Orthopaedic Case of the Month

A 25-Year-Old Man with a Paramedian Painful Lump over the Anterior Chest Wall

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History and Physical Examination

A 25-year-old Indian man presented with a swelling of 3-weeks duration over the anterior aspect of his left chest (Fig. 1). The swelling was painful and associated with intermittent low-grade fever. It was insidious in onset and gradually progressive in size. There was no history of cough, hemoptysis, recent weight loss, anorexia, pruritus, seizures, or similar swellings elsewhere in the body. The swelling was not associated with any preceding history of trauma. His medical and family histories were noncontributory. The patient had visited a primary care physician who made the provisional diagnosis of muscular cysticercosis and referred the patient to our institution. On examination, the patient's vital signs were stable and there was no evidence of lymphadenopathy. His physical status was good. Local examination revealed a tender 5-cm × 3-cm hemispheric fluctuant mass located over the left

lower chest wall anteriorly near midline. Its margins were not well defined. Local temperature was increased. The overlying skin was freely mobile and there were no scars or sinuses. On attempted contraction of the upper abdominal muscles, there was no change in the size of the swelling; however, its side-to-side mobility became restricted, suggestive of a swelling arising in the muscle. The rest of the organ systems (respiratory system, abdomen, nervous system) appeared normal on clinical examination.

Laboratory examination revealed an increased leukocyte count ($13,400/\text{mm}^3$) and the differential count was 60 polymorphonuclear leukocytes, 35 lymphocytes, two monocytes, and three eosinophils. The erythrocyte sedimentation rate (53 mm at the end of the first hour) and C-reactive protein (10.3 mg/L) levels were increased. The sputum examination was negative for acid-fast bacilli. Enzyme-linked immunosorbent assay (ELISA) was negative for cysticercosis antibodies. The ELISA test for HIV I and II antibodies was negative. The patient's immune status was normal with no other focus of infection.

The patient underwent imaging studies and laboratory tests. Plain radiographs of the chest were normal. Ultrasound, CT, and MRI of the chest were performed.

Based on the history, physical examination, and imaging studies, what is the differential diagnosis?

Imaging Interpretation

Ultrasound examination revealed an oval hypoechoic lesion 5 cm × 3 cm × 2 cm in the substance of the left rectus abdominis muscle with increased echogenicity of adjacent muscle fibers suggestive of edema; however, there was no evidence of hyperechoic focus (suggestive of calcification or scolex) in the lesion. Doppler examination

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Each author certifies that his institution approved the reporting of this case report, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

This work was performed at Maulana Azad Medical College & associated Lok Nayak Hospital, New Delhi, India.

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Fig. 1 A clinical photograph of the patient shows the 5 × 3 cm cystic swelling in the left rectus abdominis near its proximal attachment (marked with pen).

Fig. 2 An axial contrast-enhanced CT scan of the lower thorax shows an enlarged left rectus abdominis muscle with a well-defined lesion with fluid attenuation material centrally (white arrow). The underlying ribs and rest of the soft tissue appear normal.

revealed no signs of intralesional vascularity. We planned to further examine the patient with other imaging modalities before performing needle aspiration.

Contrast-enhanced CT of the chest revealed an ovoid lesion in the substance of the left rectus abdominis with fluid attenuation material centrally (Fig. 2). There was no evidence of calcification and underlying ribs and lung parenchyma were unremarkable. MRI, using multiple pulse sequences, ie, T1-weighted, T2-weighted, and Short Tau Inversion Recovery (STIR), revealed a well-defined, round-to-oval soft tissue signal intensity lesion localized in the substance of the rectus abdominis on the left side measuring 5.5 cm × 3.5 cm × 2.5 cm in its greatest dimensions (Fig. 3) which was hyperintense on T2-weighted and

Fig. 3 An axial T1-weighted MR image shows an enlarged rectus abdominis muscle (white arrow).

Fig. 4 An axial T1-weighted fat-suppressed image obtained after administration of gadolinium contrast shows an enhanced lesion in the left rectus abdominis muscle (white arrow).

fat-suppressed inversion recovery images and showed heterogeneous enhancement after administration of gadolinium contrast (Figs. 4 and 5). There was modest surrounding edema; however, there was no osseous or pulmonary involvement. There was no evidence of any eccentric mural nodule in the lesion.

Differential Diagnosis

- Pyogenic abscess
- Parasitic cyst (cysticercosis, hydatid disease)
- Isolated tuberculous pyomyositis
- Myxoid neoplasm
- Crystal deposition disease (calcium hydroxyapatite or gout)
- Inflammatory arthritis of costochondral joint

Fig. 5 The sagittal T1-weighted image with fat suppression reveals a diffusely enhanced lesion in the superior aspect of the left rectus abdominis muscle (white arrows).

A fine-needle aspiration under ultrasound guidance was performed using the antigravity method. It yielded a scanty, thick, straw-colored aspirate that was submitted for pathologic examination. Based on the clinical history, physical examination, radiographic images, and histologic examination, what is the diagnosis and how should the lesion be treated?

Histopathologic Interpretation

Microscopic examination of the smear prepared from the aspirate revealed the presence of necrotizing epithelioid granulomatous reaction and Langhans giant cells (Fig. 6A–B). Acid-fast bacilli (AFB) were evident as bright red rods against a blue background on Ziehl-Neelsen staining (Fig. 6C). Polymerase chain reaction (PCR) for *Mycobacterium tuberculosis* was positive. A later culture also

Fig. 6A–C (A) Low-power (Stain, hematoxylin and eosin, original magnification, ×20) and (B) high-power photomicrographs (Stain, hematoxylin and eosin, original magnification, ×40) show the presence

of necrotizing epithelioid granuloma. (C) A high-power photomicrograph (Stain, Ziehl-Neelsen, original magnification, ×100) shows bright red acid-fast-bacilli against the blue background.

was positive for *Mycobacterium tuberculosis* (Bactec method).

Diagnosis

Isolated tuberculous pyomyositis of the rectus abdominis muscle.

Discussion and Treatment

Based on a fluctuant swelling, showing central attenuation on CT and hyperintense T2-weighted image sequence on MRI, we performed a needle aspiration that revealed necrotizing epithelioid granulomas and AFB suggestive of tuberculosis.

The differential diagnosis included pyogenic abscess, parasitic cyst, tuberculous pyomyositis, myxoid neoplasm, inflammatory arthritis, and crystal deposition disease. Although myxoid neoplasm, crystal deposition, and inflammatory arthritis were considered, imaging features were more consistent with an infectious etiology. Parasitic cysts are endemic in developing countries. Cysticercosis is caused by *Taenia solium* (pork tapeworm). Neurocysticercosis is the most common manifestation; muscles occasionally are involved. Serologic diagnosis using ELISA has not been satisfactory as false-negative results may occur [13]. We found no scolex on imaging studies. Myxoid tumors are a heterogeneous group of lesions characterized by abundance of extracellular mucoid matrix [13]. They show wide variability in biologic behavior, ranging from benign to locally aggressive or even malignant. In our patient, an incisional biopsy was not performed as such a biopsy might increase the risk of systemic dissemination in the event of a parasitic cyst. Inflammatory arthritis may manifest as costosternal pain and swelling but show radiographic features like reactive periostitis and hyperostosis [8]. Crystal deposition disorder may present as costosternal pain and swelling and display hyperostosis radiographically. These features were notably absent in our patient. Thus, the diagnoses of pyogenic abscess, parasitic cyst, myxoid neoplasm, inflammatory arthritis, or crystal deposition could be excluded by microscopy, culture, and PCR of aspirate that revealed tuberculosis.

Tuberculosis, caused by *Mycobacterium tuberculosis*, is a common infection in immunocompetent and immunocompromised hosts. It is known for its ability to present in various forms and guises at different sites [5]. Pyomyositis is the term used to describe a bacterial infection of skeletal muscle with formation of an abscess. Tuberculous pyomyositis is the least frequent location of extraspinal tuberculosis [22]. Isolated pyomyositis without a coexistent

active tuberculous lesion, especially in immunocompetent patients, may be considered even more rare as it usually is an extension of the abscess resulting from involvement of underlying or adjacent structures rather than by primary infection, lymphatic or hematogenous spread [4]. The reasons suggested for its rarity are high lactic acid concentration and paucity of reticuloendothelial tissue in muscles [16]. Isolated pyomyositis without associated osseous involvement has been reported [1–3, 7, 9, 10, 17, 18, 20, 21, 23, 24] (Table 1). Left untreated, the abscess may burst out resulting in chronic discharging sinus, muscle scarring, and, adherence to surrounding tissues causing functional compromise depending on the location.

The diagnosis may be delayed owing to its indolent course, nonspecific symptoms, and atypical presentation. The entity frequently is misdiagnosed as a soft tissue tumor [6, 9] or a posttraumatic muscle contusion [17]. Tuberculous pyomyositis occurs more frequently in immunocompromised patients with HIV infection, chronic renal failure, and those receiving cancer chemotherapy or corticosteroids [4, 11, 14, 15, 19]. Early diagnosis may be made using MR scans as MRI is superior to ultrasound or CT for detection and characterization of these lesions [1, 6, 16, 21, 22]. The small areas of relatively low signal intensity in the abscess on T2-weighted images represent debris and proteinaceous material [22]. Fat-suppressed STIR images and peripheral rim enhancement on T1-weighted images after administration of gadolinium contrast may help in differentiating the abscess from other soft tissue masses [6, 16].

The prognosis is good with appropriate surgical or nonsurgical methods of treatment depending on the individual case [1–3, 7, 9, 10, 17, 18, 20, 21, 23, 24] (Table 1). Antitubercular chemotherapy remains the mainstay of treatment. The goals of treatment include healing of the lesion, pain relief, and preservation of function. Drug penetration into the tubercular lesion in minimally inhibitory concentration should readily occur as muscle is a highly vascular tissue. We treated our patient with multi-drug antitubercular chemotherapy (isoniazid 5 mg/kg; rifampicin 10 mg/kg; pyrazinamide 25 mg/kg; ethambutol 15 mg/kg; along with pyridoxine 10 mg) for 6 months (2HRZE/4HR₃). His constitutional symptoms and pain subsided during the next 6 weeks and swelling gradually decreased over 6 months (Fig. 7). He was asymptomatic when last followed up at 12 months. Successful outcome with nonoperative treatment has been reported [17, 20], as in our patient. We believe surgical drainage may be reserved for recalcitrant cases not responding to medical management. It also may help in obtaining representative tissue for histopathologic examination in doubtful cases. Rarely, the swelling may produce concomitant pressure effects necessitating decompressive surgery [12]. Repeated

Table 1. Case reports of isolated tuberculous pyomyositis.

Study	Patient details and location of pyomyositis	Basis of establishing the diagnosis	Treatment
Plummer et al. [18]	20-year-old man, left gastrocnemius	Observation of bacilli in surgically evacuated material	Surgical excision, biopsy, roentgen ray therapy
Derkash and Makley [9]	20-year-old woman, right triceps	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, triple therapy for 12 months
Abdelwahab et al. [2]	20-month-old girl, right gluteal region	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 6 months
Abdelwahab and Kenan [1]	47-year-old woman, right brachialis and biceps brachii	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 6 months
Abu-Salem [3]	48-year-old man, left quadriceps femoris	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 6 months
Trikha and Gupta [23]	11-year-old boy, right biceps brachii	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT (duration not mentioned)
Dixit et al. [10]	7-year-old boy, rectus abdominis near its distal attachment	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 9 months
Baylan et al. [7]	20-year-old man, right forearm	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 12 months
Trikha et al. [24]	30-year-old woman, right vastus lateralis	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 12 months
Narang [17]	23-years-old man, right forearm muscles	Observation of bacilli from discharge	ATT for 9 months
Sabat & Kumar [20]	21-year-old woman, right rectus femoris	Clinicoradiologic correlation, observation of bacilli in needle aspirate	ATT for 6 months
Sen et al. [21]	23-year-old woman, 38-year-old woman, 32-year-old woman, forearm muscles	Observation of bacilli in surgically evacuated material	Surgical drainage, biopsy, ATT for 12 months
Current study	25-year-old man, rectus abdominis near its proximal attachment	Clinicoradiologic correlation, observation of bacilli in needle aspirate	ATT for 6 months

ATT = Antitubercular therapy.

Fig. 7 A CT axial section obtained at the 6-month followup shows the healing response and resolution of the lesion in the left rectus abdominis muscle (white arrow).

aspirations with injection of streptomycin may be used for large abscesses to reduce discomfort and for faster healing [25].

The present case highlights the fact that the atypical presentations of common diseases are more common than typical presentations of uncommon diseases. The diagnosis of tuberculosis must be considered for any unexplained swelling of the soft tissues even in the absence of osseous involvement, especially for patients from endemic regions.

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