Prospective Multicenter Cohort Study of High Resolution MRI in Giant Cell Arteritis: initial results

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Introduction

Giant cell arteritis (GCA) is a chronic vasculitis of large and medium sized arteries. Noninvasive diagnosis is challenging, and clinical signs may be unspecific. 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 [1]. Temporal atery bopsy (TAB) is considered the diagnostic gold standard [2]. In mono-centric studies, high resolution MRI of the superficial cranial arteries has proven feasible for non-invasive diagnosis of mural inflammatory changes and assessment of the cranial involvement pattern in active GCA [3, 4]. The purpose of this prospective multicenter cohort study was to compare high resolution MRI with the diagnostic gold standard TAB in a rather large cohort GCA patients form 3 academic medical centers.

Methods

256 patients (71% female, 29%male, mean 69,7 ±10.9 years) with suspected GCA underwent high resolution MRI on a 3T Trio (179 patients), 1.5T Avanto (47 patients) (Siemens Medical Systems, Erlangen, Germany) or 1.5T Achieva (30 patients) (Philips Medical Systems, Best, The Netherlands) in three academic medical centers between February 2006 and August 2011. Mural inflammatory changes such as contrast enhancement and thickening were evaluated by two blinded observers on post contrast (0.1mmol/kg Gd-BOPTA), multislice T1-weighted spin echo images with an acquired sub-millimeter spatial resolution of 196µm × 260µm (TR 500, TE 22) according to a four point ranking scale [4]. Results of MRI studies were compared with the diagnostic god standard TAB in 107 patients. Sensitivity, specificity, positive and negative predictive value (PPV, NPV) and the inter-observer agreement were calculated.

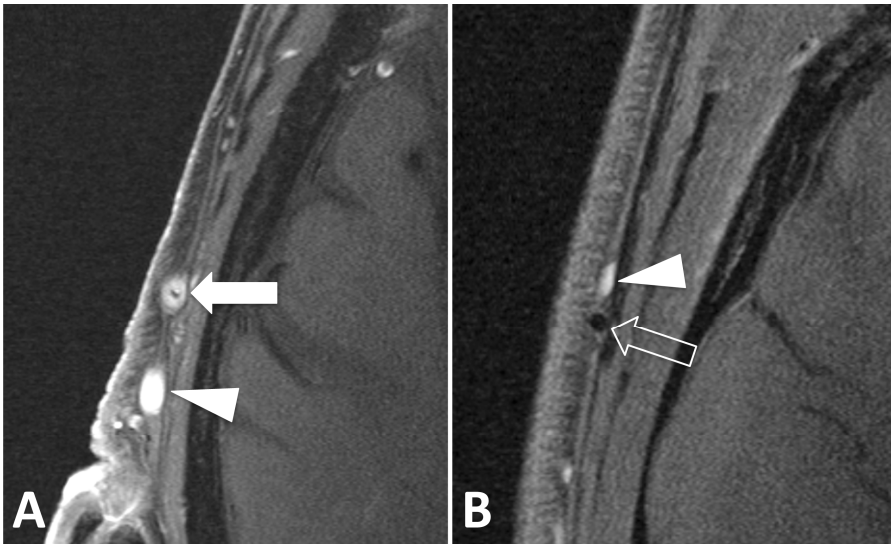

Figure 1 Post contrast MRI of the superficial temporal artery
A, High resolution MRI reveals inflammatory mural enhancement of the thickened wall of the frontal branch of the superficial temporal artery indicating vasculitis (arrow in A). Histology proved giant cell arteritis. Please note central "flow void" in the artery with fast blood flow (arrow in A) as compared to the bright intra-luminal signal in the concomitant vein with slow blood flow (arrowhead in A).
B, No mural inflammatory changes were present in the superficial temporal artery (arrow in B) in a patient who's TAB showed normal mural architecture and in whom GCA was ruled out. The concomitant vein does not display any flow void (arrowhead in B).

Results

TAB was positive in 58,9% of biopsied patients. For the two observers, sensitivities of high resolution MRI were 95% and 89%, specificities were 73% and 80%, NPV were 83% and 86%, and PPV were 91% and 83%. Substantial inter-observer-agreement with a kappa value of 0.657 was found.

Discussion

This multicenter study evaluates sensitivity and specificity of non-invasive high resolution MRI in a rather large cohort of patients with GCA. The two blinded reader achieved high sensitivities and specificities in detection of mural inflammatory changes in GCA as compared with the diagnostic gold standard temporal artery biopsy. The substantial inter-observer-agreement demonstrates the potential of this non-invasive imaging modality. Acquisition of MRI data is observer independent as compared to rather observer dependent color coded duplex sonography.

References

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