

Diffusion Weighted Imaging of Ocular Adnexal Lymphomas: usefulness in differential diagnosis and early predictor of response to therapy

L. S. Politi¹, A. J. Ferreri², S. Bianchi³, S. Pieralli¹, N. Anzalone¹, P. Vezzulli¹, A. Falini¹, G. Scotti¹

¹Neuroradiology, San Raffaele, Milan, Italy, ²Oncology, San Raffaele, Milan, Italy, ³Ophthalmology, San Raffaele, Milan, Italy

Purpose: 1) to assess feasibility and optimal MR parameters of Diffusion Weighted Imaging (DWI) of the orbits; 2) to describe characteristic MR imaging features of Ocular Adnexal Lymphomas (OAL); 3) to determine mean Apparent Diffusion Coefficient (ADC) value of OAL and compare it with normal orbital structures and other orbital pathologies; 4) to investigate whether the variation of ADC value may represent an early predictor of response to therapy.

Materials and Methods: 4 healthy volunteers underwent several axial and coronal DWI examinations with or without parallel imaging technique, with different “b values” and TE on 1.5 and 3 Tesla scanners. Once optimal parameters were assessed, mean ADC values of vitreus, lacrimal gland, extra-ocular muscles and optic nerve were calculated upon acquisition of data in 10 healthy subjects. 7 patients carrying 8 (one bilateral) pathology proven OAL underwent serial MR examinations (mean = 2,2) of the orbits with gadolinium. T1 and T2 weighted images were acquired along axial, coronal and para-sagittal planes with and without fat suppression. Before gadolinium injection, two DWI sequences were acquired (b=700, thickness=3 mm, sense reduction factor = 3.8) on the axial and coronal planes and ADC maps were calculated. Mean ADC values obtained before and after doxycycline treatment or radiotherapy were compared. Nine patients suffering from other orbital diseases (3 cavernous angiomas, 3 Graves oftalmopathy, 2 pseudotumor, 1 simple cyst) underwent the same imaging protocol.

Results: In 5/8 OAL lacrimal gland was involved. Extra-conal tissue was infiltrated in 4/8 cases, extra-ocular muscle in 1/8 and intra-conal tissue in 1/8. On T2 weighted images OAL appeared as isointense to gray matter and slightly hyperintense to extra-ocular muscles in all cases. Enhancement was intense and homogeneous. In all examinations quality of DWI images was considered diagnostic, even if some distortion artefacts were always present on coronal images. OAL resulted hyperintense in DWI images and hypointense in ADC maps. ADC values of OAL resulted significantly different from that of normal orbital structures ($p < 0.002$) and other orbital diseases ($p < 0.01$). Before treatment, mean ADC value of OALs was $610 (+/- 54) \times 10^{-6} \text{ mm}^2/\text{sec}$. After treatment in 3/8 cases a statistically significant decrease in the ADC was observed; in 2 of these a reduction in the volume of the lesion was documented.

Conclusion: DWI of the orbits is feasible and represents a useful technique for OAL diagnosis. Moreover, changes in ADC could represent an additional helpful tool for monitoring the outcome of OAL therapy.

