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Research Article

Peripheral Neurectomy for Trigeminal Neuralgia: A Series of Cases.

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Abstract

The trigeminal nerve is the largest of all the cranial nerves. It transmits sensory sensation to the face, oral, nasal cavities, and most of the scalp and carries motor supply to the muscles of mastication. Trigeminal neuralgia is pain along the distribution of the nerve with an incidence of 4 in 1,00,000. The first detailed report of trigeminal neuralgia was given by John Fothergill in 1773. Mostly unilateral in nature, paroxysmal, intense, lancinating, brief shock-like stabbing pain in the second or third branch rarely first branch of the trigeminal nerve. Trigeminal neuralgia has various treatment modalities varying from medical management to surgical intervention like microvascular decompression, gamma knife radiosurgery, and neurectomy procedures. So, the proper diagnosis and management are very important to reduce intraoperative and postoperative complications. The purpose of this article is to report a series of cases of trigeminal neuralgia which were managed from low-level treatment modalities to surgical intervention.

Key words: *trigeminal nerve, trigeminal neuralgia, neurectomy.*

Introduction

Trigeminal neuralgia (TN) is defined by the International Headache Society (IHS) as a ‘‘unilateral disorder characterized by brief electric shock-like pains, abrupt in onset and termination, and limited to the distribution of one or more divisions of the trigeminal nerve’’ [International Headache Society, 2004].[1] The incidence is estimated at 4 to 13 people per 100,000/year.[2] Trigeminal neuralgia etiology can be classified into idiopathic, classic, and secondary. Classic trigeminal neuralgia is associated with neurovascular compression in the trigeminal root entry zone, which can lead to demyelination and dysregulation of voltage-gated sodium channel expression in the membrane. There is a huge variety of pharmacological and surgical treatment options for Trigeminal neuralgia that are effective and widely used. The general recommendation is to start with medical therapy and consider surgical procedures in patients who are refractory to medical treatment.[3]

Materials and Methods

The present study was conducted in the Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyala Institute of Dental Sciences and Research Centre, Hyderabad, Telangana during the period of 2019-2021.

Patient history of classical display of symptoms such as unilateral pain, paroxysmal, intense, lancinating, brief shock like stabbing pain which are triggered by factors such as light touch in specific area or by talking, washing of face, or by eating was used to arrive at a diagnosis.

Inclusive criteria were a diagnostic nerve block of 2% lignocaine, with adrenaline 1:80,000 concentration which gave complete relief from the symptoms. All patients being on carbamazepine, ranging from 600-1200mg/day who had become refractory to medical treatment. Patients who were not fit for major surgical procedures such as microvascular decompression, trigeminal tractotomy were also considered. Patients unfit for surgical procedures, bilateral involvement, and uncommon distribution were excluded from the study.

Peripheral neurectomies were done on Inferior alveolar nerve along with Mental nerve (N=3), Infraorbital nerve (N=2). Peripheral neurectomies were done without obturation of the foramen in 3 patients, and obturation of the foramen in 2 patients. In two patients, Peripheral Alcohol injection of mental nerve was performed in whom recurrence of same pain was observed during follow up after which Peripheral neurectomy was planned.

The follow-up was done in regular intervals for a period of 2 years and the prognosis and success of the surgery was defined based on recurrence of pain during the follow up period.

Technique

Mental nerve neurectomy: Maintaining asepsis, A vestibular incision was given in the premolar region and full-thickness mucoperiosteal flap was reflected. The mental nerve was identified (Fig 1a) and cauterized. The nerve was avulsed (Fig 1b). Closure was achieved using vicryl suture material.

Inferior alveolar neurectomy: Maintaining asepsis, the inferior alveolar nerve block along with mental nerve block was given with 2% lignocaine with adrenaline 1:80,000. A crevicular incision from first molar region

extending distally along the ascending border of ramus was given, a full-thickness mucoperiosteal flap was reflected. Medial dissection was performed, temporalis muscle was stripped and coronoid retractor was placed, lingula was exposed. Inferior alveolar nerve bundle was identified. IAN was reconfirmed by its entry into the mandibular foramen and was clamped and cauterized. The vestibular incision was given in the premolar region and a full-thickness mucoperiosteal flap was raised. A mental nerve was identified and cauterized. The nerve was avulsed from the mandibular foramen (Fig. 2). Muscle layer was sutured with 3-0 vicryl and the mucosa was sutured using 4-0 vicryl suture material.

Infraorbital neurectomy: Infraorbital neurectomy has been carried out in Caldwell-Luc incision approach. Maintaining asepsis, Infraorbital nerve block was given with 2% lignocaine with adrenaline 1:80,000. An incision is made from lateral incisor to first molar region, full-thickness mucoperiosteal flap was elevated. Infraorbital foramen was identified and the nerve was clamped (Fig 3a). Complete infraorbital nerve was avulsed (Fig 3b). The infraorbital foramen was sealed using bone wax (Fig 3c). Flap closure was done.

All patients were discontinued from Carbamazepine and were prescribed antibiotics and analgesics. The patients were recalled for follow-up at regular intervals for a period of 2 years.

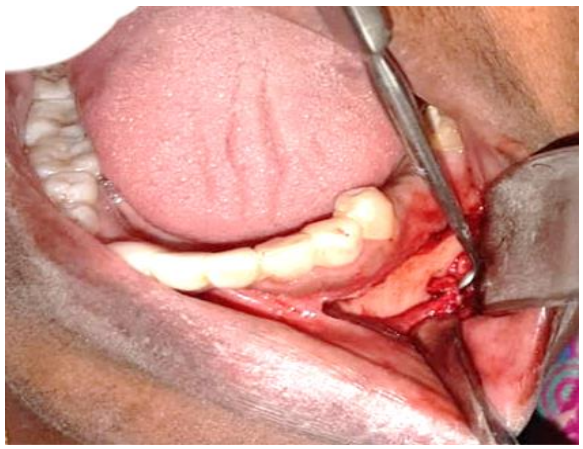

FIGURE 1a: ISOLATION OF MENTAL NERVE

FIGURE 1b: AVULSED MENTAL NERVE

FIGURE 2: AVULSED INFERIOR ALVEOLAR NERVE

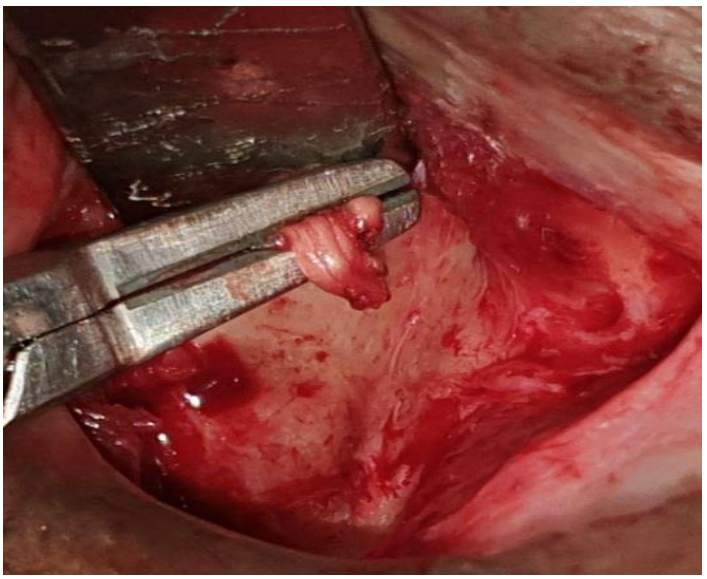

FIGURE 3a: CLAMPING OF INFRAORBITAL NERVE

FIGURE 3b: AVULSED INFRAORBITAL NERVE

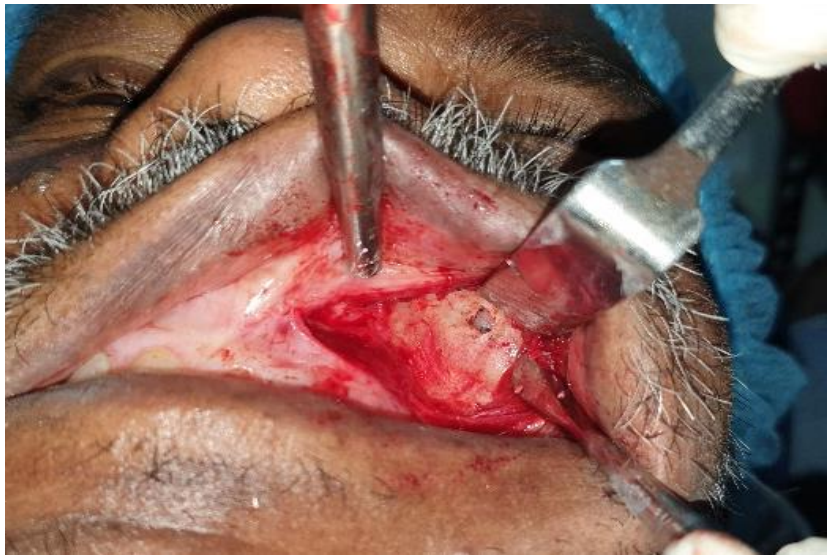

FIGURE 3c: INFRAORBITAL FORAMEN OBTURATED WITH BONE WAX

Discussion

Trigeminal neuralgia, also known as tic douloureux or Fothergill's disease, is a clinical syndrome characterized by brief paroxysms of unilateral lancinating pain that is triggered by cutaneous stimuli, such as wind on the face, talking, chewing, or brushing of teeth.[4] Analgesics such as aspirin and ibuprofen are generally not effective against trigeminal neuralgia. Anticonvulsants, such as carbamazepine (CBZ), phenytoin, gabapentin, lamotrigine, oxcarbazepine, and topiramate are used commonly because they block firing of the nerve. These medications are initially effective for pain control in 90% of patients.[5] No patient should be treated with surgical procedures without the benefit of treatment with Anticonvulsants.

Various surgical options are available for the treatment of trigeminal neuralgia which is invasive and non-invasive procedures. (1) Non-invasive technique: (a) Peripheral neurectomy, (b) Alcohol injections, (c) Cryotherapy, (d) Selective radiofrequency thermocoagulation or, (2) Invasive technique: (i) Open microvascular decompression, (ii) Percutaneous: (a) Radiofrequency rhizotomy, (b) Retrogasserian glycerol rhizotomy, (c) Balloon compression of trigeminal nerve, (d) Stereostatic radiosurgery–gamma knife.[6]

Peripheral neurectomies were first tried in the 19th century. It can be done on all the 3 terminal branches of

trigeminal nerve. It is a post-ganglionic surgical operation, which involves an avulsion of the nerve after its exit from the cranium.[7] It is a low-risk, relatively simple procedure that can be performed under local anesthesia as an outpatient procedure. The advantages of these procedures include ease in surgical process, tolerance, and acceptance by old and debilitated patients. Cerovic *et al*[8] reported that the recurrence of symptoms in patients who underwent neurectomy of mandibular nerve occur 15 to 18 months after the surgical procedure. After neurectomy the affected nerve has a very strong tendency to regenerate causing recurrence of the neuralgic pain. This particular character in a way resembles that of a tumor. To prevent this recurrence of the pain, a considerable section of the nerve, 4cm, atleast, should be excised. When the nerve happens to occupy a bone canal, the canal should be obturated. A noted advantage of peripheral neurectomy is the ease of performing a repeat surgery when required. Freemont and millac[10] recorded that the subjects who underwent the procedure reported pain-free period of 26.5 and 59 months following single neurectomy and multiple neurectomies, respectively. Hong-Sai[11], in (1999), reported a case series of 12 patients with peripheral neurectomies, of which in 4 cases, the infraorbital foramen and mental foramen were obturated with titanium screws with no incidence of recurrence in a period of 4 years. Cerovic *et al*. reported that the recurrence of pain following the first surgery on the infraorbital nerve was seen in 41% of the cases, 35% of the patients had recurrence after the second surgery between 9 and 12 months and the recurrence was seen in 44% of the patients after the third surgery with pain-free period no longer than 12 months. They concluded that the remission time after repetitive peripheral neurectomy decreases, hence there is no point in repeating the surgery on the same nerve division more than three times[8].

In our study, one patient who underwent neurectomy involving infraorbital nerve developed a recurrence of pain after follow-up of 18 months. The patient was managed by lower dose of carbamazepine and we cauterized the nerve remnants and occluded the related foramina with bone wax to reduce the recurrence rate.

Conclusion

Trigeminal neuralgia has various treatment modalities ranging from medical management to invasive surgical procedures. The diagnosis and identification of nerve branches is important for treatment planning to achieve the best treatment outcome for the patient. A surgeon should consider surgical alternatives only after failure of medical management to control pain, medically compromised patients, or individuals intolerant to the adverse effects of drugs. Peripheral neurectomy is an outpatient procedure that has been widely used since the

19th century. Since it is a chairside procedure multiple neurectomies can be performed if recurrence occurs. It is a safe and effective procedure with an acceptable outcome in providing pain relief. Review of the patient plays an important role in acknowledging the recurrence of neuralgic pain.

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