



The Role of MRI in Diagnosis of Diabetic Muscle Infarction : an Underdiagnosed Entity

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ABSTRACT

Muscle infarction is an uncommon complication of long-standing diabetes mellitus. Here, we report the case of a 62-year-old diabetic male patient with acute pain and swelling of the right thigh with signs of mild inflammation but no evidence of infection or myopathy. Initial magnetic resonance imaging (MRI) revealed diffuse swelling and edema of quadriceps muscles with blurred margins. The clinical symptoms showed significant improvement after 1 month of symptomatic treatment. Follow-up MRI performed after 3 months showed remarkable improvement in inflammatory changes with mild residual swelling and edema of the vastus lateralis muscle. In the absence of any systemic signs of infection and laboratory diagnostic markers, the detection of typical features such as hyperintense signal on T2 weighted images or hypo- to isointense signals on T1 weighted images, without localized fluid collection, remains the most useful investigative tool for diagnosing diabetic muscle infarction and obviates the need for invasive procedures like muscle biopsy. Diabetic muscle infarction is a rare complication with distinct clinical presentation, laboratory findings, and MRI features, and can be resolved over a period only by administering adequate supportive treatment. Clinicians should be aware of this complication and always consider it in the differential diagnosis of diabetic patients presenting with acute onset of pain and swelling of the extremities.

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► Implication for health policy/practice/research/medical education:

No direct relation for health policy. Knowledge about the role of MRI in the management of this complication of diabetes will help the Physicians and unnecessary surgical interventions may be avoided. There is scope for research on drugs which can prevent and treat this complication.

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1. Introduction

Diabetic muscle infarction is a rare complication of long-standing diabetes. The first cases of diabetic muscle infarction were described by Angervall and Stener way back in 1965 (1). Despite the alarming increase in the number

of diabetes cases worldwide, this rare complication of diabetes is either underdiagnosed or misdiagnosed. Diabetic muscle infarction has an acute clinical presentation with good short-term prognosis, but recurrence is seen in more than 50% of cases (2, 3). Most of the reported cases occurred in patients during the third to fifth decades of their life (4-7). However, the condition has also been reported among elderly patients in the sixth decade of their lives (8). Here we present a case of acute-onset diabetic muscle infarction diagnosed on the basis of magnetic resonance imaging (MRI) features in a patient with long-standing diabetes.

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2. Case History

We report the case of a 62-year-old man with diabetes for the past 12 years, who presented with intense pain and swelling of the anterior aspect of the right thigh. The pain had started about 1 week back and gradually increased in severity. He had no history of any trauma and fever. At the time of presentation, the patient was receiving a combination of

weighted images; these findings indicated muscle edema with inflammatory changes (*Figure 1*). Edema in the subcutaneous fat was also noted. Cytological examination of the fine-needle aspirate obtained from the lesion under ultrasound guidance revealed features of aseptic inflammation. We diagnosed diabetic muscle infarction on the basis of the patient's long-standing diabetic status, clinical presenta-

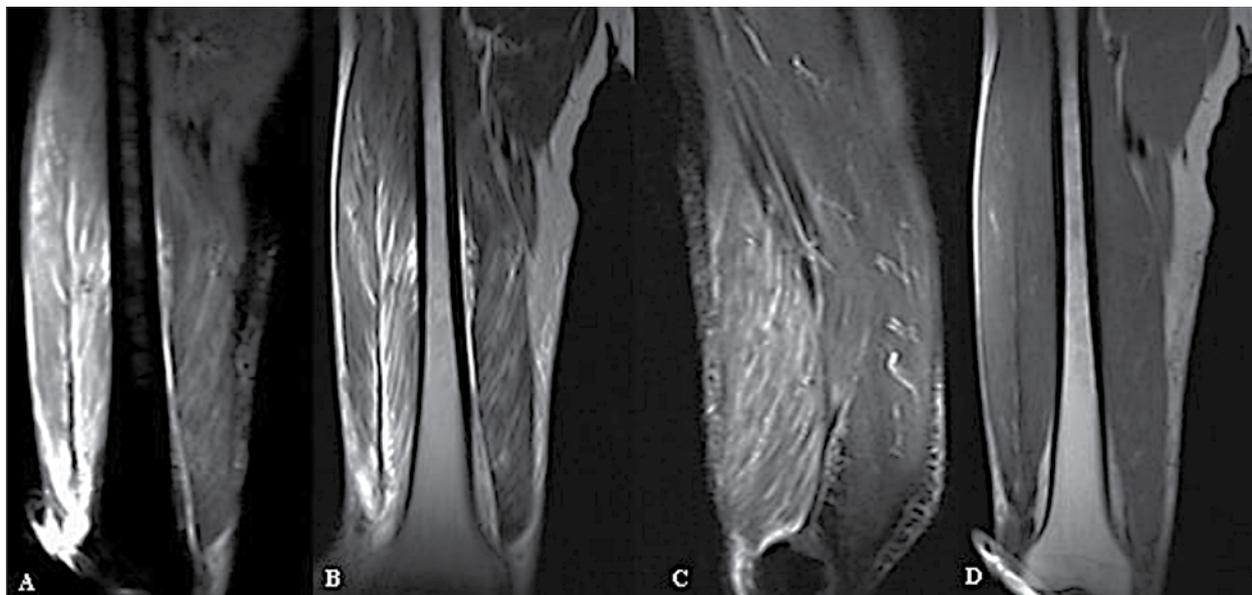


Figure 1. Magnetic Resonance (MR) Images Showing Diffuse Swelling of the quadriceps Muscles with Blurred Margins and Hyperintense Signal on Short T1 Inversion Recovery (STIR) and T2-Weighted Images and Hypo- to Isointense Signal on T1-Weighted Image. Reticulations Can be Seen in the Subcutaneous Fat on STIR and T2-Weighted Images. (A) Coronal STIR Image; (B) Coronal T2-Weighted Image; (C) Sagittal T2-Weighted Image; (D) Coronal T1-Weighted Image.

oral antidiabetic medication and insulin. He was a heavy smoker for a long time. Physical examination showed mild swelling in the anterior aspect of his right thigh with mild increase in local temperature. The swollen area was firm and tender with mild redness of the overlying skin. Apart from distal symmetrical (large-fiber) neuropathy characterized by impaired vibration sense in both the lower limbs, no other neurological deficit was observed. Laboratory investigations showed slightly elevated erythrocyte sedimentation rate (26 mm at the end of the first hour [reference range, 0–20 mm]). Complete blood counts were unremarkable with a total leukocyte count (TLC) of $6.9 \times 10^3/\text{mm}^3$ (reference range, $4\text{--}11 \times 10^3/\text{mm}^3$), total erythrocyte count of $4.9 \times 10^6/\text{mm}^3$ (reference range, $4.5\text{--}5.9 \times 10^6/\text{mm}^3$), and platelet count of $160 \times 10^3/\text{mm}^3$ (reference range, $150\text{--}300 \times 10^3/\text{mm}^3$). Differential leukocyte counts revealed 77% neutrophils, 20% lymphocytes, 2% monocytes, and 1% eosinophils. The fasting and postprandial blood glucose levels were 210 mg/dL and 340 mg/dL respectively, and glycated hemoglobin level was 8.5%. The creatine kinase level was normal (181 IU/L [reference range, 24–195 IU/L]). Urinalysis showed glucosuria and mild albuminuria. The values obtained for all other relevant laboratory parameters were within the normal limits. MRI of the right thigh showed diffuse swelling of the quadriceps muscles with blurred margins and hyperintense signal on T2-weighted and short T1 inversion recovery (STIR) images and hypo- to isointense signals on T1-

tion, laboratory findings, and MRI features. The patient showed remarkable resolution in pain and swelling over the 1-month period of symptomatic treatment. Follow-up MRI was performed after an approximately 3-month interval, and it showed remarkable resolution of the inflammation with mild residual edema and swelling of the vastus lateralis muscle (*Figure 2*).

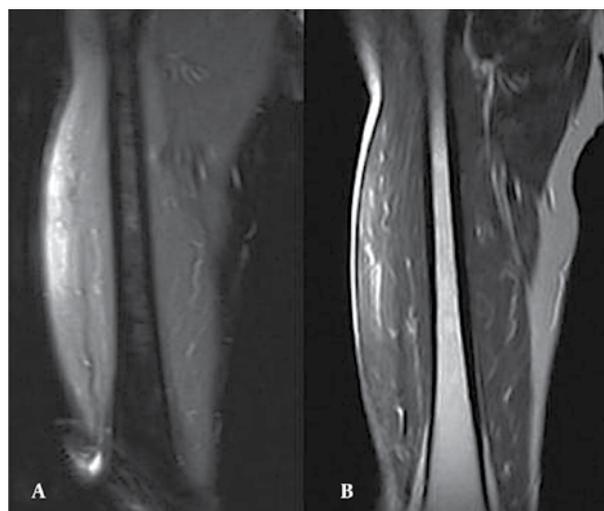


Figure 2. Magnetic Resonance (MR) Images Showing Mild Swelling and Hyperintense Signal in the Vastus Lateralis Muscle. (A) Coronal short T1 inversion recovery (STIR) image; and (B) Coronal T2-weighted image.

3. Discussion

Diabetic muscle infarction is a very rare aseptic complication of long-standing diabetes mellitus manifesting as an acute onset swelling and pain of the affected muscle. The condition is more common in women than in men. It may occur in both type I and type II diabetes patients, but is more common in patients with type I diabetes. The average time from onset of diabetes to the first episode of diabetic muscle infarction is approximately 14 years. The quadriceps muscles are the most common sites of involvement, and the calf muscles are the second most common sites; in approximately 8% of cases, the condition is bilateral (9). There are no systemic signs of infection, and no specific laboratory marker has been identified for detecting this condition. The erythrocyte sedimentation rate and creatine kinase level may be normal or elevated (3, 10). The pathogenesis of diabetic muscle infarction is not very clear. The possible causes for this condition include atherosclerosis, diabetic microangiopathy, atheroembolism, and alterations in the coagulation-fibrinolysis system (3). MRI is the modality of choice for radiological evaluation of patients with diabetic muscle infarction. The typical MRI features are hyperintense signal on T2-weighted images, which suggests marked swelling, and iso- to hypointense signal on T1-weighted images, which suggests acute edema and inflammation of the affected muscles. There may also be associated perifascial, perimuscular, and subcutaneous edema (3, 9-12). Gadolinium-enhancement is not required for diagnosing diabetic muscle infarction and is indicated only if pyomyositis is considered a differential diagnosis (10). Diabetic muscle infarction can be confidently diagnosed in most patients on the basis of the distinctive clinical and MRI features. Muscle biopsy is rarely indicated and is performed only in cases of delayed recovery or in which the clinical or MRI features are atypical. In cases in which muscle biopsy is indicated, a minimally invasive diagnostic technique, such as needle biopsy, is recommended over open biopsy to avoid postprocedural deleterious effects (3, 10). Histopathological examination of the biopsy specimen reveals areas of muscle infarction with focal areas of necrosis and regeneration, infiltration

of polymorphonuclear cells, hemorrhagic foci, interstitial fibrosis, and fatty infiltration. Hyalinosis and small arteriole wall-thickening are frequently observed (11, 12). A supportive treatment method is generally adopted for patients with diabetic muscle infarction. In the acute phases of the condition, physical activity is restricted and appropriate doses of analgesics and anti-inflammatory medications are administered. Gentle physical therapy is started once the acute phase is over. In most cases of diabetic muscle infarction, the symptoms resolve spontaneously over several weeks without the need for surgical intervention (10).

In summary, the possibility of diabetic muscle infarction should always be considered in the differential diagnosis of diabetic patients with pain and swelling of lower extremities. MRI is the most important technique for diagnosing this condition.

References

1. Angervall L, Stener B. Tumoriform focal muscular degeneration in two diabetic patients. *Diabetologia*. 1965;1(1):39-42.
2. Deimel GW, Weroha JS, Rodriguez-Porcel M. 51-year-old hospitalized man with a painful leg. *Mayo Clin Proc*. 2011;86(3):241-4.
3. Trujillo-Santos AJ. Diabetic muscle infarction: an underdiagnosed complication of long-standing diabetes. *Diabetes Care*. 2003;26(1):211-5.
4. Glauser SR, Glauser J, Hatem SF. Diabetic muscle infarction: a rare complication of advanced diabetes mellitus. *Emerg Radiol*. 2008;15(1):61-5.
5. Naderi AS, Farsian FN, Palmer BF. Diabetic muscle necrosis. *J Diabetes complicat*. 2008;22(2):150-2.
6. Parmar MS. Diabetic muscle infarction. *BMJ*. 2009;338:b2271.
7. Qasem A, Tanha F, Briemberg H. A case of diabetic muscle infarction. *Can J Neurol Sci*. 2009;36(5):651-3.
8. Karalliedde J, Vijayanathan S, Thomas S. Painful foot drop; a presentation of diabetic muscle infarction. *Diabet Med*. 2010;27(8):958-9.
9. Saifuddin A. *Musculoskeletal MRI*. London: Hodder Arnold; 2008.
10. Morcuende JA, Dobbs MB, Crawford H, Buckwalter JA. Diabetic muscle infarction. *Iowa Orthop J*. 2000;20:65-74.
11. Delaney-Sathy LO, Fessell DP, Jacobson JA, Hayes CW. Sonography of diabetic muscle infarction with MR imaging, CT, and pathologic correlation. *AJR Am J Roentgenol*. 2000;174(1):165-9.
12. Jelinek JS, Murphey MD, Aboulafla AJ, Dussault RG, Kaplan PA, Snearly WN. Muscle infarction in patients with diabetes mellitus: MR imaging findings. *Radiology*. 1999;211(1):241-7.