Visualization of Cranial Nerve-vascular Confliction of the Trigeminal and Facial Nerve With MRI Based Multimodal Virtual Endoscopy: A Prospective Study Comparing Preoperative Imaging Analysis to Surgical Findings

Xiaolei Chen MD, PhD; Fangye Li; YuanZheng Hou; Jiashu Zhang; Gang Zheng; Jingjiang Li; Bai-Nan Xu

Introduction

To address the feasibility and predictive value of MRI based multimodal virtual endoscopy in detecting and assessing features of neurovascular confliction (NVC), particularly regarding the degree of compression exerted on the root, in patients who underwent microvascular decompression (MVD) for classic primary trigeminal neuralgia (TN) and hemi-facial spasm (HFS).

Methods

This prospective study includes 42 consecutive patients who underwent MVD for classic primary trigeminal neuralgia. All patients underwent a preoperative 1.5T MRI with T2-weighted 3D sampling perfection with application-optimized contrasts by using different flip angle evolutions (3D-SPACE), 3D time-of-flight (TOF) magnetic resonance angiography (MRA), and 3D T1-weighted gadolinium-enhanced sequences in combination, while 1 patient underwent a preoperative 7.0T MRI with the same imaging protocol. Multimodal MRI images were then transferred to a standard computer workstation and co-registered with each other. The images were then reconstructed three-dimensionally with software to generate virtual endoscopy images of cerebella-pontine angle. Evaluations were performed by 2 independent observers and compared with the operative findings.

Results

For prediction of NVC, image analysis corresponded with surgical findings in 40 cases. Of the 2 patients in whom image analysis did not show NVC, 1 did not have NVC at the time of intraoperative observation, while the other one was found to have vein compression. MRI sensitivity was 97.6% (40/41), and specificity was 100% (1/1). The kappa coefficients (k) for predicting the offending vessel, its location, and the site of compression were 0.882, 0.813, and 0.942, respectively. Image analysis correctly defined the severity of the compression in 39 of the 42 cases.

Conclusions

MRI based multimodal virtual endoscopy using 3D SPACE in combination with 3D TOF-MRA sequences proved to be reliable in detecting NVC and in predicting the degree of root compression, the outcome being correlated with the latter.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the feasibility and predictive value of MRI based multimodal virtual endoscopy in detecting and assessing features of neurovascular confliction (NVC), 2) Identify that multimodal virtual endoscopy proved to be reliable in detecting NVC and in predicting the degree of root compression, the outcome being correlated with the latter.

[DEFAULT POSTER]