

Primary sternal tuberculous ulcer with dissemination to the bone marrow: a clinical rarity

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Primary tubercular osteomyelitis of the sternum with dissemination to bone marrow is a rarely described entity even in countries where tuberculosis is endemic. Delayed presentations can be in the form of sinus formation, spontaneous fracture of the sternum, extrasternal spread, and sepsis. Diagnosis can be made by CT of the chest wall and Ziehl–Neelsen staining of aspirate from the lesion or by tissue biopsy. We present a case of tuberculous osteomyelitis of the sternum with sinus formation along with widespread involvement of bone marrow, which was successfully treated with antituberculous therapy. Sternal osteomyelitis is difficult to diagnose on chest radiography and ultrasonography, but we were able to make the probable diagnosis of sternal tuberculous osteomyelitis. CT showed erosion of part of the sternal bone. Diagnosis was confirmed on histopathology and by bone marrow trephine biopsy. During the follow-up period of 3 months, the patient showed a satisfactory response to treatment.

Sternal tuberculous osteomyelitis is exceedingly a rare entity and still rarer is coexisting bone marrow dissemination of tuberculosis (TB). Kelly and Chetty, in their review, reported only 6 cases of tuberculous sternal osteomyelitis in the period from 1926 to 1985.¹ The incidence of primary osteomyelitis of the sternum accounted for only 0.3%-1.8% of all cases of osteomyelitis.¹ In our search in the world English literature, we found fewer than 35 cases of primary sternal TB.^{2,3} TB remains a formidable challenge to health care providers in the developing countries. In our case, diagnosis was made on a clinical, radiological, and histopathological basis, and subsequently confirmed by acid fast bacilli (AFB) stain and culture along with polymerase chain reaction (PCR). We were not able to find any reported case of tuberculous sternal osteomyelitis with bone marrow dissemination in a search of the world literature.

CASE

A 65-year-old male patient reported with a discharging ulcer, which was present over the lower part of the

sternal region since 5 months previously. There was a history of pain and swelling in the lower sternal part of the chest in the preceding 6 months, which led to the formation of pus. The pain was dull and aching in nature and had started insidiously, which worsened with time. It was nonradiating and got relieved temporarily by anti-inflammatory medications. The patient underwent incision and drainage from a private practitioner, but there was no improvement and it led to the formation of ulcer with pus discharge. There was no history of trauma, loss of appetite, or weight loss. There were also no complaints of cough and fever. There was no history of diabetes mellitus, TB, or hypertension. The patient did not reveal any family history of TB. He had been a chronic smoker for 30 years.

On local examination, there was a 3×2 cm oval ulcer over the lower part of the sternum, with irregular margins. The floor was covered by granulation tissue with minimal slough and pus discharge (**Figure 1**). It was fixed to the underlying structures. The surrounding skin was erythematous. The patient also had vitiligo over the chest. On palpation and percussion, tenderness



Figure 1. An ulcer seen over the lower sternal area with pus discharge and red tissue.



Figure 3. Non-contrast-enhanced computed tomography showing cortical erosion of sternum (arrow) with soft tissue sinus.

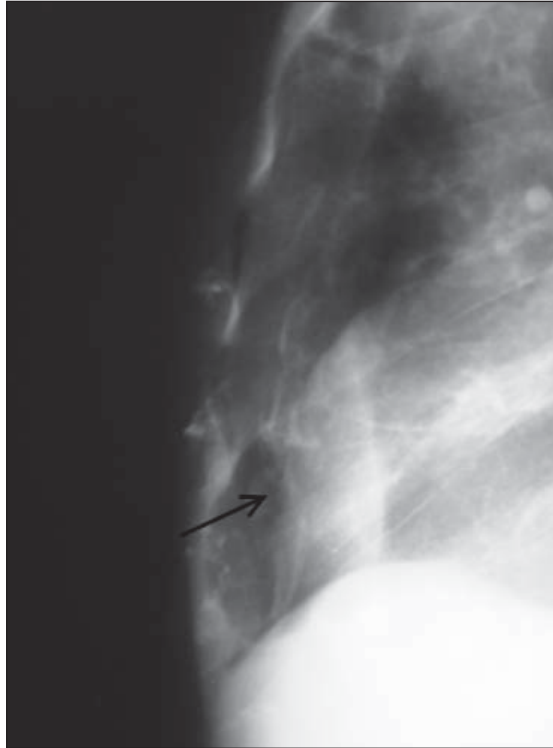


Figure 2. Radiograph (lateral view) of the sternum showing erosion in the lowermost part (arrow).

was present over the sternum. However, there was no tenderness over the spine in the thoracic region. The movements of the spine were within normal limits. There was no lymphadenopathy. The abdomen was soft and nontender without any organomegaly. The remaining systemic examination was normal. His hemoglobin was 7.0 g/dL (normal range, 10-12 g/dL) with raised a erythrocyte sedimentation rate of 75 mm/h and the rest of the blood tests were normal. Mantoux and HIV tests were negative.

On chest radiography, the anteroposterior view was normal, while the sternum lateral view revealed irregular erosion with a fuzzy anterior cortex, suggestive of osteomyelitis of the lower part of the sternum (**Figure 2**). Ultrasonography (USG) revealed a sinus track extending to the sternal region with erosion of the cortex. High-resolution CT of the chest showed erosion of the anterior cortex of the xiphisternum with thickened and inflamed overlying tissue, suggestive of chronic osteomyelitis of the sternum and sinus formation (**Figure 3**). The lungs were normal and there was no lymphadenopathy. Based on radiologic findings and endemicity of TB, a provisional diagnosis of sternal TB was made. While performing the biopsy, two sinuses were seen over the sternal region, a distance of 1.6 cm from each

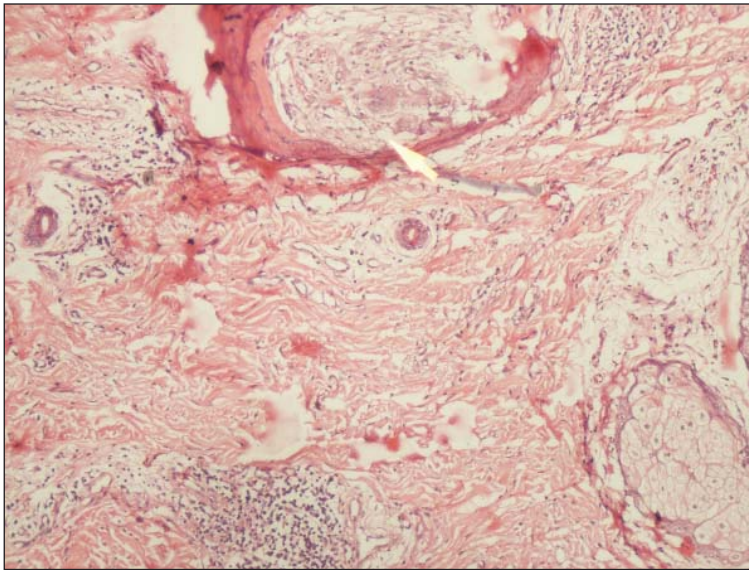


Figure 4. Photomicrograph of the ulcer revealing subcutaneous tissue with bony fragment showing granulomatous infiltrate of epithelioid cells and Langhans giant cells (Hematoxylin and eosin stain, $\times 100$).

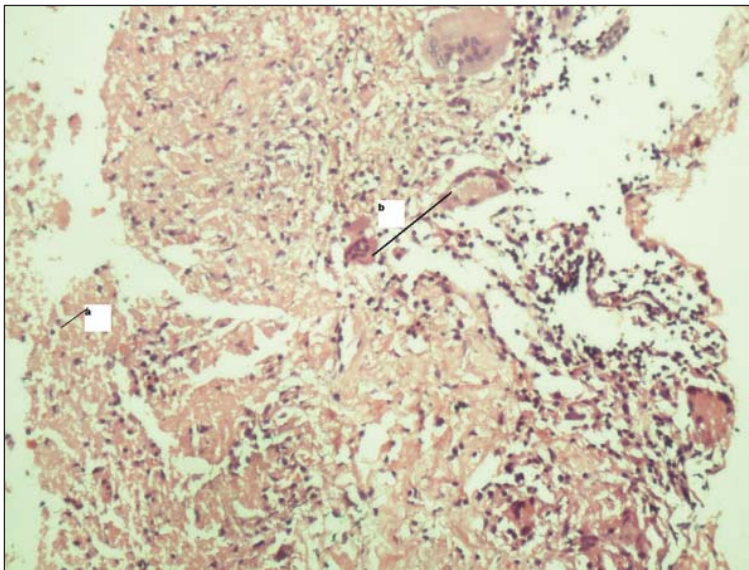


Figure 5. Photomicrograph showing caseation necrosis on the left (a) to the right and above are Langhans giant cells (b) (Hematoxylin and eosin stain, $\times 1000$).

other. Histopathologic examination revealed granulomatous infiltrate with epithelioid cells, lymphocytes, plasma cells, and Langhans type of giant cells (**Figure 4**). A diagnosis was made of sternal TB and a Ziehl-Neelsen stain for AFB, and PCR including culture was positive. On trephine bone marrow biopsy, similar infiltrates were seen in the bone marrow, suggesting disseminated bone marrow TB (**Figure 5**). The patient was given intravenous ofloxacin (100 mg twice per day) and

amikacin (500 mg twice per day) for 7 days. The patient was also started on antitubercular drugs: isoniazid, rifampicin, ethambutol, and pyrazinamide. After 6 weeks of therapy, discharge and erythema decreased and his hemoglobin was increased to 9 g/dL. After 3 months, the sinus had healed completely. He was advised to complete his antitubercular course. After 3 months, the sinus had healed completely (**Figure 6**).

DISCUSSION

TB is a public health problem worldwide. Between 19% and 43% of the world's population shows evidence of being infected with *Mycobacterium tuberculosis*. Osteomyelitis of the sternum is a very rare manifestation of TB, along with dissemination to other parts of the skeleton involving the bone marrow. TB of bones and joints accounts for 1% to 3% of patient and isolated sternum TB, representing less than 1% tubercular osteomyelitis.⁴ Less than 35 cases have been reported so far in the world literature.^{2,3,5,6} We made a diagnosis of sternal osteomyelitis based on radiography and USG findings. Histopathology was suggestive of sternal TB, which was confirmed by PCR, AFB stain, and culture. There was evidence of dissemination in the form of involvement of the bone marrow on bone marrow biopsy.

Tubercular sternal osteomyelitis is usually caused by reactivation of latent loci formed during hematogenous or lymphatic dissemination of primary TB.⁷ Direct extension from the contiguous mediastinal lymph nodes can also occur.⁸ Unlike pyogenic sternal infections characterized by more rapid and fulminant course, tubercular sternal osteomyelitis usually presents as indolent swelling and pain over the sternum.⁹ Sternal tubercular osteomyelitis can lead to secondary infection, fistula formation, spontaneous fractures of the sternum, compression or erosion of the large blood vessels, compression of the trachea, and/or migration of tuberculous abscess into the mediastinum, pleural cavity, or subcutaneous tissues.

Concomitant extrasternal tubercular involvement was described in 8 out of 20 cases reviewed by McLellan et al.⁹ These included mediastinal lymph nodes, paraspinal abscess, and pulmonary involvement. We could not find any extrasternal source of infection in our case. A definitive diagnosis can be made by histopathologic study. CT of the chest, apart from the evaluation of the sternum, is also helpful in detecting any pulmonary or mediastinal involvement, which may be missed on a plain chest radiograph.^{8,9} A CT scan of the tubercular chest wall described a characteristic ring enhancing the hypodense soft tissue lesion.¹⁰ CT chest demonstrated a soft tissue mass in the anterior mediastinum, eroding the cortex of the manu-

brium.¹¹ Magnetic resonance imaging is helpful in picking up bone marrow involvement and peristernal soft tissue changes with evaluation of sternal TB.¹² Tuberculous osteomyelitis is characterized by low signal replacement of the normal marrow fat signal on T1-weighted images, with high signal intensities on T2-weighted images and enhancement on T1-weighted images.

In addition to TB, the differential diagnosis of the chest wall sinuses includes pyogenic infections, malignancy, sarcoidosis, actinomycosis, and fungal disease.⁸ Fine-needle aspiration cytology or needle biopsy is useful to confirm the presence of TB or exclude other conditions. There is no consensus on the optimal treatment of sternal TB. Although some authors suggest that medical treatment alone is effective, others believe that aggressive debridement with primary closure as an adjunct to chemotherapy is needed to prevent recurrence or the formation of a draining sinus. In our case, the patient was treated successfully with multidrug therapy alone.

In conclusion, surgeons should be aware that initial negative microbiology results do not preclude a diagnosis of M tuberculosis. We concluded that, if the patient complains of a nonhealing ulcer, without any cough, fever, or other symptoms, then a thorough investigation should be done to rule out TB, as our patient was diagnosed after 5 months of complaints.



Figure 6. Gross appearance of the healed sinus over the sternal region after tubercular therapy.

A CT scan defines the extent of the thoracic extension, and standard microbiologic methods diagnose this entity. Bone marrow aspiration should be added to routine examinations because of its high sensitivity in detecting TB. It should be first treated by medical treatment only, and if disease is not resolved, surgery is indicated. However, in our case success was achieved with conservative treatment alone.

REFERENCES

1. Kelly CA, Chetty MN. Primary sternal osteomyelitis. *Thorax* 1985;40:872-3.
2. Gopal K, Raj A, Rajesh MR, Prabhu SK, Geothe J. Sternal tuberculosis after sternotomy for coronary artery bypass surgery: A case report and review of the literature. *J Thorac Cardiovasc Surg* 2007;133:1365-6.
3. Wang TK, Wong CF, Au WK, Cheng VC, Wong SS. *Mycobacterium tuberculosis* sternal wound infection after open heart surgery: A case report and review of the literature. *Diagn Microbiol Infect Dis* 2007;58:245-9.
4. Watts HG, Angles L, Lifesto RM. Current concepts review: Tuberculosis of bones and joints. *J Bone Joint Surg Am* 1996;78:288-98.
5. Ekingen G, Guvenç BH, Kahraman H. Multifocal tuberculosis of the chest wall without pulmonary involvement. *Acta Chir Belg* 2006;106:124-6.
6. Zhao X, Chen S, Deanda A Jr, Kiev J. A rare presentation of tuberculosis. *Am Surg* 2006;72:96-7.
7. Fadiran OA, Akintan B, Oluwale SF. Tuberculous orchitis co-existing with tuberculosis of the sternum: A case report. *Cent Afr J Med* 1999;45:45-7.
8. Bohl JM, Janner D. *Mycobacterium tuberculosis* sternal osteomyelitis presenting as anterior chest wall mass. *Pediatr Infect Dis J* 1999;18:1028-9.
9. McLellan DGJ, Philips KB, Corbett CE, Bronze MS. Sternal osteomyelitis caused by *Mycobacterium tuberculosis*: Case report and review of literature. *Am J Med Sci* 2000;319:250-4.
10. Khalil A, Le Breton C, Tassart M, Korzec J, Bigot J, Carotte M. Utility of CT scan for the diagnosis of chest wall tuberculosis. *Eur Radiol* 1999;9:1638-42.
11. SuvasiniSharma, Monica Juneja and Anju Garg. Primary tubercular osteomyelitis of the sternum. *Indian J Pediatr* 2007;17:709-10.
12. Atasoy C, Oztekin PS, Ozdemir N, Sak SD, Erden I, Akyar S. CT and MRI in tuberculous sternal osteomyelitis: A case report. *Clin Imaging* 2002;26:112-5.