cobalt sources. 70-90% of dose is given.

1) *Procedure*

Surgeon directs root of trigeminal nerve with the help of focused dose of radiation. It focusses on posterior fossa. Pain will be eliminated and procedure may be repeated if pain reoccurs.



Side effects – Facial numbness will be the after effect of the procedure.

2) *Disadvantages*

- Treatment expenses
- Patient having blood coagulation issue and patient having Warfarin intake.

3) *Alternatives and consideration*

- Radio frequency Lesioning (RFL) for elderly patient
- Gamma knife radiosurgery (GKR) is alternative for RFL in elderly patient.
- Posterior fossa exploration
- Microvascular decompression (MVD) for younger patients as they can tolerate long and invasive surgical procedures.

4) *Rhizotomy*

In this procedure the surgeon will destroy the nerve fibres to reduce pain and facial numbness. Percutaneously invasion is done.

Side effects include-

- Jaw weakness-3%
- Dysesthesia- 8%
- Ipsilateral deafness- 0%
- Corneal numbness- 8%

- Mortality is 0%

There are 3 types of Rhizotomy procedure

C. Glycerol injection

A mixture of phenol or glycerol or absolute alcohol or phenol is used is used in order to inject cistern.

1) Procedure

A needle is inserted through a face and opening is into the backside of skull, surgeon will guide the needle into trigeminal cistern, a small sac of spinal fluid that surrounds the trigeminal nerve ganglion (a part where trigeminal nerve divides into 3 branches. And root stem part. After this, surgeon will inject small amount of sterile glycerol, damage the trigeminal nerve and pain signals get block. This process relief the pain but after sometime patient will experience tingling and facial numbness.

D. Balloon Compression

A balloon will be pear in shape having 0.5-1 ml of contrast. Compression time will be of 1-7 minutes.

1) Procedure

A face incision will be done and a hollow needle will be inserted through a face to the base of trigeminal nerve. Surgeon will thread a thin, flexible tube a(catheter) with balloon at the needle end. Surgeon will inflate balloon enough pressure to damage the trigeminal nerve and pain signal will be block.

This process will control the pain but patient will face transient facial numbness.



E. Radio frequency thermal lesioning

Procedure destroys nerve fibres associated with pain using heat.

Duration is of 30-40 seconds.

Initially 10V approx. 60mA is given and its increase to 20V and 100mA.

1) Procedure

- Patient is set in sedation state surgeon will insert a hollow needle through the face which guides to trigeminal nerve.
- Once the needle is positioned, surgeon will awake the patient from the sedation state, simultaneously surgeon will insert a electrode and will ask the patient about the indication of when and where patient is experiencing tingling,
- When the location part is confirmed which is involved in the pain, patient is returned to sedation state again. Electrode is heated until it damages the nerve fibre, creating lesion (injury).
- If pain is not gone, surgeon will create additional lesion.

- After the procedure there will be temporary numbness. Pain will reoccur after 3-4 years.

2) Peripheral procedures

- Peripheral neurectomies
- Cryotherapy
- Alcohol block
- Streptomycin and lidocaine injections.

OMFS (Oral and Maxillofacial surgery) includes-

Peripheral neurectomy

- Supra orbital
- Infra orbital
- Inferior alveolar
- Long buccal
- Lingual (in rare case)

8. Conclusion

Trigeminal neuralgia is a chronic neuropathic pain. It is a rare disease. Hence the population affected to it is less. Though the disease is rare but it thus affects the quality of life of the patient. Patient need care and precaution should be taken along with mental health support. There are various medicines which are used for the treatment, it can be used alone or in combination. If medication fails, surgery option is also available, depend upon the type its side effect as well as effectiveness is seen.

Depend upon the age of person and its condition surgery alternative options are also available. If one opts for natural way it can go for Ayurveda. One can itself take the diet accordingly and control the condition to some extent. There is no sure guarantee that the condition is gone forever. But making change in the lifestyle, doing exercise, meditation, avoiding the foods, conditions that triggers the pain and considering the precaution can avoid and keep away the Trigeminal neuralgia condition in some case.

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