Microvascular decompression for hemifacial spasm intraoperative findings

- Non-Root Exit Zone Exploration during Facial Nerve MVD: A Discussion of the Pathogenesis in Atypical Cases of Hemifacial Spasm
- Intraoperative use of lateral spread response measurement in the upper orbicularis oculi and mandibular muscles in patients with hemifacial spasm after botulinum toxin treatment
- Impact of offending vessel location on lateral spread response variations in hemifacial spasm patients
- Fully endoscopic microvascular decompression for hemifacial spasm: a systematic review
- Microvascular decompression: a contemporary update
- Microvascular decompression in hemifacial spasm: functional outcome
- Dynamic changes of abnormal muscle response during decompression procedures in double compression-type hemifacial spasm
- A New Management Strategy for Hemimasticatory Spasm

Primary hemifacial spasm with few exceptions is due to the vascular compression of the facial nerve that can be evidenced with high resolution MRI. Microvascular decompression is the only curative treatment for this pathology. According to literature review detailed in chapter “conflicting vessels”, the compression is located at the facial Root Exit Zone (REZ) in 95% of the cases, and in 5% distally at the cisternal or the intrameatal portion of the root as the sole conflict or in addition to one at brainstem/REZ. Therefore, exploration has to be performed on the entire root, from the ponto-medullary fissure to the internal auditory meatus. Because microvascular decompression is functional surgery, the procedure should be as harmless as possible and with a high probability of permanent efficacy. Besides facial palsy, main complications are hearing loss, tinnitus and gait disturbances. Causes are cochlea/labyrinth ischemia due to manipulations of their nutrient arteries and/or stretching of the eight nerve complex. To minimize the latter, the approach should not be with lateral-to-medial retraction of the cerebellar hemisphere, but along an infra-floccular trajectory, from below. In fact, most of the neurovascular conflicts are situated ventro-caudally to facial REZ at the brainstem, particularly those from a megadolicho-vertebrobasilar artery and its posterior inferior-cerebellar branch. Also, care should be taken not to cause any injury of the manipulated vessels or stretching of their perforators to brainstem. Heating from bipolar coagulation must be avoided. The inserted material used to maintain the offending vessel(s) away must not be neo-compressive. Intraoperative neuromonitoring is considered to be useful for achieving safe surgery at least until the learning curve has reached an optimal level, particularly BrainstemAuditory Evoked Potentials recordings. Increase in latency and/or decrease in amplitude of wave V warn excessive stretching or damage to the cochlear nerve, and decrease in amplitude of wave I signals possible ischemia of the cochlea. Free-running EMG of the facial muscles may warn against excessive manipulation of the facial nerve. Recording of the lateral spread responses - which are a sign of hyperexcitabilty of the facial motor system - may provide information on completeness of the decompression [1)].

Compression patterns were categorised into six different types including: loop (n = 11: 4.6%), arachnoid (n = 66: 27.9%), perforator (n = 58: 24.6%), branch (n = 18: 7.6%), sandwich (n = 28: 11.9%), and tandem (n = 52: 22.0%). The compression patterns were significantly correlated with the compressing vessels involved. Thirty-two (86.5%) of 37 lesions where the vertebral artery was the

compressing vessel involved the tandem type. Anterior inferior cerebellar artery was the compressing vessel involved in 49 (84.5%) of 58 perforator type compressions, while posterior inferior cerebellar artery was the compressing vessel involved in 8 (72.7%) of 11 loop type compressions.

Once the compressing vessel responsible for the neurovascular compression are identified, the probable pattern of compression can be anticipated; this knowledge could facilitate the application of the appropriate operative procedures and minimise post-operative complications [2].

It is important to describe single versus multi-vessel neurovascular compression [3].

When a penetrating pattern is encountered during MVD surgery, decompression between the penetrating offender and the facial nerve may offer good results [4].

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Sindou M, Mercier P. Microvascular decompression for hemifacial spasm : Surgical techniques and intraoperative monitoring. Neurochirurgie. 2018 May;64(2):133-143. doi: 10.1016/j.neuchi.2018.04.003. Epub 2018 May 18. PMID: 29784430.

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Lee HS, Park K. Penetrating Offenders in Hemifacial Spasm: Surgical Tactics and Prognosis. Life (Basel). 2023 Oct 7;13(10):2021. doi: 10.3390/life13102021. PMID: 37895403; PMCID: PMC10608199.

3)
Ghaffari-Rafi A, Choi SY, Leon-Rojas J, Shahlaie K. Predictors of Multi-Vessel Identification, Outcome, and Optimal Surgical Timing for Microvascular Decompression in Hemifacial Spasm. Clin Neurol Neurosurg. 2023 Oct;233:107841. doi: 10.1016/j.clineuro.2023.107841. Epub 2023 Jun 22. PMID: 37544024.