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Refractory Trigeminal Neuralgia to Medical Treatment Resolved by Microvascular Decompression: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Authors PRLL and HVC guided the clinical care. Authors GEDRDM and AAA wrote and translated the manuscript. Authors JTMAL, SRB, MMBB and LMSPF reviewed the paper and adapted the article to the journal's standards. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Objective: The purpose of the present study is to report a case of trigeminal neuralgia (TN) refractory to medication due to a rare double compression of the trigeminal nerve by the superior cerebellar artery and the transverse pontine vein, resolved with microvascular decompression (MVD).
Case: A 64-year-old woman with right-side TN (V2–V3) had severe facial pain triggered by chewing and brushing the teeth unresponsive to carbamazepine, lamotrigine, and clonazepam. High-resolution MRI showed the double neurovascular compression (superior cerebellar artery and transverse pontine vein). MVD was performed via retrosigmoid approach allowing the visualization of the double neurovascular compression, which were both compressions grade 2. An autologous muscle graft (AMG) was used instead of Teflon.
Discussion: Venous compression is underdiagnosed and may coexist with arterial. AMG reduces inflammatory risks and reduces the risk of Teflon stiffness, which could cause additional compression.
Conclusion: The patient remained pain-free and medication-free..High-resolution MRI was essential for diagnosis and surgical planning. MVD with AMG was safe and effective, providing immediate and lasting symptom relief.

Keywords: Trigeminal neuralgia; microvascular decompression; neurovascular compression e autologous muscle graft.

1. INTRODUCTION

Trigeminal Neuralgia (TN) is a neurological disorder causing intense, brief facial pain triggered by mild stimuli like chewing or brushing. The pain is paroxysmal, electric shock-like, and lasts seconds to two minutes (IHS, 2018; Bendtsen et al., 2020). Prevalence ranges from 4 to 13 per 100,000 people, with higher incidence in women (Villegas Díaz et al., 2024; Kumar et al., 2013). Secondary TN, linked to conditions like multiple sclerosis or tumors, may present bilaterally (Houshi et al., 2022). Chronic TN impacts sleep, mood, and relationships, highlighting the need for multidisciplinary management (Bendtsen et al., 2019; Villegas Díaz et al., 2024).

The primary cause of classic TN is neurovascular compression, often caused by compression of the superior cerebellar artery, leading to demyelination of the nerve root and neuronal hyperexcitability (Benoliel et al., 2019). The International Headache Society (IHS) classifies TN as idiopathic, classic, or secondary, based on clinical and imaging findings (Benoliel et al., 2019; Bendtsen et al., 2019).

Initial treatment is pharmacological, with carbamazepine, oxcarbazepine, gabapentin, and lamotrigine. However, refractory patients become candidates for surgery (Villegas Díaz et al., 2023). Microvascular decompression (MVD) is the surgical technique of choice, with an initial success rate of up to 92.7%, a mortality rate of 0.7%, and an annual recurrence rate of 2% (Gusmão et al., 2003).

This case highlighted a rare double compression of the trigeminal nerve by the superior cerebellar artery and the transverse pontine vein. Autologous muscle grafting was chosen for interposition, resulting in complete remission of the pain. This report emphasizes the importance of recognizing anatomical variants and less conventional surgical approaches.

2. CASE REPORT

A 64-year-old female patient, normotensive, was diagnosed with trigeminal neuralgia (TN) affecting the maxillary (V2) and mandibular (V3) branches on the right. She reported recurrent, intense, paroxysmal, and lancinating pain, triggered by chewing and brushing her teeth. The patient had no other comorbidities besides TN and nothing noteworthy was found in the analysis of her clinical and family history. Neurological, clinical, and physical examinations showed no abnormalities, except for TN.

Initial pharmacological treatment with carbamazepine (800 mg/day), clonazepam (2 mg/day), and lamotrigine (100 mg/day) did not control the pain. Due to the patient's refractoriness to medication at high doses for 6 months and due to important side effects such as dizziness and drowsiness, microvascular decompression (MVD) surgery was chosen.

Preoperative exams, such as electrocardiogram, chest X-ray, complete blood count, and urea and creatinine levels, were performed without significant changes. Also, high-resolution magnetic resonance imaging (MRI) was performed which demonstrated double neurovascular compression.

The surgery was performed under general anesthesia, via the retrosigmoid route, with the patient in the left lateral decubitus position. After shaving and disinfecting the retroauricular region, an "S" incision was made to access the subcutaneous, muscular, and periosteal layers. A craniotomy was performed and the dura mater was opened to better expose the trigeminal nerve.

Two vascular compressions were identified: the superior cerebellar artery compressing the nerve in the superomedial portion and the transverse pontine vein, a rare compression, in the superolateral portion (Fig. 1). Both compressions were classified as grade 2 (Bendtsen et al., 2020). Careful dissection was performed to avoid damage to the fragile transverse pontine vein. Autologous muscle grafting was performed to separate the trigeminal nerve from the compressed vessels (Fig. 2). This method was preferred over Teflon because of the risk of Teflon stiffness, which could cause additional compression. After decompression, hemostasis was ensured and the dura was closed with epicranial flaps and biological glue. Suturing was performed in anatomical planes without the need for drainage, and a compressive dressing was applied. Postoperatively, the patient remained pain-free and medication-free. The pain, previously triggered by chewing and toothbrushing, ceased completely and the patient made a successful recovery.

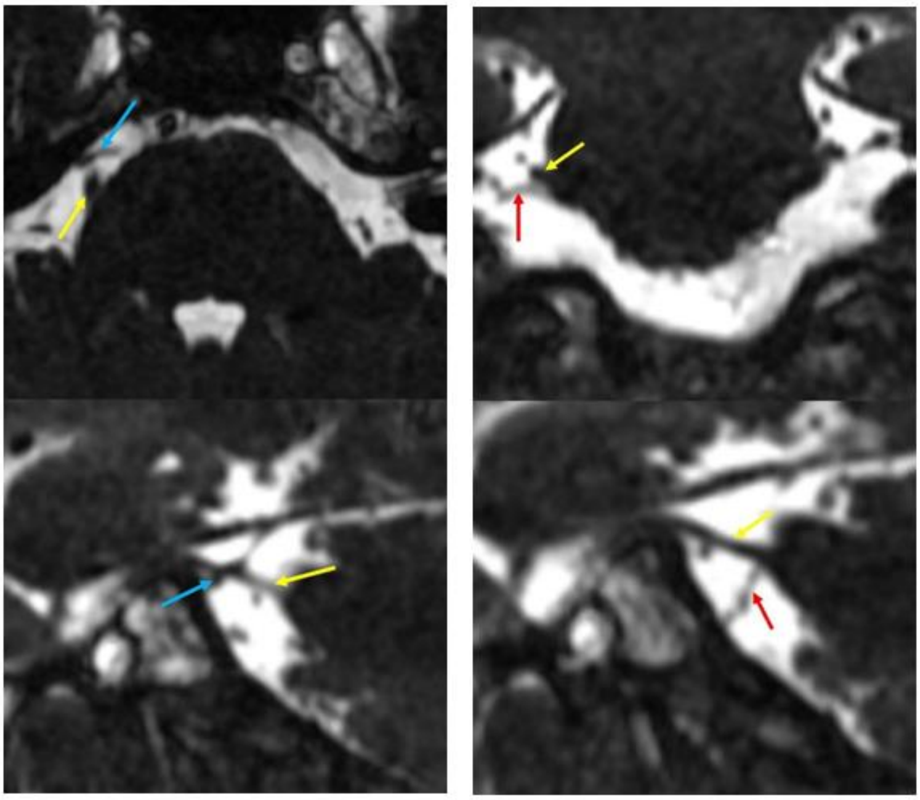

Fig. 1. Magnetic resonance imaging. Yellow arrow: trigeminal nerve; Red arrow: superior cerebellar artery; Blue arrow: transverse pontine vein

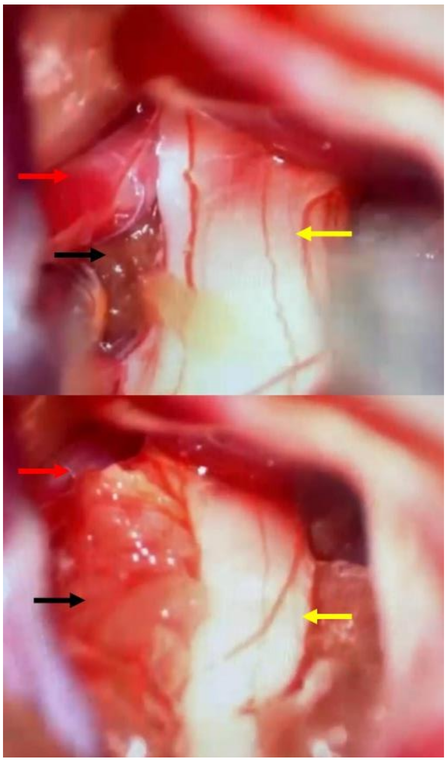

Fig. 2. Transsurgical image. Yellow arrow: trigeminal nerve; Red arrow: superior cerebellar artery; Black arrow: Autologous muscle grafting separating the trigeminal nerve from the compressed vessels

3. DISCUSSION

The present clinical case of trigeminal neuralgia shows a rare double compression of the trigeminal nerve by the superior cerebellar artery and the transverse pontine vein. Based on MRI images, microvascular decompression (MVD) was chosen using autologous muscle grafting (AMG) for interposition, resulting in complete remission of the pain. Neurovascular compression by the superior cerebellar artery characterizes the main cause of classic TN. However, venous compression, less recognized and rarely diagnosed, may also be involved in neurovascular compression. In a study of 5,271 patients undergoing MVD, 600 cases presented isolated venous compression, representing 11.4% (Yamaki, 2021).

Although less frequent, venous compression can be also treated with MVD, resulting in pain relief rates up to 82.3%, but with a higher chance of recurrence compared to arterial compression (Alzeeralhouseini et al., 2022). This highlights the importance of detailed intraoperative evaluation, especially when preoperative imaging does not clearly reveal the compressive vessel. In this case, AMG was chosen during MVD. Studies show that using AMG provides complete pain relief in up to 93.2% of cases, with immediate relief in 91.3%, results comparable to synthetic materials like Teflon (Bezerra et al., 2023).

Although effective, Teflon is associated with a higher risk of complications, such as granulomas and chemical meningitis (Jagannath et al., 2012), while AMG, being autologous, offers a lower risk of inflammatory and infectious complications (Jagannath et al., 2012). Recurrence rates for AMG are 6.2% at 6 months, 10.5% at 12 months, and 10.3% at 36 months (Bezerra et al., 2023), suggesting good long-term efficacy.

High-resolution MRI is effective in identifying trigeminal nerve atrophy, a sign of neurovascular compression. In a study of 60 patients, trigeminal nerve volume reduction correlated with the severity of intraoperative vascular compression and favorable clinical outcomes (Cheng et al., 2023). A 2024 meta-analysis reinforced the usefulness of MRI in identifying relevant neurovascular compressions, especially in the nerve root entry zone (Zhao et al., 2024).

According to the European Academy of Neurology, the initial treatment for TN should be pharmacological, using carbamazepine, oxcarbazepine, gabapentin, and lamotrigine. However, many patients do not achieve satisfactory relief and become candidates for MVD (Bendtsen et al., 2019). Prolonged use of carbamazepine and oxcarbazepine can lead to significant side effects, such as hyponatremia, sedation, and severe skin reactions, particularly in elderly patients (Gambeta et al., 2023).

Clinical observations suggest a female predominance in TN cases with venous compression, possibly due to hormonal factors affecting the sensitivity of trigeminal nerve fibers. Chronic pain also significantly impacts patients' quality of life, often leading to the development of depression and anxiety, highlighting the importance of emotional support in their treatment (Alzeeralhouseini et al., 2022).

4. CONCLUSION

Microvascular decompression (MVD) with muscle interposition proved to be an effective approach for treating trigeminal neuralgia that did not respond to medication. The removal of vascular adhesions and the protection of the trigeminal nerve with muscle tissue led to lasting pain relief, avoiding the risks of complications associated with synthetic materials. While postoperative follow-up is crucial to monitor possible muscle atrophy, the patient had a successful recovery, remaining pain-free and without the need for medication, significantly improving her quality of life. The technique was effective in decompressing all affected areas, providing a long-term and safe solution for refractory cases.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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