RECENT ADVANCES IN DIAGNOSIS AND TREATMENT OF NEURALGIA

Ghanshyam Sevak *, B S Sonigara1 And Kumkum Sarangdevot

1 B N College of Pharmacy, Udaipur, Rajasthan, India
2 Pacific College of Pharmacy, Udaipur, Rajasthan, India

ABSTRACT

Neuralgia describes a variety of rare and painful conditions in which shooting, stabbing, burning, pain, or numbness occur along the course of a nerve, usually in the head or neck. Many believe that the protective sheath of the nerve deteriorates, sending abnormal messages. Like static in a telephone line, these abnormalities disrupt the normal signal of the nerve and cause pain. Most often the damage is from a blood vessel compressing the nerve. Other causes include aging, multiple sclerosis, and nearby tumors. Trigeminal neuralgia was identified almost 2,000 years ago. Early treatments, like most medicine in those days, were mostly topical (applied to the skin) and ineffective. Today, the most effective treatments for neuralgia are allopathic, but alternative therapies may help support the patient’s general well being and improve overall health.

Keywords: Stabbing pain, Treatment, tumors, nerve, topical

INTRODUCTION

ABOUT NEURALGIA : Neuralgia describes a variety of rare and painful conditions in which shooting, stabbing, burning, pain; electric-like shocks; or tingling, pins and needles, or numbness occur along the course of a nerve, usually in the head or neck. Neuralgia attacks tend to by cyclic, often coming and going without warning. They can last for minutes, hours, days, or longer, depending on the patient, and range from mild to debilitating. Often, no physical cause can be found, although some forms of neuralgia may be triggered when nerves are compressed by injuries, arteries, tumors, or, in rare cases, as the result of nerve damage from multiple sclerosis. Neuralgia is an uncommon condition, with trigeminal neuralgia occurring most often. Other types are occipital neuralgia, glossopharyngeal neuralgia, and post herpetic neuralgia. Most neuralgia patients are 50 or older, although younger patients can be affected as well.

Classification of Neuralgia:-

Most neuralgia appears suddenly, with no apparent physical basis for the pain, which can be severe. Other neuralgias may follow an injury, with pain, burning, tingling, or numbness in whatever parts of the body the affected nerve supplies.

1. Trigeminal neuralgia (TN)
2. Glossopharyngeal Neuralgia(GN)
3. Occipital Neuralgia (OCN)
1. Trigeminal Neuralgia

Synonyms: - TIC DOULOUREUX, FOTHERGILLS DISEASE, PROSOPALGIA

Trigeminal neuralgia, also called tic douloureux, is a rare neurological disease that causes sudden, severe, brief, stabbing recurrent episodes of facial pain in one or more branches of the trigeminal nerve. It is usually caused when the trigeminal nerve is being compressed by an artery or a vein, but can also be present with no apparent cause. It is sometimes misdiagnosed as a dental or jaw problem or as a psychological disorder. Once correctly diagnosed, there are several medical and surgical treatment options to reduce or relieve the debilitating pain caused by this disease. Trigeminal neuralgia is a painful disorder of a nerve in the face called the trigeminal nerve or fifth (5th) cranial nerve. There are two trigeminal nerves, one on each side of the face. It is also called tic douloureux, from the French for "painful spasm," is a disorder of the fifth cranial nerve, whose three branches supply the face. (There are 12 pairs of cranial nerves that supply the human head.) Most TN patients are 50 or older, with more women affected than men. Early attacks are short—one to two minutes long—but excruciating, with stabbing, shooting, pain on one side of the face. The location depends on which branch of the nerve is affected. At first, weeks or months separate incidents, but as the condition progresses the time between attacks shortens. Eventually, the area becomes hypersensitive, and painful bouts can even be triggered by eating, drinking, talking, cold, or even touching the face. These nerves are responsible for detecting touch, pain, temperature and pressure sensations in areas of the face between the jaw and forehead. People who have trigeminal neuralgia usually have episodes of sudden, intense, "stabbing" or "shock like" facial pain. This pain can occur almost anywhere between the jaw and forehead, including inside the mouth. However, it usually is limited to one side of the face. In some cases, the cause of trigeminal neuralgia is unknown. In many people, however, something seems to be irritating the trigeminal nerve, usually in the area of the nerve's origin deep within the skull. In most cases, the irritation is believed to be caused by an abnormal blood vessel pressing on the nerve. Less often, the nerve is being irritated by a tumor in the brain or nerves. Sometimes, the problem is related to a rare type of stroke. In addition, up to 8% of patients who have multiple sclerosis (MS) eventually develop trigeminal neuralgia as a result of MS-related nerve damage. New cases of trigeminal neuralgia affect 4 to 5 of every 100,000 people in the United States each year. It affects women slightly more often than men, possibly because the disease is most common in older people and women live longer. The first episode of facial pain usually occurs when the patient is 50 to 70 years old. Although infants, children and young adults may develop this disorder, it is rare in people younger than age 40.

SOME FACTS:-

- Indian Film star Salman Khan was diagnosed with Trigeminal neuralgia in 2011.
- All Ireland winning Gaelic Footballer Christy Toye was also diagnosed in 2013.
HISTORY OF TGN

- John Fothergill gave the first full and accurate description of trigeminal neuralgia in 1773, but early description of TN can be inferred from the writings of Galen, Aretaeus of Cappadocia.
- First surgical treatment was done by JOHN MURAY (Amochan).
- Both are graduated from the University of Edinburgh Medical School.

2. Glossopharyngeal Neuralgia (Throat Pain)

Synonyms: - Weisenberg syndrome, Cranial mono neuropathy

Overview:

Glossopharyngeal neuralgia is an irritation of the ninth cranial nerve causing extreme pain in back of the throat, tongue and ear. Attacks of intense, electric shock-like pain can occur without warning or can be triggered by swallowing. Although the exact cause is not known, a blood vessel is often found compressing the nerve. It can also occur in people with throat or neck cancer. The condition is similar to trigeminal neuralgia of the face. Medications may initially relieve the pain, but surgery is often needed for long-term relief.

The glossopharyngeal nerve is the ninth (IX) cranial nerve, which arises from the brainstem inside the skull. It supplies sensation to the back of the throat and tongue and portions of the ear. When the glossopharyngeal nerve becomes irritated, an attack of intense electric shock-like pain is felt in the back of the throat, tongue, tonsil or ear. You may initially experience short, mild attacks, with periods of remission. But neuralgia can progress, causing longer, frequent attacks of searing pain. Glossopharyngeal pain can be similar to trigeminal neuralgia – and misdiagnosed. Be sure to see a neurosurgeon who specializes in facial pain who can make the distinction is a relatively rare neuralgia, marked by recurring attacks of severe pain that occur for no apparent reason in the throat, ears, and neck. Glossopharyngeal neuralgia patients also tend to be middle-aged, but are more often male than female.

Figure 1.2: Position of Glossopharyngeal Nerve

The attacks can occur without warning, but, like other facial neuralgias, can also be triggered by sneezing, swallowing, talking, yawning, or clearing the throat.
3. Occipital Neuralgia

It is caused by pain from one of the two occipital nerves that supply the back of the head. Unlike TN or glossopharyngeal neuralgia, occipital neuralgia may occur in conjunction with muscle tension or migraine headaches, with the spasms of nerve pain on top of nearly continual aching. Although most neuralgia has no known cause, one type, post herpetic neuralgia (PHN) is only seen following an outbreak of shingles, a painful, blistering rash caused by the Herpes zoster virus, the same virus that causes chicken pox. Herpes zoster lives in nerve tissue, and never goes away, even after the initial outbreak of chicken pox has disappeared. Older people, especially those with weak immune systems, can suffer a relapse, with the rash appearing along the course of the nerve that is affected. This produces the searing pain of neuralgia, which can be made even worse by the touch of clothing, bedclothes, or another person. PHN and TN are the most common types of neuralgia.

CAUSES

**Trigeminal Neuralgia**: - It is usually caused when the trigeminal nerve is being compressed by an artery or a vein, but can also be present with no apparent cause. It is sometimes misdiagnosed as a dental or jaw problem or as a psychological disorder.

**Glossopharyngeal Neuralgia**: - It is believed to be caused by irritation of the ninth cranial nerve, called the glossopharyngeal nerve. Symptoms usually begin in people over age 4. In most cases, the source of irritation is never found. Some possible causes for this type of nerve pain (neuralgia) are:

- Blood vessels pressing on the glossopharyngeal nerve
- Growths at the base of the skull pressing on the glossopharyngeal nerve
- Tumors or infections of the throat and mouth pressing on the glossopharyngeal nerve

Many believe that the protective sheath of the nerve deteriorates, sending abnormal messages. Like static in a telephone line, these abnormalities disrupt the normal signal of the nerve and cause pain. Most often the damage is from a blood vessel compressing the nerve. Other causes include aging, multiple sclerosis, and nearby tumors.

Who is affected?

Glossopharyngeal neuralgia is rare compared to other facial pain syndromes. It occurs slightly more in women than men. Patients are usually middle age and older people.

SYMPTOMS

Symptoms OF Trigeminal neuralgia:-

Typically described by the patient as episodes of extremely severe pain

The TN pain is described as:

- Lancinating pain
- Like electric shock
- Stabbing pain
Trigeminal neuralgia causes episodes of sudden, intense facial pain that usually last for two minutes or less. In most cases, the pain is described as excruciating, and its quality is "sharp," "stabbing," "piercing," "burning," "like lightning" or "like an electric shock." In most cases, only one side of the face is affected.

The pain of trigeminal neuralgia is recognized as one of the most excruciating forms of pain known. The pain often is triggered by non painful facial movements or stimuli, such as talking, eating, washing the face, brushing the teeth, shaving or touching the face lightly. In some cases, even a gentle breeze on the cheek is enough to trigger an attack. Approximately 50% of patients also have specific trigger points or zones on the face, usually located somewhere between the lips and nose, where an episode of trigeminal neuralgia can be triggered by a touch or a temperature change. In some cases, a sensation of tingling or numbness comes before the pain. Attacks of trigeminal neuralgia can vary significantly, and may occur in clusters, with several episodes following in series over the course of a day. For unknown reasons, trigeminal neuralgia almost never occurs at night when the person is sleeping. Some patients also have a cheek twitch or muscle spasm, wincing, a facial flush, a tearing eye or salivation on the same side of the face. It is the facial muscle spasms that led to the older term, tic douloureux (in French, tic means muscle twitch or spasm; douloureux means painful).

**Symptoms of Glossopharyngeal neuralgia:**

Symptoms include severe pain in areas connected to the ninth cranial nerve:

- Back of the nose and throat (nasopharynx)
- Back of the tongue
- Ear
- Throat
- Tonsil area
- Voice box (larynx)

The pain occurs in episodes and may be severe. It is usually on one side, and feel jabbing. The episodes can occur many times each day, and awaken the person from sleep.

It can sometimes be triggered by:

- Chewing
- *Coughing*
- *Laughing*
- *Speaking*
Swallowing

Patients describe an attack as a burning or jabbing pain, or as an electrical shock that may last a few seconds or minutes. Swallowing, chewing, talking, coughing, yawning or laughing can trigger an attack. Some people describe the feeling of a sharp object lodged in the throat, which can last several days or weeks, followed by a remission for months or years. Occurs more frequently over time and may become disabling.

DIAGNOSIS

Diagnosis for Neuralgias:

Physicians begin with a thorough examination, and often include a CT scan or MRI. These will sometimes uncover an artery or tumor that is compressing the nerve and creating the symptoms, but very often no obvious medical problem is found. In addition, trigeminal neuralgia can be identified by several distinctive traits, many of which apply to other neuralgias as well:

- The patient has attacks of pain in the face those last less than two minutes.
- The pain follows the path of the trigeminal (or another) nerve.
- The pain is described as sudden, sharp, stabbing or burning, and severe.
- The pain may be triggered by certain activities.
- There are no symptoms between attacks.
- In many patients, TN can be positively diagnosed if the drug carbamazepine (Tegretol) diminishes the pain of an attack.

Exams and Tests:

Tests will be done to identify problems, such as tumors, at the base of the skull. Tests may include:

- Blood tests (sugar level) to look for the causes of nerve damage
- CT scan of the head
- MRI of the head
- X-rays of the head or neck

Sometimes the MRI may show swelling (inflammation) of the glossopharyngeal nerve. Glossopharyngeal neuralgia is identified in the same way as TN, that is, the patient complains of stabbing, spasmodic pain that follows the Glossopharyngeal nerve. A positive diagnosis is usually achieved if the pain stops when the nerve is blocked with a local anesthesia.

Occipital neuralgia is caused by pain from one of the two occipital nerves that supply the back of the head. Unlike TN or Glossopharyngeal neuralgia, occipital neuralgia may occur in conjunction with muscle tension or migraine headaches, with the spasms of nerve pain on top of nearly continual aching. X rays and CT scans can help indicate if the nerve is compressed; numbing the nerve with anesthetics can pinpoint the cause.
To find out whether a blood vessel is pressing on the nerve, pictures of the brain arteries may be taken using:

- Magnetic resonance angiography (MRA)
- CT angiogram
- X-rays of the arteries with a dye (conventional angiography)

Your doctor will ask about your symptoms and your medical history, including any history of multiple sclerosis, a condition that may cause similar or even identical symptoms. To help rule out medical and dental conditions that can have similar symptoms, your doctor also will ask whether you have a history of TGN.

- Recent trauma to your face or teeth
- A recent tooth infection or root canal treatment
- A tooth extraction on the same side as your facial pain – Sometimes a tooth extraction can cause pain in the area of the missing tooth.

TREATMENT

Treatment of Neuralgia:-

Trigeminal neuralgia was identified almost 2,000 years ago. Early treatments, like most medicine in those days, were mostly topical (applied to the skin) and ineffective. Today, the most effective treatments for neuralgia are allopathic, but alternative therapies may help support the patient's general well being and improve overall health. Various therapies are used to treat Neuralgia. These are as follows:-

**Nutritional therapy**

B-complex vitamins, taken orally or given by intra-muscular injection, are important for a healthy nervous system, and may supplement medical treatment. A whole foods diet with adequate protein, carbohydrates, and fats that also includes yeast, liver, wheat germ, and foods that are high in B vitamins is important. Essential fatty acids, such as flax or fish oil, may also help reduce inflammation.

**Herbal therapy**

Capsaicin cream, made from capsicum, a substance found in hot peppers, has sometimes been helpful in desensitizing painful areas in post herpetic neuralgia. Capsaicin may diminish the amount of "substance P," a chemical used by nerves to send pain signals to the brain. St. John’s wort, an antidepressant, may help the other forms of neuralgia, which are often treated allopathically with tricyclic antidepressants (TCAs)

**Acupuncture**

Some patients found that acupuncture was helpful in treating their neuralgia pain, especially that of post herpetic neuralgia. Others were unable to obtain relief from the procedure.
Chiropractic

Chiropractors can manipulate the jawbone, neck or spine to treat neuralgia pain. Like most alternative treatments for neuralgia, this is effective for some patients and not for others.

Homeopath: - Homeopathic treatment can also be tried. An experienced homeopathic practitioner will prescribe remedies to bolster the patient’s general health, tailoring remedies to the patient's overall personality profile as well as specific symptoms.

Other alternative therapies

The pain of neuralgia may also be relieved by hydrotherapy (hot shower or bath), deep massage, reflexology (massaging reflex points in the feet relating affected painful areas in the body) or yoga exercises. In addition, guided imagery, biofeedback therapy, and hypnosis may be beneficial. Patients should also consider t'ai chi, qigong, and other movement therapy.

Patients may also be helped by transcutaneous electrical nerve stimulation (TENS), in which a weak electrical current applied to the skin interferes with the nerve's ability to send pain signals to the brain. Although somewhat controversial, initial results, especially for post herpetic neuralgia, are promising.

Generally Trigeminal Neuralgia and Glossopharangial Neuralgia is not completely treated with medicine for long term relief. So there are four types of treatments available.

➤ Medication / Allopathic treatment
➤ Surgical treatment
➤ Needle procedure
➤ Radiotherapy

ALLOPATHIC TREATMENT / MEDICATION

Once a diagnosis of neuralgia has been established, physicians prescribe drugs to alleviate the pain. The anticonvulsant drug carbamazepine (Tigerton) is often an effective treatment for TN, relieving or reducing the pain within a day or two. Unfortunately, it can also cause dizziness, drowsiness, nausea, and double vision, as well as other side effects. If Tegretol is not well tolerated, doctors can try another anticonvulsant, like gabapentin (Neurontin), antispasmodics like baclofen (Lioresal), or anti-anxiety drugs like clonazepam (Klonopin). These drugs are also frequently prescribed for other forms of neuralgia as well.

Injecting local anesthetics into the nerve can stop the pain for a few hours, and for some patients this is effective for a much longer time. Lidocaine cream may be somewhat helpful in treating PHN, probably by temporarily desensitizing nerves just under the skin. Lidocaine may also help atypical forms of TN. Alcohol and glycerin injections that destroy part of the nerve (and thereby its ability to transmit pain) may also be an option. One particularly unpleasant, but evidently successful, method of treating neuralgia seems to be desensitization. This means that if a patient is bothered by the touch of clothing on the skin, the therapist may rub a towel briskly over the area for a few minutes. If the patient has trouble tolerating heat or cold, warm or cold water may be applied. Although initially quite painful, this method gradually diminishes the frequency and intensity of the patient's pain, apparently by overwhelming (and eventually reducing) the nerve's ability to send messages to the brain.
For PHN, the best treatment seems to be prevention. People with shingles should see a doctor as soon as the rash develops so they can receive treatment to ease the severity of the outbreak and minimize the risk of developing post herpetic neuralgia. It is not clear, however, whether treatment can prevent subsequent neuralgia. If PHN does develop, TCAs—especially amitriptyline—are often helpful. It’s important to stress, though, that early attention to either a shingles outbreak or PHN episode will reduce the incidence and severity of future attacks. Some patients receive complete pain relief after treatment. Others are able only to reduce the pain (to greater or lesser degrees), while for a very few treatment is completely ineffective. For these patients PHN becomes a lifelong, chronic condition; most cases, however, moderate on their own and disappear within five years. In 2002, clinical trials showed that gabapentin (Neurontin) was effective in treating patients with PHN with relatively low adverse effects.

As a last resort, surgery may bring relief for those neuralgia patients not helped by pharmaceuticals. Most procedures try to reduce the nerve's ability to send pain signals to the brain. One of the most promising is dorsal root entry zone (DREZ) lesioning, which uses radio frequency to disrupt the nerves that are causing pain. Some studies showed that as many as 80% of DREZ patients were helped.

The drugs most commonly used for treating trigeminal neuralgia are medications that were originally developed for the treatment of epilepsy. However, this class of medications has been found to be quite effective in treating nerve pain, including TN, when taken on an ongoing basis. The anti-convulsant most commonly prescribed for TN is:-

1. Carbamazepine (Tegretol®)

**Description:-**

Tegretol, carbamazepine USP, is an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as chewable tablets of 100 mg, tablets of 200 mg, and XR tablets of 100, 200, and 400 mg.

**Use in Trigeminal neuralgia: - Tegretol** is indicated in the treatment of the pain associated with true trigeminal neuralgia. Beneficial results have also been reported in glossopharyngeal neuralgia. This drug is not a simple analgesic and should not be used for the relief of trivial aches or pains.

**Contraindications:-** Tegretol should not be used in patients with a history of previous bone marrow depression, hypersensitivity to the drug, or known sensitivity to any of the tricyclic compounds, such as amitriptyline, desipramine, imipramine, protriptyline, nortriptyline, etc. Likewise, on theoretical grounds its use with monoamine oxidase (MAO) inhibitors is not recommended. Before administration of Tegretol, MAO inhibitors should be discontinued for a minimum of 14 days, or longer if the clinical situation permits.

Coadministration of carbamazepine and nefazodone may result in insufficient plasma concentrations of nefazodone and its active metabolite to achieve a therapeutic effect. Coadministration of carbamazepine with nefazodone is contraindicated.

**Drug Interactions:-** There has been a report of a patient who passed an orange rubbery precipitate in his stool the day after ingesting Tegretol suspension immediately followed by Thorazine®* solution. Subsequent testing has shown that mixing Tegretol suspension and chlorpromazine solution (both generic and brand name) as well as Tegretol suspension and liquid Mellaril®, resulted in the occurrence of this precipitate. Because the extent to which this occurs with other liquid medications is not known, Tegretol suspension should not be
administered simultaneously with other liquid medicinal agents or diluents. Clinically meaningful drug interactions have occurred with concomitant medications and include many medicines.

**Side Effects:** Tegretol may cause rare but serious skin rashes that may lead to death. These serious skin reactions are more likely to happen when you begin taking TEGRETOL within the first four months of treatment but may occur at later times. These reactions can happen in anyone, but are more likely in people of Asian descent. If you are of Asian descent, you may need a genetic blood test before you take TEGRETOL to see if you are at a higher risk for serious skin reactions with this medicine. Symptoms may include: skin rash, hives, sores in your mouth, blistering or peeling of the skin. It may also cause rare but serious blood problems. Symptoms may include: fever, sore throat, or other infections that come and go or do not go away easy bruising red or purple spots on your body, bleeding gums or nose bleeds, severe fatigue or weakness. Like other antiepileptic drugs, TEGRETOL may cause suicidal thoughts or actions in a very small number of people, about 1 in 50.

**TABLE 1.1: DOSES AND ADMINISTRATION:**

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<th>Indication</th>
<th>Initial Doses</th>
<th>Subsequent Doses</th>
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<td>Trigeminal Neuralgia</td>
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<td>increments of 50 mg (½ tsp)</td>
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<td>2. Phenytoin (Dilantin)®</td>
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**DESCRIPTION:**
Phenytoin sodium is an antiepileptic drug. Phenytoin sodium is related to the barbiturates in chemical structure, but has a five-membered ring. The chemical name is sodium 5,5-diphenyl-2,4-imidazolidinedione.

**INDICATIONS AND USAGE**
Dilantin is indicated for the control of generalized tonic-clonic (grand mal) and complex partial (psychomotor, temporal lobe) seizures and prevention and treatment of seizures occurring during or following neurosurgery. Phenytoin serum level determinations may be necessary for optimal dosage adjustments.

**Drug Interactions:**
There are many drugs which may increase or decrease phenytoin levels or which phenytoin may affect. Serum level determinations for phenytoin are especially helpful when possible drug interactions are suspected. The most commonly occurring drug interactions are listed below:

Drugs which may increase phenytoin serum levels include: acute alcohol intake, amiodarone, chloramphenicol, chlorzoxazone, cimetidine, diazepam, dicumarol, disulfiram, estrogens, ethosuximide, fluoxetine, H2-antagonists, halothane, isoniazid, methylphenidate,
phenothiazines, phenylbutazone, salicylates, succinimides, sulfonamides, ticlopidine, tobutamide, trazodone.

3. Gabapentin (Neurontin®)
4. Pregabalin (Lyrica)
5. Baclofen
6. Lamotrigine (Lamictal®)
7. Topiramate (Topamax)
8. Oxcarbazepine (Trileptal®)

SURGICAL TREATMENT

General introduction:-

Rhizolysis – In this approach, part of the trigeminal nerve is inactivated temporarily by using one of the following methods: a heated probe, an injection of the chemical glycerol or a tiny balloon that is inflated near the nerve to compress it. During the procedure a needle or a tiny hollow tube called a trocar is inserted through the skin of your cheek. These procedures provide immediate relief in up to 99% of patients, but 25% to 50% of people will have the problem return during the next several years.

Stereotactic radio surgery – This form of radiation therapy uses a linear accelerator or a gamma knife to inactivate part of the trigeminal nerve. After your head is positioned carefully in a special head frame, many tiny beams of radiation are aimed precisely at the part of the trigeminal nerve that must be inactivated. Stereotactic radiosurgery is a fairly new treatment option for trigeminal neuralgia, and its long-term success rate is still being evaluated.

Micro vascular decompression of the trigeminal nerve – In this delicate surgical procedure, a surgeon carefully repositions the blood vessel that is pressing on your trigeminal nerve near your brain. Because this procedure involves opening your skull, the ideal candidate for this procedure is someone who is generally healthy and younger than 65. Overall, the immediate success rate is approximately 90%, and 70% to 80% of patients have long-term relief. Micro vascular decompression may be effective for patients who have not had success with one of the less invasive surgeries. You should seek medical help immediately if you develop facial pain that fits the pattern of trigeminal NURALGIA Medical Therapy for Trigeminal Neuralgia.

The first line of treatment for patients with trigeminal neuralgia is always medication. Even minimally invasive surgery carries risks and should be considered a last resort.

Evaluation for Trigeminal Neuralgia: -

Surgical evaluation for trigeminal neuralgia includes confirming the diagnosis of trigeminal neuralgia, reviewing a brain magnetic resonance imaging (MRI) scan to exclude other treatable causes of face pain, and evaluating the severity. It is reserved for patients who do not respond or are intolerant to drugs. Following types of surgeries are available for the treatment of TN.

- Micro vascular Decompression (MVD).
Gama knife therapy.

Cryotherapy.

Percutaneous radiofrequency.

Thermal Rhizotomy.

Radiofrequency Lesioning (also called radiofrequency Rhizotomy).

1. Micro vascular Decompression for Trigeminal Neuralgia:-

Micro vascular decompression (MVD), also known as the Janetta procedure, is the most common surgical procedure for the treatment of trigeminal neuralgia. This is an open surgical approach where a small incision is made behind the ear, a small hole is drilled in the skull and, under microscopic visualization, and the trigeminal nerve is exposed. In most cases, there is a blood vessel (typically an artery, but sometimes a vein) compressing the trigeminal nerve. By moving this blood vessel away from the nerve and interposing a padding made of Teflon felt, the pain is nearly always relieved. While MVD is considered to be the most invasive surgery for TN, it is also the best procedure for fixing the underlying problem that usually causes TN: vascular compression*. MVD also causes the least damage to the trigeminal nerve and provides, on average, the longest pain free periods and the best chance of being permanently off medication. MVD has a long-term success rate of approximately 80% as a stand-alone treatment. The procedure requires an average hospital stay of two to three days, and four to six weeks to return to normal daily activities. MVD is a major surgery, and includes the procedure of craniotomy-cutting a small hole in the skull. Typical surgical risks for any open-skull neurosurgical procedure include infection, excessive bleeding, spinal fluid leakage, and risks of anesthesia. Rare neurological injury can include damage to hearing, vascular injury (stroke), and, very rarely, death. As MVD is a major surgery, patients will have some occasional pain and headache postoperatively, but the nurses will give you medication to help you control this pain. Patients spend one night in the intensive care unit and one to two nights in the regular ward.

Pain and stiffness from the operation usually subside within a week, and you can begin to resume normal activities at your own pace. No one can promise that any surgery for trigeminal neuralgia will be successful for all patients, and there is always the chance that pain will recur at a later date; however, MVD is the best chance at relieving the underlying problem behind trigeminal neuralgia pain.

Relevant surgical anatomy: - The relevant surgical anatomy includes: muscular layers of the neck; petrous and occipital bones; occipital artery (OA), extradural vertebral artery and mastoid emissary vein (MEV); transverse and sigmoid sinuses (TS and SS); IVth, Vth, VIth, VIIth-VIIIth and IXth-Xth-XIth cranial nerves (CN); cerebral hemisphere and brainstem; arteries and veins of the CPA and others. Most of these structures will be in the surgical field at some stage during the procedure, and they must be known and recognized.

2. Gamma Knife surgery:-

The Gamma Knife Unit of the Timone University Hospital in Marseille, France is a tertiary referral center for GKR. The patients in this study were referred for evaluation and subsequent treatment of GPN. Indication for GKR was the presence of medically intractable GPN, patient’s refusal for open surgery or contraindication to micro vascular decompression. Patients selected for GKR were presented with detailed information concerning not only GPN
but also other surgical options, including the expected risks and benefits for each treatment. Informed consent was obtained from all patients for GKR. Following the GKR, patients were evaluated postoperatively with periodic assessment of pain relief and neurological function.

Between January 2002 and February 2009, total of 7 patients (5 males and 2 females) with mean age of 62 (range 36-83) and with symptoms of medically intractable GPN were treated using GKR at the Timone University Hospital Gamma Knife Unit. All patients had normal neurological examinations and suffered from differentiations pain. In all patients, medical therapy had been attempted and had proven unsuccessful.

From the time of the failure of the medical treatment for the GPN to GKR ranged from 8 to 72 months with the mean interval being 28 months. Four patients had a neurovascular conflict. One patient had GPN secondary to a surgical procedure for laryngeal adenocarcinoma. None of the patients had undergone any previous surgical intervention for pain. GKR was performed while the patient was under local anesthesia supplemented with inhalation of analgesic agents. Leksell stereotactic frame (Elekta Instruments AB, Sweden) was fixed to the patient’s head and the patient subsequently underwent stereotactic enhanced magnetic resonance imaging (MRI) and computed tomography (CT). For the MRI, three-dimensional (3D) constructive interference in steady-state (CISS) imaging without gadolinium and 3D magnetization-prepared rapid acquisition gradient echo (MPRAGE) with gadolinium was routinely used.

Anatomical landmarks and the relationship between vascular structures and lower cranial nerves were visualized on Gamma-Plan (Elekta Instruments AB, Sweden), a dedicated treatment planning software, to evaluate whether there was evidence of neurovascular compromise or compression. Either the cisternal part or the distal part of the glossopharyngeal nerve at the level of the glossopharyngeal meatus (GPM) of the jugular foramen were chosen as a radio surgical target, irrespective of the presence of neurovascular compression, to minimize the radiation dose to the brainstem and vagus nerve. Dose planning was performed in both the axial and coronal planes by using Gamma-Plan, and the target was irradiated using Gamma Knife 4C Model (Elekta Instruments AB, Sweden) with a dose ranging from 60 to 80 Gy, targeted on the cisternal segment (n=2) or GPM (n=5) with a single 4-mm collimator.

Patients were discharged the day following the GKR and followed-up every 3 months for the first year and every 6 months thereafter with imaging and the assessment of pain. The extent of the pain relief was categorized using the following classification: Class I, pain-free without medication; Class II, pain-free with medication; Class III, pain frequency reduction greater than 90%; Class IV, pain frequency reduction between 50 to 90%; Class V, no significant reduction in pain frequency.

**Side effects of Gamma Knife surgery**

Side effects may include tingling or numbness in the face (in up to 20-30% of patients), but this is usually mild if it does occur. Patients are not put to sleep for this procedure as it causes minimal pain and discomfort. The treatment requires use of a frame that is attached to the head with pins. There is mild pin site pain for approximately 1-2 days following treatment. Patients usually begin to return to normal activities within 48 hours, though this depends on the individual. No one can promise that any surgery for trigeminal neuralgia will be successful for all patients; Gamma Knife treatment "scrambles" the pain pathways, but there is always a chance that the pain can recur at a later date.
3. Radio surgery for Trigeminal Neuralgia:-

Radio surgery (Gamma Knife®) treatment for trigeminal neuralgia is the least invasive surgical option. In fact, it is technically not surgery at all. The Gamma Knife is a device that delivers precise, controlled beams of radiation to targets inside the skull, including the brain and associated nerves. For trigeminal neuralgia treatment, the radiation beams are aimed at the trigeminal nerve where it enters the brainstem. Gamma Knife treatment does not target the root because of trigeminal neuralgia, but instead damages the trigeminal nerve to stop the transmission of pain signals. The procedure requires little or no anesthesia, and is performed on an outpatient basis. This procedure provides significant pain control or reduction in approximately 80+% of patients, but response is usually slower than for other treatments. Patients may respond within 4 to 6 weeks post-treatment; however, some patients require as much as 3 to 8 months for the full response. Most patients remain on full doses of medication for at least 3-6 months after treatment.

4. Radiofrequency Lesioning (RFL) for Trigeminal Neuralgia

Radiofrequency lesioning (also called radiofrequency rhizotomy) is a good option for severe pain in high-risk patients, such as patients with concurrent illness that would make an open surgical procedure too dangerous. It is also a good option for patients with multiples sclerosis (MS), who’s TN, is often not caused by vascular compression. Like Gamma Knife treatment, radiofrequency lesioning does not treat the root cause of TN, but instead damages the trigeminal nerve, to stop the transmission of pain signals. In this procedure, an electrode inserted through the cheek is used to heat the nerve and cause selective damage to stop pain signals from traveling to the brain. The treatment provides immediate pain relief in up to 90% of patients, but can cause more facial numbness than the other procedures and has a pain recurrence rate of 40% at 2 to 3 years post-surgery. If necessary, the procedure can be repeated.

PREVENTION:-

Because the cause of trigeminal neuralgia is unknown, it cannot be prevented.

Surgical Treatment for Glossopharyngeal Neuralgia:-

During MVD, a craniotomy is made in the skull. The glossopharyngeal nerve is often compressed by an artery near the brainstem. Lying close by is the vagus nerve. Some people manage the pain trigger by applying a liquid xylocaine to the tonsil area and temporarily numbing it so they can eat and swallow.

Tupes of Surgery ;- 

There are various methods are available for the treatment of glossopharyngeal neuralgia by by the help of surgery methods are as follows.

- Micro vascular decompression (MVD).
- Rhizotomy.
- Gama knife surgery.
- Radiation
1. Micro vascular Decompression (MVD):-

is a surgery to gently reroute the blood vessel from compressing the nerve by padding the artery with a sponge. Surgery is performed under general anesthesia and requires a 1 to 2 day hospital stay. During surgery, a 1-inch opening, called a craniotomy, is made in the skull behind the ear.

This exposes the nerve at its connection with the brainstem. A blood vessel (occasionally a tumor) is often found compressing the nerve (Fig. 2). After the nerve is freed from compression, it is protected with a small Teflon sponge the sponge remains in the brain permanently. A sponge is inserted between the nerve and the blood vessel to relieve the compression that causes the painful neuralgia attacks. MVD provides pain relief in 85% of patients [1]. The major benefit of MVD is that it causes little or no swallows or voice side effects. However, there is a 5% risk of death due to manipulation of the nearby vagus nerve, which can cause problems with heart rate and blood pressure.

2. Rhizotomy: -

It is a minimally invasive approach that reaches the nerve through the cheek without a skin incision or skull opening. The outpatient procedure is performed under local anesthesia and light sedation. Patients go home the same day. A hollow needle is inserted through the skin of the cheek into the glossopharyngeal nerve at the base of the skull. An electrode passes a heating current to destroy some of the glossopharyngeal nerve fibers that produce pain. This procedure is typically recommended for those with pain caused by throat or neck cancer.

MVD + Nerve Rhizotomy: - is a surgery to move the artery (if found) and cut the nerve root at its connection to the brainstem. Similar to the MVD surgery, a small opening is made in the back of the skull. If a blood vessel compressing the nerve is not found, or if it cannot be easily moved, the surgeon may opt to cut the nerve. The glossopharyngeal nerve is identified and cut. Then a stimulation probe is used to identify only the sensory roots of the vagus nerve.

The sensory root fibers, which transmit the pain signals to the brain, are severed. The entire vagus nerve is not cut. MVD + rhizotomy provide 96% long-term pain relief [1]. The potential side effects of rhizotomy are hoarseness of voice, difficulty swallowing (dysphagia), and loss of taste sensation. Percutaneous Stereotactic Radiofrequency Rhizotomy (PSR) is a minimally

Figure 1.3: Micro vascular Decompression

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invasive approach that reaches the nerve through the cheek without a skin incision or skull opening. The outpatient procedure is performed under local anesthesia and light sedation. Patients go home the same day. A hollow needle is inserted through the skin of the cheek into the glossopharyngeal nerve at the base of the skull. An electrode passes a heating current to destroy some of the glossopharyngeal nerve fibers that produce pain. This procedure is typically recommended for those with pain caused by throat or neck cancer.

3. Gamma Knife surgery:-

The Gamma Knife Unit of the Timone University Hospital in Marseille, France is a tertiary referral center for GKR. The patients in this study were referred for evaluation and subsequent treatment of GPN. Indication for GKR was the presence of medically intractable GPN, patient’s refusal for open surgery or contraindication to micro vascular decompression. Patients selected for GKR were presented with detailed information concerning not only GPN but also other surgical options, including the expected risks and benefits for each treatment. Informed consent was obtained from all patients for GKR. Following the GKR, patients were evaluated postoperatively with periodic assessment of pain relief and neurological function.

4. Radiation:-

The goal of radiation treatment is to damage the nerve root to interrupt the pain signals from reaching the brain. Stereotactic radio surgery is a noninvasive outpatient procedure that uses radiation beams to destroy some of the glossopharyngeal nerve. A stereotactic mask or frame is attached to the patient’s head to precisely locate the nerve on an MRI scan and to hold the head perfectly still during treatment. Highly focused beams of radiation are delivered to the nerve root. In the weeks after treatment, a lesion (injury) gradually develops where the radiation occurred. Pain relief may not occur immediately but rather gradually over time. Patients remain on medication for a period of time following treatment to control the pain while the radiation takes effect.

Clinical trials

Clinical trials are research studies in which new treatments—drugs, diagnostics, procedures, and other therapies—are tested in people to see if they are safe and effective. Research is always being conducted to improve the standard of medical care.

When to Contact a Medical Professional: - Call your health care provider if you have symptoms of glossopharyngeal neuralgia. See a pain specialist if the pain is severe to be sure that you is aware of all your options for controlling pain

CONCLUSION

Glossopharyngeal neuralgia in multiple sclerosis may occur due to vascular compressive lesions and it should not be solely attributed to the underlying demyelinating process. Vascular compression of the glossopharyngeal nerve could independently cause glossopharyngeal neuralgia in patients with multiple sclerosis, and vascular imaging to exclude such a diagnosis is recommended. Only a few neuralgia patients will not be helped by some combination of drugs and surgery. PHN, in particular, tends to fade away on its own, and only 2–3% of patients have pain that lasts a year or longer. For those unfortunate few, however, PHN can become a lifelong, debilitating condition.
REFERENCES


