Brachial plexus injury: evaluation of nerve roots with MR myelography using fast imaging employing steady state acquisition (FIESTA)

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SYNOPSIS

To examine clinical feasibility of MR myelography using fast imaging employing steady state acquisition (FIESTA) to assess traumatic brachial plexus injuries (BPI), 10 volunteers and 11 BPI patients underwent MR myelography using FIESTA. We evaluated visibility of nerve roots of the volunteers and condition of nerve roots in the patients. MR myelography was compared to CT myelography if available. MR myelography using FIESTA demonstrated clearly most nerve roots in the volunteer studies. Most nerve roots were fairly evaluated with MR myelography in the BPI patients. MR myelography can replace some of the myelographic examinations in evaluation of BPIs.

PURPOSE

The aim of this study is to examine clinical feasibility of MR myelography using FIESTA sequence to assess preganglionic nerve roots in patients with traumatic BPIs.

METHODS

Ten volunteers and 11 patients with traumatic BPIs underwent MR myelography using FIESTA on a 1.5-T superconductive MR unit. MR myelography of the cervical and upper thoracic spine was obtained in a coronal plane. We paid attention to the ventral and dorsal roots of the bilateral sides from C4 to T1 levels. In the volunteer studies, we evaluated visibility of each root on a three-point scale: 3 (excellent), 2 (good) or 1 (poor). In the evaluation of MR myelographic images of the patients, we rated condition of each nerve root on a five-point scale: 5 (definitely normal), 4 (probably normal), 3 (inconclusive), 2 (probably injured) or 1 (definitely injured). In five patients who underwent conventional myelography and CT myelography, we also rated condition of each nerve root based on CT myelography findings on the same scale system to estimate coincidence of MR myelography and CT myelography.

RESULTS

MR myelography using FIESTA demonstrated clearly most of the nerve roots in the volunteer studies (Fig.1). In the visibility evaluation, 93.7% of nerve roots were rated as excellent, 5.0% as good and 1.3% as poor. In the interpretation of nerve root injuries with MR myelography, 56.5% of nerve roots were rated as definitely normal, 14.0% as probably normal, 17.8% as inconclusive, 1.9% as probably injured and 9.8% as definitely injured. With regard to coincidence of the two modalities, the overall weighted kappa value was 0.57. Most of nerve roots were fairly evaluated with MR myelography in the patients with BPIs (Fig.2) although some nerve roots were difficult to evaluate when large traumatic meningoceles caused spinal canal stenosis.

DISCUSSION

In clinical evaluation of BPIs, it is essential to differentiate preganglionic injuries from postganglionic lesions to determine management and prognosis. Several MR sequences have been attempted to evaluate cervical nerve roots and replace conventional myelography, but flow artifact caused by cerebrospinal fluid hindered sufficient image quality. FIESTA provides images with high signal-to-noise ratio and is resistant to flow artifact, thus it is a suitable sequence for MR myelography.

CONCLUSION

MR myelography can replace some of the conventional myelography and CT myelography in evaluation of traumatic BPIs.