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# Microvascular decompression for hemifacial spasm: a review of twenty-one operated cases



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## Abstract

**Background:** Microvascular decompression of facial nerve provides definitive and long-term cure for hemifacial spasm. We review our experience of treating hemifacial spasm by microvascular decompression.

**Objectives:** To evaluate the results of microvascular decompression of facial nerve for hemifacial spasm and to discuss the critical steps during surgery necessary to achieve a good result.

**Patients and methods:** Twenty-one cases of hemifacial spasm operated by the author were analysed. All the patients underwent microvascular decompression of the facial nerve by the retromastoid approach. Preoperative and postoperative videos of the patients were made with their consent. Patient outcome and complications were analysed.

**Results:** Twenty patients had complete resolution of the spasm after surgery. The second operated patient had facial palsy with hearing loss in the immediate postoperative period and recurrence of the spasm after 6 months of surgery. Postoperative mild transient facial weakness in one patient, mild sensory-neural hearing loss in two, delayed facial palsy which resolved completely in two patients, transient facial twitching which responded to carbamazepine in one and paradoxical CSF rhinorrhea treated successfully by lumbar drainage in one patient were the complications noted.

**Conclusion:** Hemifacial spasm is best treated by surgery, and our results compare favourably with those in the existing literature. Sensorineural hearing loss and facial nerve palsy are the main complications to be expected during the learning curve.

**Keywords:** Hemifacial spasm, Microvascular decompression, Facial palsy

## Introduction

Hemifacial spasm is a gradually progressive disorder characterised by intermittent, tonic, involuntary twitching of the face, usually unilateral and rarely bilateral. It is caused by an aberrant vascular loop compressing the facial nerve at its point of exit from the brainstem.

Microvascular decompression of the facial nerve, first described by Janetta [1–3], provides the definitive cure for

this condition. This procedure is technically more demanding than trigeminal nerve decompression because of its close association with the lower cranial nerves, eighth nerve, flocculus and the choroid plexus. The smallest of technical error may lead to facial nerve palsy, leaving the patient with a cosmetic disfigurement worse than before.

We review our experience of treating hemifacial spasm by surgery over the last 6 years. All the cases were operated by the author, without electrophysiologic monitoring [4] as it is not available with us (and so is the case in many hospitals in developing countries around the world because of financial constraints).

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## Patients and method

A total of twenty-one patients operated by the author in the last 6 years were reviewed. All the patients had hemifacial spasm since few years. All had tried medical management in the form of carbamazepine, gabapentin and pregabalin at other hospitals, but the spasms were not controlled. The first patient had a history of treatment by botox injection resulting in a mild facial palsy.

MRI of the brain with 3D CISS/FIESTA images was done to identify the vessel compressing the facial nerve root entry zone and to rule out other causes of hemifacial spasm-like tumour, AVM, aneurysm and demyelinating conditions like multiple sclerosis. It is important to differentiate primary hemifacial spasm caused by atraumatic pulsatile vascular compression from secondary hemifacial spasm and other conditions like blepharospasm and fasciculation, as treatment strategy for both is different. If surgery is carried out for hemifacial spasm seen in demyelinating lesions, fascinations seen in Bell's palsy, blepharospasm, etc. then is bound to fail.

Only patients with primary hemifacial spasm were included in this study.

Out of a total of 21 patients, four were male, and seventeen were females. Thirteen had right-sided spasm while eight had spasm on the left side. The responsible vessel was anterior inferior cerebellar artery (AICA) in eighteen cases, posterior inferior cerebellar artery (PICA) in two cases and veins in one case.

The age distribution was as under (Table 1).

All the patients were operated by the retromastoid approach under general anaesthesia in supine position (Video 1). The head was turned to the opposite side by 90°, and the ipsilateral shoulder elevated by sandbag. The vertex of the head was dropped by 10–15° towards the floor. This is important as it improves the visualisation of the facial nerve from the inferior angle. A standard retromastoid craniotomy was done, and dura opened. The cerebellum is then gently pressed on the inferior-lateral aspect with the suction cannula over a cottoned patty, so as to release CSF from the cerebello-medullary cistern. We avoid using self-retaining retractors for cerebellar retraction as this leads to a greater chance of traction injury to the eighth nerve and consequent hearing loss [5–7]. As CSF is drained, the lower cranial nerves come into view. A small vein drain from the

cerebellum to the inferior petrosal sinus may get ruptured. Hence, forceful retraction should be avoided. We usually do not cauterise the vein. The lower cranial nerves are followed back to their origin from the brainstem by cutting the arachnoid adhesions between the nerves and the cerebellum sharply by micro-scissors. Once the brainstem is visualised, attention is directed to the arachnoid between the 8th nerve and the cerebellum. These are cut sharply leading to further visualisation of the 7–8th nerve complex. Next, the lower cranial nerves are visualised at their point of entry into the brainstem. Then, the angle of microscope is turned slightly upwards, and the flocculus and the choroid plexus are visualised. All these steps can be done without using self-retaining retractors. Gentle pressure on the cottonoid with a suction provides sufficient retraction to carry out the dissection. The facial root exit zone is best visualised through the infra-floccular approach lifting the cerebellar rostrally. At this stage, it may be necessary to use the thin 3-mm blade of self-retaining Leyla retractor to gently retract the flocculus. The root entry zone of the facial nerve comes in the view. The vascular loop indenting the facial nerve can now be seen. The loop is gently separated from the facial nerve. Any arachnoid adhesions restricting the movement of the loop are cut sharply with micro-scissors. The goal of the surgery is to reorient the axis of the vessel and changes its course away from the facial nerve, rather than simply “push” Teflon between the vessel and the nerve. Soft Teflon felt is now inserted between the nerve and the vessel loop to prevent re-adhesion.

After confirming adequate hemostasis, dura is closed in watertight fashion. Muscles and skin are closed in standard fashion, and dressing applied.

Postoperatively, the patient is kept in an ICU for few hours. Antiemetics, analgesics and IV fluids are continued for 24 h as postoperative transient, vertigo and ataxia, and vomiting may occur. Patient is usually discharged on the second or third postoperative day. Stitches are removed on the eighth or ninth postoperative day.

## Results (Videos 1 to 7)

Twenty patients had complete resolution of their spasm immediately following surgery. One patient had some twitching of the face postoperatively which was well controlled by carbamazepine. Carbamazepine was discontinued after 3 months, and the patient did not have any recurrent spasms. The complications are given in Table 2.

## Discussion

Hemifacial spasm has an incidence of approximately 10 per 100,000 population with a 2:1 female predominance and a mean age of onset between 45 to 55 years [8]. It usually begins with minor twitching of eyelids (Video 7

**Table 1** Age distribution

Age in years	No. of patients
31–40	5
41–50	11
51–60	4
61–70	1

**Table 2** Complications

Complication	No. of patients	Treatment and outcome
Mild sensorineural hearing loss	2	Persistent
Postoperative facial palsy and delayed recurrence	1	Patient not willing for surgery
Postoperative transient mild facial palsy	1	Recovered completely
Delayed facial palsy	2	Recovered in 3 months
Paradoxical csf rhinorrhea	1	Treated successfully by lumbar drainage

and progressively increases in severity to involve the rest of the ipsilateral face. In neglected cases, it may lead to sustained tonic contractions of the face lasting few seconds (Video 4).

Microvascular decompression remains the safest and the most effective method of treating this condition with a success rate of 80–100% reported around the world. Though botox is being used for the treatment of hemifacial spasm, it is expensive, needs repeated injections and may lead to asymmetry and atrophy of facial musculature and does not remove the cause of the disease. Hence, it should be used only when the patient is deemed unfit for surgery.

Sensorineural hearing loss and failure of the procedure to relieve the spasm are the two main areas of concern for the operating neurosurgeon.

Hearing loss can be prevented by avoiding self-retaining retractors and forceful cerebellar retraction. The cerebellar retraction initially should be in a rostra-caudal direction and not in the lateral to medial direction. It should be done with the help of gentle pressure by thin no 1 suction cannula over a cottoned to release CSF. This prevents traction injury to the 8th nerve.

Failure of surgery is the most common due to inadequate proximal dissection. It is important to look for the loop at the root exit zone of the facial nerve at the brainstem. The distal vessels in contact with the nerve are usually not pathogenic. Studies have shown that in cases of failure, the compression is usually found proximal to the Teflon patch on MRI and confirmed on re-exploration [9].

The key surgical steps can be summarised as follows:

- Dropping the vertex of the head by 15°.
- Adequate bone removal inferiorly.
- Avoid self-retaining retractors as far as possible.
- Avoid bleeding from the manipulation of choroid plexus.
- Use a thin no 1 suction cannula with a keyhole to avoid suction injury to the facial nerve.
- Mobilise the offending vessel adequately away from the nerve by cutting the arachnoid before Teflon insertion.

Endoscope-assisted microvascular decompression is being used recently by some neurosurgeons who claim better visualisation of the vessel loop and the facial nerve exit zone. Endoscope definitely helps in providing a view around the “corners and angles” so that an offending vessel loop is not missed. However, endoscope may cause injury to critical neuromuscular structures particularly in the “blind zone”, prompting some surgeons to use multi-scope technique [10]. For neurosurgeons working in a developing country, microscope is more cost-effective than endoscope. Studies with either of these have shown equally good results.

Our cure rate of 95% compares favourably with those in the existing literature which ranges from 90–98%. The complications of delayed facial palsy seen in two patients are also well documented in the literature and resolved completely. The incidence of sensory hearing loss, seen in two patients, can hopefully be prevented as further experience is gained in this procedure.

## Conclusion

Hemifacial spasm is best treated by microvascular decompression. However, surgical technique is of paramount importance to achieve good results and to make the surgery acceptable and popular among the population.

## Supplementary information

**Supplementary information** accompanies this paper at <https://doi.org/10.1186/s41983-020-00179-y>.

**Additional file 1: Video 1.** Operative video of microvascular decompression of facial nerve in a patient with left hemifacial spasm.

**Additional file 2: Video 2.** Video showing the preoperative status and the postoperative result after MVD in a female patient with severe sustained hemifacial spasm.

**Additional file 3: Video 3.** Video showing the preoperative status and the postoperative result after MVD in a male patient with left hemifacial spasm.

**Additional file 4: Video 4.** Video showing the preoperative status and the postoperative result after MVD in a female patient with severe hemifacial spasm.

**Additional file 5: Video 5.** Video showing the preoperative status and the postoperative result after MVD in a female patient with severe hemifacial spasm.

**Additional file 6: Video 6.** Video showing the preoperative status and the postoperative result after MVD in a female patient with mild hemifacial spasm.

**Additional file 7: Video 7.** Video showing the preoperative status and the postoperative result after MVD in a patient with mild hemifacial spasm

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#### Author's contributions

The author, Dr APP, is involved in treating the patients, preparing the manuscript and its submission.

We the authors confirm that this manuscript or its part has not been submitted for publication anywhere.

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#### Availability of data and materials

The study does not contain any data or materials from other sources.

The data supporting the results can be found in the hospitals where the surgery was carried out, namely, SSG Hospital, Sterling hospital and Neuron Hospital Vadodara, Gujarat, India.

#### Ethics approval and consent to participate

As the approval of the ethics committee is mandatory for publication of this article, the study was put up before the "NEURON HOSPITAL ETHICS COMMITTEE."

The ethics committee after due review and deliberation has given the consent for the publication of this article on 5 May 2020.

#### Consent for publication

We the authors give consent to the "The Egyptian Journal of Neurology, Psychiatry and Neurosurgery" to publish our study. Also, we confirm that consent for publication and consent for publication of videos has been obtained from all the participants involved in this study.

#### Competing interests

The author declares no competing interests.

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