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CASE REPORT

C. Gigante
A. Borgo
G. Cecchetto
S. Turra

Pyomyositis in children: report of three cases and review of the literature

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C. Gigante • S. Turra
Department of Orthopaedics
and Traumatology
University of Padua
Padua, Italy

A. Borgo (✉)
Department of Orthopaedics
and Traumatology
San Bortolo Civil Hospital
Via Rodolfi 37, I-36100 Vicenza, Italy
E-mail: andrea-borgo@libero.it

G. Cecchetto
Department of Pediatric Surgery
University of Padua
Padua, Italy

Abstract In temperate places, pyomyositis is uncommon in children and adolescents. We report 3 cases of pyomyositis in boys aged 11, 13 and 16 years. *Staphylococcus aureus* was the etiologic agent in all cases. Antibiotics therapy alone, or associated to surgical treatment, was performed to resolve the infections. We describe the clinical and radiological work-up used to arrive at a diagnosis, and review the literature on this infection, which could be easily misdiagnosed because of its rarity outside of tropical climates.

Key words Pyomyositis • Infectious myositis • Skeletal muscle infection

Introduction

In tropical areas, pyomyositis is a frequent affection of young adults in low socio-economic conditions, while it is uncommon in temperate places [1–4]. Since 1998, about one hundred articles, most of them case reports on pyomyositis as complication of critical conditions, have been indexed in Medline. Pyomyositis in otherwise healthy children is exceptional [3, 5].

We describe 3 otherwise healthy children admitted to the Orthopaedics Department of Padua University because of pyomyositis. All patients' parents provided informed consent for the case reports to be published.

Case reports

Case 1

A 13-year-old boy came to our observation because he began to limp after a week's fever (38° C). Trauma, travel or infections were not reported, and medical and family histories were negative.

Painful swelling, warm and reddened skin in the proximal lateral right leg, and inguinal lymphadenopathy were evident. A neutrophilic (73%) leukocytosis of 12.1×10^9/L was present. C-reactive protein (CRP) was 30.1 mg/dl and erythrocyte sedimentation rate (ESR) was 102 mm/h.

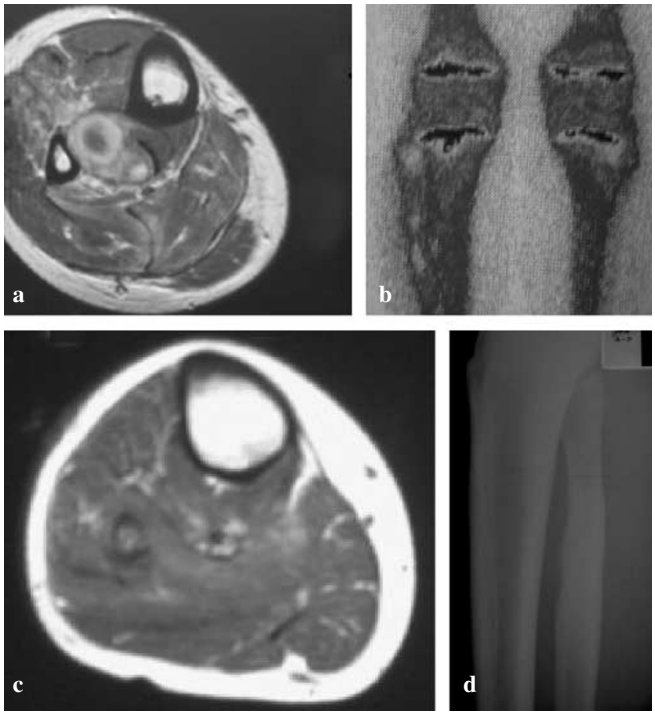

Fig. 1a-d *A 13-year-old boy with a limp (case 1).* **a** MR image of the left leg at the onset. **b** TC-99m-MDP scan of the right and left legs. **c** MR image of the left leg 2 weeks after drainage. **d** Radiograph of the left leg 9 months after drainage

Blood culture and urine microscopy and culture were negative. Radiographs were normal.

Parenteral antibiotics were started (1 g cefazolin t.i.d. and 1 g gentamycin t.i.d.), with partial remission of local pain and swelling. On ultrasound, a dishomogeneous area in the soleus was seen. Magnetic resonance imaging (MRI) showed a mass wrapping the fibula, with no bone involvement (Fig. 1a). A technetium-99m-MDP scan showed soft tissue hyperactivity (Fig. 1b). After 3 days, a surgical open drainage revealed a hematic-purulent fluid: agar blood culture was positive for *Staphylococcus aureus*. Immediately after drainage a complete remission of fever and local pain was observed and hematic parameters normalized in a few days. The patient was discharged apyretic and with complete range of motion (ROM). After 3 weeks of parenteral cefazolin (including 2 weeks with gentamcin), the patient underwent another 3 weeks of amoxi-clavulanic oral therapy.

Case 2

An 11-year-old boy had pain in the right hip and thigh, with a fever of 38° C. Limping for a week, at the time of observation he was unable to stand. Trauma was not reported, and medical and family histories were negative.

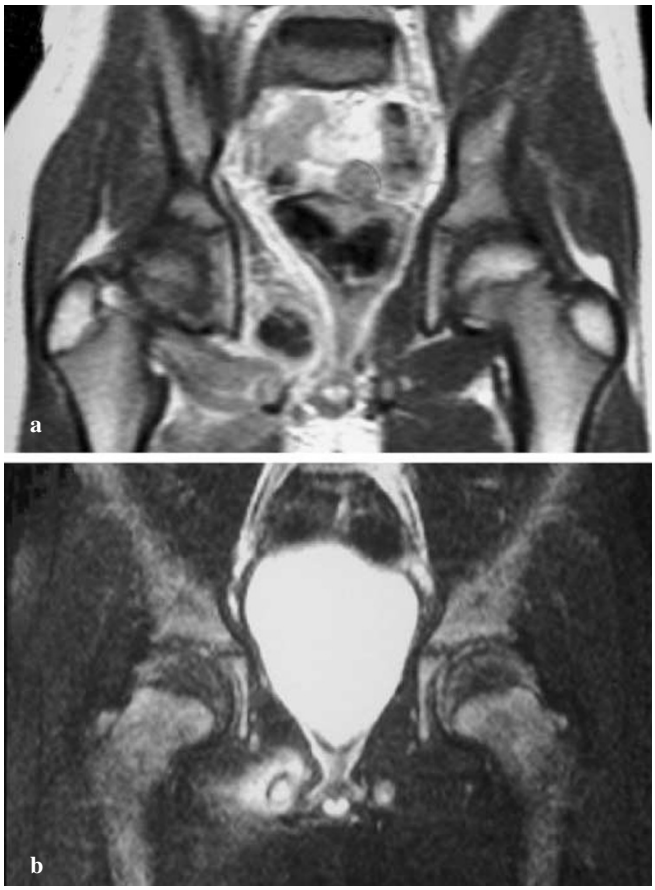

Fig. 2a, b *An 11-year-old-boy (case 2).* **a** MR image of the pelvis at the onset. **b** MR image of the pelvis 4 weeks after drainage

His thigh and hip were warm, reddened, markedly tender and swollen; there was inguinal lymphadenopathy. A neutrophilic (79%) leukocytosis of 15.52×10^9/L was present. ESR was 93 mm/h, CRP was 10.2 mg/dl, and P-Alkaline Phosphatase (P-ALP) was 196 U/L. Urine microscopy and culture were negative. High-dose ceftriaxone parenteral therapy was started.

Hip and pelvis radiographs were normal. MRI showed a 5-cm lesion in the obturator region with peripheral enhancement after the administration of contrast medium (Fig. 2a).

Percutaneous drainage allowed the culture of *S. aureus*. Apyretic after 24 hours, he was discharged after 5 days of parenteral antibiotic therapy. Asymptomatic and with full ROM, the patient underwent oral antibiotic therapy for another 2 weeks.

Case 3

A 16-year-old boy came after a 5-day history of increasing limping and pain progressively involving his thigh, hip and right back. Fever (38°–39° C) was present for 2

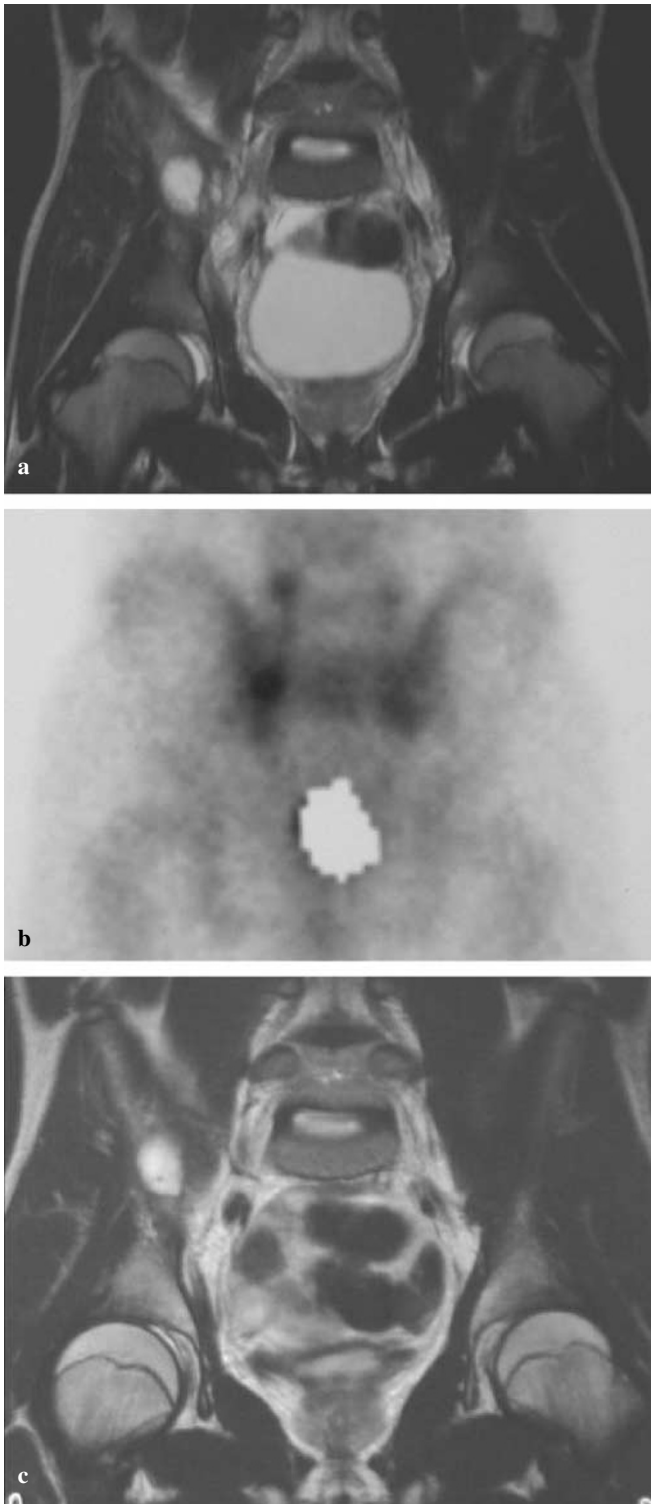

Fig. 3a-c *A 16-year-old boy (case 3).* **a** MR image of the pelvis at onset. **b** Tc-99m-MDP bone scan at onset. **c** MR image after 3 weeks of antibiotic therapy

days. No trauma or travel was reported and the medical and family histories were normal.

Local reddened and warm skin, sacroiliac tenderness and marked movement reduction were present. High-dose cefazolin parenteral therapy was started.

A neutrophilic leukocytosis of 12.72×10^9/L was present. ESR was 33 mm/h, CRP was 161 mg/dl, P-Aspartic Aminotransferase (P-AST) was 102 U/L, P-Alamine Amino Transferase (P-ALT) was 89 U/L, P-Gamma-Glutamyltronsferase (P-γGT) was 48 U/L, P-ALP was 163 U/L, P-Lactic Acid Dehydrogenase (P-LAD) was 560 U/L. Urine microscopy and culture were negative. Blood culture was positive for *S. aureus*.

Radiographs were normal. MRI showed a hyperintense T2-weighted signal in the psoas region, with peripheral enhancement after contrast medium administration (Fig. 3a). Tc99m-MDP showed local hypercaptation (Fig. 3b); leukoscan was not remarkable.

After 3 days of persisting temperature, intravenous teicoplanin was added. Completely apyrexic in 24 hours, in a week full ROM was restored. Haematological investigations came progressively back to normality. Discharged after 3 weeks of parenteral antibiotic therapy, the patient underwent amoxi-clavulanic oral therapy until the sixth week.

Discussion

In tropical areas, where young adults are typically affected, bacterial infections of the skeletal muscle represent 4% of surgical admissions [1]. In temperate climates, pyomyositis is rare: no case was reported in the US literature before 1971, but an increasing number has been reported in the US since 2000 [2]. Poor hygienic conditions, poor skin state, parasitosis, immunological defects, renal failure, trauma and ischemia may predispose to pyomyositis [1, 3]. Pyomyositis is well-documented in injection drug users and a growing number of cases is being reported among immunocompromised persons [1].

The etiology is *S. aureus* in 90% of cases. Thighs and hips are the most frequent localization [3]. Fever, pain, tenderness, swelling and reddened skin are early signs. Lymphnode involvement is usually not conspicuous. Iliac and psoas involvement may cause abdominal pain and femoral neuropathy [4, 6]. Complications are septicemia and toxic shock syndrome; severe sepsis, renal or pulmonary complications are observed in 10% of cases.

The differential diagnosis considers septic arthritis, lumbar discitis, sacroileitis, intra-abdominal diseases, radiculoneuropathy and soft tissue tumors. In HIV-infected patients, idiopathic muscle inflammation, zidovudine side effects and neoplastic processes should also be considered [4, 6].

Blood culture may be positive, ESR and CRP levels increase, and a neutrophilic leukocytosis is present. Radiographs are normal. Ultrasonography may show muscle swelling and lymphnode involvement. CT [4, 7–9] and MRI [2, 3, 7–10] investigate the deepest localizations, and exclude osteomyelitis and soft tissue sarcoma. Scintigraphy may be useful.

In our patients, we administered different antibiotic therapies and we drained the abscess only in two cases (one percutaneously and one surgically). However, the medical and surgical management of pyomyositis is not well defined. We think that antibiotic therapy alone is sufficient in an early stage and in otherwise healthy patients. Even if a short course could be considered in patients with good response [2], or when drainage is performed, we believe that antibiotic therapy (parenteral at least for 2 weeks) should be prolonged until the sixth week. The use of teicoplanin should be considered in absence of good clinical response and could avoid drainage procedure. Drainage (surgical open or percutaneous) should be performed in compromised or non-responding patients and in case of multiple or spreading localizations.

No hematological or radiological method is 100% reliable to confirm and specify the diagnosis, which results from extensive and wide considerations. Prompt diagnosis and early treatment can prevent complications and allow recovery of this potentially life-threatening disease.

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