MRI guided muscle biopsy confirmed polymyositis diagnosis in a patient with interstitial lung disease

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Abstract

Idiopathic inflammatory myopathies, such as polymyositis (PM), may present with general symptoms such as fever and fatigue and only minimal muscle weakness, making it difficult to make a definite diagnosis and provide adequate treatment. Here a case is described in which interstitial lung disease was the first and most prominent manifestation of PM. Later, when muscle weakness became apparent and inflammatory muscle disease was suspected the first muscle biopsy was non-diagnostic. However, magnetic resonance imaging (MRI) scans of the clinically weak thigh muscles showed high signal on T2 weighted images, suggesting muscle inflammation more proximal to the first biopsy site. A second biopsy at this site disclosed typical histopathological findings for polymyositis. After treatment with prednisolone in combination with cyclophosphamide both pulmonary and muscle function improved.

Conclusion—MRI scans of muscles may be helpful in selection of a site for muscle biopsy in patients with suspected inflammatory myopathy when a first muscle biopsy turns out to be negative. Additionally, patients with interstitial lung disease of unknown cause should be tested for muscular function to exclude an associated inflammatory muscle disorder.

Keywords: Muscle biopsy, Magnetic resonance imaging, Polymyositis, Interstitial lung disease.
Laboratory investigations showed serum creatine kinase >76.9 µcat/l (normal value <3 µcat/l). Other serum muscle enzymes, aspartate aminotransferase, alanine aminotransferase, LDH, and myoglobin, were also increased. The ESR was 40 mm/1st h, CRP 23 µcat/l, haemoglobin 116 g/l, leucocyte count 20.4 × 10⁹/l, platelet count 503 × 10⁹/l, creatinine 90 µmol/l (normal value <120 µmol/l). High resolution computed tomography (HRCT) scan of the lungs displayed peripheral interstitial infiltrates.

A muscle biopsy from the vastus lateralis muscle disclosed minor pathological findings with occasional degenerating and regenerating fibres. An electromyogram displayed no changes related to muscle disease, but a discrete neuropathic pattern. However, the severe clinical symptoms still made IIM a likely diagnosis.

MRI showed an increased signal on T₂ weighted images most prominent in the proximal thigh muscles, indicating pronounced proximal inflammation (fig 1). Distally, where the first biopsy specimen had been taken, only discrete signs of inflammation were evident (fig 1).

A second muscle biopsy more proximal in the vastus lateralis muscle showed tissue changes typical of inflammatory myopathy, including inflammatory infiltrates of mononuclear cells in the endomysium and with non-necrotic fibres surrounded and invaded by inflammatory cells (fig 2). At the same time anti-Jo-1 antibodies were detected. A diagnosis of polymyositis with pulmonary involvement was made according to the criteria suggested by Bohan and Peter. The patient was initially treated with prednisolone 0.75 mg/kg/day and because of the severe pulmonary disease, cyclophosphamide 150 mg/day.

Clinical improvement was already noticed after one week with subjectively decreased dyspnoea. One month later muscle function measured by a myositis index had improved.
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Bohan and Peter.3 Normal muscle biopsies specimen according to the suggested criteria by without typical changes in the muscle biopsy of possible or probable PM can still be made findings of PM and are regarded as a prerequi-

necrotic muscle fibres invaded by mononuclear inflammatory cells are typical histopathological findings for PM and the

inflammatory changes recorded are not specific for IIM and may therefore not replace a muscle biopsy in the diagnostic investigation. Besides, a muscle biopsy is still required to subclassify the IIM on histopathological grounds.6 In this case general and pulmonary symptoms preceded the muscular weakness and careful diagnostic procedures for the pulmonary disease were undertaken, though without conclusive results. The patient was even treated with antibiotics for a suspected "mechanic's hands", keratosis and hyperpigmentation of the hands, together with the positive anti-Jo-1 antibody would suffice for a diagnosis of Jo-1 positive PM with interstitial lung disease, we still thought it to be of clinical importance to have a positive biopsy. Therefore we pursued the diagnostic procedures with MRI of the th

In this case fatigue, general symptoms preceded the muscular weakness and an open lung biopsy was actually planned in our case when the muscular symptoms became prominent and an increased serum creatine kinase level made IBM a likely diagnosis. To our surprise the muscle biopsy showed only slight non-specific findings. Although the observation of hyperkeratosis and hyperpigmentation of the hands, clinical signs typical of "mechanic's hands", together with the positive anti-Jo-1 antibody would suffice for a diagnosis of Jo-1 positive PM with interstitial lung disease, we still thought it to be of clinical importance to have a positive biopsy. Therefore we pursued the diagnostic procedures with MRI of the th

Figure 3 Symptoms and investigations over time. HRCT = high resolution computed tomography.

Three months after starting treatment HRCT showed regression of the interstitial lung changes. After six months of treatment the muscle function was further improved, but pulmonary function tests were not changed (TLC 82% and TLco 61% of predictive value). Figure 3 presents an overview of the clinical course.

Discussion

To our knowledge this is the first reported case in which MRI was useful in selection of a muscle biopsy site to confirm the diagnosis of polymyositis in a patient with a severe interstitial lung disease. In this case fatigue, general symp-
toms, and dyspnoea initially predominated over the muscular symptoms. When muscle weakness progressed and an IBM was suspected the first muscle biopsy sample, although taken from the clinically weak thigh muscle, was non-diagnostic for IIM. However, a second biopsy taken proximally, the site being selected with guidance from the MRI, displayed typical inflammatory lesions detected by MRI and muscle biopsy 2. Prednisolone, cyclophosphamide Decreased dyspnoea

Improve muscular function

Figure 3

Muscle biopsy 1

HRCT: interstitial lung changes

Muscle weakness, patient referred to rheumatology department HRTC: interstitial lung changes

MRI and muscle biopsy 2

Prednisolone, cyclophosphamide Decreased dyspnoea

Improved muscular function

In the recently suggested revised classification criteria of IIM, positive MRI scans have been suggested for inclusion.13 The drawback of this technique as a routine diagnostic tool, however, is primarily the high costs that prevent the use of MRI scans as a screening tool for muscle inflammation. Furthermore, the inflammatory changes recorded are not specific for IIM and may therefore not replace a muscle biopsy in the diagnostic investigation. Besides, a muscle biopsy is still required to subclassify the IIM on histopathological grounds.6

Another reason for a negative biopsy is the fact that corticosteroids before the biopsy sampling. In our case both explanations were considered as the cause of the first negative muscle biopsy: From the MRI scans, however, it was obvious that the earlier 10 mg pred-
nisolone regimen had not suppressed the muscle inflammation and that the negative biopsy was rather a result of the local distribution of the inflammation. Both the first and second biopsies were made within a period of two days, and therefore the contribution of a general disease progression as an explanation for the findings must be considered marginal.

MRI of muscle with T1 and T2 weighted images has been reported as a sensitive diagnostic tool in patients with myositis. Muscle changes in IBM as detected with MRI include oedema within and around muscles, muscle calcification, fatty infiltration, and fibrosis.7 The inflammatory lesions detected by MRI also correlate with disease activity,7 which makes MRI a possible tool for follow up studies.

Besides, a muscle biopsy is still required to subclassify the IIM on histopathological grounds.6 In this case general and pulmonary symptoms preceded the muscular weakness and careful diagnostic procedures for the pulmonary disease were undertaken, though without conclusive results. The patient was even treated with antibiotics for a suspected Pneumocystis carinii infection, which could later be excluded. Interstitial lung disease in PM or dermatomyositis occurs in about 5–30% of the cases,11 and in patients with anti-Jo-1 antibodies fibro-
sing alveolitis has been reported in as many as 50–100%.12 The prognosis of these patients is generally poor with a five year survival of 40%.11 Fibrosing alveolitis has also been reported as an isolated lung disease in a limited number of patients with anti-Jo-1 antibodies and as the initial symptom in patients eventually developing myositis.11 An open lung biopsy was actually planned in our case when the muscular symptoms became prominent and an increased serum creatine kinase level made IBM a likely diagnosis. To our surprise the muscle biopsy showed only slight non-specific findings. Although the observation of hyperkeratosis and hyperpigmentation of the hands, clinical signs typical of "mechanic's hands", together with the positive anti-Jo-1 antibody would suffice for a diagnosis of Jo-1 positive PM with interstitial lung disease, we still thought it to be of clinical importance to have a positive biopsy. Therefore we pursued the diagnostic procedures with MRI of the th

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muscle after the first biopsy turned out negative.

This case illustrates how muscle inflammation with moderate clinical muscle symptoms can be easily overlooked in patients with pronounced pulmonary disease. Thus a higher incidence of muscle inflammation in association with fibrosing alveolitis than hitherto reported may not be excluded, and clinical examination of muscle function should be included in these patients.

The presence of the anti-Jo-antibody seems to be a sensitive marker for lung disease, and should in patients with primary interstitial lung disease raise the question of a possible underlying inflammatory muscle disorder.

Our conclusion from this case is that in a patient with severe muscle symptoms and a negative muscle biopsy MRI should be performed in order to locate the inflammatory tissue changes.

We find it important to pursue the diagnostic procedures in order to get a histopathological confirmation of diagnosis. Firstly, because a delay in diagnosis due to a negative biopsy may result in a poor functional outcome. Secondly, a distinction between PM and IBM is not always evident on clinical grounds. Furthermore, we recommend that patients with interstitial lung disease of unknown cause should be tested for muscle function to exclude an associated inflammatory muscle disorder.

We thank associate professor Robert Harris for linguistic advice.

Grant supports: The Swedish Rheumatism Association.