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Surgical proven location of the Facial Nerve in the vicinity of Cerebellopontine Angle Tumours depicted pre-operatively by Tractography

P.M. Gonçalves-Pereira¹, G. Neto D’almeida², R. Manaças³, P. Escada³, T. Taoka³
¹Serviço de Radiologia, Hospital dos Lusíadas, Lisboa/PORTUGAL,
²Neurosurgery dept, Hospital Egas Moniz, Lisboa/PORTUGAL,
³Neuroradiology dept, Hospital dos Capuchos, Lisboa/PORTUGAL, ⁴ENT dept, Hospital Egas Moniz, Lisboa/PORTUGAL, ⁵Radiology dept, Nara University Hospital, Nara/JAPAN

Purpose/Introduction: To determine the clinical utility of pre-operative diffusion tensor (DT) tractography of the facial nerve in the vicinity of cerebellopontine angle (CPA) tumours. The location of the facial nerve was established pre-operatively by tractography and compared with in-vivo electrode stimulation during microsurgery of vestibular schwannomas and rare CPA masses (meningiomas and arachnoid cysts).

Subjects and Methods: We have evaluated 19 patients with histologically proven CPA vestibular schwannomas (n=15), meningiomas (n=2) and arachnoid cysts (n=2). The location of the facial nerve on the cerebellopontine angle was assessed intra-operatively by visual inspection and mapping (using a monitoring electrical equipment) and compared with pre-operative DT tractography. DT images were obtained at 1.5T using a single-shot, high-resolution echoplanar sequence with six-axis encoding. Tractography of the facial nerve was performed accordingly to the method of Taoka T. et al.¹².

Results: The facial nerve position was depicted intra-operatively in all the patients and illustrated by DT tractography in 18 patients (Figures 1 and 2). In 17 patients (>90%) there was a precise correspondence between the CPA course of the facial nerve found at surgery and DT tractography. In one patient the facial nerve was found anterior/cranial to the tumor while tractography seemed to depict an anterior/caudal course.

Figure 1: Vestibular Schwannoma on the left CPA. Axial and coronal T1 pós-Gad and equivalent tractography images. The facial nerve was identified during surgery with a similar antero-inferior location as predicted by tractography.

Figure 2: Left CPA Meningioma extending through the porus acusticus. Axial T1 pós-Gad. Axial and coronal tractography images predicted a postero-inferior displacement of the facial nerve, which was confirmed during surgery.

Discussion/Conclusion: DT tractography of the facial nerves is feasible and has a consistent correspondence with the surgical findings. This technique may deliver useful pre-operative information and contribute to lower the risk of facial nerve injury during CPA surgeries.

References: