

Clinical application study of MR perfusion imaging and diffusion tensor imaging in the tumor like lesions of the cervical spinal cord

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Introduction and Purpose: Functional MR imaging including MR perfusion weighted imaging(PWI) and diffusion tensor imaging(DTI) in the cervical spinal cord are important for clinicians as the tumor like lesions in the cervical spinal cord are difficult to differentiate by conventional MR imaging methods. Our study is to evaluate the application of MR PWI and DTI in the tumor like lesions in cervical spinal cord.

Method and materials: Cervical dynamic susceptibility contrast(DSC)-GRE-PWI and cervical DTI(EPI sequence TR/TE=10000/85, b-value 1000s/mm², 25 directions; field of View was 20, slice thickness 4 and gap 0) scan were performed on 11 patients with GE 1.5T MR scanners with 8 channel neurovascular coils. One patient accepted repeated cervical MR PWI; and 2 patients repeated cervical DTI examination. Trace apparent diffusion coefficient (trace ADC) and Fractional anisotropy (FA),of DTI and relative cerebral blood volume (rCBV) in the PWI were calculated by Functool on a GE workstation.

Results:

There are 5 patients whose lesions were with increased rCBV comparing with the contralateral side, including one patient was with ependymoma, one with meningioma; one with sarcoidosis, 2 patients with astrocytoma. Mean rCBV ratio between lesion and contralateral side is 1.82 ± 0.35 . There are 6 patients whose cervical spinal cord lesions were with decreased rCBV comparing with the contralateral side. One patient was with radiation injury for medulloblastoma which was confirmed by progressive decreased perfusion of a follow-up PWI examination; 2 patients with enhancing demyelinating lesions; 3 patients were with myelomalacia including one was because of post cervical meningioma resection; the other 2 were sequela of demyelinating disease. There is only one pathology confirmed astrocytoma with increased FA than contralateral side; for other lesions, mean FA value of other lesions(0.29 ± 0.03) were lower than the contralateral side(0.56 ± 0.11), paired t test, $P < 0.01$.

Conclusions:

Combining cervical PWI and DTI could supply more information, including perfusion and anisotropy abnormality of tumor like lesions in the cervical spinal cord; which are important for clinical diagnosis and further treatment.

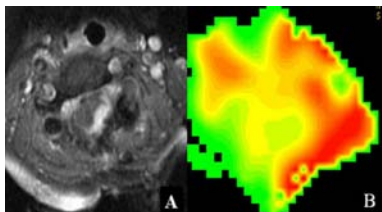


Figure 1: A case of ependymoma. A: Axial T1-weighted post-contrast image; B: rCBV images. The lesion at the C2-3 level left of the cervical spinal cord enhanced on the post-contrast T1-weighted image, while the lesion showed increased perfusion (red signal) on the rCBV image.

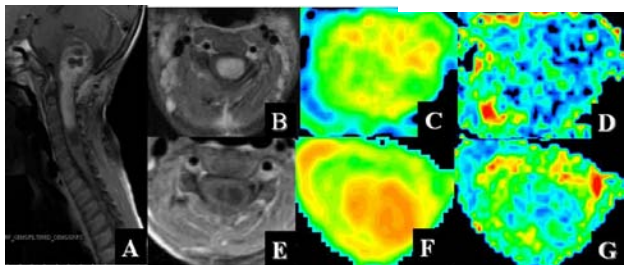


Figure 2: A patient with astrocytoma. A: Sagittal T1-weighted post-contrast image; B and E: Axial T1-weighted post-contrast image; C and F: ADC image; D and G: FA image. B, C and D are images at C2-3 level; E, F and G are images at the C5 level.

The tumor components included enhanced bulk and non-enhanced cysts in Figure 2A. In Figure 2B, the lesion at C2-3 level enhanced significantly, while the ADC image revealed inhomogeneously increased ADC value within the mass. FA image of Figure 3D showed that fibers were disrupted and invaded. In Figure 2E, the lesion at C5 level was mostly cystic; ADC values of these cysts increased and FA image (Figure 2G) revealed displaced and disrupted fibers.