



Long-term Follow-up of Trigeminal Neuralgia Patients treated with Percutaneous Balloon Compression Technique: A Retrospective Analysis

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ABSTRACT

Background: Trigeminal neuralgia (TN) refers to sharp, lancinating pain in the areas supplied by trigeminal nerve. Both pharmacological and surgical lines of treatments are available for the treatment of TN. Percutaneous balloon compression (PBC) is one such surgical technique that is usually advocated for the treatment of TN occurring in elderly patients. Hence, we aim to evaluate the follow-up results of the TN patients treated by the PBC technique.

Materials and methods: A total of 400 patients were selected for the study who had undergone surgical treatment of TN by percutaneous balloon decompression technique. All the postoperative follow-up records of the patients, clinical history, and complication records of the patients were studied and evaluated.

Results: Of all the patients included in the study, 353 patients showed improvement clinically after PBC therapy. Out 400, 180 were males and 220 were females. Postoperative complications of the patients during their follow-up were also recorded and it was observed that the most common complication arising after treatment with this technique included facial numbness, masseter muscle weakness, paresthesia, diplopia, and corneal anesthesia.

Conclusion: One of the most common neuralgic pains affecting the face is the pain of TN. Although numerous lines of treatment options are available for its treatment, all these have one or the

other drawbacks. From our results, we can conclude that PBC technique offers more advantages than other surgical modalities and, therefore, should be preferred over other techniques of treatment.

Keywords: Pain, Percutaneous balloon compression, Trigeminal neuralgia.

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INTRODUCTION

Trigeminal neuralgia (TN) refers to the intense neuropathic pain that arises in one or more than one division of 5th cranial nerve: the trigeminal nerve. Based on the type of etiologic agent involved, TN is of four main types, namely atypical, idiopathic, secondary, and postherpetic.¹ On the basis of the pain's clinical features or characteristics, TN is further classified into two types: Classical TN (CTN) and mixed TN (MTN).² It has been referred to as cephalalgias by Galen and Hippocrates. The name Tic Douloureux was given to TN in 1756 by Andre. According to Jhon Hunter, TN is a pathologic state of nervous system in which pain appears to be arising from teeth, gums, and tongue where in actual state, no pathology, disease, or lesion is present.^{3,4} For treatment of the cases of TN, both the medicinal therapy and surgical therapy are available. For the medicinal part, Carbamazepine and Gabapentine forms the first line of drugs. In case the patient does not respond to the medicinal therapy or the patient is resistant to the pharmacological means, surgical treatment is the only main line of treatment left. Various surgical modalities for

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the treatment of TN include neurectomy, blockage of the nerve by glycerol, rhizotomy by radiofrequency, gamma knife surgery, and trigeminal ganglion compression.⁵ Therefore, we evaluated the long-term prognosis of patients in which percutaneous balloon compression (PBC) technique was used for the treatment of TN.

MATERIALS AND METHODS

All the patients who had undergone PBC for the treatment of TN were included for the study. The patient data were collected from the year 2005 to 2010 for all the above-mentioned treated cases. Inclusion criteria included patients who reported in hospitals with the chief complaint of neuralgic pain (paroxysmal pain of sharp, electric shock-like nature) and who did not respond well to pharmacological line of treatment. Patients giving history of other systemic diseases or lesions (multiple sclerosis, any kind of malignancies, or tumors) were excluded from the study. Only those patients were counted in the study for which follow-up data of a minimum of 4 years were available. After applying the exclusion criteria, a total of 400 patients were left for this study. Out of 400, 220 were females and 180 were males. All the surgical procedures were performed by a registered oral surgeon.

Assessment and evaluation of individual symptoms of TN, clinical findings, and postoperative complications was done and a separate record was maintained for all of the above-mentioned data. Follow-up record was

maintained in the form of questioner, clinical examination, and complete checkup to look for any complication. Regular follow-up was done after every 2 months. All the follow-up data were recorded and assessed by a registered oral surgeon only. Patients in whom clinical signs and symptoms of neuralgic pain subsided were considered as successful. Facial pain arising due to any other reason in these patients postoperatively, who did not fulfill the criterion of neuralgic pain, was not considered as treatment failure. Results obtained were statistically analyzed using Statistical Package for the Social Sciences (SPSS) software. One-way analysis of variance (ANOVA) was used to assess the level of significance ($p < 0.05$ is significant).

RESULTS

The results of the present study are summarized in Tables 1 to 5. We included a total of 400 patients for the study, of whom 353 patients showed an improvement clinically after PBC therapy. Out of 400, 180 were males and 220 were females (Table 1, Graph 1) ($p < 0.05$). A total of 232 patients were above 50 years of age, while 168 were below 50 years (Table 2, Graph 2). We also divided the patients on basis of duration of TN. One hundred fifty-one patients had a TN history of more than 10 years (Table 3, Graph 3). While assessing the data regarding the most commonly side of the face affected, we observed that in more than 65% of cases, right side of the face was affected by the lesion (Table 4, Graph 4). Facial numbness,

Table 1: Distribution of the patient's outcome on the basis of sex

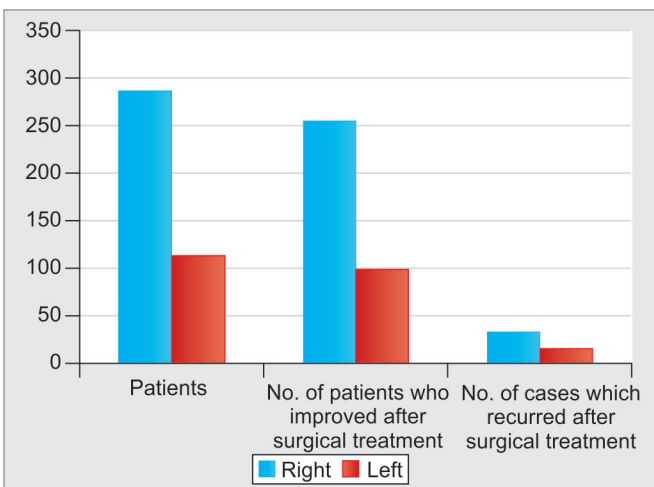
Sex	Patients	No. of patients who improved after surgical treatment	No. of cases which recurred after surgical treatment	p-value
Males	180	161	19	0.0014 S
Females	220	192	28	

S: Significant

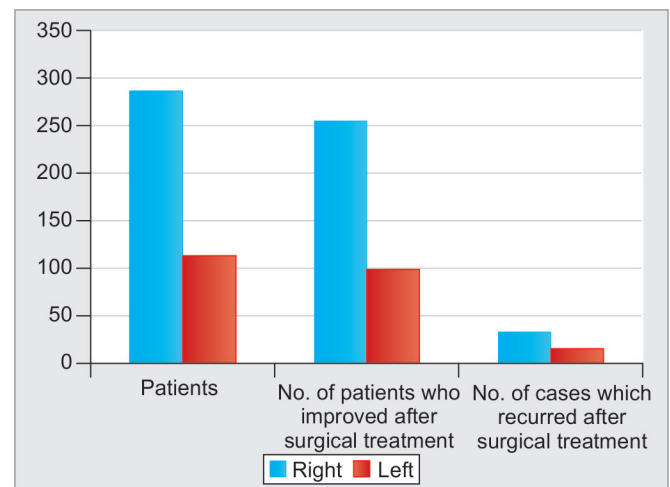
Table 2: Distribution of the patient's outcome on basis of age

Age	Patients	No. of patients who improved after surgical treatment	No. of cases which recurred after surgical treatment	p-value
< 50 years	232	197	35	0.0024 S
> 50 years	168	156	12	

S: Significant



Graph 1: Patients with treatment outcome divided on the basis of sex

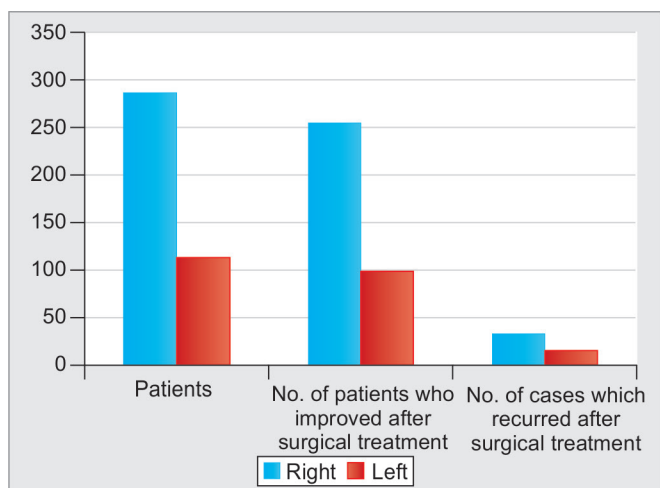


Graph 2: Patients with treatment outcome divided on the basis of their age

Table 3: Distribution of the patient's outcome on the basis of history of trigeminal neuralgia

Time duration of pain	Patients	No. of patients who improved after surgical treatment	No. of cases which recurred after surgical treatment	p-value
< 10 years	249	212	37	0.0031 S
> 10 years	151	141	10	

S: Significant

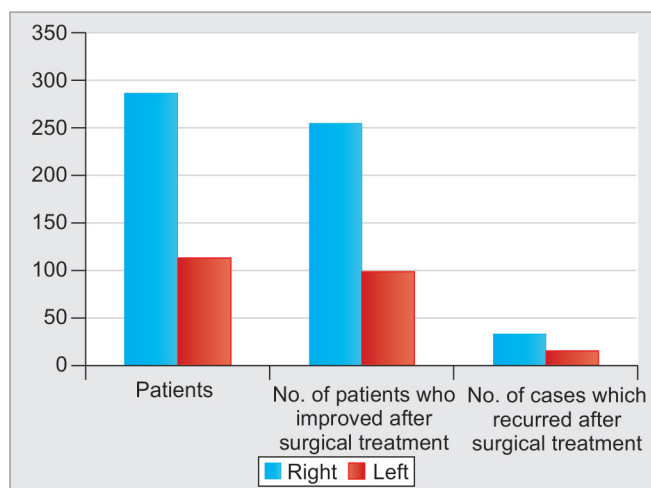


Graph 3: Patients with treatment outcome divided on the basis of history of trigeminal neuralgia

Table 4: Distribution of the patient's outcome on the basis of side of face involved by trigeminal neuralgia

Side of the face involved	Patients	No. of patients who improved after surgical treatment	No. of cases which recurred after surgical treatment	p-value
Right	287	255	32	0.0045 S
Left	113	98	15	

S: Significant



Graph 4: Patients with treatment outcome divided on the side of the face involved by trigeminal neuralgia

Table 5: Postoperative complications of patients after treatment by percutaneous balloon compression

Complication	No. of patients (%)
Facial numbness	110 (27.5%)
Masseter muscle weakness	44 (11%)
Paresthesia	25 (6.25%)
Diplopia	20 (5%)
Corneal anesthesia	11 (2.75%)

masseter muscle weakness, paresthesia, diplopia, and corneal anesthesia were the common postoperative complications seen in patients after undergoing treatment by PBC technique.

DISCUSSION

One of the most common cause of facial neuralgia is the TN comprising more than 25 cases per one lakh population and is often regarded as one of the most painful condition affecting the patients.^{6,7} Different researchers advocate different treatment modalities for treating TN, but all the available treatment options have their own limitations. Hence, we assessed the follow-up results of TN patients treated with PBC. More than 50% of the patients in our study were females (Table 1). Manzoni and Torelli (2005) also mentioned that male-to-female ration in TN cases is approximately 2:3.⁸ In our study; we observed that

TN was more common in patients above 50 years of age (Table 2). Pollock and Stien⁹ and Koopman et al¹⁰ also mentioned in their work that TN is significantly more common and prevent in person above 50 years of age and the frequency of its occurrence increases with age.

We also evaluated in postoperative complications arising in TN patients treated by PBC. In our study (Table 5), facial numbness was the post common complication seen in TN-treated patients followed by masseter muscle weakness, paresthesia, diplopia, and corneal anesthesia. Surgical treatment involving PBC aims to alter the triggering lancinating pain of TN by injuring the myelinated fibers. As unmyelinated fibers mediate the corneal reflex, the reflex is also lost when these fibers are injured.¹¹ Percutaneous balloon compression techniques aiming at trigeminal ganglion are known to cause a number of consequences, such as paresthesia, masseter muscle weakness, hypoesthesia, etc.¹² Our results were in correlation with the results of Du et al¹³ who noticed facial numbness as the most prevalent postsurgical complication in their series of TN patients.

In a series of TN cases studied by Günther et al,¹⁴ they observed that with approximately eight and half year follow-up, complications did occur postoperatively in their series. These complications mainly included hypesthesia, hypacusis, partial facial nerve palsy,

complete hearing loss, etc.¹⁴ Occurrence of transient hypoesthesia is often regarded as a common side-effect of PBC.^{15,16} Although temporary, ipsilateral mastication weakness is often considered as one of the problem arising postoperatively.^{17,18}

Mullan and Lichtor¹⁸ were the first to describe the technique of PBC. Increasing popularity of PBC technique in recent times can be attributed to its minimal invasiveness, comparatively cheapness, and more safety and effectiveness it provides. Du et al (2015) assessed the prognosis of PBC technique in treatment of TN patients with age of more than 80 years and concluded PBC technique to offer additional advantages over other surgical methods for the treatment of TN. Therefore, it should be preferred in treating elderly patients.¹⁷ Campos and Linhares postoperative follow-up of 39 patients if TN treated by PBC. They observed that postoperative hypoesthesia can be regarded as a single prognostic factor that can positively alter the results. They concluded that PBC is a safe procedure with a very low range of side effects, low morbidity rate, and offers additional advantages over other surgical methods.¹² Park et al¹⁹ retrospectively surveyed 50 TN patients who were treated by PBC, and from the results, they also favored PBC technique for the treatment of TN over other surgical modalities.

CONCLUSION

Trigeminal neuralgia is one of the most common causes of facial neuralgia and has a significant impact on the quality of life of the patients. Diagnosis of TN is very important, as some other lesions and dental pathologies can also mimic TN. Various surgical modalities are available for the treatment of TN out of which PBC offers numerous advantages. From the results, we can conclude that it is a better option for surgical treating TN, as it is minimally invasive, comparatively cost-effective, and offers comparatively minimal complications during the postoperative life of the treated patients.

REFERENCES

1. Rovit RL. Percutaneous radiofrequency thermal coagulation of the Gasserian ganglion. In: Rovit RL, Murali R, Jannetta PJ, editors. Trigeminal neuralgia. Baltimore: Williams and Wilkins; 1990. p. 109-136.
2. Sweet WH. Trigeminal neuralgia: problems as to cause and consequent conclusions regarding treatment. In: Wilkins RF, Rengachary SS, editors. Neurosurgery, 2nd ed. New York: McGraw-Hill; 1996. p. 3931-3943.

3. Katusic S, Beard CM, Bergstralh E, Kurland LT. Incidence and clinical features of trigeminal neuralgia, Rochester, Minnesota, 1945-1984. *Ann Neurol* 1990 Jan;27(1):89-95.
4. Eboli P, Stone JL, Aydin S, Slavin KV. Historical characterization of trigeminal neuralgia. *Neurosurgery* 2009 Jun;64(6):1183-1186.
5. Barker FG, Jannetta PJ, Bissonette DJ, Larkins MV, Jho HD. The long-term outcome of microvascular decompression for trigeminal neuralgia. *N Engl J Med* 1996;334:1077-1083.
6. Devor M, Amir R, Rappaport ZH. Pathophysiology of trigeminal neuralgia: the ignition hypothesis. *Clin J Pain* 2002 Jan-Feb;18(1):4-13.
7. Edlich RF, Winters KL, Britt L, Long WB 3rd. Trigeminal neuralgia. *J Long Term Eff Med Implants* 2006;16(2):185-192.
8. Manzoni GC, Torelli P. Epidemiology of typical and atypical craniofacial neuralgia. *Neurol Sci* 2005 May;26 Suppl 2:s65-s67.
9. Pollock BE, Stien KJ. Posterior fossa exploration for trigeminal neuralgia patients older than 70 years of age. *Neurosurgery* 2011 Dec;69(6):1255-1259.
10. Koopman JS, Dieleman JP, Huygen FJ, de Mos M, Martin CG, Sturkenboom MC. Incidence of facial pain in the general population. *Pain* 2009 Dec15;147(1-3):122-127.
11. Brown JA, Chittum CJ, Sabol D, Gouda JJ. Percutaneous balloon compression of the trigeminal nerve for treatment of trigeminal neuralgia. *Neurosurg Focus* 1996 Aug15;1(2):e4.
12. Campos WK, Linhares MN. A prospective study of 39 patients with trigeminal neuralgia treated with percutaneous balloon compression. *Arq Neuropsiquiatr* 2011 Apr;69(2-A):221-226.
13. Du YF, Gu Q, Yang DB, Dong XQ, Du Q, Wang H, Yu WH. Percutaneous balloon compression for primary trigeminal neuralgia in patients older than 80 years. *Chin Neurosurg J* 2015;1(8):1-5.
14. Günther T, Gerganov VM, Stieglitz L, Ludemann W, Samii A, Samii M. Microvascular decompression for trigeminal neuralgia in the elderly: long-term treatment outcome and comparison with younger patients. *Neurosurgery* 2009 Sep;65(3):477-482.
15. Ashkan K, Marsh H. Microvascular decompression for trigeminal neuralgia in the elderly: a review of the safety and efficacy. *Neurosurgery* 2004 Oct;55(4):840-848.
16. Lichtor T, Mullan JF. A 10 year-follow-up review of percutaneous microcompression of the trigeminal ganglion. *J Neurosurg* 1990 Jan;72(1):49-54.
17. Du Y, Yang D, Dong X, Du Q, Wang H, Yu W. Percutaneous balloon compression (PBC) of trigeminal ganglion for recurrent trigeminal neuralgia after microvascular decompression (MVD). *Ir J Med Sci* 2015 Dec;184(4):745-751.
18. Mullan S, Lichtor T. Percutaneous microcompression of the trigeminal ganglion for trigeminal neuralgia. *J Neurosurg* 1983 Dec;59(6):1007-1012.
19. Park SS, Lee MK, Kim JW, Jung JY, Kim IS, Ghang CG. Percutaneous balloon compression of trigeminal ganglion for the treatment of idiopathic trigeminal neuralgia: experience in 50 patients. *J Korean Neurosurg Soc* 2008 Apr;43(4):186-189.