

Abdominal rectus muscle pyomyositis: Report of a case and review of the literature

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Abstract

Pyomyositis is an uncommon primary bacterial infection of skeletal muscles, usually caused by *Staphylococcus aureus*. Predisposing factors for pyomyositis include immunodeficiency, trauma, injection drug use, concurrent infection and malnutrition. The diagnosis, staging of the disease and differential diagnosis are established by ultrasound, CT and MRI. Treatment involves surgical drainage and antibiotic therapy. We report a case of abdominal rectus muscle pyomyositis, which constitutes, as far as we know, the second reported in bibliography, while *Prevotella disiens* is firstly reported as causative agent.

Introduction

Pyomyositis is an uncommon primary bacterial infection of skeletal muscles, usually caused by *Staphylococcus aureus*.¹ It is presumably hematogenous in origin, not associated with contiguous infection of the skin, bone or soft tissue,² and often leads to abscess formation.³ Pyomyositis is primarily an infection of the tropics, although it has been recognized in temperate climates with increasing frequency.³ Most patients with tropical pyomyositis are otherwise healthy without underlying comorbidities, while most patients in temperate regions are immunocompromised or have other serious underlying conditions. The disease is usually diagnosed late and for this reason it carries high morbidity and significant mortality.^{4,5} Differential diagnosis and staging are established by ultrasound, CT and MRI. The agent responsible can be isolated from blood cultures. Treatment relies on antibiotic therapy and surgical drainage. We report a case of abdominal rectus muscle pyomyositis, which constitutes, as far as we know, the second reported in bibliography.⁶

Case Report

An 81-year-old patient was admitted to our hospital emergency department with a gradually increasing, during the last 15 days, painful swelling in the lower abdomen at the right abdominal rectus muscle (Figure 1). Patient reported that he initially felt pain after strenuous muscle activity (lifting of a heavy object). The inflamed swelling was accompanied with general symptoms of weakness, fever and chills. The patient's medical history included only hypertension. Hemodynamic findings at the time of admission were: arterial blood pressure 60/40 mm/Hg, temperature 37.4°C, heart rate 125/min, pH 7.45, pO₂ 98.7 mmHg, pCO₂ 26.0 mm Hg, Lactic Acid 1.3 mmol/L, HCO₃⁻ 20.9 mmol/L, Actual Base Excess (ABE) -4.3 mmol/L. Additional blood tests revealed Hct 37%, leukocytes 26.800 /mm³, 96.5% granulocytes, platelets 317.000 /mm³, blood glucose 197 mg/dl, urea 70 mg/dL, creatinine 1.29 mg/dL, K⁺ 3.8 mmol/L, Na⁺ 128 mmol/L, Blood (Serum) Glutamic-Oxaloacetic Transaminase (SGOT) 19 IU/L, Blood (Serum) Glutamic Pyruvic Transaminase (SGPT) 16 IU/L. With clinical suspicion of incarcerated Spigelian hernia, the patient underwent abdominal and chest x-ray investigation, which were normal, and an abdominal CT scanning which revealed an abscess, with contrast agent-induced enhancing of the capsule as well as the internal diaphragms, inside the right abdominal rectus muscle below the umbilicus (Figure 2). Due to the diagnosis of abdominal rectus muscle pyomyositis, the patient underwent a surgical drainage of the abscess.

In pus culture, *Streptococcus constellatus* and *Prevotella disiens* were isolated. The initial empiric antibiotic therapy was modified according to the results of the antibiogram (Table 1) and Amoxicillin/Clavunanic acid was administered orally, 1 g twice per day, for an additional 3 weeks. The postoperative course was uneventful.

Discussion

Pyomyositis is an uncommon primary acute bacterial infection of skeletal muscles, 1985 by Scriba,⁷ as an endemic disease in the tropics. Pyomyositis is endemic in tropical areas affecting mainly young people and children while it is uncommon in non tropical areas affecting mainly adults and elderly patients.⁸ Trauma has a crucial role in development of pyomyositis, as it is found in 25-40% of the cases.⁹ The muscles

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most commonly affected include the extensor femoral muscle group (mainly quadriceps femoris), the outer hip muscles (namely the gluteus muscles) and the inner hip muscles, especially the psoas as well as the iliacus muscle.^{5,10} The abdominal rectus muscle pyomyositis is very rare and only one other case is referred in medical literature.⁶ In our case, this pathological condition could have been caused by hematogenous infection of an abdominal rectus muscle hematoma, as the patient correlated the initial pain at this location with strenuous muscle activity – lifting of a heavy object. Rectus sheath hematoma is a rare clinical condition that may occur after a spontaneous or a posttraumatic rupture of the epigastric vessels or the muscle fibers of the rectus abdominis muscle.¹¹ When the hematoma is located above the semilunar line of Douglas it is usually limited, because of the existence of the posterior wall of the sheath. If it is located below this line, it can result in peritoneal infiltration or extension to the contralateral side, becoming bilobular.^{12,13}

Predisposing factors to pyomyositis are diabetes mellitus, alcohol abuse, parenteral drug abuse, HIV infection, cancer, trauma and hematologic diseases. *S. aureus* is the most common causative organism isolated from blood or pus cultures.^{1,14,15} Other, rarely, isolated germs are *Streptococcus* group bacteria, *Escherichia coli*,

Salmonella species, *Mycobacterium tuberculosis* and other, as well as its combination.^{6,16,17} In our case, as referred above, a traumatic injury due to strenuous muscle activity was most likely the main predisposing factor. *Streptococcus constellatus* and *Prevotella disiens* were identified as the causative agents from blood cultures. This is the first case of *Prevotella disiens* reported in the literature.

S. constellatus belongs to the *S. anginosus* group (milleri group) along with *S. intermedius* and *S. anginosus*. These organisms are part of the human oropharyngeal microbiome and may be isolated from the throat, the nasopharynx, and the gingival crevices. They are also found in the gastrointestinal tract and in the vagina. *S. intermedius*, *S. constellatus*, and *S. anginosus* are recognized for their propensity to cause purulent tissue abscesses, intra-abdominal infections, pulmonary infections, bacteraemia, CNS infections, oral infections, and endocarditis. Bacteremia is usually attributable to a focus of infection within the gastrointestinal or upper respiratory tract. Suppurative metastatic abscesses are a significant complication of bacteremia, with *S. intermedius* and *S. constellatus* being more often associated with abscess formation than *S. anginosus*.¹⁸

Genus *Prevotella* are gram-negative, obligate anaerobic bacteria that constitute a major part of the normal flora of the mouth, gastrointestinal tract, and female genital tract and consist of pigmented and nonpig-

mented species. *P. disiens* and *P. bivia* (previously called *Bacteroides*) are two very common members of the non pigmented *Prevotella* and are important in obstetric and gynecologic infections. *P. bivia* and *P. disiens* have been isolated from blood, head and neck infections, GU tract infections in both males and females, and other sites of infection. *P. disiens* is commonly isolated from the urogenital tract.¹⁹ Isolates of *P. bivia*, *P. disiens*, *P. buccae*, *P. denticola*, and *P. nigrescens* have been found in blood-stream infections.²⁰

Pyomyositis usually presents as a subacute infection of a skeletal muscle, but may also present as a diffuse inflammatory or a rapidly progressing myonecrotic process as in our case. In the first (invasive) stage, the patient presents with muscle pain, pyrexia, and often weakness and the lab tests usually reveal mild leukocytosis, elevated inflammatory markers (e.g. CRP, ESR) and occasionally anemia. The second stage is characterized by marked oedema of the affected muscle and the patient presents signs of localized inflammation such as tenderness. In the third stage the systemic manifestations are severe; indeed our patient presented with a sepsis syndrome.

Toxic shock caused by a non-toxin producing strain of staphylococcus aureus and coma may develop.^{10,21}

X-rays are usually unremarkable. The diagnosis is established with an US imaging and verified by a CT scanning,^{8,10,13} which assessed the exact location and extension of

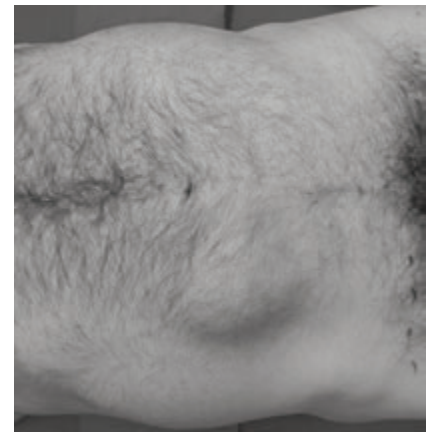


Figure 1. Swelling in the lower abdomen at the right abdominal rectus muscle, below the umbilicus.

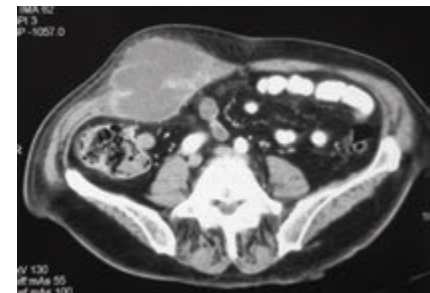


Figure 2. Abdominal computed tomography: abscess with diaphragms, inside the right abdominal rectus muscle below the umbilicus.

Table 1. Identification for both isolates (performed on automated BIOMÉRIEUX VITEK® 2 SYSTEM). Antimicrobial susceptibility test (AST) was performed: A) for isolate No 1: *Streptococcus constellatus* spp. *constellatus*, on automated BIOMÉRIEUX VITEK® 2 SYSTEM; B) for isolate No 2: *Prevotella disiens*, on SENSITITRE™ ANAEROBE PLATE FORMAT. Susceptibility to ampicillin, amoxicillin, Amoxicillin-clavulanic acid was inferred from susceptibility to benzylpenicillin. (<0.06: S) (EUCAST Clinical Breakpoint Table v. 5.0)

	<i>Streptococcus constellatus</i> spp. <i>constellatus</i> MIC	Cat	<i>Prevotella disiens</i> MIC	Cat
Amoxicillin				S
Amoxicillin/clavulanic acid		S		S
Ampicillin	≤0.25	S		S
Ampicillin/Sulbactam		S		
Benzylpenicillin	≤0.06	S	<0.06	S
Cefotaxime	0.25	S		
Cefoxitin			<1	S
Ceftriaxone	0.25	S		
Clindamycin	≤0.25	S	<0.25	S
Erythromycin	≤0.12	S		
Imipenem			<0.12	S
Levofloxacin	≤0.25	S		
Metronidazole			<0.5	S
Piperacillin/Tazobactam		S		S
Tetracycline	1	S		
Vancomycin	0.25	S		

the abscess and the condition of the rectus abdominis muscle. Differential diagnosis includes inflammatory abdominal disorders or abdominal tumors,²² and other disorders of the abdominal wall,²³ such as hematoma, tumors (desmoid, neurofibromas, sarcomas) and abscesses due to perforated diverticula. In our case, the diagnosis was confirmed with a CT scanning.

Pyomyositis therapy consists of surgical or radiologically-guided drainage of the abscesses, accompanied with broad-spectrum intravenous antibiotic therapy and management of accompanying diseases^{10,15,24} In our case, open drainage of the abscess under local anaesthesia was the therapy of choice, because the abdominal rectus muscle is located immediately beneath the skin, without any other tissues in between. Hyperbaric oxygen therapy (HBOT) in the treatment of pyomyositis, is referred only in one case of iliopsoas muscle pyomyositis with contribution, as an adjunct to antibiotic therapy, to the favorable outcome of the case.²⁵ Antibiotic therapy optimal duration has not been established. In our case the surgical drainage of abdominal rectus sheath abscess was done under antibiotic therapy simultaneous treatment. The antibiotic therapy was modified later in accordance with the result of pus culture.

Conclusions

In conclusion, pyomyositis of the abdominal rectus muscle is a very rare condition, but it must be suspected as a possible cause of acute abdominal rectus muscle pain, marked oedema, localized inflammation and pyrexia. Administration of antibiotics and early drainage of the abscess remain the cornerstone of therapy.

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