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Diffusion tensor tractography of the spinal cord preliminary results in a series of 18 patients at 1.5 T

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BACKGROUND

Early detection of cervical myelopathy is a targeting point in the therapeutic staging even if MR signal abnormality on T2 sequences appears late in the course of the disease. Diffusion techniques are routinely performed in brain exploration and by exploring water cell mobility allows early detection in tissue characteristics. These techniques can now be applied to spinal cord (a technological challenge considering the small size of the canal and the artefacts generated by surrounding bony and vascular structures). Bundles of the spinal cord can be tracked with diffusion tensor imaging techniques. We validated the feasibility of this technique at 1.5T in a routine clinical condition and evaluated the results in a series of 30 patients presenting with cervical pain and/or radiculopathy. Fiber tracking and anisotropic fraction maps obtained were correlated with other imaging modalities and to the clinical data.

Diffusion tensor imaging was performed in both sagittal and axial plans, for a maximum examination time of 5 minutes.

9 patients presented with a normal sized cervical canal and minor spinal cord symptoms, 14 had focal discarthrosis stenosis with focal displacement of the spinal cord and among them 4 had spinal abnormalities on T2 weighted images at the level of the focal stenosis.

METHOD AND RESULTS

Diffusion imaging was reliably obtained in all patients. Fractional anisotropy and ADC maps were calculated at different levels of the cervical spine; in addition, diffusion tensor tractography was also obtained. We compared the information obtained in sagittal and axial T1 and T2 acquisitions and to those from the literature.

The range of FA was 0.6 to 0.7 in the normal cervical spinal cord. Changes in FA and ADC and tractography were observed in patients with signal abnormalities with lower FA value and higher ADC values. In 3 patients with no spinal signal abnormalities but with clinical suspicion of myelopathy we also observed these changes.

CONCLUSIONS

Our results confirm that diffusion can be performed in a routine spinal examination and add a valuable point to the evaluation of the spinal content and therefore to the follow-up and therapeutic staging. ●