

## Early corticosteroid treatment effects on MRI and Ultrasonography findings in Giant Cell Arteritis

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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 artery biopsy (TAB) is considered the diagnostic gold standard [2]. Corticosteroids are the mainstay of treatment in GCA [1]. 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]. However, the characteristic mural inflammatory changes vanish under steroid treatment. The purpose of this study was to compare the impact of initial corticosteroid treatment on high-resolution

MRI and color-coded duplex ultrasonography (CCDS) findings in GCA.

### Methods

130 patients with suspected GCA underwent high-resolution MRI and 159 patients underwent CCDS at our University Medical Centre. 59 of these patients (32 women, 27 men; mean 71 years) who underwent both

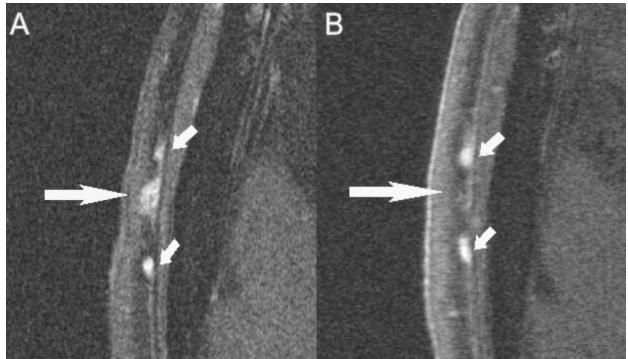


Figure 1 High Resolution MRI in GCA

High resolution MRI of the right superficial temporal artery of an 80-year-old female patient with biopsy proven GCA demonstrates mural thickening and contrast enhancement consistent with vasculitic changes (large arrow in A). Mural inflammatory changes have disappeared after 2 months of corticosteroid treatment (large arrow in B). The concomitant veins show homogenous signal intensity within their lumen (small arrows in A and B).

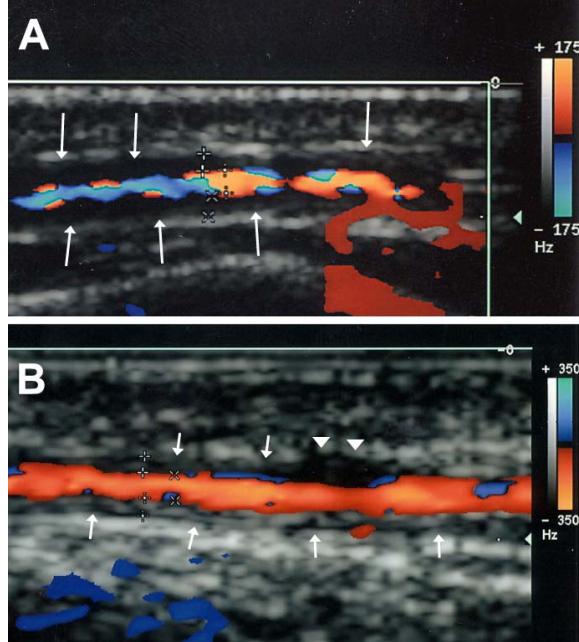


Figure 2 Color-Coded Duplex Sonography in GCA

CCDS of the superficial temporal artery of an 86-year-old steroid naïve patient with biopsy-proven GCA. Note the dark and homogenous vessel wall edema consistent with acute arteritis (long arrows A). The superficial temporal artery of a 76-year-old patient with biopsy-proven GCA, who had received steroids for 10 days demonstrates irregular and mostly moderate echogenicity in the vessel wall (short arrows in B) with only one irregular hypoechoic spot on one side of the wall (arrowheads in B). Diagnosis was not established by ultrasound, subacute arteritis or diffuse atherosclerosis were indiscernible.

examinations within 10 days and had received steroid treatment for less than 2 weeks were included in this retrospective study. 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 196 $\mu$ m  $\times$  260 $\mu$ m (TR 500, TE 22). Sensitivity and specificity were calculated for each imaging modality grouped according to the duration of steroid treatment prior to imaging: 0-1 day, 2-4 days and > 4 days. In 41 patients imaging results were compared with findings of temporal artery biopsy (TAB). AUC-s were compared non-parametrically. P-values < 0.05, two tailed, were considered significant.

### Results

61% (39/59) of patients were diagnosed with GCA. TAB findings were positive in 59% (24/41). Compared with TAB sensitivity of CCDS and MRI under steroid treatment of 0-1 day were 92% and 90%, 2-4 days 80% and 78%, and >4 days 50% and 80%, respectively. Compared with the final clinical diagnosis sensitivity of CCDS and MRI under steroid treatment of 0-1 day were 88% and 85%, 2-4 days 50% and 64%, and >4 days 50% and 56%, respectively. The area under the curve for MRI and CCDS were 0.923 (95% CI 0.821-1.000) and 0.896 (95% CI 0.779-1.000) for patients scanned within 0-1 days of treatment, 0.6964 (95% CI 0.490-0.903) and 0.750 (95% CI 0.587-0.913) within 2 to 4 days of treatment, and 0.778 (95% CI 0.606-0.950) and 0.650 (95% CI 0.395-0.905) for patients scanned after > 4 days of treatment, respectively. The differences among the subgroups and the imaging procedures did not reach the level of significance with p-values ranging from 0.054 – 0.155.

### Discussion

Immediate initiation of corticosteroid treatment is mandatory in GCA to avoid irreversible ischemic complications such as visual loss. Sensitivity of a first-time CCDS or MRI for detection of GCA rapidly decreases under corticosteroid treatment. A previous study showed that after months under steroid treatment the inflammatory changes detected by MRI vanish (5). This work indicates

that for first-time diagnostic imaging in GCA the sensitive period of detecting univocal changes of inflammation is very short, potentially as short as one day. **Therefore, CCDS or MRI examination of patients with suspected GCA should be performed as soon as possible, preferentially within the first day after onset of steroid treatment.**

### References

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