# Comparison of duplex sonography and high resolution MRI

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## Introduction

Giant cell arteritis (GCA) is a chronic vasculitis of large and medium sized arteries. 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]. Noninvasive diagnosis of giant cell arteritis (GCA) is a challenge. Clinical signs may be unspecific. In the 1990s, color coded duplex sonography (CCDS) of the superficial temporal artery has been introduced [2]. The clinical value of this technique has been debated [3, 4]. Recently, 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 [5, 6]. The purpose of this study was to to compare the diagnostic performance of high resolution magnetic resonance imaging (MRI) and color coded duplex sonography (CCDS) in patients with GCA.

## Methods

59 patients (32 female, 27 male, mean 71 years) with suspected GCA underwent high resolution MRI on a 1.5 T Sonata (21 patients) or 3T Trio system (38 patients) (Siemens Medical Systems, Erlangen, Germany) and CCDS within a time frame of less than two weeks. Mural inflammatory changes such as contrast enhancement and thickening were evaluated on post contrast (0.1mmol/kg Mulithance, Bracco, Italy), 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 [6]. Results of MRI studies and CCDS were compared with the final clinical diagnosis and results of TAB. Sensitivity, specificity, positive and negative predictive value (PPV, NPV) was calculated for either method. In 41 of the patients, imaging results were also compared with findings of temporal artery biopsy (TAB). The differences in the diagnostic performance between high resolution MRI and CCDS were evaluated using the paired Wilcoxon`s signed rank test. *P*-values < 0.05 were considered statistically significant.

## Results

36 of the 59 patients (61%) were finally diagnosed of having GCA by the rheumatologist. Sensitivity of MRI (CCDS) was 69% (67%), specificity 91% (91%), NPV 66% (64%), and PPV 92% (92%). TAB was positive in 24 of the 41 biopsied patients (59%). Sensitivity of MRI (CCDS) compared with TAB was 83% (79%), specificity 71% (59%), NPV 80% (73%) and PPV 75% (67%). The differences between MRI and CCDS were not significant.

## Discussion

Both noninvasive imaging modalities, CCDS and MRI, had comparably high sensitivities and specificities in detection of mural inflammatory changes in GCA as compared with the diagnostic gold standard TAB. MRI demonstrated improved sensitivity, specificity as well as negative and positive predictive values which were not significantly different from CCDS within our study group. Each of the two has its own specific advantage and disadvantage which need to be evaluated in regard of the local setting. In addition larger prospective patient trials are warranted to further investigate the potential of noninvasive imaging to eventually replace temporal artery biopsy in the diagnosis of GCA.

## References

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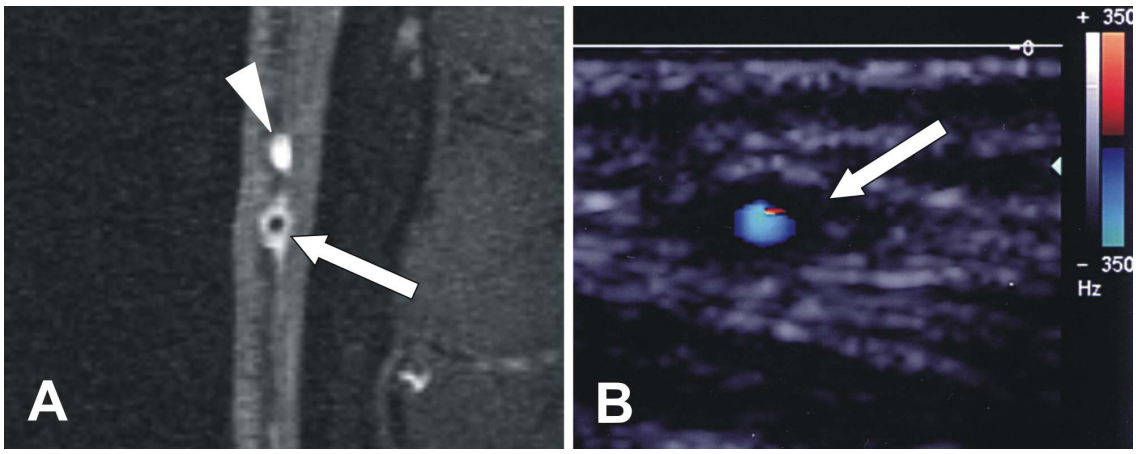


**Figure 1 Post contrast MRI and color coded duplex sonography of the superficial temporal artery**

**A**, 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 (arrow in A) as compared to the lack of flow void in the concomitant vein (arrowhead in A).

**B**, Color coded duplex sonography of the superficial temporal artery demonstrates the typical dark “halo” (arrow in B) which is considered the most specific CCDS-finding in giant cell arteritis.