

Peripheral Neurectomy: Minimally Invasive Surgical Modality for Trigeminal Neuralgia: A Retrospective Study

Peripheral
Neurectomy for
Trigeminal
Neuralgia

Waheed Alam¹, Farooq Azam² and Naeem ul Haq³

ABSTRACT

Objective: The present study aimed to assess the minimal invasive surgical modality or peripheral neurectomy for trigeminal neuralgia.

Study Design: A retrospective study

Place and Duration of Study: This study was conducted at the Department of Neurosurgery Jinnah Teaching Hospital, Peshawar from June 2022 to May 2023.

Materials and Methods: All the patients underwent peripheral neurectomy were analyzed for complications, pain relief and recurrence, and additional procedure for treatment recurrence and follow-up were done for 36 months postoperatively.

Results: The overall mean age was 52.6 ± 8.62 years (35-70 years). The preoperative mean VAS was 7.52 ± 0.9 (5.9-9). There was significant improvement in VAS during follow-up after two and three years that was 0.79 ± 1.34 and 1.5 ± 0.97 respectively. The condition most usually impacted the third division (inferior alveolar) in 12 cases (54.5%). The second division (infraorbital) affected 7 individuals (31.8%), while the first division (supraorbital) affected two patient (9.1%). The inferior alveolar neurectomies were performed under general anesthesia whereas other two procedures were done under local anesthesia. Intra-operative and postoperative complications were found insignificant. About 9.1% (n=2) patients had recurrent pain.

Conclusion: Peripheral neurectomy gives effective pain relief for TN patients in the short to medium term. The technique significantly reduced the degree of preoperative anxiety, depression, and pain.

Key Words: Trigeminal neuralgia, Peripheral neurectomy, Invasive surgical modality

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INTRODUCTION

Trigeminal neuralgia (TN) is the sudden intermittent, intense, lancinating, and severe unilateral facial pain in trigeminal nerve last for fraction of second caused by intraoral stimuli.^{1,2} The annual prevalence of TN is approximately 13 per 100,000 per annum. It is more frequent in those over the age of 40, with a slight feminine inclination. A comprehensive physical examination and interviews with patients about their trigeminal nerve supplied region are required for an appropriate diagnosis of TN.³

In 30% of patients, medicinal treatment fails owing to insufficient pain control or excessive side effects; consequently, surgical intervention is necessary in these individuals. There are several surgical methods available for TN treatment. Peripheral neurectomy is a low-risk treatment modality that includes trigeminal nerve postganglionic segment by surgical avulsion under the local anesthesia for TN-related peripheral pain management.⁴

According to a previous research, the most prevalent cause of trigeminal neuralgia is vascular compression of the superior cerebellar artery; nevertheless, an inflammatory disease such as meningitis.⁵ Typically, therapy begins with a conservative approach such as carbamazepine, but the daily dose must be increased as there is no improvement with time. The surgical approach is the second priority for alleviation of intense neuralgic pain after conservative treatment fail to relieve pain.⁶ Regardless being the oldest surgical approach, no earlier study have significant statistics on surgical intervention of TN by peripheral neurectomy.⁷ Therefore, the present study was carried out to investigate the peripheral neurectomy efficacy in treating the trigeminal neuralgia for pain relief, recurrence, and reduced complications.

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MATERIALS AND METHODS

A retrospective study was conducted on 22 trigeminal neuralgia patients aged between 35 and 70 years in the Department of Neurosurgery Jinnah Teaching Hospital, Peshawar from June 2022 to May 2023. All the patients underwent peripheral neurectomy were analyzed for complications, pain relief and recurrence, and additional procedure for treatment recurrence and follow-up were done for 36 months postoperatively. Patients of either gender aged 35-70 years and presented with trigeminal neuralgia attributes, particularly persistent pain despite treated with tab carbamazepine or conservatively were enrolled. All the patients <35 years age having symptomatic TN had rare exhibition of bilateral involvement and <1 year follow-up duration were excluded. Patients under the age of 35, cases that have previously been treated with neurectomy, and patients who are unsuitable for local or general anesthesia were also excluded. All the patients were given antibiotic drugs for 5-7 days following surgery. Postoperative evaluation of those patients were done on the second day and seventh days, as well as after one and six months and up to 3 years. Pain alleviation, recurrences of pain (if any), and the necessity for any further operation to control recurring pain were different complications. Infection at the location of the procedure, hemorrhage, suture dehiscence, and return of neuralgic pain were the consequences explicitly anticipated.

Data analysis was done using SPSS version 27. Mean and standard deviation was used for quantitative variables whereas qualitative variables were expressed as frequency and percentage. Paired matched test was done to compare the pre-operative and post-operative parameters based on 95% confidence interval and 5% level of significance.

RESULTS

The overall mean age was 52.6 ± 8.62 years (35-70 years). Of the total 22 TN patients, there were 12 (54.5%) male and 10 (44.5%) female. The preoperative mean VAS was 7.52 ± 0.9 (5.9-9). There was significant improvement in VAS during follow-up after two and three years that was 0.79 ± 1.34 and 1.5 ± 0.97 respectively. The inferior alveolar neurectomies were performed under general anesthesia whereas other two procedures were done under local anesthesia. Intra-operative and postoperative complications were found insignificant. About 9.1% (n=2) patients had recurrent pain. The occurrence of left and right side face was 8 (36.4%) and 14 (63.6%) respectively. Patients distribution based on their age were as follows: 4 (18.2%) in 35-45 years, 10 (45.5%) in 46-55 years, and 8 (36.4%) in 56-70 years as shown in Table-I. Five

patients had pain recurrence. Three of these featured both V2 and V3, while two involved V3. Various characteristics of patients are shown in Table-II. The condition most usually impacted the third division (inferior alveolar) in 12 cases (54.5%). The second division (infraorbital) affected 7 individuals (31.8%), while the first division (supraorbital) affected two patient (9.1%) as depicted in Figure-1.

Table No. 1: Patient’s distribution based on their age groups (N=22)

Age groups (years)	Frequency (N)	Percentage (%)
35-45	4	18.2
46-55	10	45.5
56-70	8	36.4

Table No. 2: Characteristics of study population

Parameters	Value
Age (mean \pm SD) in years	52.6 ± 8.62
Gender N (%)	
Male	12 (54.5)
Females	10 (44.5)
Face side involvement N (%)	
Left	8 (36.4)
Right	14 (63.6)
Postoperative duration (years)	3.0 ± 1.6
Trigeminal nerve division N (%)	
V1, V2, and V3	2 (9.1)
V2 and V3	3 (13.6)
V2	15 (68.2)
V3	2 (9.1)
VAS Preoperative pain	7.52 ± 0.9 (5.9-9)
VAS Preoperative pain after two years follow-up	0.79 ± 1.34
VAS Preoperative pain after three years follow-up	1.5 ± 0.97

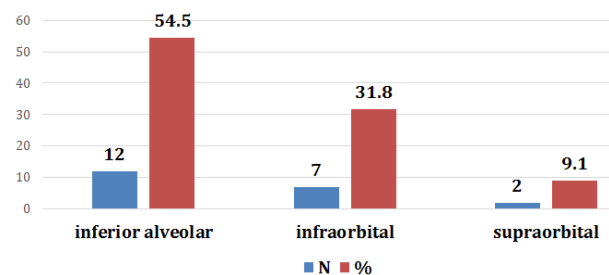


Figure No. 1: Involved branches of trigeminal nerve (N=22).

DISCUSSION

The present study investigated the peripheral neurectomy as a minimally invasive surgical technique for trigeminal neuralgia and found that peripheral neurectomy provides significant pain relief for TN patients in both short and long-term. The procedure dramatically decreased preoperative anxiety, despair,

and discomfort. TN is basically neuropathic condition of face pain distinguished by sudden intermittent, intense, lancinating, and severe pain in trigeminal nerve division. This facial pain in trigeminal nerve last for fraction of second caused by intraoral stimuli. These patients are frequently terrified that the pain may return, given that pain episodes grow in severity, frequency and duration unless treated with specific therapy.⁸

The pain episodes of TN patients come from the membrane voltage gated sodium channel expression caused by deregulation and demyelination in the entry zone of trigeminal root associated with neurovascular compression of Classic TN pathophysiology.⁹ An earlier investigation reported that the peripheral vasculature pathological vascular abnormalities contribute to inferior alveolar nerve demyelination causing pain in the beginning and progression of TN patient's treatment.¹⁰⁻¹¹

Another authors conducted their study on 72 individuals with idiopathic TN and reported that 62.5% patients had alone or V2 conjunction implicated by V3. Kumar et al., stated that one-third of the individuals in their research had both V2 and V3 involvement.¹²

Peripheral neurectomy is an effective and safe surgical technique of minimal invasive type. It is possible to do it as an outpatient operation under local anesthesia. It entails the trigeminal nerve branches cutting after their escape through facial bone foramina. It prevents the afferent signal's conduction, hence stopping pain episodes. The demyelination of affected nerve fibres caused by peripheral vascular alterations, as shown on histological and immunohistochemically analysis, provides a basis for peripheral neurectomy in the treatment of TN pain.¹³ It is performed mostly on elderly or disabled individuals for whom other invasive neurosurgery operations are contraindicated.

Many of individuals affected have many episodes per day, and while they are pain-free between attacks, they live in continual worry of recurrences.¹³ There are several non-surgical and surgical treatment options accessible in the literature; nevertheless, most writers believe that TGN treatments should progress progressively from pharmaceutical therapy to more invasive, intracranial surgeries.^{14,15}

A case study of 63 individuals with 112 neurectomies. A follow-up time of 0-9 years was noticed, as was a pain relief period of 24-32 months. Any therapy for idiopathic neuralgia is beneficial if it relieves pain.¹⁶⁻²⁰ If pharmacological methods fail to manage the neuralgic pain, surgical intervention is indicated.²¹ Although alcohol nerve block injections are considered less invasive treatments, they can induce local edema, the danger of recurring pain, as well as a modest risk of dysesthesia and necrosis of the surrounding tissues.²²⁻²³ This is consistent with the findings of Bick et al, who evaluated 146 patients.²⁴

CONCLUSION

Peripheral neurectomy gives effective pain relief for TN patients in the short to medium term. The technique significantly reduced the degree of preoperative anxiety, depression, and pain.

Author's Contribution:

Concept & Design of Study: Waheed Alam
 Drafting: Farooq Azam,
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 Data Analysis: Naeem Ul Haq
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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