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CASE REPORT

Influence of corticosteroid treatment on MRI findings in giant cell arteritis

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Abstract Giant cell arteritis (GCA) remains a diagnostic challenge. With the use of a high-resolution MRI protocol, visualization of the superficial cranial arteries is feasible and mural inflammation can be assessed noninvasively. Until today, it is not known how soon inflammatory signals in diagnostic MR imaging vanish after initiation of treatment. Here, we report sequential MR imaging findings during the initial weeks of corticosteroid treatment in a 79-year-old female patient with histologically proven GCA. Mural inflammatory changes decreased within the first 2 weeks and have almost entirely vanished after 2 1/2 months of continued treatment. Moreover, MR angiography revealed sequential stenoses of the subclavian artery, which improved in variable extent with some residuals despite high dose steroid medication. This report underlines the value of high-resolution MRI in diagnosis and follow-up of GCA and illustrates the potential of MRI to detect and monitor intra- and extra-cranial involvement patterns of GCA in high detail.

Keywords Arteries · Corticosteroids · Giant cell arteritis · MR angiography · Vasculitis

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Introduction

Due to its variable clinical presentation and unspecific symptoms, the noninvasive diagnosis of giant cell arteritis (GCA) is challenging. Although the clinical criteria of the American College of Rheumatology [1] assist in finding the correct diagnosis, concordance with these criteria does not necessarily provide the correct conclusion in the individual patient [2]. Color-coded duplex ultrasonography has proven feasible in the hands of experienced observers [3–5] with its sensitivity being dependent on the pretest likelihood of the disease [6]. Recently, a noninvasive MRI protocol for the assessment of mural inflammatory changes in the superficial temporal arteries has been introduced [7]. In a single MRI examination, the cranial involvement pattern (i.e., location and extent of inflammatory changes of the small superficial cranial arteries) can be assessed in high detail [8]. Furthermore, this protocol can be amended by a MR angiography of the thoracic aorta and the supra-aortic arteries to accomplish a single comprehensive noninvasive imaging study of the thoracic, cervical, and cranial vasculature, which can be performed in less than 40 min [9–11].

Until today, it is not known how soon inflammatory signs in diagnostic MR imaging vanish after initiation of treatment. We report sequential MR imaging findings in a patient with histologically proven GCA during the initial weeks of corticosteroid treatment.

Case report

A 79-year-old female patient presented with an impairment of visual function due to anterior ischemic optic neuropathy (AION). There were no classical symptoms of GCA,

especially headache or jaw claudication, but erythrocyte sedimentation rate (75 mm after the first hour), C-reactive protein (63 mg/l), and fibrinogen (856 mg/dl) were highly elevated. These laboratory values indicated GCA as the cause of AION. Temporal artery biopsy revealed the typical aspect of GCA. After initial high-dose intravenous corticosteroid therapy, laboratory values normalized within 1 week and remained normal over the next 3 months.

High-resolution MR follow-up examinations of the supra-aortic and superficial cranial arteries revealed significant improvement of vasculitic findings during the course of steroid treatment: At initial presentation, three sequential stenoses of the left subclavian artery were found in MR angiography (arrows in Fig. 1a), demonstrating extracranial manifestations of GCA in this patient. At the same time, inflammatory contrast enhancement and thickening of the vessel wall were depicted in enlarged, high-resolution MR images of the left superficial temporal artery (arrows in Fig. 1d). After 2 weeks of corticosteroid treatment, subclavian artery stenoses were still present (arrows in Fig. 1b), whereas mural inflammatory changes of the superficial left temporal artery had decreased (open arrows in Fig. 1e). Further MRI follow-up after 2 1/2 months of continued steroid medication revealed a substantial improvement regarding the proximal and the further distal subclavian stenoses (open arrows in Fig. 1c) while the third

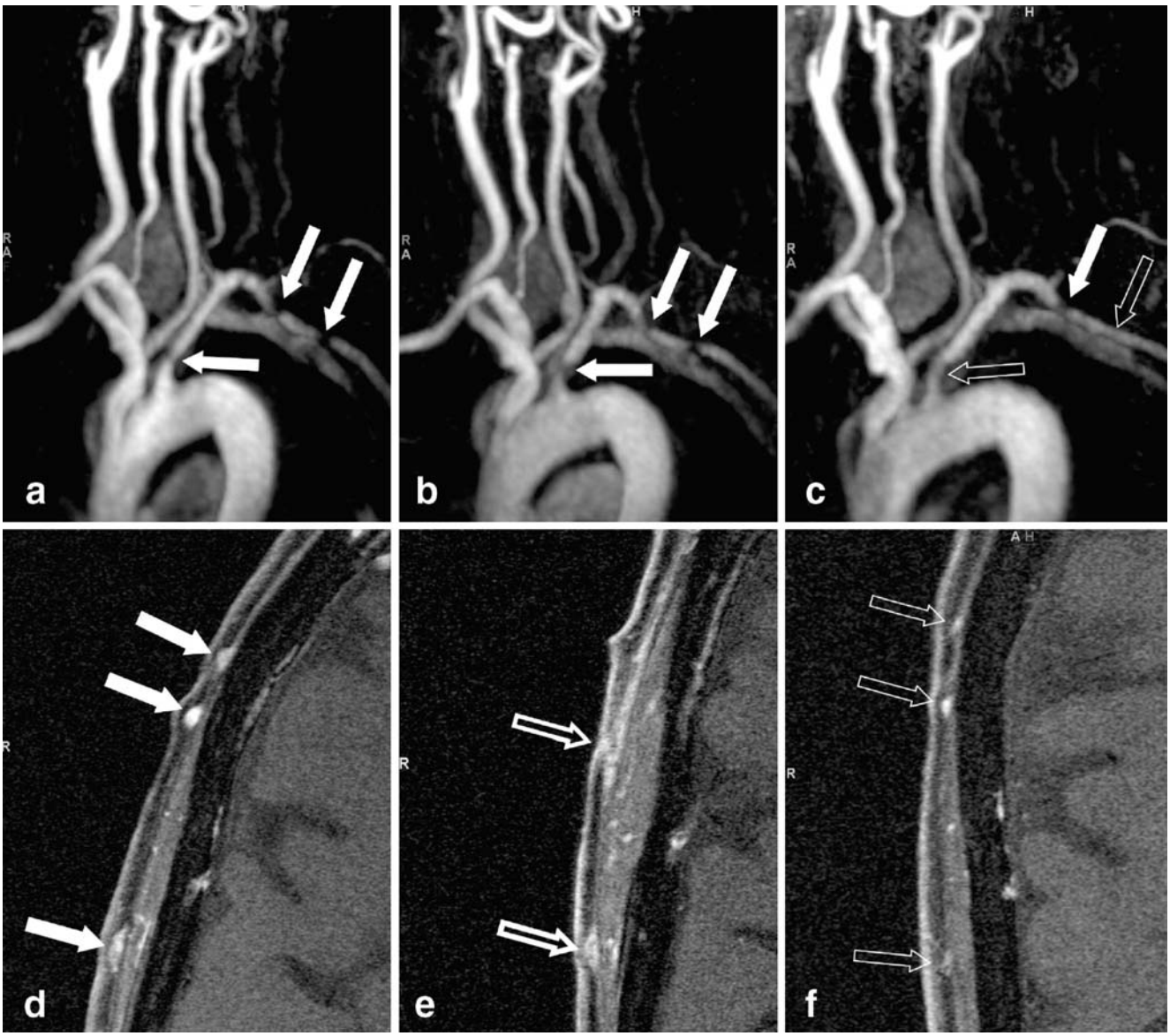

Fig. 1 MR angiography of the aortic arch and the supra-aortic arteries reveals three sequential stenoses of the left subclavian artery (*arrows* in **a**) that are still present after 2 weeks of corticosteroid treatment (*arrows* in **b**). Follow-up after 2 1/2 months of continued steroid medication revealed a substantial improvement (*open arrows* in **c**), while one stenosis (*solid arrow* in **c**) remained. Enlarged high-resolution MR images of the left superficial temporal artery (*arrows* in **d**) depict mural inflammatory enhancement that had decreased after 2 weeks of steroid medication (*open arrows* in **e**) and had almost entirely vanished after 2 1/2 months (*light arrows* in **f**)

stenosis (solid arrow in Fig. 1c) remained. At this time, the mural inflammatory signs at the left superficial temporal artery had almost entirely vanished (light arrows in Fig. 1f).

Discussion

This report reveals the value of high-resolution MRI in diagnosis and follow-up of GCA. At initial presentation, mural inflammatory changes of the superficial cranial arteries could be successfully demonstrated by noninvasive MRI. During the first weeks of steroid treatment, these inflammatory signs decreased substantially as depicted by sequential follow-up MRI examinations. Stenoses of the supra-aortic arteries have improved in variable extent with some residuals despite high dose steroid medication. This illustrates the potential of high-resolution MRI to detect and monitor intra- and extra-cranial involvement patterns of GCA in high spatial and temporal detail.

Temporal artery biopsy, which typically reveals multinucleated giant cells or signs of granulomatous inflammation, is considered the diagnostic gold standard in GCA [12]. Even after 2 weeks of corticosteroid treatment, biopsy may reveal signs of GCA in cases of active disease [13]. In addition, high-resolution MRI can provide information about the effect of steroid treatment on vascular inflammatory changes such that signs of mural inflammation vanish under long-term corticosteroid treatment [14]. Decreased enhancement in large-vessel vasculitis presumably relates to improvement of disease status [15, 16]. However, the exact temporal evolution of segmental vascular changes, as depicted by MRI associated with steroid treatment, has not been investigated so far. As mural hyperenhancement can undergo considerable changes within only a few days of corticosteroid treatment, it is recommended to examine the patients suspected of GCA before or at least as early as possible after initiation of treatment. However, since irreversible visual loss is a dreaded complication of GCA, corticosteroid therapy needs immediate initiation.

Upper extremity artery balloon angioplasty in combination with immunosuppressive therapy represents an efficient method for treatment of stenoses in extra-cranial GCA [17]. In this case, the remaining subclavian artery stenosis was clinically not relevant at the time of the third investigation. Therefore, balloon angioplasty was not performed.

Potentially, MRI may be used to monitor treatment effects and to indicate relapse of disease. Yet, the significance of MRI findings in the time course of steroid treatment needs to be evaluated in larger patient studies.

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