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Case Report

Primary sternal osteomyelitis mimicking a neoplastic growth

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ABSTRACT

Chronic osteomyelitis usually present as bony growth but it can rarely present as a soft tissue growth mimicking neoplasm and is usually diagnosed by the combination of radiology and microbiology. This is a case report of an adult male who had chronic osteomyelitis mimicking a neoplastic growth of soft tissue. CT scan showed soft tissue mass mimicking a soft tissue tumor but microbiology test and MRI confirmed the diagnosis of chronic osteomyelitis.

Keywords: Sternal osteomyelitis, Sternal neoplasm

INTRODUCTION

Chronic osteomyelitis usually present as bony growth but it can present as a soft tissue growth mimicking neoplasm. Chronic Inflammatory lesions of the bone can present as bone tumor, hematological malignancy, soft tissue tumors, rhabdomyosarcoma and Langerhans cell histiocytosis.[1] Osteomyelitis involving sternum is an even more rare clinical entity and presents as a sternal mass which has broad differential diagnosis including malignant and inflammatory causes and can present a diagnostic challenge.

In this report, we present a case of a 37 years old male who presented with a 6-months history of upper anterior chest wall mass causing pain radiating to left arm. Our patient is diagnosed with primary sternal osteomyelitis following work up and appropriately treated with antibiotics and debridement.

CASE REPORT

A 37 years old male presented with anterior chest wall pain and swelling. He also had some cough, but no fever, chills, shortness of breath or hemoptysis. He did have a history of illicit drug use but denied any iv drug use that was confirmed on his prior UDS. On examination, he was afebrile and the vitals were stable.

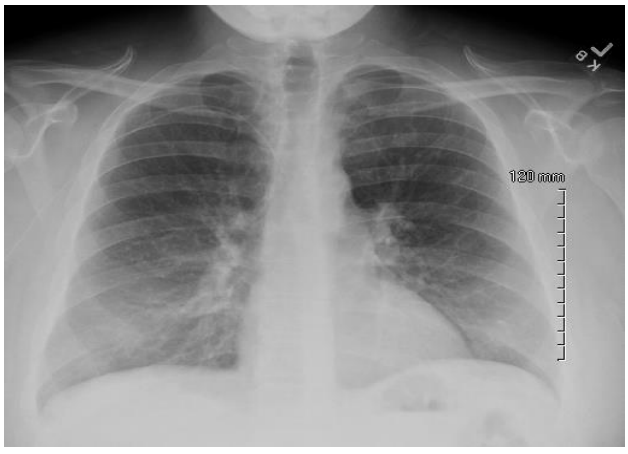

Figure 1: CXR shows no acute cardiopulmonary disease.

CXR was unremarkable (Figure 1) but CT scan of the thorax showed a poorly defined soft tissue mass ventral to the sternal manubrium extending into the medial left

pectoral musculature measuring approximately 8.0 cm x 3.0 cm x 4.1 cm with associated erosive or destructive change involving the superior aspect of the left sternoclavicular joint (Figure 2).

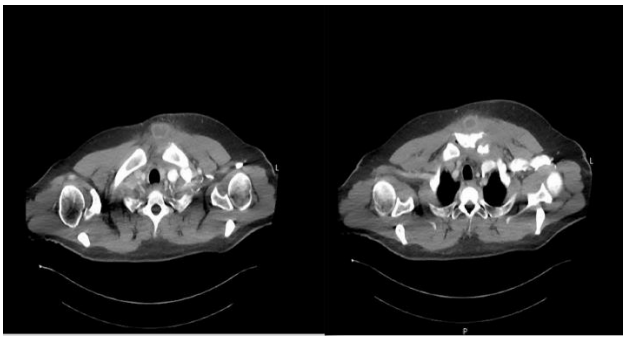

Figure 2: CT chest with contrast revealed a poorly defined soft tissue mass ventral to the sternal manubrium.

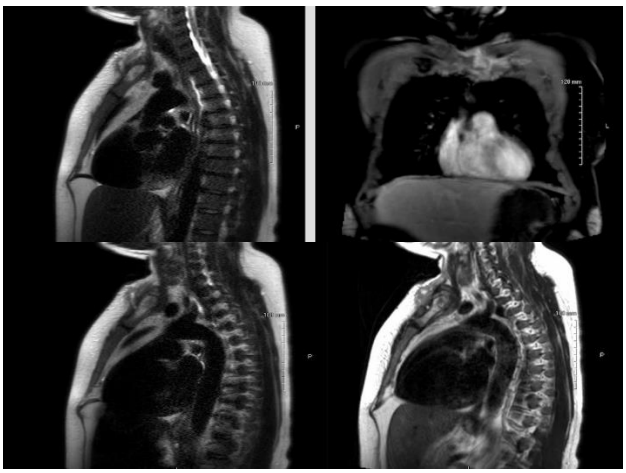

Figure 3: MRI chest with contrast revealed bone destructive changes of left sternoclavicular joint with adjacent soft tissue inflammation and a rim enhancing fluid collection suggestive of left sided sternoclavicular osteomyelitis.

An FNA was done on the mass which drained 6 cc of dark red and thick fluid showing clusters of inflammation with a background of stray squamous cells, necrosis and red blood cells. An incisional biopsy of the mass showed portions of fibro adipose tissue exhibiting dense fibrosis with mixed inflammation. In the meantime, one set of his blood culture grew Staph aureus sensitive to methicillin. His drainage culture also grew the same organism. He was initially started on Clindamycin iv as he was found to have a severe allergic history to penicillin for possible abscess. Due to lack of improvement in pain, an MRI of the chest was ordered which revealed bone destructive changes of left sternoclavicular joint with adjacent soft tissue inflammation and a rim enhancing fluid collection suggestive of left sided sternoclavicular osteomyelitis with a phlegmon and a small abscess anterior to the sternum and sternoclavicular joint mildly indenting the left subclavian vein (Figure 3). He was started on Vancomycin IV for 2 weeks followed by Doxycycline PO for a total of 6 weeks. He remained afebrile and hemodynamically stable throughout the course and was discharged in a stable condition.

DISCUSSION

Chronic osteomyelitis is a disease of insidious onset and it usually affects children and young adults. It mostly involves metaphysis of long bones in children but in adults, the major sites of involvement are vertebrae, pelvic bones and sternoclavicular bones.[2] Long bones involvement is also seen but is less common.[3] Primary sternal osteomyelitis accounts for 0.3% cases of all osteomyelitis.[4] Between year 1926 and 1989 only 57 cases of primary sternal osteomyelitis have been reported.[5] However, last 2 decades have seen a rise in the incidence of primary sternal osteomyelitis, mainly due to rise in the risk factors.

Routes of infection in osteomyelitis can be hematogenous, infection from adjacent joint or tissue, direct inoculation due to trauma. Osteomyelitis usually begins in bone diaphysis in adults but can spread to medullary canal. If the infection penetrates the bone cortex, it can lead to soft tissue abscess and mimic a soft tissue growth.[6] The mechanism of bacterial penetration in metaphyseal vessels is unclear. Most of the times the hematogenous osteomyelitis is monomicrobial and most common organism is *staphylococcus aureus*. Additionally, the predominance of *staphylococcus aureus* in osteomyelitis is due to its adherence to bone tissue by binding to its proteins as fibronectin, collagen and fibrinogen.[7] *Pseudomonas aeruginosa* is commonly implicated in osteomyelitis occurring in IV drug users.

The patient with chronic osteomyelitis usually presents with recurrent episodes of bone pain, limited range of motion, and adjacent soft tissue swelling. When involving sternum, osteomyelitis usually follows a subacute course, and has insidious and gradual progression; diagnosis requires a high degree of suspicion and identification of the risk factors. A delay in diagnosis may occur since the condition is so rare.

The diagnosis of osteomyelitis is usually made by radiographic imaging supported by culture data and laboratory evaluation. The lab evaluation for suspected osteomyelitis involves WBC count, ESR, CRP, and blood culture. First imaging modality should be plain radiograph. However, X-ray imaging may not show any changes until advance stages of the disease. Computed tomography (CT) with IV contrast is more sensitive to assess bone and periosteal soft tissue involvement.[8] CT is superior to MRI in detecting bone changes but less sensitive than MRI in detecting the soft tissue changes. MRI not only delineates the extent of cortical destruction in osteomyelitis but also tells about the involvement of bone marrow and periosteal soft tissue. IV contrast is

useful to distinguish between phlegmon, soft tissue abscess, necrotic tissue, and neoplastic growth. Spiral CT scan with 24-32s acquisition is extremely valuable in detecting osteomyelitis involving sternoclavicular joint.[9] If the initial imaging with CT is negative, and the degree of suspicion is high, bone scan and gallium scan may show high sternal uptake.[10] Confirmation of diagnosis mandates FNA and biopsy to identify the causative organism and histopathological examination and guide antimicrobial therapy.[4]

Treatment options for osteomyelitis can be both medical and surgical. When used early during the disease, IV antibiotic treatment alone may suffice and leads to complete resolution in localized disease and may decrease the need for surgical intervention.[11] Surgical options include debridement of necrotic tissue, abscess drainage, and removal of infected prosthetic devices. Initially broad-spectrum antibiotics are used which can later be tailored to culture and sensitivity results. Treatment of choice for methicillin-sensitive *Staphylococcus aureus* (MSSA) is IV-beta lactams. Most of the case of MSSA bone infection are penicillin resistant so it is generally treated with IV-Nafcillin/Oxacillin/Flucloxacillin. IV route is preferred as desired serum drug levels can't be achieved with the use of oral agents due to limited oral bioavailability. In cases of severe allergy to penicillin, IV Vancomycin is used. Another choice is Clindamycin which has excellent bone penetration. Vancomycin is also the drug of choice for methicillin-resistant *Staphylococcus aureus* (MRSA). Fluoroquinolones are an excellent choice for the treatment of gram-negative infections because of their high bone penetration, even with oral administration.[12]

Surgical treatment has been extensively described in literature for treatment of primary sternal osteomyelitis. Combining surgical treatment provides a more definitive treatment and reduces morbidity and is more cost effective.[13] Surgical treatment involves complete resection of anterior periosteum and infected bone. Posterior periosteum may be spared if not infected to save mediastinal integrity.[13] Large sternal resection may be carried out in stages to preserve chest wall stability. Following debridement rotational muscle flaps involving pectoralis major, rectus abdominis, latissiums dorsi or omentum may be used to fill large defects.[4] Using hyperbaric oxygen therapy has also been reported in successful treatment of PSO.[14]

CONCLUSION

Diagnosis of osteomyelitis requires both radiological and microbiological evidence to avoid any confusion since it can require prolonged and specific antibiotic treatment. If osteomyelitis mimics a soft tissue growth on CT scan, the MRI should be obtained as it is more useful in differentiating between different soft tissue growths. Selection of antibiotics in osteomyelitis depends on its ability to penetrate the bone and its activity against the isolated organism. Sternal Osteomyelitis is a rare entity and frequently presents sternal mass which has broad differential diagnoses.

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