

**Review Article****Variegated treatment modalities for trigeminal neuralgia**

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**ABSTRACT**

Trigeminal neuralgia is a chronic pain disorder affecting the trigeminal nerve which usually worsens with passage of time. It is an episodic pain syndrome which has been fairly responsive to medical & surgical treatment modalities. It is a pathology characterized by paroxysmal pain so severe and sudden almost like an electric shock, which lasts from a range of very few seconds to a maximum of two minutes. The article is focused on different treatment modalities and their subsequent prognosis.

**Key words:** Trigeminal Neuralgia, Oro-Facial Pain, Treatment

**INTRODUCTION**

Trigeminal neuralgia has been referred by a variety of names including prosopalgia and tic douloureux, or even Fothergill disease. Meticulously elaborating, it is unilateral episodic oro-facial pain which is characterized by severe electric shock like lancinating pain along with periods of pain free phases [1]. International Association for study of pain has defined trigeminal neuralgia as "sudden and usually unilateral severe but brief stabbing reoccurring pain in one or more branches of the 5<sup>th</sup> cranial nerve [2].

Trigeminal neuralgia is now a fairly observed condition, with an incidence rate close to 5.7 per 100,000 women and 2.5 per 100,000 men. The usual age range that is affected is the age group of 50-70 years [3]. A lot of pathophysiological factors have been framed to explain the etiology of trigeminal neuralgia, most of which are based on the subjective signs of pains rather than a laboratory finding. However, the one that has been fairly common and well documented now is the micro vascular compression (distortion) of the trigeminal root. Other causes include vacuolated ganglionic cells along with segmental demyelination and the juxta-position of the denuded axons.

**DIAGNOSIS**

The primitive diagnosis of the tic douloureux disease is established on the symptoms of paroxysmal shock like pain which is the usually precipitated by the triggering factors like cold, blow of air, smiling etc. Magnetic resonance imaging (MRI) has been particularly useful in diagnosing subjects with neurological disabilities [4]. The enhanced resolution of MRI as compared to that of CT scan for the proper visualization of the soft lesions. A relatively newer technique called the Magnetic resonance angiography (MRA) has allowed to particularly visualizing the vessels of the associated region without the use of contrast media [5].

**TREATMENT MODALITIES**

The treatment options of trigeminal neuralgia have been divided into medical and surgical modalities as shown in table-1.

**Medical treatment**

**Carbamazepine:** The Carbamazepine has been widely accepted as the most basic and fundamental treatment option for the patients of trigeminal neuralgia. It has been universally used following the successful reports of the Blom's basic study in 1962 [6]. However, severe side effects have been observed which includes hyponatraemia and water intoxication [7]. J.C.Taylor et al carried out a study of treatment of

trigeminal neuralgia in about 143 patients with the use of carbamazepine. The drug had been effectively noteworthy in a total of 99 patients which is about 69%. Only 19 of them didn't respond well to treatment. [8]

**Levetiracetam:** Levetiracetam, a well approved anti-epileptic drug used in children, has shown significant promise for the treatment of trigeminal neuralgia. In a series of clinical trials carried out in a total of 23 patients, a decline of 62.4% was seen in the episodes of neuralgic pain during the day [9]. However the only roadblock in using levetiracetam is the colossal amount of associated side effects. Amongst them, influenza and Nasopharyngitis are the most common adverse reactions. The common therapeutic dose range is 1000 - 4000 mg/day.

**Table 1: Treatment modalities of trigeminal neuralgia**

| Type of treatment         | Mode of treatment |
|---------------------------|-------------------|
| <b>Medical treatment</b>  | Carbamazepine     |
|                           | Levetiracetam     |
|                           | Topiramate        |
|                           | Phenytoin         |
|                           | Gabapentin        |
| <b>Surgical treatment</b> | Alcohol Block     |
|                           | Cryotherapy       |
|                           | Neurectomy        |
|                           | Radiosurgery      |
|                           | Gangliolysis      |

**Topiramate:** Topiramate belongs to the newer group of anti-epileptic pharmaceutical drug that has provided hopes for the treatment of pain relief in cases of trigeminal neuralgia. It is effectively a GABA enhancer drug which blocks the Na<sup>+</sup> and also selectively blocks AMPA receptors [10]. According to a study, a declined dosage of Topiramate must be employed to initiate the management of trigeminal neuralgia. The dosage can be significantly increased if the condition doesn't improve [11].

**Phenytoin:** Phenytoin is a very potent anti-convulsant drug. It has been successfully employed in the treatment of trigeminal neuralgia. The drug possesses the potential to considerably block out the high action potential thus significantly changing the pain threshold. A group of 20 patients suffering from fothergill disease had been administered phenytoin

and about 8 of them had complete relief and 6 of them had partial relief [12].

**Gabapentin:** Gabapentin is an anti-convulsant medication used in the treatment of grand mal epilepsy. For the very first time, the use of gabapentin for the treatment of trigeminal neuralgia started in the year 1994. The mechanism of action of gabapentin is enhancement of GABA response. The Gabapentin structure is similar to GABA receptor and hence when it simulates it, there is a significant decline in the release of mono amine neurotransmitters [13]. The recommended average dose is close to 200mg/day.

### Surgical treatment

**Alcohol Block:** Alcohol Blocks are the most basic surgical techniques applied in patient who do not respond appropriately to the medical therapies. They can also be used in debilitating patients who do not want to opt for any other invasive surgical procedures. The treatment option of alcohol block has been successful for short term relief of pain. A retrospective study had been conducted to gauge the efficacy in 100 patients. The subjects encountered close to 250 alcohol blocks for a period of 6 years. The technique of the alcohol block administration was the distal injection procedure. The technique involves identifying the nerve of concern and administering local anesthesia followed by about 1.50 ml of absolute alcohol. The average phase of pain relief was close to 15 months. However some inflammation and fibrosis was observed in numerous patients [14].

**Cryotherapy:** Cryotherapy as a surgical modality for trigeminal neuralgia was first introduced by Lloyd in the year of late 1970s. The results were surprisingly fair where around 60 subjects recovered from the pain [15]. The fundamental aim of Cryotherapy is to provide relief by applying significant low temperatures at the site of concern. The goal is to disturb the cell metabolism by crystallizing the cytosol which would eventually lead to decrease pain and spasm.

**Neurectomy:** Peripheral Neurectomy has been appraised as a secure and efficacious treatment option in cases of fothergill disease for senior group of subjects as well for patients residing in the locations where any other surgical treatment may not be successfully availed. Peripheral Neurectomy was carried out for the very initial time in 18th century with extremely restricted accomplishment [16]. The technique includes selective division and subsequent catheterization of a peripheral branch of the fifth

cranial nerve. Comparatively, PeripheralNeurectomy is a successful alternative as compared to the alcohol block because tissue toxicity and inflammation along with some serious fibrosis can be observed in alcohol block [17].

**Radiosurgery:** Gamma knife radiosurgery has been a popular alternative for the surgical treatment of fothergill disease. It is a minimal invasion procedure that has been asserted with fair prognosis and low possibility of causing facial numbness and significant declined cases of recurrence. The commonly referred name for gamma knife radiosurgery is stereo-tactic surgery. The technique is based on using high emission of concentrated gamma rays. In a span of 7 years starting from the year 1996, a total of 151 subjects suffering from trigeminal neuralgia were subjected to the treatment option of radiosurgery. The surgery successfully eliminated pain in about 45% of the cases [18].

**Gangliolysis:** The most fundamental goal of the procedure is to confine the treatment to the particularganglionic fibers of the trigeminal nerve that are involved in the pain mechanism. This is accomplished by indulging the injection needle through the foramen ovale into the Gasserian ganglion under use of radiation source and fluorescence screen. According to the study, a set of 32 patients suffering from trigeminal neuralgia were given an opportunity to undergo percutaneous Gangliolysis. Results clearly suggested a success for all patients but one [19].

## CONCLUSION

In conclusion, Trigeminal neuralgia is extremely prevalent amongst the varied forms of facial neuralgias. The Different treatment modalities discussed have shown better prognosis in the current years. However, no single medical or surgical treatment modality has shown a 100% success. There is a lot of potential for development of better treatment options if adequate research study is conducted in years to come.

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