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Case Report

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Microvascular Decompression with Use of Fogarty Balloon on Gasser's Ganglion in Patients with Trigeminal Neuralgia: Report of 8 Cases

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Abstract

Introduction: *Trigeminal neuralgia is characterized by intense pain over the region of innervation of the trigeminal nerve. There are several options for managing symptoms, among the surgical options is the vascular microdecompression, however, it has not been possible to find an ideal treatment for this disease.*

Objective: *Evaluate the intensity of postoperative pain in patients undergoing surgical treatment with the use of a Fogarty balloon over the gasser ganglion.*

Methods: *Observational, analytical, and retrospective study from October 2008 to April 2023. The surgical technique with the use of the intraoperative Fogarty balloon is presented.*

Results: *A total of 22 patients in whom the surgical treatment used was 63.6% surgical treatment without fogarty balloon (n = 14) and 31.8% (n = 8) was surgical treatment with fogarty balloon. There was a good response to surgical treatment in general.*

Conclusion: *Although to date there is no surgical treatment with an ideal treatment for the management of neuralgia and given that the use of an intraoperative balloon can be a good technique, we consider that describing its use supports the performance of future research studies.*

Keywords: Trigeminal Neuralgia (TN), Fogarty Balloon (BF), Superior Cerebellar Artery (ACS), Superior Petrose Vein (PSV), Visual Analog Scale (VAS)

1. Background

Trigeminal neuralgia is a pathology characterized by disabling attacks of facial pain over the areas of innervation of one or all branches of the trigeminal nerve [1-5].

According to the third edition of the International Classification of Headache Disorders, trigeminal neuralgia is defined as a recurrent severe paroxysmal pain restricted to the trigeminal territory, lasting from a fraction of a second to 2 minutes, the pain is described as an electric shock and is triggered by innocuous stimuli [3-6].

Various studies reveal an overall incidence of approximately 12.6-28.9 cases per 100,000 individuals per year [7,8]. The pathophysiological mechanism of this pathology is uncertain in most cases, and compression of the nerve through the superior cerebellar artery is the most accepted cause [9-11].

Anatomically, the trigeminal nerve is related to vascular structures such as the posterior cerebellar artery, which in most cases has a loop that contacts the cisternal portion of the trigeminal nerve [8, 9].

There are several types of treatments that have been used throughout history for the treatment of trigeminal neuralgia and so far no definitive treatment for this disease has been described [8-12]. It was not until 1967 that Dr. Peter Janneta performed the first explorations of the cranial nerves in the posterior fossa with the use of a microscope, in which he observed the vascular loop in relation

to the trigeminal nerve, performing the first decompressions and obtaining good long-term results [8].

The technique described by Janneta has presented variations since its description, the asterional approach being one of these, which seeks to be a minimally invasive approach for the performance of vascular microdecompression, obtaining good results[3-15].

This approach has as anatomical references the craniometric point asterion where a minimum craniotomy of 2 cm is performed, where the edges of the transverse sinus and the sigmoid sinus must be observed as limits for the decompression of the trigeminal nerve to be performed in this small window [16].

The use of the percutaneous fogarty balloon has been compared with microvascular decompression, where in some series no significance has been obtained from the use of the balloon compared to decompression. In other series, microvascular decompression has been superior in long-term outcomes compared to the use of the fogarty balloon.

2. Objectives

The aim of this study is to evaluate the intensity of pain in patients undergoing surgical treatment with the use of an intraoperative fogarty balloon by asterional approach in patients with trigeminal neuralgia.

3. Methods

An observational, analytical, and retrospective study was conducted in patients undergoing microvascular decompression surgery for trigeminal neuralgia at the ISSSTE 20 de Noviembre National Medical Center in the period from October 2008 to April 2023. A total of 22 patients undergoing microvascular decompression with and without the use of a fogarty balloon through Meckel's cavum on the gasser's ganglion in the asterional approach were included.

The affected branches of the trigeminal nerve of each of the patients were obtained, as well as the affected side of the face. Similarly, the intensity of the patients' pain was collected by applying the visual analogue pain scale (VAS) at the preoperative and postoperative time and at 6 months of follow-up.

4. Description of the Alternative Technique

The patient is positioned in park-bech, marking is performed for an asterional approach, this point is discovered and a single trepane is performed on it and subsequently widening the edges, dural opening is performed with a base on the sinuses (Figure 1.A), the cisterns are emptied, starting with dissection of these, the loop of the superior cerebellar artery is identified, (Figure 1.B) the Teflon is left between the artery and the cisternal part of the trigeminal nerve (Figure 1.C), after which the nerve is sought to enter the cavum of meckel and the fogarty balloon is introduced (Figure 1.D) insufflating it for 10 seconds with 5 cc of air to cause an ischemic process within the gasser's ganglion. after this, intervention closure is performed.

5. Results

A total of 22 patients underwent one of the two surgical treatments of microvascular decompression during the period from October 2008 to April 2023. The mean age of the patients was 56.6 years (± 3.3), mostly female (n = 18, 81.8%). The most affected side of the face was the right side with 68.2% (n = 15) (Table 1).

Pain intensity was assessed using the VAS scale. The preoperative scale most frequently showed a pain intensity of 10 (n = 11, 50%), followed by an intensity of 9 (n = 5, 22.7%) and an intensity of 8 (n = 4, 18.2%). In the postoperative scale, a pain intensity of 2 (n = 11, 50 %) predominated, while in the 6-month follow-up the most predominant pain intensity was 2 (n = 10, 45.5 %). (Table 2)

6. Discusion

Trigeminal neuralgia is a pathology characterized by intense episodes of facial pain, which has led to the application of surgical treatments, such as microvascular decompression, among many others described [12-18].

However, it is mentioned that the variability in assessing the response to surgical treatment between series has made it difficult to compare surgical techniques [19,20].

Within the general data of our study, we observed demographic statistics similar to those commented in the international literature (81.8 %) [5, 6].

Since the first descriptions of this pathology, an effective treatment for this entity has been sought, which with the passage of time and research has evolved into a broader understanding of the pathophysiology of the disease. In the same way, surgical approaches have been modified since their first descriptions, the asterional approach in our experience represents an easy repeatability in neurosurgical training centers, which is why it was our approach of choice for the performance of this study without presenting any complications [16].

The postoperative reduction, especially at levels of intensity, suggests the efficacy of surgical treatment, in accordance with previous results commented on in the series where a significant decrease in symptoms after surgery was obtained [17].

Multicenter studies such as that of Venda where different surgical methods for the treatment of trigeminal neuralgia were compared, without reaching any satisfactory result in any of the surgical options, this is due to the fact that the evaluation of the symptoms is carried out subjectively according to the pain threshold of each patient [19].

Presenting the surgical technique with the use of the Fogarty balloon on the trigeminal lymph node after vascular decompression, in our experience shows good results compared to performing only a vascular decompression, we believe that similar studies can be carried out in a multicenter way to evaluate the efficacy of this form of the Fogarty balloon in other hospitals, which is why we

have commented on the surgical technique used in this study.

7. Conclusion

Trigeminal neuralgia continues to be one of the most aggravating neurological pathologies, as it does not have an effective treatment, presenting in some cases persistence of symptoms.

In reporting this series of cases, we consider that sharing this addition to the technique already described can help future studies focused on this pathology.

	Frequency (n)	Percentage (%)
V2	9	40.9
V3	7	31.8
All branches	4	18.2
Two branches	2	9.1
Total	22	100
n: number; %: Percentage		

Table 1: Involvement of the Branches of the Trigeminal Nerve

EVA	Preoperative (n, %)	Postoperative (n, %)	Follow-up 6 months (n, %)
0	0 (0)	0 (0)	1 (4.5)
1	0 (0)	1 (4.5%)	2 (9.1)
2	0 (0)	11 (50)	10 (45.5)
3	0 (0)	1 (4.5)	0 (0)
4	0 (0)	3 (13.6)	3 (13.6)
5	0 (0)	1 (4.5)	0 (0)
6	0 (0)	3 (13.6)	0 (0)
7	1 (4.5)	0 (0)	0 (0)
8	4 (18.2)	1 (4.5)	2 (9.1)
9	5 (22.7)	0 (0)	0 (0)
10	11 (50)	0 (0)	0 (0)
n: number; %: Percentage			

Table 2: Pain Intensity Assessed by the VAS Scale

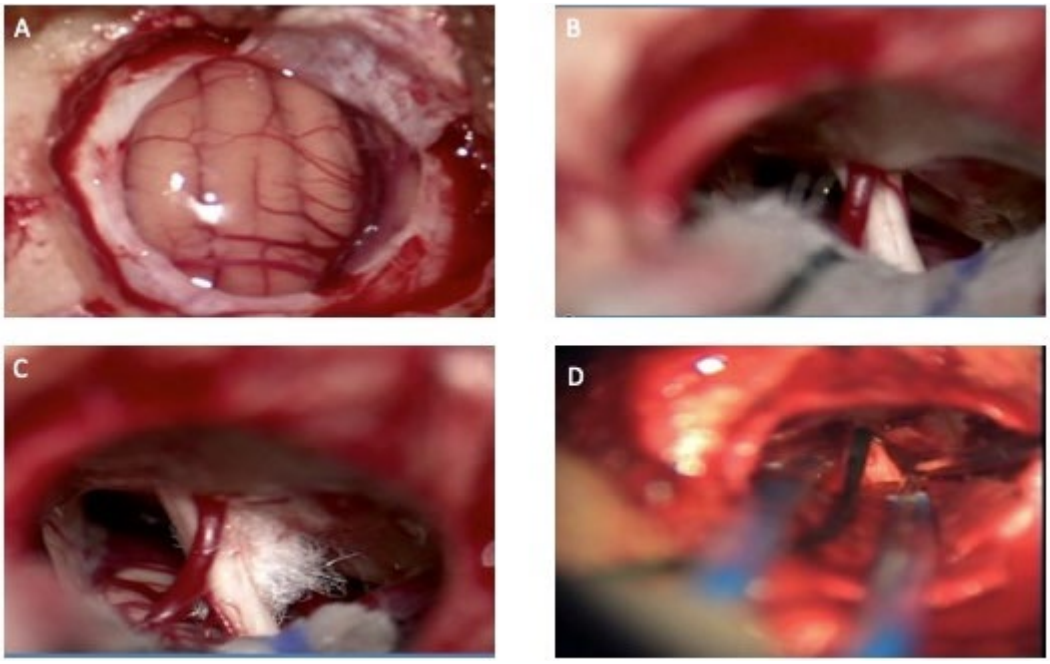

Figure 1: Use of the Fogarty Balloon in Vascular

Microdecompression in Trigeminal Neuralgia. A. Asteroidal approach. B. Identification of the neurvascular complex of the trigeminal nerve and superior cerebellar artery. C. Placement of Teflon over the junction of the artery and trigeminal nerve. D. Placement of the Fogarty balloon on the gasser ganglion.

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