

Neurovascular conflict at facial nerve root entry zone

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Section: Neuroradiology

Area of Interest: Neuroradiology brain

Procedure: Perception image

Imaging Technique: MR

Special Focus: Seizure disorders Case Type: Clinical

Cases

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Patient: 65 years, male

Clinical History:

A 65-year-old male patient presenting with atypical intermittent right hemifacial spasms through 1-2 years. Each episode starting with blepharospasm propagating to spasms in cheek and the oral angle.

Imaging Findings:

MRI of the cerebrum without contrast shows a neurovascular conflict with the posterior inferior cerebellar artery at the right facial nerve root entry zone. No cerebellopontine angle tumours. No aneurism on 3D TOF.

More white matter lesions than expected in both hemispheres which are interpreted as vascular lesions.

Two lacunar infarcts, one in each of the lacuna radiata.

Furthermore an arachnoid cyst anterior to the right temporal pole was revealed.

Discussion:

Hemifacial spasm (HFS) is a movement disorder characterized by involuntary, intermittent, irregular contractions. Primary HFS is caused by vascular compression of the facial nerve at the root entry zone in the posterior fossa [1]. Secondary HFS is caused by facial nerve or brainstem damage [2]. HFS is mostly unilateral [3], the prevalence is 9.8 in 100, 000 people and average onset is 44 years [1].

The facial nerve is innervating the ipsilateral facial muscles and spasms usually starts with the lower eyelid and propagates to the cheek, perioral region, and neck [1]. The condition progresses over months to years [4]. Spasms are insuppressible and can be present during sleep. Imaging the cisternal anatomy of the facial nerve maps the root exit zone from the pons, the attached segment, the root detachment zone, the transitional myelin zone, and the true cisternal zone[4]. The transitional zone with transition of myelination from glial to Schwann cell myelin is believed to be sensitive to repetitive pulsation [4].

Examination should include high-resolution magnetic resonance imaging (MRI) [1, 4] reporting any secondary disease as well as the cranial nerve course, characterisation of neurovascular compression, precise point(s) of contact and any displacement [4]. High-resolution 3D T2 images or 3DTOF may be used to evaluate the cranial nerve segments [4]. Alternatively TOF-MR can be used [4]. T1-weighted sequences may be added [4]. If MRI is contraindicated, CT cisternogram combined with CT angiogram is an alternative [4]. Neurovascular pulsatile compression of the facial nerve is the most common cause of HFS, but symptoms on the affected side should be present for the finding to be significant. Studies suggest that more than 20% [4] to 53% [5] of normal subjects have vascular compression on imaging, but then the vascular conflict is mild to moderate and often involves the cisternal portion of the nerve and the anterior inferior cerebellar artery (AICA) [5]. Patients with HFS more often have

moderate to severe vascular compression located centrally to the cisternal portion of the facial nerve conflicting with the vertebral artery, AICA and/or posterior inferior cerebellar artery (PICA) [5].

HFS is treated with botulinum injections, as was the case for this patient (benefits unknown), or systemic medication. Surgical decompression is a third option in refractory cases [4]. Identification of involved vessels and the pattern of neurovascular compression can influence the type of surgery.

Neurovascular conflicts can be present without the patient having symptoms in which case the finding is insignificant. Precise reporting of the neurovascular conflict enables precise surgery thereby influencing the outcome.

Differential Diagnosis List: Hemifacial spasm caused by neurovascular conflict with facial nerve, Facial nerve or brainstem damage (as trauma; demyelinating lesions; vascular aetiologies and cerebellopontine angle tumours), Blepharospasm, Tics, Partial motor seizures, Meige syndrom, Neuromyotonia

Final Diagnosis: Hemifacial spasm caused by neurovascular conflict with facial nerve

References:

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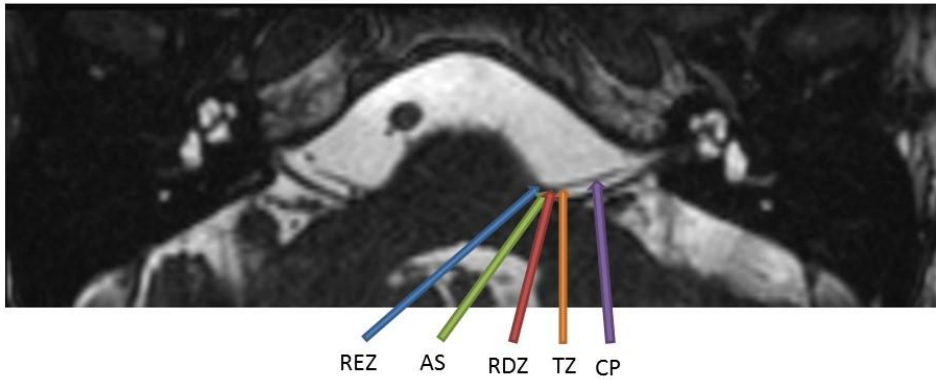
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Figure 1

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Description: REZ: root exit zone (nerve exits from pons). AS: attached segment (nerve adheres to pons). RDZ: root detachment zone (nerve detaches from pons). TZ: transition zone (transition from central to peripheral myelin). CZ: cisternal zone. **Origin:** Marklund M, Research Center for Advanced Imaging, Dept. Radiology, Zealand University Hospital, Roskilde, Denmark

Figure 2

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Description: Neurovascular conflict between the facial nerve and the posterior inferior cerebellar artery (PICA) at the vulnerable transition zone, where central glial myelin transitions into peripheral Schwann cell myelin. **Origin:** Marklund M, Research Center for Advanced Imaging, Dept. Radiology, Zealand University Hospital, Roskilde, Denmark