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Description of complications after microvascular decompression and predictive value to mortality in the study

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ABSTRACT

Background: Microvascular decompression is a surgical procedure performed for the purpose of relieving pressure on patients with a cranial nerve, which is usually either the trigeminal nerve or the facial nerve. This study was aimed to assess postoperative complications and predict clinical outcomes related to the survival rate of patients after MVD. Patients and methods: The study collected data from 83 individuals with microvascular decompression and related to trigeminal neuralgia patients who were treated in different hospitals in Iraq between March 16th, 2022, and July 25th, 2023. The data collection has determined the clinical outcomes of patients aged 49-71 years. Complications following the operation and neuropathic pain intensity were assessed during follow-ups at 0-12 months and 12-24 months. Predictive factors for patient survival rates were analysed. The outcomes methodology was analysed and designed by SPSS, version 22.0. Results: Our study presented data on postoperative complications, which yielded a complication rate of 26.51%. Among the most frequent complications were infarction in 3 cases, permanent ataxia in 5 patients, and permanent hypoesthesia in 6 patients. It was observed that most of the conditions improved satisfactorily during the follow-up period of 12 to 24 months. This is in comparison to a follow-up period of 0 to 12 months, which utilised a pain intensity measure after microvascular

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compression surgery. Conclusion: Clinical findings indicate a significant enhancement in the efficacy of surgical interventions for trigeminal neuralgia patients following microvascular decompression, with a minimum survival rate of 70%.

Introduction

Microvascular decompression (MVD) for the treatment of trigeminal neuralgia (TN), first reported by Gardner in 1962, [1] was popularized by Jannetta starting in 1967. [4] The pain remission rate after an MVD, in the first months, is greater than 80%, [2,3,4] with an incidence of recurrence between 15 and 30%. [10, 17,25] The highest incidence of recurrence occurs in the first two years after surgery. [5,6]

Several studies have attempted to test the accuracy and predictive value of preoperative MRI to identify possible CNVs in patients with refractory classic TN who are being evaluated for MVD [7,8,9,10]. Although currently, the indication for surgical treatment is based solely on the patient's symptoms, the demonstration of a clear CNV can be an important argument in favor of surgery, especially in patients with diagnostic doubts due to an unusual presentation. With constant pain or in older patients who, despite the surgical risk, can benefit from MVD [11,12]

Trigeminal neuralgia is a chronic pathology which consists of intense and episodic pain in the face since it affects one of the trigeminal branches: ophthalmic, maxillary, or mandibular [13,14].

It affects more women than men, more frequently after the age of 50. The pain occurs in a paroxysmal and discontinuous manner and is usually triggered by tactile stimuli on the surface of the face or other activities such as chewing, speaking, yawning, or washing [15].

With a brain MRI, one of the main causes of this pathology can be revealed, which is neurovascular compression. The most common is the superior cerebellar artery (90%), followed by the anterior inferior cerebellar artery (10%), which causes mechanical irritation to the nerve. However, there are other causes of this pathology that cannot be improved with surgical decompression: chemical irritation, HIV, multiple sclerosis, and herpes zoster infection, among others [16,17,18].

Previous syudy collectively provide insights into the complications that can occur after microvascular decompression (MVD) surgery, where report serious and life-threatening complications, including intracerebellar hematoma, infarction, and hydrocephalus [19]. And in another study also discusses complications such as facial nerve palsy, middle ear effusion, hearing loss, tinnitus, vertigo, and hemifacial paresis. While MVD is generally considered a safe procedure, these papers highlight the importance of careful surgical techniques and perioperative care to minimize potential risks and improve patient outcomes [20,21].

that mortality after microvascular decompression (MVD) is a rare but serious complication. Yue 2021 reports seven cases of life-threatening complications after MVD, including cerebellar infarction, cerebellar hematoma, and intracranial infection where we found that postoperative decline in consciousness and fatal complications, such as cerebellar hemorrhage and epidural hematoma, occurred in a small percentage of patients [22]

Patients and methods

An objective cross-sectional study was conducted, which outlined complications following

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microvascular decompression and analysed the predictability of mortality. The study collected data from 83 patients with trigeminal neuralgia treated at different hospitals in Iraq between March 16th, 2022, and July 25th, 2023. The data collection ascertained the clinical outcomes of patients aged 49 to 71 years, encompassing age, gender, and diagnostic details of trigeminal neuralgia type and symptoms, as well as decompression degree. The outcomes methodology was analysed and designed by SPSS, version 22.0.

The clinical outcomes of the surgical intervention for trigeminal neuralgia were analysed with regard to the different categories of trigeminal neuralgia, namely typical and atypical. Additionally, the specific side on which the operation was performed was recorded for both the left and right hemispheres in relation to the patients. The distribution of pain patterns in patients was analyzed, and the patients were categorized into three groups (V1, V2, V3) based on the degree of pain. Additionally, patients were divided into two types based on the degree of decompression: complete decompression of arteries or veins and incomplete decompression of arteries or veins.

Complications after the operation were considered as clinical results and pain intensity was assessed during two follow-up periods: (0-12) months and (12-24) months, utilizing the nerve pain intensity scale ranging from (0-5). The predictive value of patient survival rates post-microvascular decompression surgery was also evaluated. This study used multivariate logistic regression to identify risk factors associated with the outcome of microvascular decompression in patients.

Results

Table 1: Clinical demographic characteristics outcomes.

Basic parameters	**N= 83**
Age at operation	
years [Mean ± SD]	60 ± 11
Gender	
Males	32 [38.55%]
Females	51 [61.45%]
Clinical outcomes of diagnoses	
Indications	
Right-sided pain	13 [15.66%]
Left-sided pain	20 [24.10%]
Concomitant continuous pain	10 [12.05%]
Classical trigeminal neuralgia	31 [37.35%]

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Idiopathic trigeminal neuralgia	9 [10.84%]
Diagnosed examine	
Sensory abnormalities in neurological examination	30 [36.14%]
Response to sodium channel blockers	53 [63.86%]
Type of trigeminal neuralgia	
Typical	70 [84.34%]
Atypical	13 [28.92%]

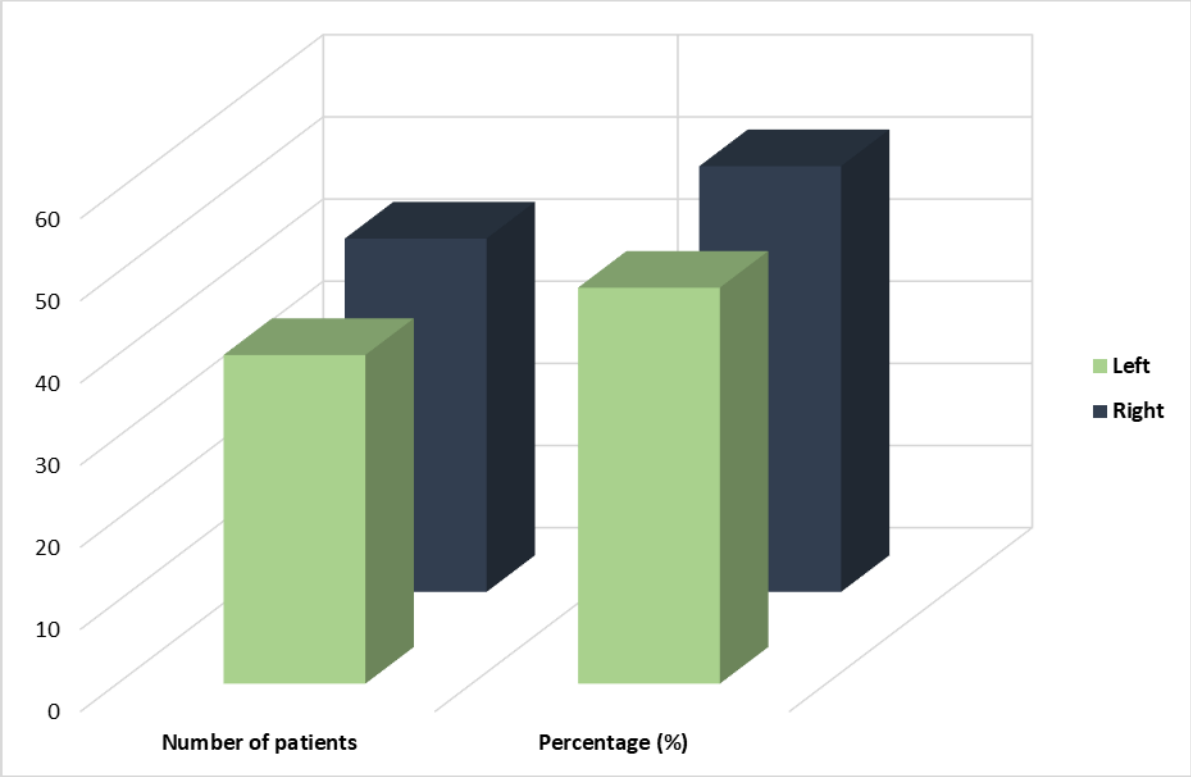

Figure 1. Determine the side of the operation related with patients.

Table 2: Distribution of patients' pain.

Variables	***Number of patients [83]***	***Percentage [%]***
V1	*7*	*8.43%*
V2	*14*	*16.87%*
V3	*8*	*9.64%*
V1+V2	*30*	*36.14%*

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V2+V3	*11*	*13.25%*
V1+V2+V3	*13*	*15.66%*

Table 3: Distribution of decompression degree associated with patients.

Decompression degree	***Number of patients [83]***	***Percentage [%]***
Complete decompression from arteries or veins	*59*	*71.08%*
Incomplete decompression from arteries or veins	*24*	*28.92%*

Table 4: Identify complications related to patients after microvascular decompression.

Complications	***Number of patients [83]***	***Percentage [%]***
Infarction	*3*	*3.61%*
Haemorrhage cerebellar	*2*	*2.41%*
Cerebrospinal fluid leak	*4*	*4.82%*
Permanent ataxia	*5*	*6.02%*
Permanent severe hypoesthesia	*6*	*7.23%*
Nerve palsy	*2*	*2.41%*
The total number of complications	***22***	***26.51%***

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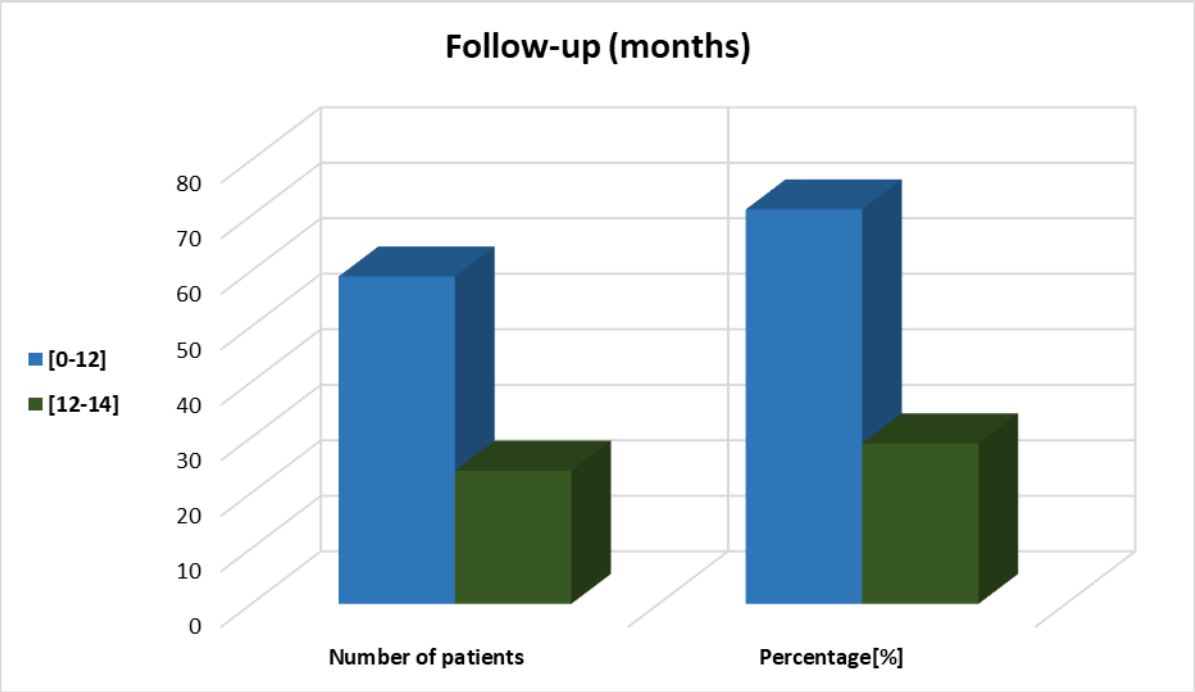

Figure 2: Determine follow-up of patients.

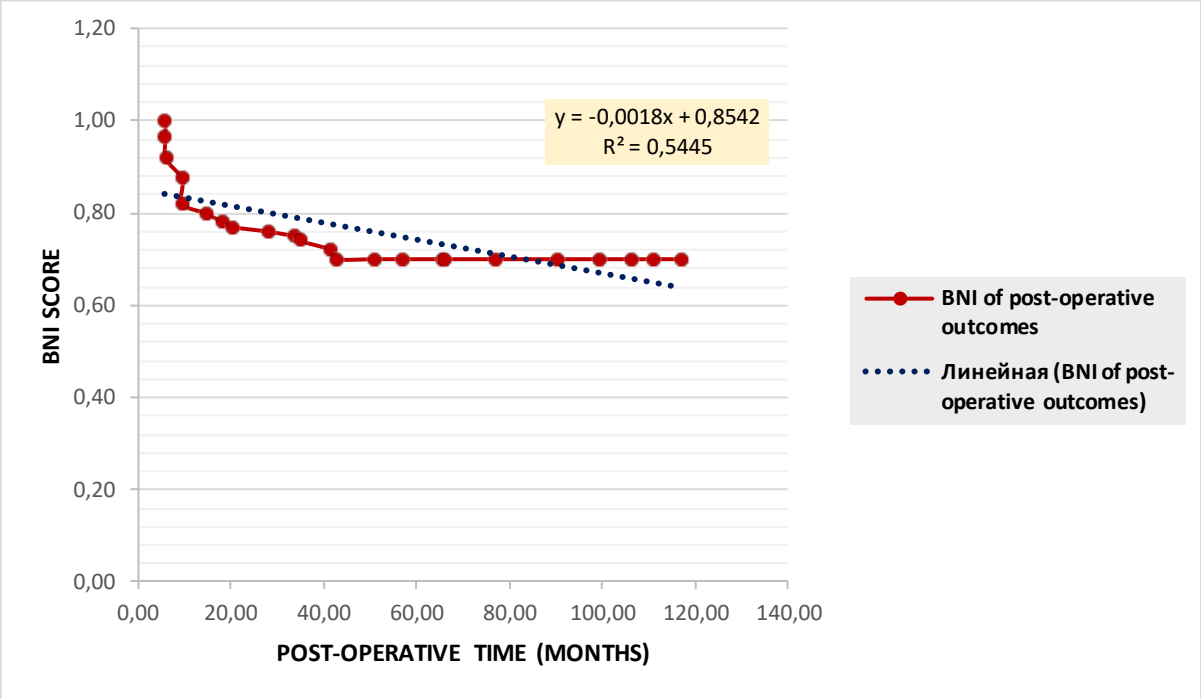

Figure 3: Predicted outcome associated with microvascular decompression of patients versus time.

Table 5: Assessment of pain intensity by BNI scale.

Scores	***Follow-up [0-12] months***	***Follow-up [12-24] months***
1	*20 [24.10%]*	*32 [38.55%]*

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2	*28 [33.73%]*	*17 [20.48]*
3	*17 [20.48%]*	*15 [18.07%]*
4	*10 [12.05%]*	*12 [14.46%]*
5	*8 [9.64%]*	*7 [8.43%]*

Table 6: Multivariable logistic regression of factors associated with influencing patients' microvascular decompression.

Variables	***OR (95% CI)***	***P-value***
Age		
> 60	*5.362 [1.42-10.44]*	*0.0157*
Sex		
Female	*3.355 [1.21-8.77]*	*0.0148*
Affect side		
Right	*8.142 [4.50-20.78]*	*0.0121*
Distribution of pain		
V2	*6.82 [3.28-11.62]*	*0.0138*
V1+V2	*4.82 [2.13-13.818]*	*0.0153*
Decompression degree		
Incomplete decompression from arteries or veins	*16.82 [8.42-23.18]*	*0.0168*
Post-operative complications		
Infarction	*6.54 [2.48-8.11]*	*0.0871*
Permanent ataxia	*8.53 [4.61-14.22]*	*0.0156*
Permanent severe hypoesthesia	*6.01 [4.184-12.56]*	*0.0138*

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Discussion

Our study analyzed clinical outcomes related to evaluating complications and postoperative survival rates for trigeminal neuralgia patients after microvascular decompression. These clinical results showed that women (61.45%) were more susceptible to the disease than men (38.55%). Patients were diagnosed with clinical results, which found that 37.35% of patients were accompanied by classic trigeminal neuralgia and pain in the left side with 24.10% and pain in the right side with... 15.66%, as clinical examinations found that 36.14% had sensory abnormalities in the neurological examination, while the response to sodium channel blockers was with 63.86% of patients. Also, the clinical and demographic results determined the types of trigeminal neuralgia, which were that most patients (84.34%) had Typical trigeminal neuralgia, but 28.92% had Atypical. Moreover, our study determined the patients' side of the operation and showed that 51.81% of patients were on the right side and 48.19% were on the left side.

Furthermore, these results indicated a distribution of the degree of decompression associated with the patients, which included complete arterial or venous decompression at 71.08% and incomplete arterial or venous decompression at 28.92%.

For more clinical results, our study showed the results of postoperative complications, which had a postoperative complication rate of 26.51%, the most prominent of which were stroke in 3 cases, permanent ataxia in 5 patients, and permanent hypoesthesia in 6 patients, where it was noted that most of the disease improved well after follow-up (12 - 24) months compared to follow-up of (0 - 12) months based on the measure of pain intensity after microvascular compression. Clinical results have shown a good improvement in the success of effective surgery for trigeminal neuralgia patients after microvascular decompression, with the minimum survival rate reaching 70%. Logistic regression showed the risk factors, which found that females were more affected, and the factors for complications after surgery, which were stroke, permanent ataxia, and permanent hypoesthesia.

Previous studies have shown that an operation to relieve microvascular pressure is considered an ideal surgical treatment that shows good effectiveness in treating patients with trigeminal pain. French studies have reported that specific surgical techniques and strategies may contribute to a reduction in complications associated with cardiovascular disease, with high rates of pain relief and low rates of disease recurrence, resulting in a decrease in patient mortality after microvascular decompression. Some studies have found that there are some risks and consequences, even with a low mortality rate, in terms of infection, bleeding, damage to nearby tissue, and problems with anesthesia. However, after microvascular decompression, the majority of patients have excellent outcomes significantly better symptoms, and the overall risk of death is very low.

Conclusion

The present study reveals an improvement in the clinical outcomes of patients with trigeminal neuralgia following microvascular decompression. The rate of complications during the 24-day follow-up was low at 26.51%. The most frequent complications observed after the surgical procedure were infarction, permanent severe hypoesthesia, and permanent ataxia. Furthermore, the findings indicated enhanced surgical management, leading to an anticipated patient survival rate of 70%. Pain intensity assessment prior to and following the procedure is deemed a sophisticated and efficient prognostic tool for clinical outcomes related to microvascular

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decompression surgery.

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