

TEACHING CASES

Painful swelling in the thigh: diabetic muscle infarction

Ami Schattner MD, Taiba Zornitzki MD, Meital Adi MD, Joshua Friedman MD

The case: A 52-year-old woman was admitted with painful swelling in her left thigh. She had a 12-year history of type 2 diabetes mellitus and hypertension, and she was a smoker (40 pack-year smoking history). At her last examination, her HbA_{1c} level was 7.7%, her serum total cholesterol level was 8.65 (normal < 5.17) mmol/L and her triglyceride level was 3.77 (normal < 2.26) mmol/L. She had diabetic retinopathy and microalbuminuria, and she had a myocardial infarction 12 years earlier. Two months before admission, the patient underwent a left femoropopliteal bypass for peripheral vascular disease. Her medications at the time of admission included acetylsalicylic acid, enalapril, metformin, glibenclamide and simvastatin.

On admission, the patient complained of continuous severe pain in her anterior thigh that had developed gradually. The pain was not reduced by nonsteroidal anti-inflammatory drugs taken orally. She reported that the pain was very intense, and that it was present at rest but became worse with movement. The pain had increased over the 4 weeks before presentation. She denied any trauma, fever or chills. The patient had lost 4 kg, and she was unable to walk because of the pain.

A physical examination showed a firm swelling in the anterior part of her thigh. An area that measured 10 × 5 cm was hard and felt warm, and there was mild erythema and tenderness. The patient's muscle strength and motion were markedly limited by pain.

Key points

- Patients with longstanding diabetes and microvascular complications may develop diabetic muscle infarction.
- Patients usually present with a painful, tender muscle mass, often in the thigh.
- Constitutional symptoms are usually absent.
- Levels of muscle enzymes may not be increased but levels of acute phase reactants often are.
- The diagnosis is clinical, and an MRI can confirm the diagnosis.
- Diagnostic tests (imaging, laboratory investigations) can be used to rule out other causes.
- Slow, spontaneous resolution usually occurs; muscle biopsy or surgery can delay recovery.

Her acute phase reactants were elevated: her erythrocyte sedimentation rate was 153 (normal 0–30) mm/h, and her C-reactive protein level was 115 (normal 0.2–3.0) mg/L. She was anemic (hemoglobin 6.2 mmol/L) and had mild leukocytosis (11.2 [normal 3.8–9.8] × 10⁹/L, with 78% polymorphonuclear cells). She also had a mildly reduced level of serum albumin (31 [normal 41–53] g/L) and a normal globulin level (30 [normal 20–35] g/L). The results of liver function tests were normal. Doppler ultrasonography showed no abscess or deep vein thrombosis. Her femoropopliteal bypass graft and larger arteries were patent. Magnetic resonance imaging showed increased signal intensity on T₂-weighted images of her left quadriceps, with diffuse subcutaneous and fat edema. There was extensive swelling of the quadriceps vastus medialis and rectus with intermuscular edema (Figure 1, Figure 2).

Despite 3 weeks of bed rest, opiates, enoxaparin and clopidogrel, there was only a slight clinical improvement. However, her C-reactive protein level gradually decreased. An open muscle biopsy was performed to rule out a tumour. Instead, diabetic muscle infarction was confirmed (Figure 3). One week after the biopsy, there was significant worsening of her pain and severe edema of

Box 1: Differential diagnosis of diabetic muscle infarction

Infection

- Pyomyositis
- Necrotizing fasciitis
- Cellulitis
- Abscess
- Osteomyelitis

Trauma

- Hematoma
- Exertional rupture of muscle
- Myositis ossificans

Vascular

- Deep vein thrombosis
- Acute compartment syndrome

Tumour

- Lymphoma, primary muscle
- Sarcoma, soft-tissue
- Benign muscle tumour

Inflammatory

- Myositis, focal inflammatory
- Polymyositis or dermatomyositis

Diabetes-related condition

- Diabetic amyotrophy

Other

- Ruptured Baker cyst
- Adverse reaction to simvastatin
- Arterial graft complication

the whole thigh. After 2 months of bed rest, tramadol for pain and a combination of clopidogrel and low-molecular-weight heparin, all of her complaints and physical findings gradually dissipated. The results of her blood tests normalized. The patient resumed working and was well 10 months later.

Our patient presented with long-term intense leg pain and dysfunction, a large tender mass in her thigh, elevation of acute-phase proteins and a prolonged unrelenting course. A long list of differential diagnoses was proposed (Box 1). Although diabetic muscle infarction seemed the most likely diagnosis, a muscle biopsy was judged necessary to rule out a primary muscle tumour. The biopsy was followed by clinical deterioration, similar to that reported in other cases.¹

About 100 cases of diabetic muscle infarction have been reported since the first report in 1965.^{1,2} Thus, idiopathic mus-

cle infarction is rare and occurs specifically among patients with diabetes. Although the exact pathogenesis is unknown, it is assumed to be a microvascular complication of diabetes. Most affected patients have a long history of diabetes (either type 1 or type 2) and about 97% have other microvascular complications, most often nephropathy.²

Patients typically present with intense, nonremitting and disabling pain in a lower limb with associated edema and mass. Normal temperature and normal levels of muscle enzymes are also typical.² Muscles in the thigh are affected 4 times more frequently than the calf. The quadriceps are the most commonly affected muscles. Involvement of the arms is rare.

Magnetic resonance imaging (MRI) is the diagnostic test of choice, and T_2 -weighted axial plane images are useful for diagnosis.^{2,3} Other diagnostic modalities may help to rule out other diagnoses, rather than help to make the correct diagnosis of diabetic muscle infarction. The clinical presentation and MRI findings are distinctive (Figure 1, Figure 2); thus, a biopsy is rarely indicated. Muscle biopsy and surgery should be avoided despite the severe presentation because these interventions can prolong resolution or temporarily worsen the patient's symptoms.

Whether this rare complication of diabetes can be prevented is unknown. Diabetic muscle infarction is self-limiting, and full recovery can be expected over time. Recommendations for treatment are based on limited evidence and expert opinion. We recommend supportive treatments, such

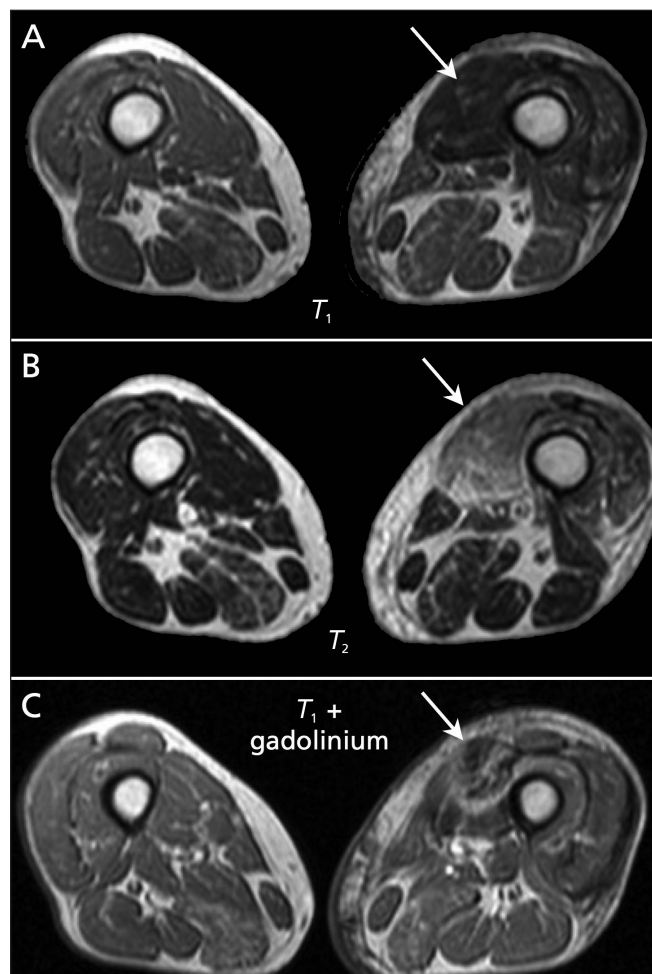


Figure 1: Magnetic resonance imaging of the patient's thighs. **A:** T_1 -weighted images showing swelling and hypointensity (arrow) of the involved muscle. **B:** T_2 -weighted images showing diffuse, heterogeneous signal in the involved muscle (arrow), suggesting edema. **C:** A focal area of heterogeneously enhanced mass (arrow) with peripheral enhancement was visible after administration of gadolinium.

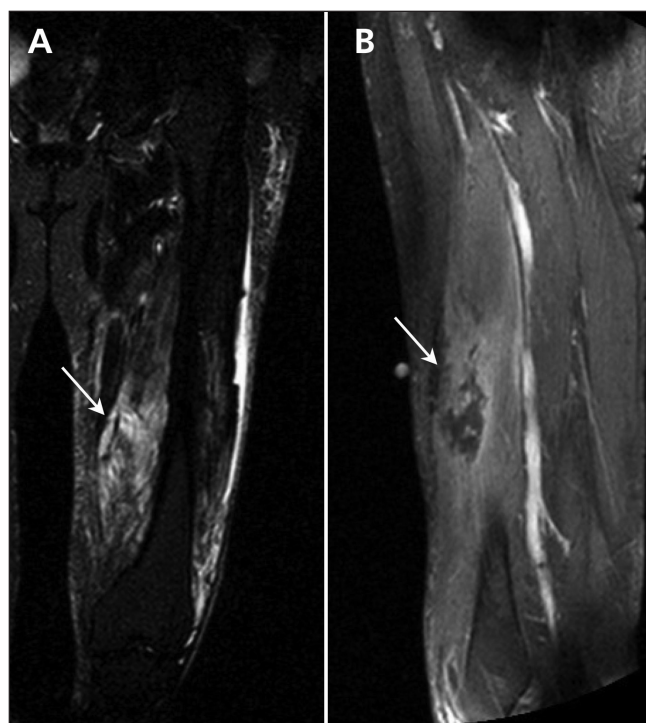


Figure 2: Magnetic resonance imaging of the patient's thigh. **A:** Coronal image showing diffuse, heterogeneous, intense signal of the involved muscle (arrow), which suggests edema. **B:** Sagittal image showing a heterogeneously enhanced mass (arrow) with peripheral enhancement after administration of gadolinium.

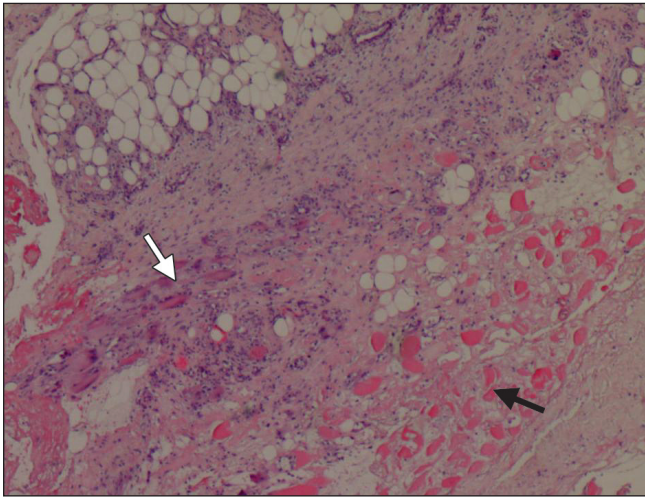


Figure 3: Muscle biopsy showing ischemic skeletal muscle fibres with areas of necrosis (black arrow), reparative changes with myofibre regeneration (white arrow), signs of fibrosis, fat necrosis and chronic inflammation. Atherosclerotic changes are seen in medium-sized vessels and fibrin thrombi are seen in the small vessels (hematoxylin–eosin stain, original magnification $\times 40$).

as bed rest, analgesics and, if required, a cautious use of anti-inflammatory medications. As a possible microvascular complication of diabetes, antiplatelets are theoretically effective, and advice such as optimizing glycemic control and smoking cessation seems prudent. In one analysis of cases reported from several sources, patients who underwent surgery had a recovery period that was more than double that of those who received conservative treatments such as bed rest, analgesics and anti-inflammatory medications (13 weeks v. 5.5 weeks, $p < 0.05$).⁴

Unfortunately, diabetic muscle infarction recurs in about one-half of patients.^{1,4} The overall prognosis for these patients may be related to the severity of their underlying diabetes and

the degree of macrovascular and especially microvascular complications.

In conclusion, diabetic muscle infarction is a rare complication of diabetes. The incidence is likely to increase because of the increasing global prevalence of diabetes. Physicians should consider diabetic muscle infarction in the differential diagnosis for patients with diabetes who have a painful, swollen muscle. Conservative treatment strategies should be chosen over aggressive invasive measures when possible.

Competing interests: None declared.

REFERENCES

1. Kapur S, Brunet JA, McKendry RJ. Diabetic muscle infarction: case report and review. *J Rheumatol* 2004;31:190-4.
2. Trujillo-Santos AJ. Diabetic muscle infarction. An underdiagnosed complication of long-standing diabetes. *Diabetes Care* 2003;26:211-5.
3. Kattapuram TM, Suri R, Rosol MS, et al. Idiopathic and diabetic skeletal muscle necrosis: evaluation by magnetic resonance imaging. *Skeletal Radiol* 2005; 34:203-9.
4. Kapur S, McKendry RJ. Treatment and outcomes of diabetic muscle infarction. *J Clin Rheumatol* 2005;11:8-12.

Teaching cases are brief case reports that convey clear, practical lessons. Preference is given to common presentations of important rare conditions, and important unusual presentations of common problems. Articles start with a brief summary (100 words) outlining the case and its relevance to a general audience. The case presentation follows (500 words maximum) as well as a discussion of the underlying condition (1000 words maximum). Up to 5 references are permitted and visual elements (e.g., tables of the differential diagnosis, clinical features or diagnostic approach) are encouraged. Written consent from patients for publication of their story is a necessity and should accompany submissions. See information for authors at www.cmaj.ca.

	Health Canada	Santé Canada	<i>Your health and safety...our priority.</i>	<i>Votre santé et votre sécurité... notre priorité.</i>
<h2>Stay informed!</h2> <p>Receive the latest Health Product Advisories and the Canadian Adverse Reaction Newsletter by email.</p> <h2>Soyez à jour!</h2> <p>Recevez par courriel les derniers Avis sur les produits de santé et le Bulletin canadien des effets indésirables.</p> <p>Subscribe to MedEffect e-Notice at www.healthcanada.gc.ca/medeffect Abonnez-vous à l'Avis électronique MedEffet à www.santecanada.gc.ca/medeffet</p>				
				