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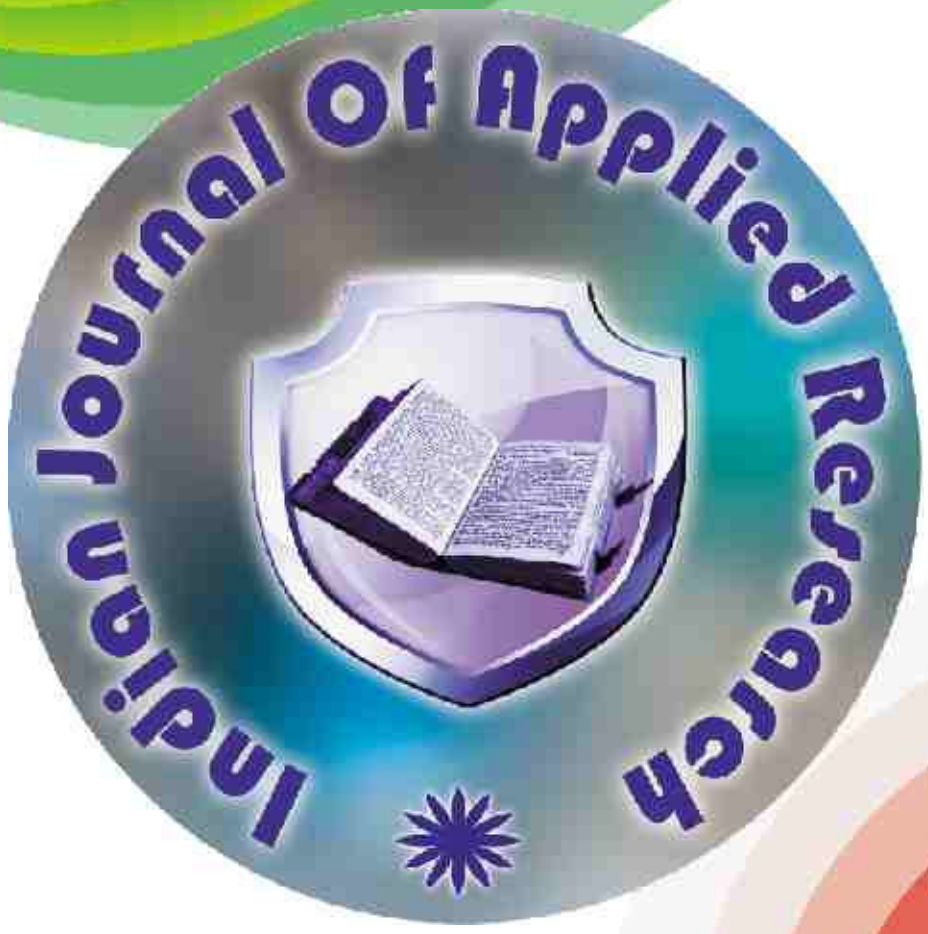

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Neurectomy For Tic How Much Reliable?

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ABSTRACT

Purpose: The purpose of this study was to assess the efficacy of the procedure, the rate and duration of recurrence of pain, the incidence of other complications in patients treated with inferior alveolar and lingual Neurectomy for trigeminal neuralgia (VIII). Method: Ten cases with idiopathic trigeminal neuralgia treated at the department of oral and maxillofacial surgery from july 2002 to November 2006 were considered for study. All the patients underwent MRI to rule out intracranial space occupying lesions, multiple sclerosis or vascular loop compression & were treated by inferior alveolar and lingual Neurectomy using Ginwallas approach. Results: Out of ten patients, recurrence of pain was present in two patients, one patient had pain in third division and the other had pain in the second division. All the patients had swelling, bruising, trismus & expected sensory loss. Conclusion: Peripheral neurectomy has been criticized by various authors for its effectiveness but the results of the present study shows that the procedure seems to be promising for a considerable period of time with minimal mortality, morbidity and post-operative complications.

Keywords : Neurectomy, Tic, Trigeminal, Neuralgia, Surgical Management

Introduction

Trigeminal neuralgia is one of the most painful & debilitating diseases known [1]. International headache society defines trigeminal neuralgia as painful unilateral affliction of the face, characterised by brief electric shock like pain limited to the distribution of one or more divisions of the trigeminal nerve. Pain is commonly evoked by trivial stimuli including washing, shaving, and smoking, talking and brushing the teeth spontaneously. The pain is abrupt in onset and termination and may remit for varying periods [2].

According to Kherrick, on an etiologic basis there are two different types of trigeminal neuralgia. The majority of cases are of a primary type, for which there is an unknown or debatable cause. The secondary type follows an underlying cause and is generally a symptom of another disease process.

In the primary form of the disease, the pain is seen most commonly in persons over the age of 40 and is twice as common in women; it is more common on the right side of the face and oral cavity. If secondary to another disease process, the age, sex, and distribution of the disease are altered and neuralgic signs, such as loss of hearing, sensations, blindness, etc., may be present. The pain has been described as suggestive of an electric shock. Trigger areas are usually localised in the anterior portions of the oral cavity or face. He also found that approximately 95% of the cases affect the second or third division of the fifth cranial nerve, with the ophthalmic division being involved in less than 3% of the cases.

Trigeminal neuralgia is recognised by the following symptoms:

1. Intermittent attacks of lancinating unilateral pain along one or more branches of the trigeminal nerve, with freedom from pain between attacks.
2. Paroxysmal pain lasting from several seconds to several minutes.
3. Periodicity of pain followed by natural complete remission lasting for weeks, months, or years, followed by recurrence of pain.
4. Trigger areas which, when stimulated precipitate the lancinating pains.
5. Negative neurological examination findings.
6. Relief of pain by total anaesthesia of the trigger area.
7. Generally a refractory period for a few minutes immediately after a violent attack of pain [3].

There are several theories regarding the mechanism of pain production in trigeminal neuralgia. All remain uncertain and controversial. One theory suggests partial and focal nerve demyelination as a result of tumour or vascular compression. This can lead to abnormal transmission and processing of impulses along the trigeminal nerve. An alternative theory suggests that chronic irritation or trauma to the trigeminal nerve can cause ectopic action potential and failure of segmental inhibition, leading to symptoms of trigeminal neuralgia. In reality, for most patients with trigeminal neuralgia, there is no identifiable cause [4].

Because of the lack of understanding of the disease, early treatments prescribed for trigeminal neuralgia were haphazard [5]. The current treatment of trigeminal neuralgia consists of medical and surgical therapies. Medical management consists of pharmacologic and non-pharmacologic approaches, while surgical management consists of numerous peripheral and intracranial procedures [1].

The first line of treatment is usually medical therapy, with drugs such as carbamazepine, baclofen, gabapentin, phenytoin or clonazepam in single or combination regimens. Pharmacologic therapy is effective for many patients; however, for some these medications either fail to relieve the pain and/or produce intolerable side effects with significant medical and functional morbidity. If medical therapy is unsuccessful or not tolerated, surgical treatment should be considered [1].

Current nonmedical management of trigeminal neuralgia includes microvascular decompression, radiosurgery, neurectomy of peripheral trigeminal branches, and percutaneous destructive procedures. None of these treatments is curative, and all of these treatments are associated with a risk of pain recurrence [6].

Neurectomy is probably the oldest recorded surgical procedure for trigeminal neuralgia [7]. Peripheral neurectomy has been used to control the paroxysms of pain in trigeminal neuralgia since Nicholas Andre performed the first authenticated neurectomy in 1732 [8]. Peripheral neurectomy is effective in relief of pain because it interrupts the flow of a significant number of afferent impulses to central trigeminal apparatus. The neurectomies not only remove the sensory receptors of the peripheral nerves but the trauma that is produced also causes temporary degenerative changes in the ganglionic cells [9].

Mainly employed by present day maxillofacial surgeons, the technique is too under-reported to allow evaluation of its usefulness against other treatments [2]. So the aim of this study was to assess the efficacy of the procedure, the rate and duration of recurrence of pain, the incidence of other complications in patients treated with inferior alveolar and lingual neurectomy for trigeminal neuralgia (VIII).

Material and method:

This study was carried out on ten patients presenting with the features of idiopathic trigeminal neuralgia in the Department of Oral and Maxillofacial Surgery from July 2002 to November 2006. The diagnosis was based on a detailed history, clinical examination, radiological findings, diagnostic local anaesthetic block & control of pain by carbamazepine. The branch of nerve involved was identified according to the site of pain and confirmed with diagnostic local anesthetic 2% lignocaine with adrenaline 1: 200,000 injection at the identified site. Before being considered for surgical treatment, all patients had been placed on maximum pharmacological therapy, especially a course of carbamazepine, gabapentine. All patients had became refractory to medical therapy or had clinical and/ or laboratory side effects sufficient to demand drug cessation. All patients were investigated pre-operatively with magnetic resonance imaging (MRI), which revealed no underlying structural abnormalities such as intracranial space occupying lesions, multiple sclerosis or vascular loop compression. All the patients were treated with inferior alveolar and lingual neurectomy using Ginwallas approach.The follow-up period covered by this study ranged from 2-5 years.

Inclusion criteria:

- All patients with proven cases of idiopathic trigeminal neuralgia V (III) division.
- All patients which were refractory to medicinal treatment.
- All patients who were allergic to carbamazepine therapy.
- Both male and female patients were included.

Exclusion criteria:

- Medically compromised patients who were unfit for general anaesthesia.
- All patients with compressive lesions like space occupying lesions and aberrant vascular loops were excluded.
- Previously treated cases for neurectomy.

Surgical Technique

The patient was positioned on the table, prepared in the usual manner and draped so that only the mouth was exposed. Mandibular and mental block anaesthesia was given on the affected side with 2% Xylocaine with adrenaline. The ascending ramus was also infiltrated. An intraoral incision was made on the anterior border of the ascending ramus, extending from below the coronoid process, downward and slightly medially until it reached the body of the mandible at the angle. At this point the main incision was divided, one fork going over the ridge lingually and the other similarly going over the ridge buccally, like an inverted Y. Next, by means of blunt and sharp dissection, the incision was deepened on the medial aspect of the ascending ramus. The medial pterygoid muscles were split, rather than divided and the inferior alveolar nerve was located. Once the nerve was located, it was followed and freed both upward and downward toward the mandibular foramen. A heavy linen thread was looped around the nerve. Two such loops were thrown around the nerve. The proximal loop was carried up as high as possible and knotted, the distal knot was applied a little lower, and the nerve was divided between the two knots. The proximal knot was cut short and that end of the nerve was retracted upward. The ends of the distal knot were kept long and not cut. At this time a small incision was made in the buccal sulcus and in the mental foramen region the nerve was exposed. The nerve was teased out of the foramen, grasped by two haemostats and divided between them. The distal end of the nerve was wound around the haemostat and avulsed, thereby doing away with peripheral branches of the nerve. After this had been achieved, the operator returned to the first site of operation. The divided nerve end, before it enters the mandibular foramen, was grasped by a haemostat and wound around it very slowly until the entire nerve, the length of the canal, was avulsed out. Complete hemostasis was achieved. The site of operation was closed using a 3-0 Vicryl continuously locking sutures.

Results:

Out of ten patients, 4 patients were between 60-70years, 3 patients were between 50-60years whereas one patient belonged to 30-40yrs, 40-50yrs and 70-80yrs each. The range was from 36 to 72yrs. There were 5 male and 5 female patients. The right side was involved in 4 patients and left side was involved in 6 patients; with all patients having unilateral involvement.

In all patients, pain was involving third division of trigeminal nerve which were treated using inferior alveolar and lingual neurectomy using Ginwalla's approach. Out of ten patients, 8 patients were found to be pain-free whereas recurrence of pain was found in 2 patients. One patient developed pain in the same division and underwent repetitive inferior alveolar and lingual neurectomy and complete pain relief achieved. Another patient developed pain in the second division of the trigeminal nerve and underwent infraorbital neurectomy. But the recurrence of pain still persisted, and then he was referred to neurosurgeon for further management. All patients developed facial swelling, bruising and trismus in the early postoperative period and the expected loss of sensation in the appropriate distribution of the trigeminal nerve as a post-operative complication.

Discussion:

Although medication therapy with an antiepileptic drug should be the initial choice for virtually all patients with trigeminal neuralgia, it is important to emphasize that surgical treatment of trigeminal neuralgia is often highly effective and well tolerated, and some have a low incidence of complication [10]. In 30% of the cases, medical treatment fails through inadequate pain control or because of intolerable side effects. In these cases, surgical management is the only viable option [11]. However, none of them is a cure [12]. The outcome varies widely by literature [13].

Khanna and Galinde performed 84 inferior alveolar neurectomies and reported 74% success rate during the follow-up of 5yr [14]. These results were similar to the results found in the present study. We found a success rate of 80% over the follow-up of 2-4yrs. Mason performed 15 inferior alveolar neurectomies and found pain relief in 8 patients by the end of 1 year. At the end of 4yr, pain relief was present in 2 patients amongst 12 patients. Failure was found due to the recurrence of pain in other branches of third division or in other division [15] similar to the results found in the present study. Quinn and Weil found that the median total pain-free period among 88 patients with 162 neurectomies was 41 months with a mean of 52.1 months [9].

Murali and Rovit reported that of 12 patients who underwent peripheral neurectomy as an initial procedure, 7 had an excellent result (total loss of pain without requiring a course of carbamazepine) and 5 had a good result (loss of pain requiring modest amount of carbamazepine). Of 28 patients who had previously received a prior percutaneous radiofrequency thermocoagulation followed later by peripheral neurectomy for recurrence of pain, 22 (79%) had an excellent result and 6 (21%) had a good result lasting 5 years or more [16].

Freemont and Millac reported that a single neurectomy yielded, on average, 26.5 months free of pain and serial neurectomies gave on average a 59-month pain-free period [17].

By contrast, Danish investigators found that, during a mean follow-up of 7yr, 78% of patients who had undergone neurectomy experienced a recurrence. One half of the patients had their first recurrence within a month. In their series, neurectomy (as well as alcohol block) compared unfavourably with radiofrequency lesioning. Complications (mainly eye problems and dysaesthesiae) were reported in just under 10%, similar to those who had undergone radiofrequency lesioning or alcohol blocks [18].

The more radical procedures have significant disadvantages with varying rate as stated by Steven Grafford [Table no.2]. In the present study, we found no major complications of these procedures other than some facial swelling, trismus and bruising in the early postoperative period and the expected loss of sensation in the appropriate distribution of the trigeminal nerve similar to the results reported by Syed Amjad Shah [11].

We found several advantages of this technique, which are as follows:

- It is associated with acceptable success rate.
- It is easy to perform as compared to other central procedures.
- It is well tolerated by elderly, debilitated, or cognitively impaired patients.
- The procedure can be performed while the patient is under local anaesthesia.
- Corneal sensation is left intact in patients with first division trigeminal neuralgia.
- The patient can be sent home either the day of the operation or 1 day later.
- Pain relief occurs immediately following the operative procedure or very soon thereafter.
- There are no major complications of these procedures other than some facial swelling, bruising and trismus in the early postoperative period and the expected loss of sensation in the appropriate distribution of the trigeminal nerve.

Conclusion:

Although several treatment procedure have been evolved and are in use for treating this dreadful disease, but none of them proved to be a permanent cure to the disease and are also associated with varying rate and severity of complications and drawbacks. Peripheral neurectomy has been criticized by various authors for its effectiveness but the results of the present study shows that the procedure seems to be promising for a considerable period of time with minimal mortality, morbidity and post-operative complications.

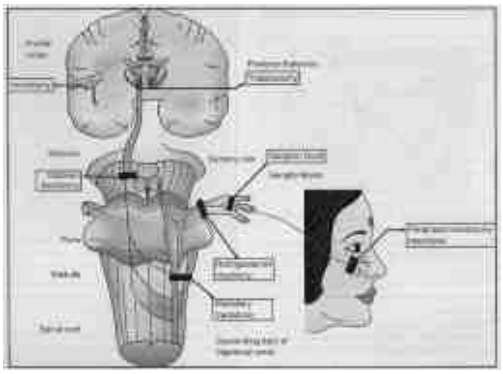
Table no.1 Summary of results found in the patients

Case no.	Age/ Sex	Side involved	Division of trigeminal nerve involved	Recurrence of pain after treatment	Complications occurred after the procedure	Any further treatment required
1.	43y/F	L	3rd	Absent	All patients had facial swelling, bruising and trismus in the early postoperative period and the expected loss of sensation in the appropriate distribution of the trigeminal nerve.	none
2.	65y/M	L	3rd	Absent		none
3.	65y/M	R	3rd	Absent		none
4.	56y/M	L	3rd	Absent		none
5.	63y/F	R	3rd	Absent		none
6.	72y/M	R	3rd	Absent		none
7.	50y/F	L	3rd	Absent		none
8.	36y/F	L	3rd	Absent		none
9.	63y/F	L	3rd	Recurrence was present in 3rd division		Inferior alveolar and lingual neurectomy was done.
10.	56y/M	R	3rd	Recurrence of pain was in 2nd Division		Infraorbital neurectomy was done but patient still had pain so further referred for RFTA

Table no.2 - Surgical Management of trigeminal Neuralgia:
(According To Neurosciences Report Summer 2006 by Steven Grafford.)

Sr. no.	Procedure	Effectiveness	Comment
1.	Alcohol Block	Excellent	- Relief is typically 8-16 months. - Paraesthesia or dysesthesia occurs in 48%. - Necrosis of local region is seen in 10% cases.
2.	Alcohol Gangliolysis	88% at 4 years	- Corneal anaesthesia occurs in 15%. - Neuroparalytic keratitis in 4-7%. - Postoperative paraesthesia in 55%. - Herpetic outbreak in 26%. - Transient masticatory muscle weakness in 45%.
3.	Neurectomy	Excellent	- Relief is typically 26-38 months. - Anaesthesia dolorosa & corneal anaesthesia are rare.
4.	Glycerol Gangliolysis	89-96%	- 7-10% had early recurrence. - 7-21% developed recurrence over extended follow-up. - Facial hyperesthesia occurs in 24-80%. - Corneal anaesthesia occurs in 9%. - Facial dysesthesia occurs in 8-29%.
5.	Radiofrequency Gangliolysis	78-100%	- 1-17% early recurrence. - 4-32% developed recurrence over extended follow-up. - Masseter weakness occurs in 7-25%. - Troublesome dysesthesia in 11-42%. - Corneal hyperesthesia in 3-27%. - Neuroparalytic keratitis in 1-5%. - Anaesthesia dolorosa in 1-4%.
6.	Microvascular Decompression	96-97%	- 16-29% developed recurrence over extended follow-up. - Mortality occurs in 1%. - Morbidity occurs in 10-23%.
7.	Rhizotomy	85%	- 15% develop recurrence over extended follow-up. - Mortality occurs in 0.5-1.6%. - Facial weakness occurs in 7-8%. - Paraesthesia occurs as a minor complaint in 56%. - Paraesthesia occurs as a major complaint in 5%. - Neuroparalytic keratitis occurs in 15%.
8.	Trigeminal Tractotomy	??	- Ipsilateral limb ataxia occurs in 10%. - Contralateral limb sensory loss occurs in 14%.
9.	Gamma Knife	80%	- None.

Figure1. Various sites of surgical control of maxillofacial pain



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