High resolution MRI in giant cell arteritis: vessel wall imaging of the temporal artery

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Introduction

Giant cell arteritis (GCA) is a chronic vasculitis of large and medium sized arteries. It is often associated with polymyalgia rheumatica [**1**]. Clinical indications include new onset or new type of headache and tenderness of the temporal artery to palpation. Diplopia, amaurosis fugax or sudden blindness may occur. Certainty about the correct diagnosis is needed, especially in view of long term treatment with corticosteroids and its side-effects. Therefore, a biopsy of the temporal artery is regularly performed to examine the presence of giant cells [**3**]. MRI occupies a unique role in the evaluation of large vessel vasculitis [**4**] and also offers the opportunity of imaging in smaller vessels. In this study we show the feasibility of high resolution MRI to visualize the temporal artery and its mural inflammatory changes in GCA.

Methods

Thirteen consecutive patients (mean 70 years) with clinically suspected GCA underwent high resolution MRI on a 1.5 T Sonata system (Siemens Medical Systems, Erlangen, Germany) using a dedicated eight element phased-array head-coil. Multislice T_1-weighted spin echo images were acquired perpendicular to the vessel's orientation with an acquired sub-millimeter spatial resolution of 0.2 mm $\times$ 0.3 mm and a slice thickness of 3 mm (TR 500, TE 22, FoV 120x120) before and after i.v. contrast injection (0.1mmol/kg Magnevist, Schering, Germany). Two radiologists evaluated the MRI scans in consensus while being blinded to the clinical, laboratory, and histological findings which included C-reactive protein and the erythrocytes sedimentation rate. In addition, biopsy of the temporal artery was performed in 9/13 patients. Image quality criteria such as grey level, image contrast, spatial resolution, and presence of susceptibility artifacts were rated subjectively. Inflammatory changes such as signal intensity (contrast enhancement) of the vessel wall and of the peri-vascular tissue, thickening of the vessel wall, aneurysm, or dissection of the vessel were evaluated. Clinical and laboratory signs of GCA were re-evaluated under steroid medication.

Results

In all cases grey levels, image contrast, and spatial resolution were found to be of good diagnostic quality and no disturbing susceptibility artifacts were encountered. The temporal artery could be depicted clearly in each case. On post contrast scans, the lumen of the temporal veins were enhanced brightly whilethe lumen of the temporal arteries showed low signal intensity due to the so called "flow void phenomenon". The mean diameter of the artery and its lumen were 2.9 mm and 0.8 mm, respectivelyand the mean value for CRP was 9.8 mg/dl, mean ESR was 71.2 mm/h. In 11 cases mural inflammatory changes such as thickening and contrast enhancement of the vessel wall or the perivascular tissue were found on MRI (Figure 2). In these cases, GCA was verified by clinical and /or histological findings. In one case MRI was correctly negative and in another case MRI showed weak signs of inflammation while clinical and histological findings were inconclusive. In this case, MRI may be falsely positive.

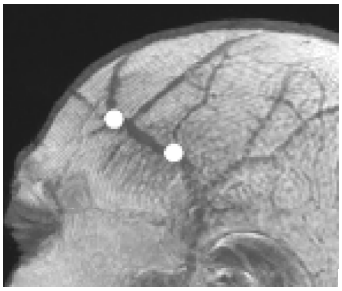

Figure 1.:

T1w MP rage sequence used as localizer. Two capsules indicate the vessels orientation.

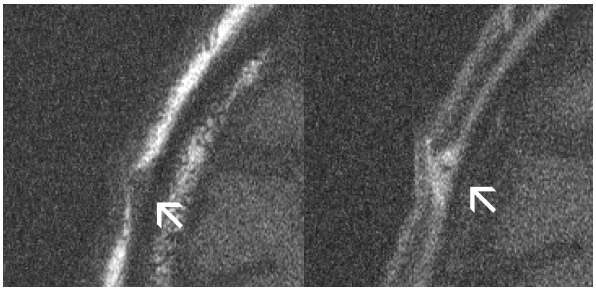

Figure 2.:

T1w SE sequence pre and after i.v. contrast depicting inflammatory changes of the vessel wall clearly.

Discussion

Mural contrast enhancement on MRI is a well established sign of inflammation. In this study we introduced a new method to visualize mural inflammatory changes in GCA. Hall et al. [**5**] have shown that inflammation of the temporal artery shows a segmental distribution. This might be a reason for falsely negative results of biopsies. High resolution MRI may be used to localize segments with the most intense mural inflammatory changes to determine the best site for biopsy. Potentially, this may reduce the number of falsely negative biopsy specimen. Also, high resolution MRI may be used to monitor the activity of mural inflammatory changes under long term corticosteroid therapy rather than performing re-biopsy as suggested elsewhere [**6**]. In conclusion, our study shows that high resolution MRI allows to visualize the temporal artery and its mural inflammatory changes. This might be useful for making the correct diagnosis, evaluating severity of the disease, and to non-invasively perform follow up investigations. Larger patient trials will be needed to evaluate reliability and diagnostic value of MRI of the temporal artery in giant cell arteritis.

References

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