

# Assessment of Outcome of Medical and Surgical Treatment of Migraine Headache: A Comparative Study

Shyam Sunder Nagpal<sup>1</sup>, Dharampaul Jain<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of General Surgery, World College of Medical Sciences and Research, Jhajjar, Haryana, India, <sup>2</sup>Assistant Professor, Department of Medicine, World College of Medical Sciences and Research, Jhajjar, Haryana, India.

## Abstract

**Background:** Migraines are a common and debilitating headache illness. According to current studies, migraine headaches affect roughly 12% of the general population, with 18% of women and 6% of men suffering from the condition. Someone in one out of every four homes suffers from migraine headaches. **Subjects and Methods:** 54 patients were enrolled in this investigation. The follow-up period lasted anywhere from 10 to 14 months, with a mean of 12 months. 27 of the 54 individuals who had migraine headaches were treated medically, whereas the other 27 were treated surgically. **Results:** There was no significant difference in gender (medical treatment group, 77.8% female; surgical treatment group, 81.5 percent female;  $P > 0.05$ ), average age (medical treatment group, 45.4 8.02; surgical treatment group, 43.3 6.4;  $P > 0.26$ ), alcohol and smoking status (medical treatment group, 11.1 percent; surgical treatment group, 7.4 percent;  $P > 0.76$ ), and mean duration of migraine headaches (medical treatment group, 19.4  $\pm$  5.21 years; surgical treatment group, 7.4 percent. There was also no significant difference in the percentage of migraine headaches with aura between the two groups (medical treatment group, 29.6%; surgical treatment group, 33.3 percent;  $P > 0.67$ ). **Conclusion:** The surgical deactivation of migraine headache trigger sites is a successful therapy option for alleviating migraine headache symptoms. Patients who fail to respond to pharmacological treatment and receive relief from headache pain after receiving botulinum toxin injections at specific anatomical trigger points may be candidates for surgery to release entrapped peripheral nerves.

**Keywords:** Surgical & medical treatment, migraine headache, migraine headache index.

**Corresponding Author:** Dr. Dharampaul Jain, Assistant Professor, Department of Medicine, World College of Medical Sciences and Research, Jhajjar, Haryana, India.

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## Introduction

Migraines are a common and debilitating headache illness.<sup>[1]</sup> According to current studies, migraine headaches affect roughly 12% of the general population, with 18% of women and 6% of men suffering from the condition.<sup>[2]</sup> Someone in one out of every four homes suffers from migraine headaches.<sup>[3]</sup> Migraine headache is most common in persons aged 25 to 55 years, which coincides with the peak years of work production and childbirth.<sup>[4]</sup> Recurrent unilateral or bilateral throbbing pain, nausea, vomiting, photophobia, and phonophobia are some of the symptoms that can persist anywhere from 4 hours to several days. The majority of migraine sufferers treat their migraines using pharmacological treatments. At present moment, there is no commonly accepted permanent cure, and many patients continue to have symptoms despite pharmacologic treatment.<sup>[5]</sup> Furthermore, traditional treatments fail to help about a third of migraine sufferers.<sup>[6]</sup> Pharmaceutical medications used to prevent and terminate pregnancy have side effects and are often highly expensive.<sup>[7]</sup> A mix of avoidance of prominent migraine triggers, prophylactic pharmacologic therapies, acute abortive therapy, and acute

analgesic therapy are the most popular treatments for migraine headaches today. Beta blockers, antidepressants, anticonvulsants, calcium channel blockers, and serotonin antagonists are some of the pharmacologic drugs often used to treat migraine headaches.<sup>[8]</sup> To prevent and relieve migraine headaches, alternative therapy approaches such as injections of botulinum toxin type A at migraine headache trigger sites are used. Although the pathogenesis of migraine headaches is still debated, research has demonstrated that stimulation of the trigeminal nerve triggers the release of calcitonin gene related peptide and neurokinin A into the trigeminal nerve cell bodies.<sup>[9,10]</sup> Inflammation and discomfort are caused by these chemicals in the regions around the trigeminal nerve.<sup>[11]</sup> The muscle, arteries, bone foramen, and potentially fascia bands encircling the trigeminal nerve branches in the head and neck irritate the nerves, causing inflammation, according to Bahman Guyuron's theory. Anatomical research have shown that such irritation is possible.<sup>[12]</sup> According to this notion, the surgical treatment of migraine headaches has evolved to involve the removal of various surrounding superficial muscles, fascia, or arteries to lessen nerve stimulation and hence migraine headaches.<sup>[13]</sup> Frontal, temporal, septonasal, and occipital migraine surgeries are the four most prevalent trigger

locations.<sup>[14]</sup> The goal of this study was to assess and compare the effectiveness and success rates of surgical nerve decompression versus medication migraine headache treatment in reducing migraine headaches.

## Subjects and Methods

This present study was conducted in the Department of Medicine at World College of Medical Sciences and Research in collaboration with Department of Surgery during the period from July, 2017 to June, 2019. The study was approved by the World College of Medical Sciences and Research at Jhajjar, institutional ethical council. Before starting therapy, all patients in the trial were asked to complete the Migraine Headache Assessment Questionnaire, as well as during the 12-month follow-up appointments. Before and after therapy, these self-reported questionnaires assess the frequency (migraines per month), duration (in days), and intensity (on a Visual Analog Scale (VAS) scale of 1 to 10, with 10 being the most severe) of migraine headaches experienced by each patient. The creation of a migraine index using the formula (frequency duration intensity) was also included in the recorded information for each visit.

### Medical Group

On the medical treatment group, a medicine department administered preventative medications as medical therapy. The patients were treated with Inderal (80 mg once daily) and amitriptyline (100 mg per day) by the medicine department.

### Surgical Group

In the surgical therapy group, surgery was performed in the same setting on one or more trigger sites. The glabellar muscles, which surround both the supraorbital and supratrochlear nerves and include the corrugator supercilii, depressor supercilii, and the lateral portion of the procerus, were removed using either a transpalpebral or an endoscopic forehead approach for patients with frontal headaches (trigger site I). An endoscopic technique was used to remove roughly 2.5 cm of the zygomaticotemporal branch of the trigeminal nerve in individuals with temporal headaches (trigger site II). Septoplasty and/or turbinectomy were performed for individuals with migraines originating from the septum (trigger site III) based on anatomic abnormalities identified on CT imaging. For patients with occipital headaches (trigger site IV), a portion of the semispinalis capitis muscle was removed bilaterally to release the greater occipital nerve, and the nerves were shielded with a subcutaneous flap to fully decompress the greater occipital nerve, with the occipital artery removed when it was entangled with the nerve. Demographic information (age, sex, alcohol use, and smoking history) as well as migraine-specific information were collected through pre- and post-treatment questionnaires (frequency, duration, intensity, location, aura, trigger points, onset of migraine headache). The frequency, duration, and intensity of migraine headaches were multiplied to create a migraine headache index score.

The severity of the headache was graded on a scale of 0 to 10 (with 0 designating "no pain," 13 denoting "mild pain," 37 denoting "moderate pain," 79 denoting "severe pain," and 10 denoting "worst pain possible"). After 12 months, an effective treatment was characterised as a reduction in the migraine headache index of 50% or greater. After 12 months, elimination was defined as a migraine pain index of zero.

### Statistical Analysis

Chisquare tests were used to compare the success and elimination rates of the medicinal and surgical therapy groups. Fisher's exact test was used to compare trigger locations in both groups. T tests were also used to examine the mean decreases in migraine frequency, duration, intensity, and index within and between the medicinal and surgical treatment groups. Significant was defined as a P value of less than 0.05. SPSS version 22 was used for statistical analysis.

## Results

In total, 54 patients were enrolled in this investigation. The follow-up period lasted anywhere from 10 to 14 months, with a mean of 12 months. 27 of the 54 individuals who had migraine headaches were treated medically, whereas the other 27 were treated surgically. [Table 1] shows the demographic information for each category.

**Table 1: Migraine headaches and patient features.**

Variables	Medical treatment group N=27 (%)	Surgical treatment group N=27(%)	P value
Age in years (Mean $\pm$ S.D.)	45.4 $\pm$ 8.02	43.3 $\pm$ 6.4	0.26
Male	06 (22.2%)	05 (18.5%)	0.21
Female	21 (77.8%)	22 (81.5%)	0.41
Alcohol or tobacco use	3 (11.1%)	2 (7.4%)	0.76
Migraine headache with aura	08 (29.6%)	09 (33.3%)	0.67
Onset of migraine headache, years	19.4 $\pm$ 5.21	17.6 $\pm$ 5.2	0.48

There was no significant difference in gender (medical treatment group, 77.8% female; surgical treatment group, 81.5 percent female;  $P > 0.05$ ), average age (medical treatment group, 45.4 8.02; surgical treatment group, 43.3 6.4;  $P > 0.26$ ), alcohol and smoking status (medical treatment group, 11.1 percent; surgical treatment group, 7.4 percent;  $P > 0.76$ ), and mean duration of migraine headaches (medical treatment group, 19.4  $\pm$  5.21 years; surgical treatment group, 17.6 5.2 years;  $P > 0.48$ ). There was also no significant difference in the percentage of migraine headaches with aura between the two groups (medical treatment group, 29.6%; surgical treatment group, 33.3 percent;  $P > 0.67$ ).

The frequency distribution of trigger points was not significantly different between the two groups, according to Fisher's exact test ( $P = 0.49$ ) [Table 2]. All patients in both groups had their migraine headache parameters assessed

before and after therapy. There was no significant difference in migraine headache index score (medical treatment group, 130.26 ± 46.2; surgical treatment group, 14.73 ± 4.48 per month; P = 0.36), duration (medical treatment group, 1.04 ± 0.41 day; surgical treatment group, 1.06 ± 0.45 day; P = 0.42), intensity (medical treatment group, 7.36 ± 1.04; surgical treatment group, 7.23 ± 1.02 on VAS; P = 0.48), or frequency (medical treatment group, 14.34 ± 4.56 per month; surgical treatment group [Table 3].

**Table 2: Percentage of migraine headache trigger sites in treatment groups**

Type of trigger point	Medical treatment group (%)	Surgical treatment group (%)	P value
Trigger point I	16 (59.3%)	17 (%)	0.49
Trigger point II	6 (22.2%)	6 (22.2%)	0.28
Trigger point III	2 (7.4%)	1 (3.7%)	0.12
Trigger point IV	3 (11.1%)	3 (11.1%)	0.62

**Table 3: Pretreatment migraine pain characteristics compared by groups**

Characteristics of migraine headache	Medical treatment group	Surgical treatment group	P value
Frequency (migraine headaches/month)	14.34 ± 4.56	14.73 ± 4.48	0.36
Duration (days)	1.04 ± 0.41	1.06 ± 0.45	0.42
Intensity (visual analog scale 0- 10)	7.36 ± 1.04	7.23 ± 1.02	0.48
Migraine headache index score	130.26 ± 46.2	133.21 ± 46.4	0.52

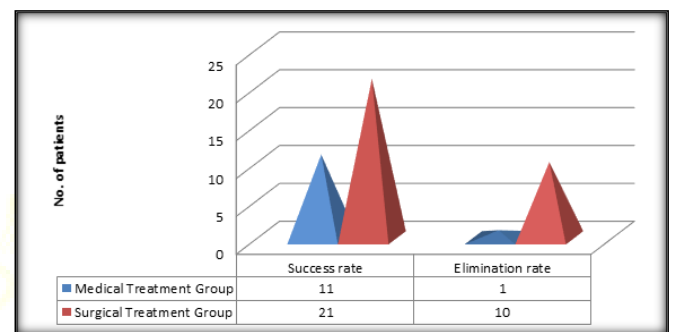
When compared to pretreatment values, all patients in both groups showed a substantial reduction in all parameters examined at the 12-month follow-up [Table 4]. A direct comparison of the two groups' outcomes revealed a significant improvement in the surgical treatment group over the medical treatment group in the following areas: headache frequency, 5.56 per month versus 9.94 per month, (P 0.01); duration, 0.56 day versus 0.92 day, (P 0.01); intensity, 4.52 versus 6.46, (P = 0.01); and migraine headache index scores, 10.94 versus 51.39, (P 0.01), [Table 4].

**Table 4: At a 12-month follow-up, the features of posttreatment migraine headaches were compared between groups**

Characteristics of migraine headache	Medical treatment group	Surgical treatment group	P value
Frequency (migraine headaches/month)	9.94 ± 3.32	5.56 ± 1.57	0.01
Duration (days)	0.92 ± 0.26	0.56 ± 0.18	0.01
Intensity (Visual analog scale 0- 10)	6.46 ± 2.32	4.52 ± 1.06	0.01
Migraine headache index score	51.39 ± 12.62	10.94 ± 4.32	0.01

Of the 27 patients who received medical treatment, 11

(40.74%) saw a 50% or higher drop in their migraine headache index score, with one (3.7%) reporting migraine headache cessation. Twenty-seven (77.7%) of the 27 surgical treatment patients achieved a migraine headache index score reduction of 50% or more, with nine (37.03%) experiencing complete eradication. Surgical treatment (77.7%) had a considerably greater success rate (percentage of patients who experienced a 50% reduction in migraine headaches) than medicinal treatment (40.74 percent; P 0.01). [Figure 1] shows that the eradication rate following surgical therapy (37.03 percent) was substantially higher than that following medicinal treatment (3.7 percent; P 0.01). Neither the surgery nor the pharmacological treatment groups had any problems. In addition, no patient in either group experienced a more severe headache after treatment.



**Figure 1: At a 12-month follow-up, the success and eradication rates of surgical versus medicinal migraine headache treatment were compared.**

## Discussion

The goal of this study was to evaluate and compare the success of surgical deactivation of migraine headache trigger points with medication migraine headache treatment. The 12-month results show that surgical deactivation of one or more trigger sites can effectively eliminate or minimize the frequency, duration, and intensity of migraine headaches, and that the effects are long lasting. Although medicinal therapy allows patients and physicians to have some control over their migraine headaches, migraine headaches are rarely completely eliminated for long periods of time.<sup>[3,4]</sup> Furthermore, pharmaceutical therapies have a wide range of adverse effects and comorbidities, including fatigue, dizziness, cardiovascular arrhythmias, and hepatotoxicity.<sup>[8]</sup> Botox injections, massage therapy, acupuncture, biofeedback, and chiropractic services are some of the alternative treatments used by people with migraine headaches to supplement established medical therapies.<sup>[15]</sup> In a study by Bahman Guyuron et al., it was shown that surgical deactivation of migraine trigger sites is a cost-effective approach to the treatment of migraine headache.<sup>[5]</sup> Patients can expect to spend less on drug therapy and alternative treatment modalities after deactivation, and may require fewer doctor and emergency room visits. In the treatment of migraine headaches, decompression of the four main peripheral trigger sites (frontal, temporal, septal/turbinates, and occipital) has a reported success rate of 75 percent to 92

percent of patients.<sup>[6,13]</sup> Migraine surgery is a revolutionary treatment option for people who suffer from incapacitating migraine headaches.<sup>[11,12]</sup> Importantly, surgery for migraine headache is not first-line therapy; rather, it is reserved for individuals who have failed to respond to conventional migraine treatment regimens, which involve various pharmaceutical and behavioural therapies.<sup>[3]</sup> Furthermore, because migraine attacks can be caused by a variety of factors, patients are only eligible for migraine surgery if discrete peripheral nerve trigger points are identified using botulinum toxin injection and a thorough physical examination.<sup>[17]</sup> Migraine surgery is not recommended for the treatment of acute migraine headaches, but rather as a preventative approach.<sup>[3]</sup> A subset of plastic surgeons who affirm an awareness of the available research supporting its practise are interested in migraine surgery. The referral pattern appears to be a substantial impediment to undertaking migraine surgery. Improved knowledge with the concept and skills of migraine surgery, as well as increased referrals of potential patients by neurologists, may encourage more plastic surgeons to conduct migraine surgery.<sup>[3]</sup> The study's drawbacks included a lack of thorough knowledge among neurologists about migraine surgical methods and the fact that patients were not referred for surgery, resulting in a limited sample size. More favourable results can be reached in the future with improved intergroup contacts, increased familiarity with this type of treatment among neurologists and plastic surgeons, and more research with more samples.

## Conclusion

In summary, the surgical deactivation of migraine headache trigger sites is a successful therapy option for alleviating migraine headache symptoms. Patients who fail to respond to pharmacological treatment and receive relief from headache pain after receiving botulinum toxin injections at specific anatomical trigger points may be candidates for surgery to release entrapped peripheral nerves. Migraine surgery is an intriguing option for suitably selected migraine headache patients, and it will continue to be a booming subject with plenty of research prospects.

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