Microvascular decompression for hemifacial spasm

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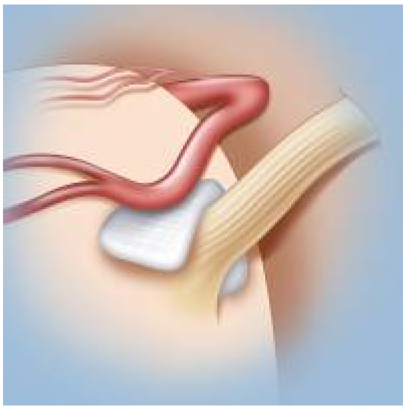

see also Hemifacial spasm treatment.

When a penetrating pattern was encountered during MVD surgery, decompression between the penetrating offender and the facial nerve may offer good results [1].

Many ablative procedures are effective for hemifacial spasm (HFS) (including sectioning of divisions of the facial nerve), however, this leaves the patient with some degree of facial paresis. The current procedure of choice for HFS is microvascular decompression (MVD) wherein the offending vessel is physically moved off of the nerve, and a sponge (e.g. Ivalon®, polyvinyl formyl alcohol foam) is interposed as a cushion. Other cushions may not prove to be as satisfactory (muscle may disappear, and Teflon felt may thin [2]).

Most often, the offending vessel approaches the nerve at a right angle, and causes grooving in the nerve. Compression must occur at the root exit zone; decompression of vessels impinging distal to this area is usually ineffective.

Intra-operative brainstem auditory evoked potentials (BAER), [3] or more applicable, direct VIII nerve monitoring [4] may help prevent hearing loss during MVD for 7th or 8th nerve dysfunction. Furthermore, monitoring for the disappearance of the (delayed) synkinetic response may aid in determining when adequate decompression has been achieved (generally reserved for teaching institutions) [5].

The facial nerve should not be manipulated, and one should avoid dissection around the VII and VIII nerves near the IAC [6]. Vessels must be preserved, especially the cochlear artery and small perforators. Place gentle medial traction on the cerebellum (<1 cm is recommended [7]), and incise the arachnoid membrane between the flocculus and the eighth nerve (to avoid tension on nerves that could cause post-op deficit). The IX nerve may be followed medially from the jugular foramen to locate the origin of the VII nerve (the origin of VII is 4 mm cephalad and 2 mm anterior to that of the IX nerve [8]).

Redo MVD remains a feasible treatment option for HFS patients who have failed to benefit from prior MVD, but is associated with higher risks of cranial nerve and vascular injuries [9].

Planning

Three-dimensional reconstructions were found to provide much clearer characterization of this area than traditional preoperative imaging. Therefore, Teton et al., suggest that use of these reconstructions in the preoperative setting has the potential to help identify appropriate surgical candidates, guide preoperative planning, and thus improve outcome in patients with HFS [10].

Position

The classic surgical position for microvascular decompression (MVD) is lateral decubitus position with the head rotated 10 degrees away from the affected side.

Ko et al. measured the angles of the posterior fossa, specifically focusing on the surgical corridors used in MVD surgery for hemifacial spasm (HFS), to identify the proper surgical position.

The following parameters were assessed on preoperative magnetic resonance images (MRI): petrous angle (PA), sigmoid angle (SA), sigmoid diameter (SD), and root exit zone-sigmoid sinus edge angle (REZ-SEA).

The mean PA was 59.7 ± 5.6 degrees, SA was 16.8 ± 8.6 degrees, SD was 13.4 ± 3.5 mm, and the mean REZ-SEA was 59.6 ± 5.8 degrees. The difference between the maximum SA to avoid cerebellar hemisphere injury and the minimum REZ-SEA required to verify the facial nerve REZ is assumed to be the usable range of angles for the operative microscope; the average midpoint of this range was 38.2

± 6.4 degrees.

Turning the patient's head 10 degrees away from the affected side was generally appropriate for performing MVD surgery because it provided a mean microscope angle of 48 degrees. However, some patients had corner values for the sigmoid angle, REZ-SEA, and sigmoid sinus diameter. Rotating a patient's head based on precise calculations from preoperative MRI helps to achieve successful surgery [11].

Skin incision

“5–5-5” incision (5mm medial, extending 5cm up to 5cm down), used for approach to seventh/ eighth nerve complex:

Intraoperative Findings

Microvascular decompression for hemifacial spasm intraoperative findings.

Videos

A video demonstrates the surgical steps of a MVD at left facial REZ in a 41-year-old man who presented with typical hemifacial spasm on the left side due to VIIth nerve REZ compression by PICA. A classical retromastoid and infrafloccular approach was performed to avoid stretching of the VIIIth nerve and access the VIIth nerve ventro-caudally. The next step is insertion-along the brainstem, VII-VIIIth nerves REZ, and flocculus-of a plaque made of Teflon felt (Edward-type) which is semi-rigid, and by principle does not exert direct compression on the facial REZ, thus avoiding compression and/or transmission of pulsations on the VIIth nerve. The patient's postoperative period was uneventful and clinical outcome good [12]

Routine postoperative admission

Postoperative neurocritical intensive care unit (NICU) admission of patients who underwent craniotomy for close observation is common practice. Hatipoglu Majernik et al. performed a comparative analysis to determine if there is a real need for NICU admission after microvascular decompression (MVD) for cranial nerve disorders or whether it may be abandoned. The study evaluates a consecutive series of 236 MVD surgeries performed for treatment of trigeminal neuralgia (213), hemifacial spasm (17), vagoglossopharyngeal neuralgia (2), paroxysmal vertigo (2), and pulsatile tinnitus (2). All patients were operated by the senior surgeon according to a standard protocol over a period of 12 years. Patients were admitted routinely to NICU during the first phase of the study (phase I), while in the second phase (phase II), only patients with specific indications would go to NICU. While 105 patients (44%) were admitted to NICU postoperatively (phase I), 131 patients (56%) returned to the ward after a short stay in a postanaesthesia care unit (PACU) (phase II). Specific indications for NICU admission in phase I were pneumothorax secondary to central venous catheter insertion (4 patients), AV block during surgery, low blood oxygen levels after extubation, and postoperative dysphagia and dysphonia (1 patient, respectively). There were no significant differences in the distribution of ASA scores or the presence of cardiac and pulmonary comorbidities like congestive heart failure, arterial hypertension, or chronic obstructive pulmonary disease between groups. There were no secondary referrals from PACU to NICU. Our study shows that routine admission of patients after eventless MVD to NICU does not provide additional value. NICU admission can be restricted to patients with specific indications. When MVD surgery is performed in experienced hands according to a standard anaesthesia protocol, clinical observation on a neurosurgical ward is sufficient to monitor the postoperative course. Such a policy results in substantial savings of costs and human resources [13].

Outcome

Microvascular decompression for hemifacial spasm outcome

Complications

see Microvascular decompression for hemifacial spasm complications.

Transposition in microvascular decompression for hemifacial spasm

Transposition in microvascular decompression for hemifacial spasm.

Observational cohort studies

A single-center cohort of 55 hemifacial spasm patients completed a questionnaire approximately 5 years following microvascular decompression. Data encompassed tinnitus presence, side, type, onset, and severity measured by a 10-point Visual Analogue Scale (VAS). Descriptive, correlation, and logistic regression analyses were conducted. RESULTS : At surgery, participants' median age was 58 years (IQR 52-65). The median duration of HFS symptoms before surgery was 5 years (IQR 3-8), slightly predominant on the left (60%). Postoperative tinnitus was reported by 20 patients (36%), versus nine (16%) that reported preoperative tinnitus. Postoperative tinnitus was ipsilateral on the surgical side in 13 patients (65%), bilateral in six (30%), and contralateral in one (5%). Among patients with bilateral postoperative tinnitus, 33% did not have this preoperatively. Tinnitus was continuous in 70% of cases and pulsatile in 30%. Onset of new tinnitus was in 58% immediately or within days, in 25% within three months, and in 17% between three months and one year after surgery. The mean severity of postoperative tinnitus was 5.1 points on the VAS. Preoperative tinnitus and presence of arachnoid adhesions had suggestive associations with postoperative tinnitus in initial analyses ($p = 0.005$ and $p = 0.065$). However, preoperative tinnitus was the only significant predictor of postoperative tinnitus ($p = 0.011$).

Tinnitus is a common condition following microvascular decompression for hemifacial spasm, with a moderate overall severity. Causes behind postoperative tinnitus remain obscure but could be related to those of postoperative hearing loss in this patient population. Clinicians should be aware of tinnitus following MVD and vigilantly monitor its occurrence, to facilitate prevention efforts and optimize outcome for HFS patients undergoing MVD [14]

Case series

Al Menabbawy et al. extracted retrospective data of patients who received Indocyanine green videoangiography from a prospectively maintained database for microvascular decompression. They noted relevant data including demographics, offending vessels, operative technique, outcome, and complications.

Out of the 438 patients, 15 patients with a mean age (SD) of 53 ± 10.5 years underwent intraoperative ICG angiography. Male: female was 1:1.14. The mean disease duration prior to surgery was 7.7 ± 5.3 years. The mean follow-up (SD) was 50.7 ± 42.0 months. In 14 patients, the offending vessel was an artery, and in one patient, a vein. Intraoperative readjustment of the Teflon pledget or sling was required in 20% (3/15) of the cases. No patient had any sort of brainstem ischemia. Eighty percent of the patients (12/15) experienced complete resolution of the spasms. 86.7% (13/15) of the patients reported a satisfactory outcome with marked improvement of the spasms. Three patients experienced slight hearing affection after surgery, which improved in two patients later. There was no facial or lower cranial nerve affection.

Intraoperative ICG is a safe tool for evaluating the flow within the brain stem perforators and avoiding brainstem stroke in MVD for hemifacial spasm [15].

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