CLINICAL CASE - TEST YOURSELF Chest

Diabetic patient with painful swelling of the shoulder and arm

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PART A

A 42-year-old female patient with known type II diabetes mellitus presented to the Emergency Department with significant swelling and increasing pain of the right shoulder-arm radiating to the axillary fossa and lateral chest wall. She had had the pain for 20 days. Fever (temperature 37.8°), significant swelling and signs of infection in the painful arm were noted on clinical examination. The laboratory tests were in keeping with sepsis with leukocytosis (WBC 30,000) and consequent diabetic ketoacidosis (blood glucose 420 mg/dL, pH 7,189, HCO_3 7.8 mmol/L). An emergency CT scan of the chest-right shoulder was ordered. **(Fig. 1-5)**.

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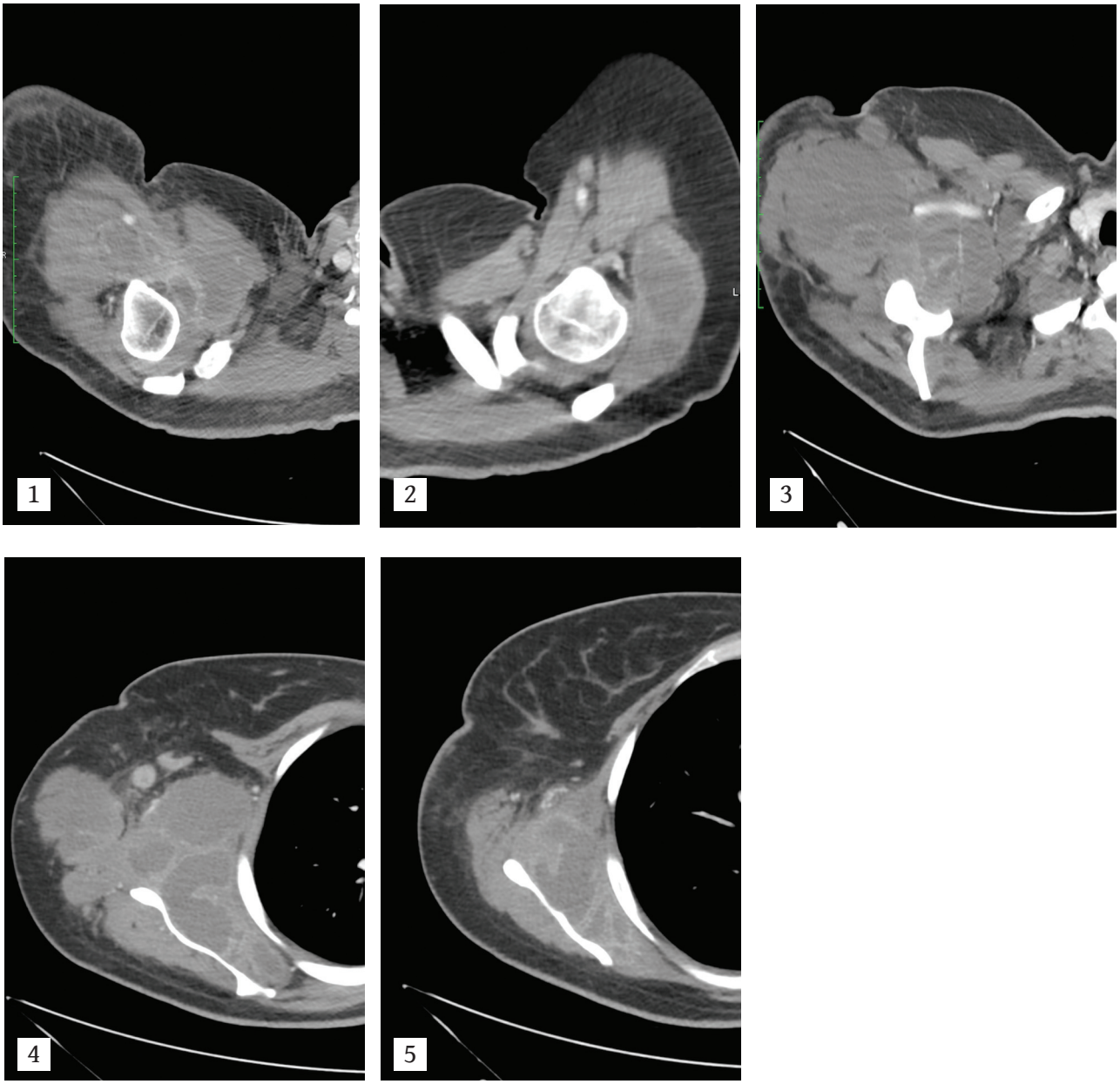

Fig. 1 - 5. *Consecutive contrast enhanced CT images*

PART B

Diagnosis: Primary pyomyositis with extensive, bilateral-multifocal muscle involvement

Primary pyomyositis (also known as tropical myositis, infectious myositis) is a rare clinical entity of subacute skeletal muscle infection, usually as a result of transient bacteremia rather than direct extension from an adjacent soft-tissue infection [1-4].

Although once considered a tropical disease, pyomyositis is an emerging disease in temperate climates as well and may prove life threatening if left untreated, as it gradually but quite rapidly progresses from diffuse inflammation of the muscles to focal abscess formation and finally to toxicity and sepsis [1-4].

The most common pathogen causing pyomyositis is Staphylococcus aureus which is seen in >75% of cases. Less common infectious agents are other bacteria (including mycobacteria), viruses, fungi and parasites [4].

Pyomyositis is most commonly seen in young adults with underlying medical conditions such as human immunodeficiency virus (HIV) infection, malignancies, diabetes mellitus, malnutrition and autoimmune diseases or a history of intravenous drug use. Other predisposing factors of pyomyositis include strenuous physical activity or rhabdomyolysis and muscle trauma with a hematoma acting as a nidus for infection [1, 4].

In terms of location, pyomyositis most commonly involves the largest muscle groups around the pelvic girdle and lower extremities such as the quadriceps, gluteal and iliopsoas muscles, while the muscles of the shoulder, arm, forearm and chest wall represent more unusual sites of infection. Historically, an iliopsoas abscess was related to tuberculosis, but today iliopsoas pyomyositis is most commonly secondary to urinary tract or gastrointestinal infection [1]. A single muscle is most commonly affected in pyomyositis, but multiple site involvement is not rare (11-43%) [1, 4].

There are three distinct and consecutive stages of pyomyositis:

1. the invasive stage characterized by muscle edema and pain;
2. the suppurative stage with intramuscular abscess formation and fever; and
3. the late stage of septic state, which is potentially lethal. Characteristically, 90% of cases are diagnosed in the suppurative phase [1].

Pyomyositis typically has a subacute clinical course, while the clinical presentation may be subtle and misleading. Therefore, a high clinical suspicion of the disease is very important for a prompt diagnosis [4,5].

Differential diagnosis of pyomyositis includes other types of musculoskeletal infections seen in the emergency department from superficial infections such as cellulitis to necrotizing fasciitis, osteomyelitis or infectious arthritis [6].

In the diagnostic work up of pyomyositis laboratory exams are rarely helpful or specific for pyomyositis. Imaging on the other hand plays a very important role, which in an appropriate clinical setting may lead to a prompt and accurate diagnosis [1].

On an emergency basis Computed Tomography (CT) proves an invaluable imaging tool, widely available, fast, with high spatial resolution and multiplanar reformatting capabilities [6,7]. CT findings suggestive of pyomyositis include asymmetric enlargement and decreased attenuation of the affected muscles with effacement of surrounding fat planes. Rim-enhancing intramuscular abscesses on contrast enhanced studies is the hallmark of pyomyositis. Disproportionate muscle involvement compared to subcutaneous tissue involvement is useful in distinguishing pyomyositis from cellulitis, while the absence of subcutaneous gas or necrotic muscle areas seen in necrotizing fasciitis favors the diagnosis of pyomyositis [6]. CT has overall higher sensitivity in detecting soft tissue gas [7]. Moreover, CT is particularly helpful in guiding percutaneous abscess drainage, thus contributing to successful treatment along with the appropriate antibiotic therapy [6].

Magnetic Resonance Imaging (MRI) represents the mainstay imaging tool for soft tissue infection due to its high spatial and contrast resolution, providing excellent anatomical information [7]. Particularly in cases of pyomyositis, MRI enables early recognition of the disease as well as precise evaluation of the extent and degree of infection. Diffuse enlargement of the affected muscles in the early stages, increased T2 signal due

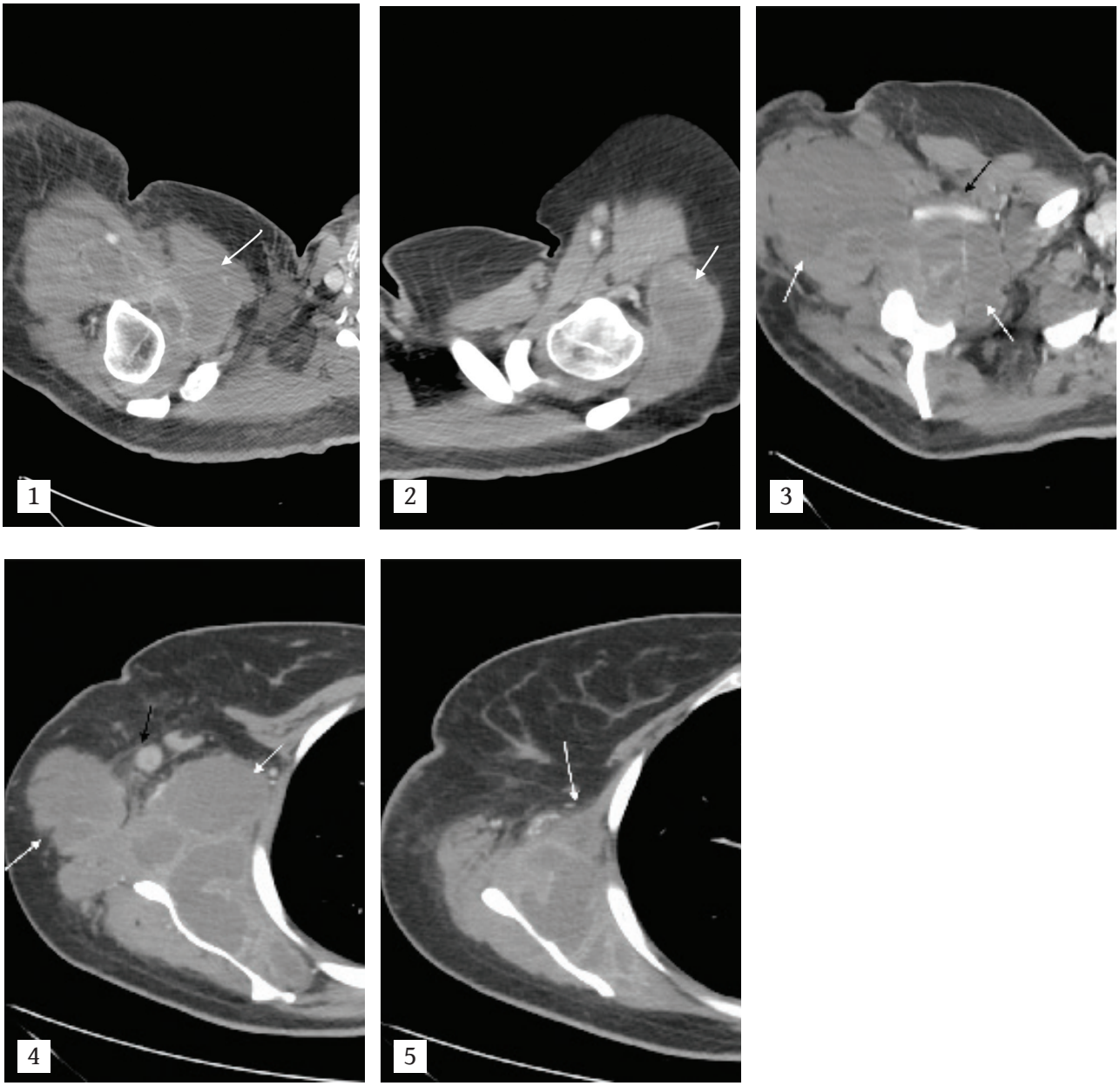

Fig. 1. Contrast enhanced CT showing diffuse enlargement and decreased attenuation of the muscles around the right shoulder and arm (pectoralis minor, deltoid and biceps) with peripherally enhancing intramuscular fluid collections consistent with abscesses (arrow). Findings in keeping with multifocal pyomyositis. Swelling of the right arm and subcutaneous edema-inflammatory changes are also noted

Fig. 2. Enlargement of the left deltoid muscle with peripherally enhancing abscesses (arrow). Bilateral multifocal pyomyositis

Fig. 3. Diffuse enlargement of the muscles (mainly subscapularis and latissimus dorsi) with intramuscular abscesses (white arrows). Right axillary artery (black arrow) is anteriorly displaced

Fig. 4. Enlargement of the muscles (latissimus dorsi and subscapularis) with several sized, peripherally enhancing abscesses within the subscapularis muscle (white arrows). Reactive axillary lymphadenopathy (black arrow)

Fig. 5. Pyomyositis noted in serratus anterior and intercostal muscle (arrow)

to edema and peripherally enhancing intramuscular fluid collections with low-intermediate T1 and high T2 signal are typical findings of pyomyositis [7-10]. Osseous changes due to adjacent inflammatory process may be also evaluated on MRI [7].

Ultrasonography (US) may be also used when pyomyositis is suspected demonstrating a bulky muscle with abnormal echotexture and hypoechoic intramuscular areas suggestive of fluid collections, which may be percutaneously aspirated under US guidance [1].

The treatment of pyomyositis depends on the stage of the disease. Early stages of infection may be effectively treated with appropriate antibiotic therapy, while in cases of intramuscular abscess formation the treatment of choice includes CT or US guided percutaneous drainage followed by intravenous administration of the appropriate antibiotics. Complete recovery is therefore achieved and no long-term sequelae is noted in the vast majority of cases [1, 4].

Our patient represents an unusual case of pyomyositis in terms of multifocal and uncommon muscle group involvement. The clinical presentation of the patient was subacute, though in combination with the underlying history of diabetes mellitus and the laboratory findings of sepsis, diagnosis of pyomyositis was highly suspected. CT on an emergency basis revealed typical findings of the disease with asymmetric muscle and arm enlargement and multiple, several sized intramuscular abscesses in the upper extremities bilaterally (**Fig. 1-5**). The wide extent of the disease and the multifocal, bilateral involvement was very well appreciated and other severe and life-threatening clinically suspected conditions such as necrotizing fasciitis were excluded. Furthermore, on the basis of CT findings, CT guided percutaneous drainage was decided and performed by placing three 8Fr pig tail catheters in the larger collections with complete drainage of the pus 9 days later. Methicillin-Resistant Staphylococcus aureus (MRSA) was isolated on pus cultures and appropriate intravenous antibiotic therapy was administered. Our patient massively improved after drainage of the abscesses with excellent post-procedural recovery.

In conclusion, in cases of clinically suspected pyomyositis in the emergency department CT proves to be an invaluable, fast diagnostic tool showing the extent of the disease with major contribution to the management and therapy by guiding percutaneous drainage procedures. **R**

Conflict of interest:
The authors declared no conflicts of interest.

KEY WORDS diabetes; pyomyositis; Computed Tomography

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