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**Case Report** **OPEN ACCESS**

# Interdisciplinary approach in ophthalmic trigeminal neuralgia: A case report

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**ABSTRACT**

**Introduction:** Trigeminal neuralgia (TN) is a severe pain disorder characterized by electric shock-like cramps and facial pain that is often triggered by innocuous stimuli. TN can be classified as classical, secondary, or idiopathic, with classical TN involving the vascular compression of the trigeminal nerve root. It is more prevalent in women and typically affects the right side of the face.

**Case presentation:** A 38-year-old woman with persistent right facial pain experienced paroxysms near her right eye leading to headaches. Her medical history included treatment with carbamazepine, amitriptyline, eslicarbamazepine, and sertraline, but symptoms persisted. Diagnostic assessments included physical examinations, laboratory tests, and imaging. Hypersensitivity and allodynia were observed in the trigeminal nerve branches, and a magnetic resonance imaging revealed vascular contact and an arachnoid cyst in 2023.

**Results:** Despite multiple pharmacological treatments and rehabilitation, the patient's condition remained chronic with recurrent symptoms. The pharmacological therapies included pregabalin, baclofenac, topiramate, and botulinum toxin. Rehabilitation involved biobehavioral approaches and transcutaneous electrical nerve stimulation therapy. Owing to the persistent symptoms, microvascular decompression (MVD) surgery was advised. Partial improvement was noted in allodynia and sensitivity to rehabilitation; however, paroxysmal symptoms persisted.

**Discussion:** This case illustrates the importance of a comprehensive multimodal approach to managing TN by integrating pharmacological, rehabilitative, and surgical interventions. The variability in treatment responses poses significant challenges. The literature supports MVD for TN with clear neurovascular compression and highlights the role of rehabilitation as an effective adjunct treatment. Patient experience underscores the potential benefits of rehabilitation and the critical role of imaging in guiding surgical decisions. This approach highlights the necessity for tailored treatment plans in complex TN cases despite challenges in symptom management and treatment adherence.

**Conclusions:** Rehabilitation, along with pharmaceutical therapy, can be good adjuvant treatment for ophthalmic neuralgia. Regarding the final treatment performed from a medical perspective, MVD is considered the first-line surgical procedure for patients with a clear neurovascular compression etiology determined by imaging.

**Keywords:** trigeminal neuralgia, interdisciplinary health team, rehabilitation, surgery

## INTRODUCTION

Trigeminal neuralgia (TN) is a disabling pain characterized by electrical cramps, accompanied by hemifacial pain [1]. According to the International Association for the Study of Pain [2], TN is a manifestation of orofacial neuropathic pain restricted to one or more divisions of the trigeminal nerve. Pain recurs with abrupt onset and termination, triggered by innocuous stimuli, and is typically compared to an electric shock or described, as shooting or stabbing. Some patients experience continuous pain between the painful paroxysms [3].

According to the international classification of headache disorders, 3rd edition [4] criteria for TN, TN can be subclassified as classical, secondary, or idiopathic depending on the

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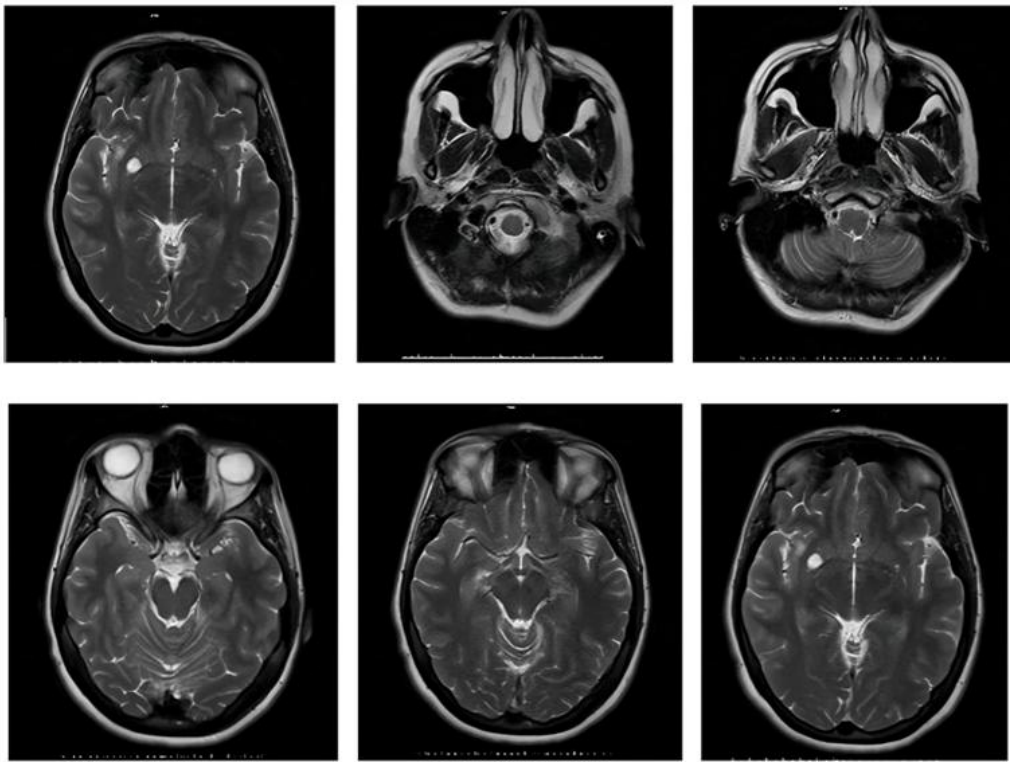

**Figure 1.** No space-occupying lesions or vascular anomalies were observed: A small gliosis area and pseudonodular lesion suggestive of an arachnoid cyst were identified & the trigeminal nerve pathway was normal (Reprinted with permission of patient)

underlying cause (**Figure 1**). Classical TN is defined as a specific category of TN in which magnetic resonance imaging (MRI) reveals vascular compression with morphological changes in the trigeminal nerve root. Secondary TN results from a major neurological disease (such as a cerebellopontine angle tumor or multiple sclerosis), whereas idiopathic TN excludes any identifiable lesion or disease as the cause of TN [5-7].

TN was more prevalent in women than in men (F:M ratio 3:2) [8, 9] and the right side of the face was more commonly affected than the left [10].

TN is diagnosed by identifying specific pain characteristics, such as severe, electric shock-like pain that lasts from a fraction of a second to two minutes and is triggered by harmless stimuli within the trigeminal nerve distribution [11]. It is crucial to rule out other potential causes of facial pain through a detailed patient history and examination [12]. Classic TN was confirmed by visualizing neurovascular compression of the trigeminal nerve root using MRI or direct surgical observation [13].

The first-line treatment for TN involves medications, such as carbamazepine (CBZ), a sodium channel blocker, with strong evidence supporting its use. Other medications such as gabapentin, oxcarbazepine, and baclofen are also commonly used with gradual dose escalation to avoid severe side effects [14]. Lamotrigine is often used in combination with CBZ [15].

When medications fail or are not suitable, surgical options, such as microvascular decompression (MVD), are considered, which involves separating the trigeminal nerve from compressing blood vessels and has shown long-term pain relief [10]. Less invasive options such as gamma knife radiosurgery (GKR) are also available, offering favorable pain relief for patients who cannot undergo more invasive procedures. Percutaneous procedures such as radiofrequency ablation provide additional treatment options, especially for secondary causes of TN [14].

The summary of NT diagnosis and treatment is presented in **Table 1**.

**Table 1.** Diagnosis and treatment summary

| | Diagnosis | Treatment |
|---|---|---|
| Diagnosis of TN | TN diagnosis involves identifying specific pain characteristics and ruling out other potential causes through a detailed patient history. | Classic TN is diagnosed based on specific criteria and confirmed through neurovascular compression visualization. |
| First-line pharmacologic treatment | CBZ is the primary first-line medication for TN management, with gradual dose escalation to avoid adverse reactions. | Gabapentin, oxcarbazepine, and baclofen are also commonly used as first-line or adjunct therapies for TN. |
| Second-line pharmacologic treatment | Lamotrigine is a second-line medication option for TN, often used in combination with other drugs. | Other medications like pimozide and phenytoin are considered second-line options but are less commonly used due to severe side effects. |
| Surgical and interventional options | Microvascular decompression offers longer pain relief with lower recurrence rates compared to GKR, but radiosurgery is less invasive and suitable for certain patients. | Percutaneous procedures like radiofrequency ablation and glycerol injection can provide focal nerve injury for TN management, especially in older patients or those with specific conditions. |

Rehabilitation is typically not the primary treatment for TN; however, it can be a supportive measure to help manage symptoms and improve overall well-being, in conjunction with other treatments [16].

## CASE PRESENTATION

### Patient Information

The patient was a 38-year-old woman who, as of 27 October 2022, presented to the Adavall Physiotherapy and Rehabilitation Clinic located in Valladolid (Spain), complaining of pain on the right side of her face that had persisted for years. This pain was characterized by the appearance of paroxysms (referred to as cramps) in the posterior region of the right eye and the right lacrimal and temporal areas, occasionally resulting in diffuse headaches. This document was written according to the CASE REport guidelines for case reports [17]. The study was conducted in accordance with the guidelines of the Declaration of Helsinki, and written informed consent was obtained from all patients involved in the study. The study was reviewed and approved by the Research Ethics Committee at Universidad Europea Miguel de Cervantes (17/2024).

### Medical History

She first experienced this pain in December 2019, when she was diagnosed with TN by a neurologist and treated with CBZ and amitriptyline. The symptoms recurred by 2021, when she was diagnosed with facial pain and exhibited mixed characteristics similar to TN. She was treated with eslicarbamazepine and sertraline until June 2022, when she was diagnosed with TN. The patient was advised to undergo radiofrequency treatment of the Gasserian ganglion (V1 and V3), which was ultimately ruled out.

### Relevant Past Interventions and Their Outcomes

Owing to the persistence of symptoms, she visited the neurology clinic in September 2022 and was diagnosed with facial pain suggestive of right nerve V neuralgia, predominantly affecting V1. Treatment with eslicarbamazepine was continued and sertraline, pregabalin, and baclofen were added. As these treatments were ineffective, the patient was included in a clinical trial of botulinum toxin. She received 2.5 units at four points in the zygomatic arch area and five units at eight points in the preauricular area and right temple, but the treatment was ineffective. As the symptoms continued, she was prescribed topiramate and amitriptyline in addition to her existing medications. In November 2022, she was referred to the pain unit, where she was diagnosed with atypical facial pain and recommended rehabilitation and hypnosis alongside pharmacological treatment. MRI revealed no alterations in the trigeminal nerve, and no indication for interventional treatment of the gasserian ganglion. The patient's symptoms continued to worsen until February 2023 when she was diagnosed with atypical right retroauricular pain without vascular compression.

### Family History

The patient did not have any chronic medical condition. Bruxist. Recurrent intranasal herpes. The patient had no family history of this condition. However, his mother and grandfather suffered from migraines.

### Psychosocial History

Several episodes of visual hallucinations and bradypsychia were reported in November 2022. Episodes of staring in response to the call, as well as the emotional lability of crying and laughing, are not well explained in relation to medication. Psychological evaluations indicated the presence of depression and anxiety in relation to work situations, cognitive appraisal, cognitive focus on pain, rumination about the origin of pain, and mild catastrophizing in the form of rumination. Fed up, emotional exhaustion, and irritability.

### Imaging Tests

MRI is the first choice for diagnosis. If MRI is contraindicated or unavailable, testing of trigeminal reflexes is useful for distinguishing secondary from primary TN [5].

Nuclear magnetic resonance measurements were performed in November 2022. The cisternal path and origin of both trigeminal nerves were normal with no extrinsic compression or nearby vascular structures.

In September 2023, in the MRI fast imaging employing steady-state (FIESTA) acquisition sequence, vascular contact was observed between the right facial stethoacoustic bundle and a fine-caliber vascular branch at the cisternal level prior to the entrance of the acoustic pore. Contact was observed between the cisternal path of the right cranial nerve, with a small-caliber structure, and the nerve itself. In addition, a 1 cm pseudonodular lesion was located in the right sublenticular region, hyperintense on T2, and canceled out the fluid-attenuated inversion recovery (FLAIR) signal, suggestive of an arachnoid cyst or a dilated perivascular space. Therefore, the patient was advised to undergo the surgery.

MRI images and synthesis of the radiology report are shown in **Figure 1**.

### Laboratory Testing

Blood biochemistry tests, lipid profiles, serum proteins, TSH hormone, anemia, vitamin B12, and folic acid were performed, and the results were within the normal ranges. The autoimmunity test results were negative.

The chronology of the patient's diagnosis is presented in **Table 2**.

**Table 2.** Timeline of patient diagnosis

| Date | Event |
|---|---|
| Dec 2019 | Initial diagnosis of TN and treatment with CBZ and amitriptyline |
| 2021 | Diagnosis of facial pain with mixed characteristics, treated with eslicarbamazepine and sertraline |
| Jun 2022 | Re-diagnosed with TN, recommended radiofrequency treatment of the gasserian ganglion, which was ruled out |
| Sep 2022 | Diagnosed with facial pain suggestive of right nerve V neuralgia with predominance in V1, added treatments of sertraline, pregabalin, and baclofenac |
| Nov 2022 | Diagnosed with atypical facial pain, MRI showed no significant abnormalities, recommended physiotherapy and hypnosis |
| Feb 2023 | Diagnosed with atypical right retroauricular pain without vascular compression |
| Sep 2023 | MRI FIESTA sequence revealed vascular contact and a pseudonodular lesion suggestive of an arachnoid cyst, advised for surgery |

## RESULTS

### Rehabilitation Assessment

During the first session, patients were asked about their pain characteristics. She indicated that pain does not follow a time pattern that can be 1-2 on a visual analog scale or evolve up to 7-8. The main type of pain is right retroocular pain, which rarely radiates into the mandibular region. If irradiated, there is a sensation of a whiplash-type electric shock towards the jaw that lasts a few seconds, with a persistent basal painful sensation persisting in the eye. She believed that if she touched the supraorbital area, the pain would improve. After moments of intense pain, she never remained without baseline pain, even if it was mild and lasted for minutes or hours. The patient did not wake up during the sleep. It only relates to cold in winter as a precipitating factor and trigger for pain. The patient attaches reports where the psychological impact of the pain is recorded. They indicate ruminations regarding the origin of pain and slight catastrophisation in the form of rumination.

During the physical examination, no skin abnormalities or red or swollen eyes were observed. The eyes were closer than the contralateral eye.

Sensitivity assessment was performed for tactile sensitivity and two-point discrimination. Supratrochlear, supraorbital, and infraorbital nerve hypersensitivity Tactile sensory discrimination was performed by touching the posterior part of the reflex hammer along the course of three branches of the trigeminal nerve. This stimulus is painful and may indicate allodynia. This abnormal painful response to gentle stroking of the skin occurs in 37% of the patients with secondary TN [6].

Furthermore, in the anamnesis, the patient tells us that she is unable to wash her face normally or put on makeup, especially with the use of mascara, which causes pain.

In cases of sensitivity to palpation of the muscles, the diagnostic criteria for temporomandibular disorders [18] were followed, and the patient was asked if she perceived pain, if it was familiar, and if there was referred pain. Palpation was performed bilaterally on the temporomandibular joint (TMJ) main muscles: temporalis, masseter, medial, and lateral pterygoid. Active MTrPs were observed in the right masseter, temporalis, and masseter muscle.

The assessment of the opening, lateralization, and protrusion movements of the TMJ is normal; in the visual inspection of neck movements, limitations are observed, indicating that the patient perceives neck stiffness.

### Imaging and Neurological Findings

MRI with angiographic sequences was performed to evaluate potential neurovascular compression or other intracranial abnormalities associated with the patient's symptoms. Imaging findings revealed no evidence of pathological diffusion-restricted areas or hemosiderin deposits in the gradient sequences. No direct or indirect signs of space-occupying lesions were noted.

A small subcortical gliosis area was observed in the right insular region. Additionally, a 1 cm pseudonodular lesion was observed in the right sublenticular region, appearing hyperintense on T2-weighted images and null on FLAIR sequences, suggesting the presence of an arachnoid cyst or dilated perivascular space. Importantly, the cisternal pathway and origin of both trigeminal nerves appeared normal, with no extrinsic compression or adjacent vascular structures. The midline structures were centered, the ventricular system was normal in size, and the basal and peritroncular cisterns remained clear.

In angiographic sequences, no anomalies were detected within the circle of Willis. These imaging findings support the clinical suspicion of TN and contribute to the decision to pursue surgical intervention. The MRI images and key radiological findings are summarized in **Figure 1**.

### Rehabilitation Diagnosis

Right ophthalmic TN. Active myofascial trigger points were observed in the right masseter, temporalis, and left masseter muscles. Fluctuating inflammation in the right TMJ. Allodynia of V1 and V2 branches of the trigeminal nerve.

### Rehabilitation Treatment

This treatment was performed at the Adavall Rehabilitation and Physiotherapy Clinic S.L. by a physiotherapist expert in orofacial and craniomandibular pain. Written consent was obtained from all patients for all treatments. This study was conducted in accordance with the principles of the Declaration of Helsinki. Written consent was obtained from the patient for all treatments.

To begin treatment, the patient agreed upon the objectives. The objectives of this study were raised using the SMART objectives methodology [19, 20]. SMART means that the objectives must be specific, measurable, achievable, relevant, and timely. To facilitate the patients' achievement of the different goals set by these objectives, they were divided into short-, medium-, and long-term. Thus, in the short term, it was proposed to reduce allodynia and pain in medium-term facial palpation without pain, hygiene, and easy care activities, and reduce paroxysms in the long term. To comply with the SMART objectives in a timely manner, the patient is informed that this achievement of the objectives may be variable due to the normal course of the pathology, but that it is expected to be able to achieve each of them in two months, estimating a total of 6 months of treatment.

Initially, three treatment sessions of 45 minutes each were performed per week. These were complemented by home therapy that was indicated to the patient.

As the short-term objective was to reduce allodynia and pain, the sessions began with gentle stimuli so that the patient could withstand the tactile stimulus on her face. For this purpose, different textures such as cotton, towels, and metals were used. This was reinforced with gentle superficial massage therapy on all trigeminal branches, so that the patient was aware of the difference in sensations. A biobehavioral approach was used in each session. It consists of providing truthful information to the patient about her disorder and the behaviors that affect it, as well as answering her questions about the process because she perceives pain. Finally, we examined behavioral changes. The aim of this treatment for TN is to eliminate the patient's fear of touching their face or receiving any stimulus on it, which is complemented at home by the execution of different stimuli in branch V1 of the trigeminal nerve. To do this, she was instructed to touch the regions where she had allodynia using makeup brushes with soft towels, and to try to wash her face with progressively colder water.

When sensitivity to palpation decreased, treatment started with transcutaneous electrical nerve stimulation therapy started. It was performed in constant mode because it is considered a better option than burst-mode therapy [21, 22]. The frequency range was 75-100 Hz. The stimulus duration was 50-125 ms. The electrodes were placed following the dermatome of the V1 branch. Of the three sessions carried out per week, in one of them the V2 branch was stimulated using the previously described parameters. The patient improved after three weeks in terms of allodynia and sensitivity to palpation, except for supraorbital paroxysms that she suffered when using the computer and with stimulation in the TMJ area. During that period, he was able to wash his face with cold water and stimulate the skin with different textures; however, he could not use Mascara.

### Surgical Treatment

The patient then underwent an MVD of the right trigeminal nerve. At the vascular level, the petrosal vein and superior cerebellar artery were in contact with the cranial nerve V. It was separated from the trigeminal nerve and teflon and surgicel were placed between them. Surgery did not show any incidence. The therapeutic intervention and follow-up outcomes are presented in **Figure 2**.

## DISCUSSION

Literature supports the use of MVD as a first-line surgical procedure for TN with clear neurovascular compression, whereas rehabilitation can serve as an effective adjunct treatment for managing ophthalmic neuralgia [3, 16]. A combination of pharmacological, physiotherapy, and surgical interventions is necessary because of the complex and persistent nature of the patient's symptoms [5].

This case illustrates the importance of a comprehensive multimodal approach for managing complex cases of TN, highlighting the potential for rehabilitation as an adjunct treatment, and the critical role of imaging in guiding surgical decisions.

Neurophysiological studies on TN are primarily based on trigeminal reflexes. Any abnormality indicates an underlying structural lesion. The most sensitive reflexes are the blink reflex and inhibitory masseter reflex, which tend to be more markedly affected in patients with constant pain than in those with paroxysmal pain. In most patients with classic TN, all reflexes are normal, and any abnormality, especially in young people, should rule out causes such as a cerebellopontine angle tumor or multiple sclerosis. In contrast, somatosensory evoked potentials of the trigeminal nerve allow the study of its sensory portion, and laser-evoked potentials (LEPs) evaluate the nociceptive pathway (Aδ and C nerve fibers) [23]. Patients with symptomatic TN and approximately 50% of those with classic TN have abnormal LEPs [24].

Cognitive-behavioral therapy, acceptance and commitment therapy, and mindfulness-based stress reduction have been shown to be effective interventions for the management of neuropathic pain [25]. Specifically, the cognitive-behavioral group approach showed improvements in several domains when applied to patients with TN [26]. A multidisciplinary approach can be included as an adjuvant intervention for the management of some symptoms.

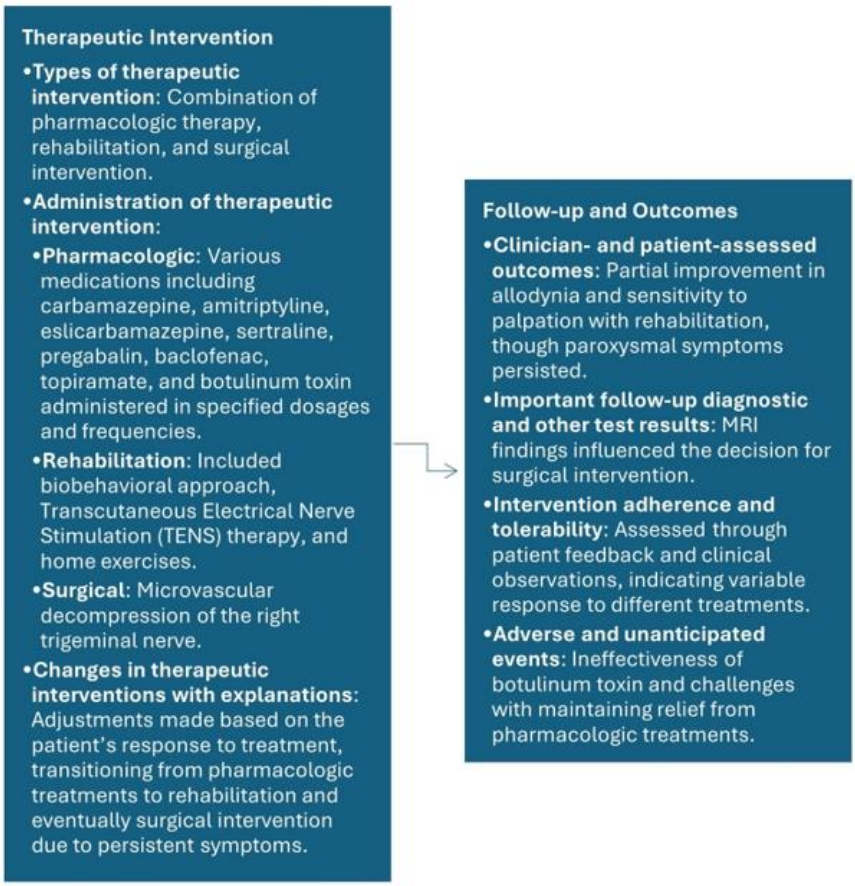


**Figure 2.** Therapeutic intervention and follow-up outcomes (Source: Authors' own elaboration)

### Strengths and Limitations in Our Approach to This Case

Although the variability in response to treatment poses a significant challenge, the multimodal approach allows for comprehensive management of symptoms.

### Patient Perspective

The patient underwent rehabilitation as another discipline in case it could help her with pathology. By considering the treatment based on the SMART objectives, the patient has felt confident in the process since the biobehavioral aspect has allowed her to resolve all doubts. However, there have been several instances where the patient felt overwhelmed by the discomfort caused by some of the treatments or by the techniques themselves on days when she felt the most pain. Even so, she said that her overall perspective on the treatment was good, since it allowed her to reduce the symptoms and tolerate ophthalmic neuralgia until the surgical process.

## CONCLUSIONS

Rehabilitation, along with pharmaceutical therapy, can be a good adjuvant treatment for ophthalmic neuralgia. Regarding the final treatment performed from a medical perspective, MVD is considered the first-line surgical procedure for patients with a clear neurovascular compression etiology determined by imaging [27, 28].

**Author contributions: AMG-G, XAS-G, FH-P, & EAS-R:** discussion; **AMG-G & EAS-R:** manuscript preparation; **AMG-G:** introduction and methodology; & **EAS-R:** tables. All authors have agreed with the results and conclusions.

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**Declaration of interest:** No conflict of interest is declared by the authors.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

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