

Peripheral Neurectomy For Trigeminal Neuralgia: A Retrospective Study Of 15 Patients

Abstract

Aim: To evaluate the efficacy of peripheral neurectomy as a surgical procedure in the treatment of trigeminal neuralgia in 15 patients.

Materials and Methods: Fifteen patients who underwent peripheral neurectomy were retrospectively reviewed for four years. The factors analyzed were the demographic details of the patients, side of involvement, branch of nerve involved, procedure used, postoperative complications, prognosis and any additional procedure used in cases of recurrences.

Results: There were no significant complications. Pain recurred in one patient who became more responsive to carbamazepine after the procedure while 14 patients achieved excellent pain control.

Conclusion: Peripheral neurectomy is an effective, safe method of pain control in trigeminal neuralgia.

Key Words

Facial pain, neurectomy, tic douloureux, trigeminal neuralgia

Introduction

Trigeminal nerve is the largest of all the cranial nerves. It transmits sensory sensation to the face, oral and nasal cavities and most of the scalp and carries motor supply to the muscles of mastication. It has three major branches, the ophthalmic nerve, the maxillary nerve and the mandibular nerve. Disease involving the nerve can cause trigeminal neuralgia or loss of sensory or motor function in the distribution of the nerve. It can cause intense shooting pain along its distribution. Neuropathy can affect the nerve from its origin in brainstem to its peripheral branches. The commonest cause is vascular compression by superior cerebellar artery. An inflammatory cause like meningitis can also cause trigeminal neuralgia. After all conservative treatment modalities have been exhausted; various surgical methods may be advocated for the treatment of trigeminal neuralgia^{[1], [2], [3], [4]}.

The aim of this study is to investigate the efficacy of peripheral neurectomy as a surgical procedure in the treatment of trigeminal neuralgia and to evaluate the results obtained by this procedure and their recurrences in a period of 4 years follow up.

Materials and Methods

Retrospective analysis of 15 patients with trigeminal neuralgia who underwent peripheral neurectomy from October 2008 to December 2012 was carried out (Table 1). Patients with persistent pain after conservative treatment or intolerance to carbamazepine therapy and those who could not afford the cost of the drug were selected for neurectomy. The diagnosis was based on a detailed history, clinical examination and control

Table 1: Summary of demographic, follow up and outcome characteristic of 15 patients treated for trigeminal neuralgia

Sr. No.	Age	Sex	Side involved	Nerve involved	Follow-up (years)	Result
1	61	F	Right	Infraorbital	3	Good
2	54	M	Left	Inferior alveolar	4	Fair
3	69	M	Right	Inferior alveolar	4	Good
4	67	F	Right	Inferior alveolar	4	Good
5	47	F	Left	Supraorbital	3	Good
6	66	M	Right	Inferior alveolar	2	Good
7	70	F	Left	Inferior alveolar	4	Good
8	52	M	Right	Infraorbital	1	Good
9	48	M	Right	Inferior alveolar	4	Good
10	65	F	Right	Inferior alveolar	4	Good
11	53	F	Left	Inferior alveolar	2	Good
12	65	F	Right	Inferior alveolar	4	Good
13	59	M	Right	Inferior alveolar	3	Good
14	56	F	Right	Inferior alveolar	4	Good
15	72	F	Right	Inferior alveolar	3	Good

¹ Abhishek Bhardwaj

² Archana Bhardwaj

³ Sameer Kaura

⁴ Ramneet Manghera

¹ Sr. Lecturer, Dept. of Oral & Maxillofacial Surgery

² Reader, Dept. of Conservative Dentistry & Endodontics
Vananchal Dental College and Hospital, Jharkhand

³ Consultant, Dept. of Oral & Maxillofacial Surgery
Dr Sameer's Dental & Maxillofacial Clinic, Punjab

⁴ 304-290 Bellevue Road, Winnipeg,
MB, R2M 1T4, Canada

Address For Correspondence:

Dr. Abhishek Bhardwaj
324, Sector I-C, Bokaro Steel City, Jharkhand- 827001.
MobileNo : 09308056390
EmailID : abhishekbhardwaj@rediffmail.com

Submission : 18th January 2013

Accepted : 03rd December 2013

Quick Response Code



of pain by Tab Carbamazepine. All these patients were taking Tab Carbamazepine (average 600–800 mg/day) for 2-3 years. The branch of nerve involved was identified according to the site of pain and confirmed with diagnostic block with 2% Lignocaine (Table 2). All patients were investigated pre-operatively with OPG/computerized tomography scanning (CT) or magnetic resonance imaging (MRI), to rule out any underlying pathology. The follow-up period covered by this study ranged from 1 to 4 years. Intra- and post-operative complications, relief and recurrence of pain, any additional procedures used, were noted during the follow-up period.

The technique of peripheral neurectomy was:

1. Access to the infraorbital nerve was

Table 2: Summary of involvement of branches of trigeminal nerve.

Sr. No.	Branch involved	Total	Percentage
1	Inferior alveolar	12	80
2	Infraorbital	2	13.33
3	Supraorbital	1	6.66

through intra-oral approach. After taking upper vestibular incision, infraorbital foramen was visualized & infraorbital nerve and its peripheral branches were identified & avulsion of the nerve was performed from the soft tissues and from the infra orbital canal by reeling on haemostat.

2. Inferior alveolar nerve was approached intra-orally by Dr Ginwalla's incision^[5], identified and avulsed from the distal end. Vestibular incision in premolar region was taken; the mental nerve was identified & avulsed from the mental foramen and from the soft tissues.
3. Supra orbital nerve was approached extra-orally by upper eyebrow incision. The nerve was identified and peripheral neurectomy was performed by avulsing the nerve.

All operations were performed under local anesthesia. Antibiotics and anti-inflammatory therapy was prescribed post-operatively. The outcomes were assessed in terms of relief of pain, recurrences of pain and the need for any other procedure to overcome pain. The complications specifically sought were infection at the site of operation, bleeding & suture dehiscence. They were graded as good, fair and poor.

- Good when there was no recurrence of pain,
- Fair when there was recurrence of pain after certain period of time,
- Poor when there was no improvement in pain episodes even after neurectomy.

Results

15 patients underwent neurectomies of which 9 were females and 6 were males and whose average age was 60.2 years (range 47–72 years) (Table 1).

The third division (inferior alveolar) was most commonly affected by the disease, in 12 patients (80%) (Table 2). The second division (infra orbital) was afflicted in 2 patients (13.33%) and the first division was involved in only one patient (6.66%). The right side was affected in 11 patients (73.33%), while left side in 4 patients (26.66%). Both facial sides were not affected in any patient in this series. The mean follow-up period was 3.26 years (range 1–4 years). There were no intra-operative or post operative complications. All patients

were relieved of pain and had discontinued the medications. Only one patient (6.66%) had recurrence of pain after a period of 1 year. He was prescribed Tab Carbamazepine 200 mg 8 hourly and was relieved of symptoms.

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^{[6],[7],[8]}. Many of those who are affected experience multiple attacks daily and though, free of pain during attacks, live in constant dread of recurrence^[8].

Since its introduction in 1963, carbamazepine has become the treatment of choice in trigeminal neuralgia. However, experience shows 20-30% of patients require alternative treatment through failure of response or intolerance^[9]. For them, a variety of procedures to modify or interrupt afferent impulses along the trigeminal pathway have been devised. Most authors agree that it should be gradual, from pharmacological therapy to very invasive, intracranial procedures^{[5],[8],[10],[11],[12]}. Currently available surgical options are

1. Non-invasive technique

- Peripheral neurectomy,
- Alcohol injections,
- Cryotherapy,
- Selective radio frequency thermocoagulation

2. Invasive technique

- Open: microvascular decompression,
- Percutaneous:
 - i. Radiofrequency rhizotomy,
 - ii. Retrogasserian glycerol rhizotomy,
 - iii. Balloon compression of trigeminal nerve,
 - iv. Stereotactic radiosurgery - Gamma knife^[13].

Any treatment of idiopathic neuralgia is successful as long as it eliminates the pain^{[14],[15]}. The persistence of pain after pharmacological and injection (alcohol) therapies requires surgical intervention; these are the neurectomy of peripheral divisions of the trigeminal nerve and various neurosurgical procedures^{[15],[16],[17],[18]}. Though alcohol block

injections are also considered as minimally invasive procedures but they have severe draw backs & cause local edema, high risk of recurrent pain combined with moderate risk of dyesthesia & necrosis of the surrounding tissues^[16]. Neurectomy of the peripheral branches of the trigeminal nerve is the simplest, safest and minimally invasive surgical method craniotomy and neurosurgical procedures are costly, highly invasive, available at select centers and have higher rated of mortality and morbidity.^{[3],[4]}

In the present study, an intra-oral approach to the infraorbital & inferior alveolar nerves has been employed. This access is found to be better, primarily due to avoidance of post-operative facial scars. Some authors use trans-facial access to the V2 division^[19], due to lower chances of post-operative wound and edema.

Most of the studies done for neurectomy were published 20–50 years ago^{[20],[21]}. Quinn^[22] reported a retrospective case series of 63 patients with 112 neurectomies. A follow-up period of 0–9 years was noted, and the pain relief period of 24–32 months was reported. Grantham^[20] also reported on 55 patients, who had neurectomies. The follow-up was for 6-months to 8 years and the average pain relief period was 33.2 months.

Several authors discuss the number of repeated neurectomy of peripheral divisions of the trigeminal nerve^[2]. In the present study there was a single case of recurrence of neuralgic pain after a period of one year. The patient was prescribed 200 mg carbamazepine 8 hourly following which the symptoms were relieved. In addition, some authors state that the response of patients to carbamazepine in case of recurrence, improves after neurectomy^[23] and lower doses of the medication are needed^[2], which was also noted in the present study.

Conclusion

Trigeminal neuralgia is the most common cause of neuralgic pain in the facial region. Accurate diagnosis followed by low-dose carbamazepine is the first line of treatment. Surgery is reserved for patients refractory to the drug or adverse effects sufficient to mandate cessation. Peripheral

neurectomy consists of surgical avulsion of terminal branches of the trigeminal nerve. Loss of sensation along the branch of the trigeminal nerve is the sole disadvantage. However, it is one of the oldest, minimal invasive forms of surgery, well tolerated by the patient and can be done under local anesthesia, thus making it more cost effective. Due to the limitations of small sample size and short term follow-up in the present study, long term studies with large sample size are required to validate the results.

References

1. Serivani S, Mathews E, Maciewicz R. Trigeminal neuralgia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2005; 100: 527–38.
2. Cerovic R. Neurectomy of the trigeminal nerve branches: clinical evaluation of an obsolete treatment. *J Cranio-Maxillofac Surg.* 2009; 37: 388–91.
3. Agrawal SM, Kambalimath DH. Peripheral Neurectomy: A Minimally Invasive Treatment for Trigeminal Neuralgia. A Retrospective Study. *J Maxillofac Oral Surg.* 2011; 10:195–8.
4. Chandan S, Halli R, Sane VD. Peripheral Neurectomy: Minimally Invasive Surgical Modality for Trigeminal Neuralgia in Indian Population: A Retrospective Analysis of 20 Cases. *J Maxillofac Oral Surg.* 2013. Online publication.
5. Ginwala MSN. Surgical treatment of trigeminal neuralgia of third division. *Oral Surg.* 1961; 14:1300.
6. Apfelbaum RI. A comparison of percutaneous radiofrequency trigeminal neurolysis and microvascular decompression of the trigeminal nerve for the treatment of tic douloureux. *Neurosurgery.* 1977; 1: 16-21.
7. Apfelbaum RI. Neurovascular decompression: the procedure of choice? *Clin Neurosurg.* 2000; 46: 473-98.
8. Liu JK, Apfelbaum RI. Treatment of trigeminal neuralgia. *Neurosurg Clin NAm.* 2004; 15:319–334.
9. Vinken PJ, Bruyn GW. *Handbook of Clinical Neurology.* North Holland Publishing Company, New York. 1968, 383.
10. Das B, Saha SP. Trigeminal neuralgia: current concepts & management. *J Indian Med Assoc.* 2001; 99:704–709.
11. Ong KS, Keng SB. Evaluation of surgical procedures for trigeminal neuralgia. *Anesth Prog.* 2003; 50:181–188.
12. Broggi G, Ferroli P, Franzini A, Galosi L. The role of surgery in the treatment of typical and atypical facial pain. *Neurol Sci.* 2005; 26:95–100.
13. Bagheri S, Farhidvash F, Perciaccante V. Diagnosis & treatment of patients with trigeminal neuralgia. *J Am Dent Assoc.* 2004; 135:1713–1717.
14. Chole R, Patil R, Degwekar S, Bhowate R. Drug treatment of trigeminal neuralgia: a systemic review of the literature. *J Oral Maxillofac Surg.* 2007; 65:40–45.
15. Hassan Salama, et al. Outcome of medical and surgical management in intractable idiopathic trigeminal neuralgia. *Ann Indian Acad Neurol.* 2009; 12(3):173–178.
16. Nurmikko TJ, Eldridge PR. Trigeminal neuralgia - pathophysiology, diagnosis and current treatment. *Br J Anesth.* 2001; 87(1):117–132.
17. Toda K. Operative treatment of trigeminal neuralgia: review of current techniques. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008; 106:788–805.
18. Prasad S, Galetta S. Trigeminal neuralgia: historical notes and current concepts. *Neurologist.* 2009; 15(2):87–94.
19. Brito AJ. Trigeminal neuralgia. *Acta Med Port.* 1999; 12:187–193.
20. Grantham EG, Segerberg LH. An evaluation of palliative surgical procedures in trigeminal neuralgia. *J Neurosurg.* 1952; 9:390–394.
21. Khanna JN, Galinde JS (1985). Trigeminal neuralgia Report of 140 cases. *Int J Oral Surg* 14:325–332.
22. Quinn JH. Repetitive peripheral neurectomies for neuralgia of second and third divisions of trigeminal nerve. *J Oral Surg.* 1965; 23:600–608.
23. Shah SA, Khattak A, Shah FA, Khan Z. The role of peripheral neurectomies in the treatment of Trigeminal neuralgia in modern practice. *Pak Oral Dent J.* 2008; 28(2):237–240.

Source of Support : Nil, Conflict of Interest : None declared