*Case report*

# Rheumatoid vasculitis of crural muscles confirmed by muscle biopsy in the absence of inflammatory myopathy: Histologic and MRI study

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***Running title***: **Histology and MRI in rheumatoid vasculitis**

***Key words:*** Rheumatoid vasculitis, magnetic resonance imaging, muscle biopsy, cyclophosphamide

**Abstract**

A 60-year-old man who had been diagnosed as rheumatoid arthritis admitted to our hospital by dysesthesia on his legs with edema. Nerve conduction velocity test led to diagnosis of mononeuritis multiplex. Magnetic resonance imaging (MRI) of lower legs showed high intensity in slow tau inversion recovery. Typical vasculitis with neutrophils dominant cell infiltration was observed by muscle biopsy without inflammatory myopathy or fascitis. Diagnosis was made by rheumatoid vasculitis found in crural muscles. Intravenous cyclophosphamide with oral tacrolimus effectively improved dysesthesia with reduction of inflammatory response.

## Introduction

Rheumatoid arthritis (RA) is a systemic inflammatory disease that affects multiple organs as well as synovial joints **(1)**. Extra-articular manifestations of RA contain cardiopulmonary abnormalities, hematological or neurological manifestations **(2)**. Although rheumatoid vasculitis represents various organ involvements such as pleuritis, ocular manifestations or neuropathies based on systemic vasculitis, the relationship between imaging abnormality and pathological characteristics of rheumatoid vasculitis is rarely reported. In the present case, we show typical vasculitis, comparing to magnetic resonance imaging findings.

## Case report

A 60-year-old man had been diagnosed as RA according to a criteria determined by American college of rheumatology **(3)**. Although he was treated with salazosulfapyridine or methotrexate, he recently began to feel dysesthesia on his bilateral legs with edema. Since local heat and swelling of lower legs also appeared, oral prednisolone was increased to 20 mg/dl with discontinuation of disease modifying anti-rheumatic drugs. In February 2009, he was admitted to

our hospital due to these persistent symptoms. He felt dysesthesia, especially on his left legs with edema and erythema, although no skin ulcer was observed.

Laboratory findings showed a hemoglobin level of 14.0 g/dl, total leukocyte count of 14,400/$mm^3$ and a platelet count of 37.2 x $10^4$/$mm^3$. Although transaminases, renal function, creatinine kinase and aldolase levels were within normal limit, C-reactive protein was elevated to 6.99 mg/dl with accelerated erythrocyte sediment rate (99.2 mm/hr: normal range<15). Although serum IgG and IgA were within normal limits, both rheumatoid factor (76.7 IU/ml: normal range<14) and anti-cyclic citrullinated peptide antibody (>100 U/ml: normal range<4.5) were positive without anti-SS-A or anti-SS-B antibody. On admission, he showed moderate disease activity of 3.82 points by disease activity score (DAS) 28-ESR. Antineutrophil cytoplasm antibodies (ANCAs), cryoglobulins, anti-phospholipid antibodies, hepatitis B antigen, and angiotensin converting enzyme were negative. Radiographically, X-ray of his both hands represented bone erosion and joints narrowing as Steinblocker stage III. Since he had sensory disturbance of bilateral lower extremities, nerve conduction velocity (NCV) test was performed. The results showed a decrement of amplitude on the left leg with diagnosis of mononeuritis multiplex. Magnetic resonance imaging

(MRI) of lower legs showed high intensity in slow tau inversion recovery (STIR) **(Figure 1)**. Because myositis, myofastitis or edema was suspected from the MRI findings, muscle biopsy of the lesion was performed, resulting in typical vasculitis with neutrophils dominant cell infiltration **(Figure 2)** without inflammatory myopathy, fascitis or sarcoidosis. Diagnosis was made by rheumatoid vasculitis found in crural muscles. Since inflammatory myopathy was not found in the muscle biopsy specimens, STIR high lesion was considered to be edematous change induced by vasculitis. This may be consistent with clinical manifestation of absent muscle weakness. Intravenous cyclophosphamide (IVCY) was monthly introduced twice with oral 3mg of tacrolimus. These therapies were effective, showing obvious improvement of dysesthesia with reduction of CRP from 6.99 mg/dl to 1.88 mg/dl, he was discharged.

**Discussion**

A variety of extra-articular manifestations were found in RA. Although Turesson et al **(4)** reviewed extra-articular manifestations in RA, peripheral neuropathy is one of these clinical entities. Gorson **(5)** showed that vasculitis was seen in so-called vasculitis syndromes such as polyarteritis nodosa (PAN) or

secondary process of other connective tissue diseases including RA. From the diagnostic approach of rheumatic vasculitis, NCV study or subsequent muscle biopsy seem to be crucial to confirm vasculitis. Especially, biopsy specimen directly gives us available information to detect vasculitis.

In our case, positive MRI findings ended up with neutrophil infiltration dominant vasculitis. Gallien et al. **(6)** previously demonstrated positive MRI findings in T2 weighed and STIR in PAN patients. Although vasculitis was restricted in limbs in their cases, the positive MRI findings were considered to be increased muscle fluid content. As they showed, the MRI findings are observed in both edema and myopathies. Since myopathy was absent in our case, edema-like change as a result of vaculitis might exist.

In summary, we show positive MRI findings and subsequent pathological confirmation of typical vasculitis without myositis or fascitis. Since our case responded IVCY therapy based on existence of vasculitis, MRI is beneficial before performing muscle biopsy in case of rheumatoid vasculitis with peripheral neuropathy.

The authors declare no conflict of interest.

**Abbreviations**; IVCY: intravenous cyclophosphamide, MRI: magnetic resonance imaging, NCV: nerve conduction velocity, PAN: polyarteritis nodosa, RA: Rheumatoid arthritis, STIR: slow tau inversion recovery

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**Figure legends**

**Figure 1**

Magnetic resonance imaging of the left lower leg. Slow tau inversion recovery (STIR) image shows patchy high intensity of gastrocnemius muscle or tibialis posterior muscle in the patient.

**Figure 2**

Typical vasculitis in the biopsy specimen. Around small vessel in muscle of the left lower leg, typical vasculitis with neutrophil dominant cell infiltration was accompanied by leukocytoclastic vasculitis. Neither myositis nor myofascitis was observed. (Original magnification; x100)

**Fig. 1**

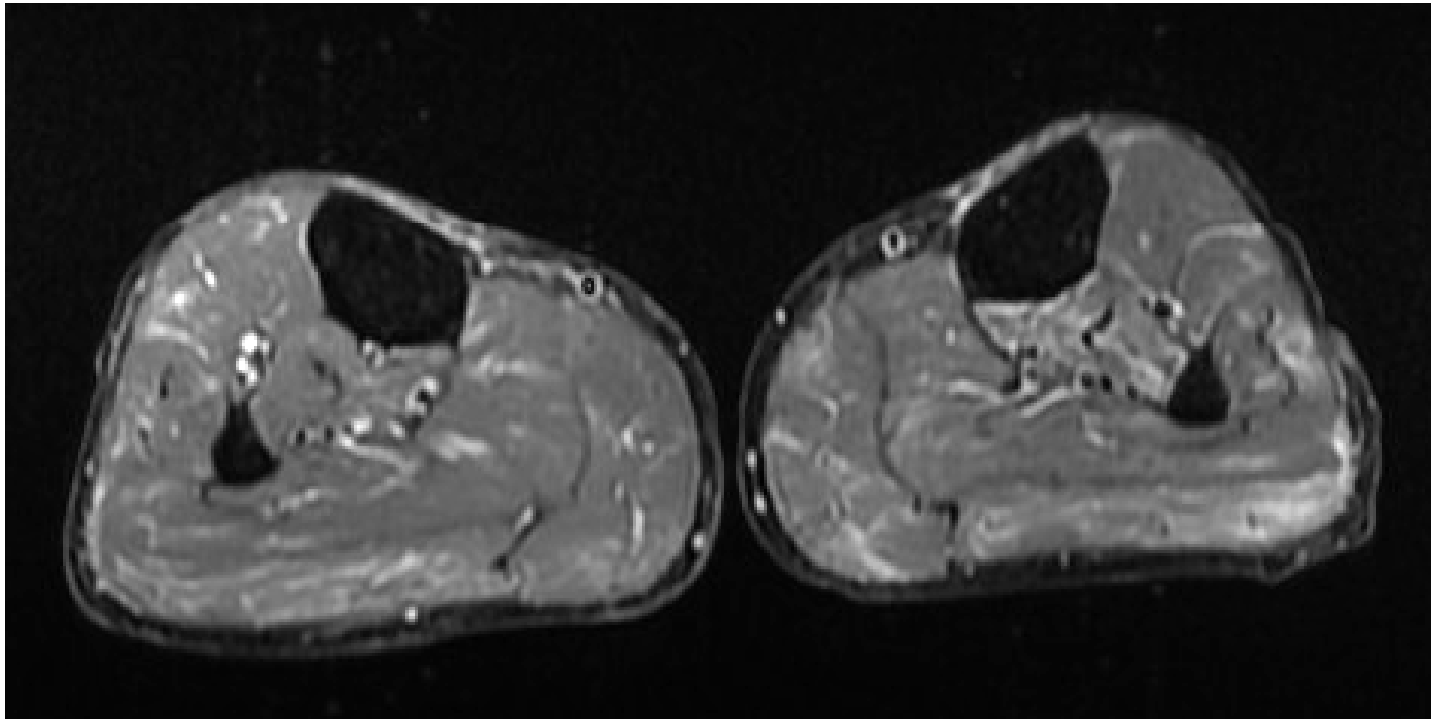

**Fig. 2**