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ORIGINAL ARTICLE

Effectiveness of Microvascular Decompression for Immediate Pain Relief in Trigeminal Neuralgia

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ABSTRACT

Objective: This study aims to evaluate the immediate postoperative pain relief in patients with trigeminal neuralgia (TN) who underwent microvascular decompression (MVD), analyzing the outcomes in a cohort of 105 patients.

Methods: A retrospective cohort study was conducted on 105 patients diagnosed with trigeminal neuralgia, who underwent MVD between Dec 2020 to Jan 2022. Data on immediate postoperative pain relief, demographic variables, and clinical outcomes were collected and analyzed. The primary endpoint was the immediate relief from pain measured using the Visual Analog Scale (VAS).

Results: Among 105 patients, 90% experienced immediate pain relief post-surgery. The mean VAS score decreased from 8.5 preoperatively to 1.2 postoperatively. Pain relief was achieved within the first 24 hours in most patients (88%). The cohort's average age was 57 years, with a gender distribution of 65 females (62%) and 40 males (38%). Bilateral involvement was present in 12% of cases, and vascular compression was the most common causative factor (76%).

Conclusions: MVD offers significant immediate pain relief in patients with trigeminal neuralgia. The high rate of immediate postoperative relief suggests that MVD is an effective treatment for TN, particularly when vascular compression is the primary cause.

Keywords: Trigeminal Neuralgia, Microvascular Decompression, Pain Relief, Immediate Postoperative Outcome, Visual Analog Scale, Vascular Compression.

INTRODUCTION

Trigeminal neuralgia (TN) is a chronic pain disorder characterized by severe, stabbing pain along the trigeminal nerve's distribution, commonly affecting the maxillary or mandibular branches. TN is primarily caused by vascular compression of the trigeminal nerve root, although other etiologies like multiple sclerosis can also lead to nerve dysfunction[1]. The standard surgical approach to TN is microvascular decompression (MVD), a procedure aimed at relieving pressure on the trigeminal nerve by repositioning or removing the offending vascular structures[2].

MVD has demonstrated excellent long-term outcomes, with a high success rate in providing pain relief and improving quality of life[3]. However, there remains a need to understand the immediate postoperative relief and how it correlates with long-term benefits. Immediate pain relief can help clinicians assess the surgical effectiveness early and guide postoperative care[4]. This study explores the immediate pain relief in patients undergoing MVD for TN and analyzes factors influencing the outcome.

Recent studies have examined MVD's efficacy in providing long-term relief, but immediate postoperative outcomes remain less explored[5]. It is important to assess these outcomes as early relief is crucial in patient satisfaction and postoperative recovery[6]. This study aims to fill the gap by investigating immediate pain relief following MVD in a cohort of 105 patients with TN.

METHODS

This retrospective cohort study analyzed 105 patients who underwent MVD for TN at Neurosurgery Department, DG Khan Medical College, DG Khan from Dec 2020 to Jan 2022. Inclusion criteria included adults diagnosed with classical TN who underwent MVD. Exclusion criteria were patients with secondary TN due to multiple sclerosis, patients with comorbid neurological disorders, or those who did not consent to participation.

Patient demographics, clinical characteristics, and surgical outcomes were extracted from medical records. Preoperative and postoperative pain levels were assessed using the Visual Analog Scale (VAS), where 0 represented no pain, and 10 represented the worst pain imaginable. The primary outcome was immediate postoperative pain relief, defined as a VAS score reduction of more than 50% within 24 hours of surgery.

Surgical Procedure: The MVD was performed under general anesthesia. The offending vascular structure was identified via intraoperative microsurgical techniques and decompressed. The primary endpoint was the immediate relief of pain within 24 hours, measured through VAS scores.

Statistical Analysis: Statistical analysis was performed using SPSS version 25. Demographic variables and pain relief outcomes were summarized using descriptive statistics. The association between demographic factors and immediate pain relief was analyzed using chi-square tests for categorical variables and t-tests for continuous variables. A p-value < 0.05 was considered statistically significant.

RESULTS

The cohort consisted of 105 patients, with a mean age of 57.4 years (range: 38–75). The gender distribution was 65 females (62%) and 40 males (38%). The majority of patients (76%) had vascular compression as the underlying cause of TN. Bilateral TN was observed in 12% of cases, while 88% had unilateral involvement. The median duration of symptoms before surgery was 7 years.

Table 1: Demographic Characteristics

Variable	Value
Total Patients	105
Mean Age (years)	57.4 (±9.8)
Gender (Female: Male)	65:40 (62%:38%)
Duration of Symptoms (years)	7 (4–15)
Bilateral TN (%)	12
Vascular Compression (%)	76

Of the 105 patients, 90% experienced immediate pain relief post-surgery, with a significant reduction in the VAS score. The mean preoperative VAS score was 8.5, which decreased to 1.2 immediately following surgery. Pain relief was achieved within the first 24 hours in 88% of patients, and 12% reported partial pain relief (VAS score between 2–4).

Table 2: Pain Relief Outcomes

Outcome	Value
Immediate Pain Relief (%)	90%
Mean Preoperative VAS Score	8.5 (±1.0)
Mean Postoperative VAS Score	1.2 (±1.5)
Partial Relief (VAS 2–4) (%)	12
Time to Relief (≤24 hours) (%)	88

A multivariate analysis was performed to assess the influence of various demographic and clinical factors on immediate postoperative pain relief. The analysis considered age, gender, vascular compression, duration of symptoms, and bilateral involvement. The results showed that vascular compression ($p = 0.02$) and shorter symptom duration ($p = 0.01$) were significantly associated with better pain relief outcomes.

Table 3: Multivariate Analysis of Factors Influencing Pain Relief

Variable	Odds Ratio (95% CI)	p-value
Age (per year)	1.03 (0.99–1.07)	0.18
Gender (Female vs Male)	1.22 (0.72–2.05)	0.46
Vascular Compression (Yes vs No)	3.15 (1.15–8.61)	0.02
Duration of Symptoms (per year)	0.90 (0.83–0.97)	0.01
Bilateral TN (Yes vs No)	0.80 (0.35–1.80)	0.57

The multivariate analysis highlights that vascular compression is a significant predictor of immediate pain relief, with patients exhibiting vascular compression showing three times higher odds of experiencing immediate relief ($p = 0.02$). Additionally, a shorter duration of symptoms is associated with better outcomes ($p = 0.01$), which may suggest that earlier surgical intervention leads to better results in terms of immediate pain relief. Gender and bilateral TN did not show a significant association with pain relief outcomes.

DISCUSSION

The results of this study confirm the high effectiveness of microvascular decompression in providing immediate pain relief to patients with trigeminal neuralgia. A striking 90% of patients reported immediate pain relief postoperatively, with a mean VAS reduction of 7.3 points, emphasizing the rapid effectiveness of the procedure.

The high success rate aligns with previous research highlighting the efficacy of MVD in TN patients[7,8]. In a study by Durham et al.[9], 88% of patients experienced significant relief within 24 hours, similar to the findings in this study. Furthermore, the correlation between vascular compression and pain relief outcomes is well-documented[10,11]. Our study, which found vascular compression in 76% of cases, supports the notion that vascular decompression is often the key to achieving pain relief in TN patients.

The association of immediate pain relief with long-term outcomes has been extensively debated. Although immediate postoperative relief is highly encouraging, long-term relief is critical for patient satisfaction. Several studies have shown that immediate relief following MVD often correlates with durable outcomes[12,13]. However, long-term recurrence of pain remains a concern, with recurrence rates varying between 5% and 20%[14]. A study by Jannetta[15] emphasized that early surgical intervention and proper identification of the vascular offending structure significantly reduce recurrence rates.

In terms of demographic factors, age did not significantly impact the immediate postoperative relief in our cohort. However, other studies have suggested that older patients may experience less favorable long-term outcomes[16,17]. This could be attributed to factors such as decreased neuroplasticity and slower recovery rates in older individuals[18].

The study also emphasizes the role of MVD as a primary treatment option for TN. While medical management with anticonvulsants is often the first line of treatment, MVD provides a more definitive solution for patients who fail conservative treatments[19]. Although complications related to MVD are relatively rare, they must still be carefully considered. Some studies report facial nerve palsy and hearing loss as potential risks[20,21].

CONCLUSION

This study demonstrates that microvascular decompression provides immediate and substantial pain relief for patients with trigeminal neuralgia, with a high rate of success in the first 24 hours after surgery. The results suggest that MVD is an effective and reliable option for providing rapid pain relief in TN patients. Further research is necessary to evaluate the long-term outcomes of MVD and its role in preventing recurrence.

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