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Diabetic myonecrosis: an unusual mimicker of idiopathic inflammatory myositis

Nayan Patel Sureja[1], Phani Kumar Devarasetti[2], Liza Rajasekhar[3]

Abstract

Diabetic myonecrosis or diabetic muscle infarction (DMI), is a very rare and under-recognised complication of poorly controlled long-standing diabetes mellitus. We report a case of a 59-year-old male, who had diabetes for ten years. He presented with bilateral thigh pain of insidious onset for three months and difficulty in walking, with a similar episode in his right thigh in 2015. Creatine phosphokinase (CPK) was one and half times the normal upper limit. Magnetic resonance imaging (MRI) of his thighs showed symmetrical bulky muscles with hyperintensities on T2-weighted and short tau inversion recovery (STIR) images, supporting a clinical diagnosis of idiopathic inflammatory myositis (IIM). However, a review of histopathology slides of a muscle biopsy from the right vastus lateralis performed in 2015 showed muscle fibre ischaemic necrosis suggestive of muscle infarction. Thus a diagnosis of recurrent diabetic myonecrosis was made and the patient was treated with bed rest, opioids and aspirin with gradual recovery.

Correspondence to:
Liza Rajasekhar
Professor and Head
Department of Clinical Immunology and Rheumatology
Nizam's Institute of Medical Sciences
Hyderabad
India

Email:
lizarajasekhar@gmail.com

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Introduction

Diabetic myonecrosis or diabetic muscle infarction, was first described by Angervall and Stener in 1965. It is a very rare, under-recognised complication of poorly controlled long-standing diabetes mellitus with associated complications like nephropathy, retinopathy and neuropathy.[1,2] Fewer than 200 cases have been reported in literature.[2]

Case presentation

A 59-year-old male, with poorly controlled type 2 diabetes mellitus (T2DM) for the last ten years, and hypertension for five years, presented with three months' history of insidious onset bilateral thigh pains. Intensity of pain gradually increased, making the patient bed-bound for ten days prior to presentation. He also had diabetic nephropathy for the previous year, bilateral diabetic retinopathy for four months, and diabetic mononeuropathy of the left ulnar nerve for one month. He had a history of similar pain in his right thigh three years before, which had improved gradually over two months with low-dose oral steroids and analgesics received elsewhere.

Examination revealed mild swelling all over both thighs, with overlying cutaneous erythema and tenderness of the thigh muscles. Muscle power at the hips and knees could not be assessed due to pain; however, it was normal at the lower legs, upper limbs and neck. The possibility of idiopathic inflammatory myositis (IIM) was considered in view of symmetrical myalgia and muscle tenderness of the proximal groups of lower limbs.

On evaluation, deep vein thrombosis (DVT) was ruled out. Creatine phosphokinase (CPK) was 354 IU/l (normal range is 20–200IU/l). MRI of the thighs, performed during a previous episode in 2015, showed increased bulk of the right vastus lateralis muscle with hyperintense signal on short tau inversion recovery (STIR) images (arrow in Figure 1a,1b) and hypointense signal on T1-weighted images. MRI of the thighs during the present episode demonstrated similar changes, but this time with symmetrical involvement of multiple muscle groups (hip adductors, abductors, quadriceps and hamstrings) (arrows in Figure 1c). Review of histopathology slides of muscle biopsy from the right vastus lateralis performed in 2015 (Figure 2), showed ischaemic necrosis of muscle fibres (arrows) with scattered lymphocytes (arrowheads). Antinuclear antibody and anticardiolipin antibodies were negative. Other laboratory data are summarised in Table 1. CPK during the previous episode was 308IU/l, with a normal range of 39–300IU/l.

[1]Senior Resident, [2]Assistant Professor, [3]Professor and Head, Department of Clinical Immunology and Rheumatology, Nizam's Institute of Medical Sciences, Hyderabad, India.

Figure 1a MRI of the right thigh in 2015 showing increased bulk of the right vastus lateralis muscle with hyperintense signal on STIR image (arrow) in coronal plane

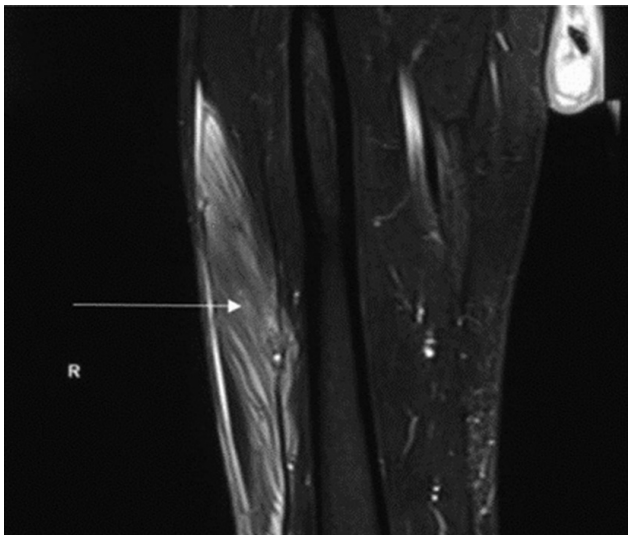


Figure 1b MRI of the thighs in 2015 showing increased bulk of the right vastus lateralis muscle with hyperintense signal on STIR image (arrow) in transverse plane

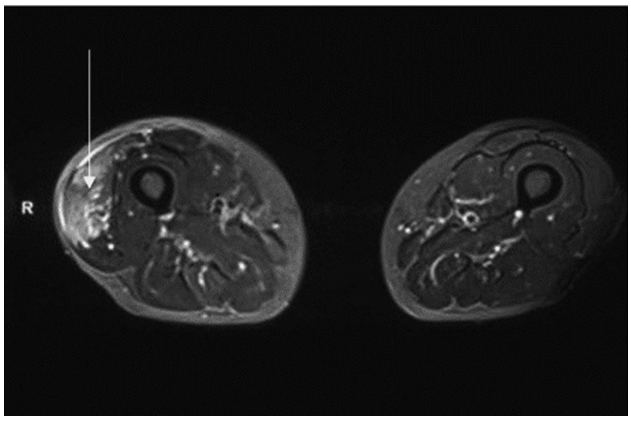
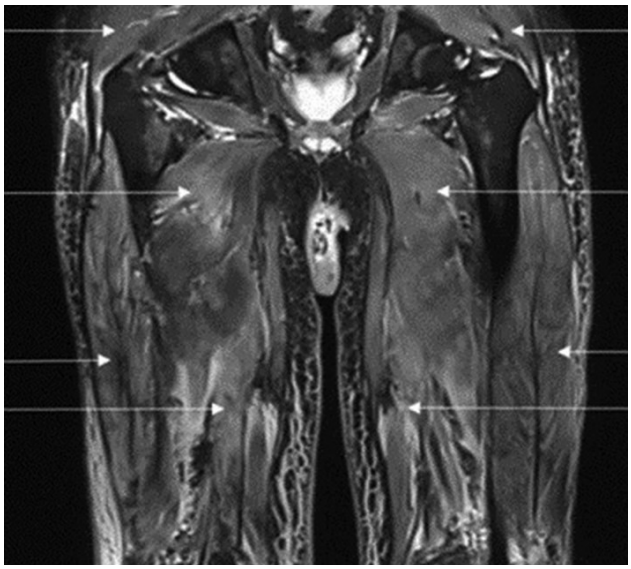


Figure 1c MRI of the thighs during present episode, showing increased bulk of the bilateral multiple muscles with hyperintense signal on STIR image (arrows) in coronal plane



Taking into consideration the following points: long-standing poorly controlled diabetes, concomitant presence of other microvascular complications of diabetes, past history of similar myalgia in the right thigh with myonecrosis on muscle histopathology, normal muscle power at the upper limbs and neck, absence of cutaneous and other manifestations of IIM, CPK being just above the normal upper limit, the absence of antinuclear antibodies and the poor general condition of the patient, muscle biopsy was deferred and a diagnosis of recurrent DMI was made. The hypertension was treated appropriately, blood glucose was controlled with insulin and bed rest was advised with DVT-prophylaxis measures. The patient also received opioid analgesics and aspirin. He had minimal pain relief during his hospital stay, but over the next two months the pain gradually decreased and he was able to ambulate with support. This clinical improvement without the use of any immunosuppressant strongly supported the diagnosis of DMI.

Discussion

DMI is a rare complication of DM. It presents with acute onset of spontaneous muscular pain and swelling, most commonly unilaterally in the thighs.[2]

A systematic review of DMI found 126 cases reported in the literature over 48 years, of which 54% were females. Half of the patients had T2DM, with a mean age of 52.2 years, whereas the mean age in patients with type 1 diabetes mellitus (T1DM) was 35.9 years. The mean duration of T2DM at the time of DMI diagnosis was 11 years, and for T1DM it was 18.9 years. Concurrent retinopathy, nephropathy and neuropathy was seen in 46.6% of patients. The mean HBA1c value at the time of DMI diagnosis was 9.34%. Nephropathy, which is the most common microvascular complication of DM, was seen in 75% of cases.[2] Bilateral involvement is seen in 8% to 33% of cases.[3,4] The most frequently affected muscles

Figure 2 Histopathology of muscle biopsy from the right vastus lateralis in 2015 showing ischaemic necrosis of muscle fibres (arrows) with scattered lymphocytes (arrowheads)

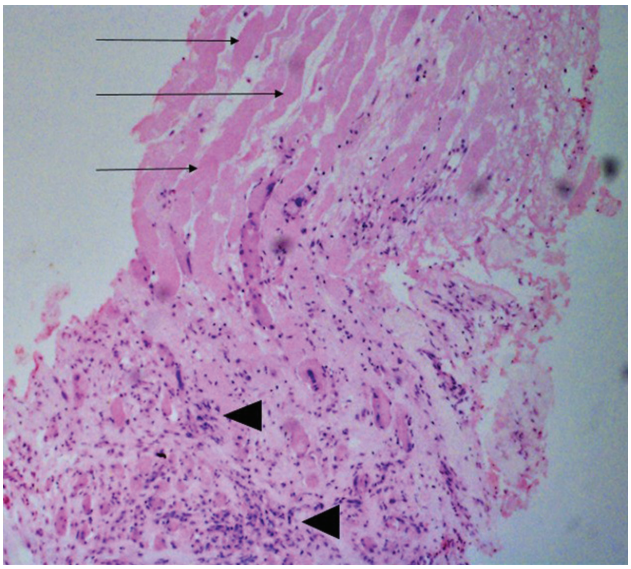


Table 1 Laboratory data

White blood cell count (4000–11000 /mm^3)	9700
Erythrocyte sedimentation rate (0–20 mm/hr)	63
Aspartate aminotransferase (7–40 IU/l)	27
Creatine phosphokinase (20–200 IU/l)	354
Lactate dehydrogenase (200–400 IU/l)	235
Serum creatinine (0.9–1.4 mg/dl)	3.0
Haemoglobin A1C (4–6 %)	8.6
24 hour urine proteins (< 0.15 grams/day)	3.7

reported are the vastus medialis and vastus lateralis, though many other muscles can be affected.[2,4] Laboratory investigations for DMI are relatively non-specific.[3] CPK may be normal or increased.

The pathogenesis of DMI is unknown. Thromboembolic events secondary to microvascular endothelial damage may cause tissue ischaemia and trigger an inflammatory response. Generation of free radicals due to reperfusion injury, and increased pressure within the fascial compartment due to tissue oedema, may lead to local hypoxia culminating in infarction. The presence of hypercoagulable state in diabetes, due to alteration of coagulation-fibrinolysis system, with increased levels of factor VII, fibrinogen, thrombomodulin, and decreased levels of antithrombin and tissue plasminogen activator may also contribute.[2,3,4,5]

Idiopathic inflammatory myositis was considered due to presentation in bilateral thighs. The classic unilateral presentation of DMI may be confused with DVT, pyomyositis, cellulitis, necrotising fasciitis or malignancy.[6] Though weakness is the most prominent symptom in IIM, sometimes myalgia may be the only presentation.[7,8] MRI is the imaging modality of choice in either condition, but does not differentiate these two conditions. In both the affected muscles show hyperintensities on T2-weighted and STIR images, and hypointensities on T1-weighted images, with associated perifascial, perimuscular and/or subcutaneous oedema.[9] Muscle biopsy can provide a definitive diagnosis in such cases. The tissue is pale and large areas of muscle fibre necrosis are seen under the microscope. If the diagnosis is certain on the basis of non-invasive investigations, muscle biopsy is not recommended, since mean time to symptom resolution may be increased in patients undergoing this procedure.[2]

Table 2 Pointers for suspecting DMI

Long-standing poorly controlled DM with presence of other microvascular complications
Acute onset focal or multifocal myalgia without fever and trauma
Tenderness of involved muscle with or without overlying cutaneous erythema
T2/STIR hyperintensities with muscle oedema of one or more muscles on MRI

DMI resolves spontaneously over a few weeks to months in most patients.[5] Management is mainly supportive, consisting of aspirin, analgesics, bed rest and controlling blood glucose levels. Onyenemezu and Capitle compared surgery, physiotherapy and bed rest in the treatment of DMI and found that the patients undergoing surgery (muscle excision biopsy) had significantly prolonged symptom recovery time when compared to those managed by physiotherapy or bed rest.[10] Horton et al. also showed that time to recovery was numerically lower in patients who received supportive care (glycaemic control and pain management/best rest) plus a nonsteroidal anti-inflammatory drug, than those who were managed only by bed rest.[2] The recurrence rate of DMI is found to be lowest with bed rest followed by physiotherapy and was highest in those who underwent surgery.[10]

Patients with DMI are at high risk of recurrence, which is reported to be from 34.9% to 45.0% in different studies, and in about two-thirds of patients these recurrences are noted in a different location or muscle group than in the initial presentation.[2,3] Our patient had recurrence of DMI after three years with current involvement of multiple muscle groups.

Though DMI is very rare, physicians who manage DM should be aware of this complication and should suspect it in the presence of the pointers listed in Table 2. In clinically suspected cases MRI helps in reaching a diagnosis, and in atypical cases muscle biopsy may help further by demonstrating muscle infarction.

Conclusion

The present case is of interest as the patient had recurrent DMI, a rare complication of T2DM, presenting with bilateral thigh myalgia which showed bilaterally symmetrical hyperintensities of multiple muscles on MRI. Increased awareness regarding this entity among physicians may help in timely diagnosis and in avoiding a battery of unnecessary investigations.

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