IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 4 Ser. 1 (April. 2025), PP 01-05
www.iosrjournals.org

Primary Sternal Tubercular Osteomyelitis: A Case Report And Discussion On A Rare Cause Of Chest Pain

Vijaya R Kamble, Mansi Chauhaan
(Department Of Radiology, Sharda University Greater Noida, India)
(Department Of Radiology, Sharda University Greater Noida, India)

Abstract:
Tuberculosis is known to have impacted people since thousands of years. [1]
India has a significantly high burden of TB which has been greatly affected by the COVID-19 pandemic. [2] While tuberculosis can affect any organ, it most commonly involves the lung parenchyma. Only 10%–14% of all cases of tuberculosis are reported to be extrapulmonary. [3]
Additionally, skeletal infections make up a proportion of about 1 to 5% within the spectrum of tuberculosis. The primary locations affected are often the vertebral column, followed by crucial weight-bearing joints like the knees and hips in the body. [4] Tubercular osteomyelitis affecting the sternum is an infrequent occurrence in extrapulmonary tuberculosis, even in nations grappling with a substantial burden of the disease. [5,6]
In the context of tuberculosis affecting bones and joints, involvement of the sternum is seen in merely 1-2% of the total cases therefore limited literature is available since only a handful of cases have been reported. [7,8]
We present a case of tuberculosis affecting the sternum in a 20-year-old male patient who reported a one-month history of chest swelling. Radiological findings (USG, CT, MRI) were prospectively correlated with histopathological examination for further confirmation of Tubercular etiology as the likely cause of Osteomyelitis. This allowed timely intervention thereby preventing further spread of infection.

Date of Submission: 22-03-2025 Date of Acceptance: 02-04-2025

I. Introduction

Tuberculosis is known to have impacted people since thousands of years. [1]

While tuberculosis can virtually involve any organ, it most commonly involves the lung parenchyma. Only 10%–14% of all cases of tuberculosis are reported to be extrapulmonary.[3] Furthermore, skeletal infections are documented in 1 to 5% of all tuberculosis instances, predominantly affecting the vertebral column and the weight-bearing joints in the body [4]. Tubercular osteomyelitis of the sternum is an uncommon variant of extra-pulmonary tuberculosis, representing only 1-2% of all cases of bone and joint tuberculosis, leading to a scarcity of available literature. [5,6]

Our case report of sternal tuberculosis in a 20 year old male patient who presented with the history of chest swelling aims to add to the available literature. The sonological findings have been correlated with CT and MRI imaging appearances, thereby making the radiological analysis holistic. Histopathological analysis further revealed Gram negative bacilli as the causative organism, pointing towards Mycobacteria as the likely etiological agent.

II. Case Report

A 20-year-old male patient presented with history of anterior chest wall swelling since 1 month. He had no past history of fever, cough or any other relevant complaint except for history of weight loss since the past few months.

The initial physical examination revealed a minor localized swelling in the area of the sternum's body, situated along the right para-median plane, with a diameter of about 2 cm.(FIGURE 1). The ESR was elevated to 42 mm/1 h. The chest radiograph PA view revealed clear lung fields. (FIGURE 2). However lateral Chest Radiograph revealed a lytic lesion within body of sternum with underlying subtle bony erosion and associated soft tissue swelling in the anterior chest wall.

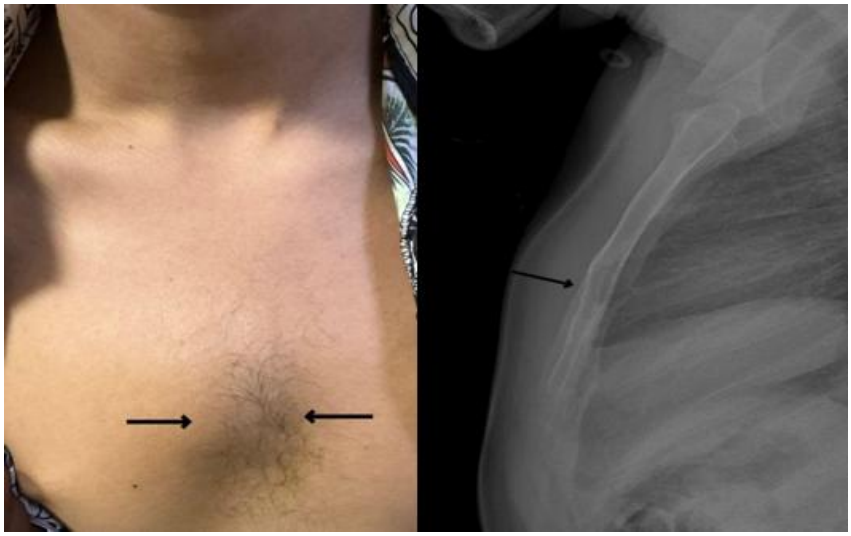

Figure 1 (Left)– Physical Examination Reveals An Anterior Chest Wall Swelling Along The Right Paramedian Plane (Arrow).
Figure 2 (Right) - Chest X-Ray Lateral View (Magnified Image) Reveals Lytic Lesion Within Body Of Sternum With Associated Soft Tissue Swelling Anterior To The Sternum And Subtle Bony Erosion. (Arrow).

USG was requisitioned for the anterior chest wall swelling. An ultrasound investigation conducted with a transducer operating at a high frequency, unveiled an ill-defined, hypoechoic collection with multiple septations within, situated in the subcutaneous layer. The underlying bone was lytic and the collection was seen extending posteriorly into the retrosternal plane, through the underlying bone abnormality. The retrosternal component of the extension had echogenic foci within. On Color Doppler study, the collection was showing peripheral vascularity. (FIGURE 3 and 4)

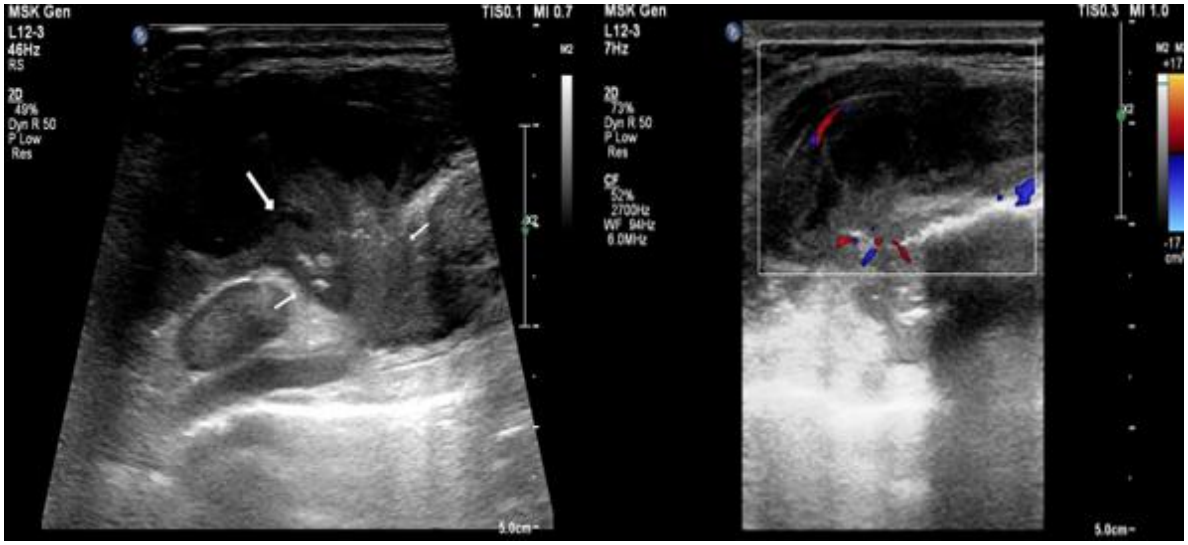

Figure 3 (Left) – Ultrasonographic examination of the chest wall swelling revealed an ill-defined, hypoechoic collection in the subcutaneous plane. The underlying bone was lytic and the collection was seen extending posteriorly through the underlying bone abnormality, into the retrosternal compartment (white arrows).
Figure 4 (Right) - On Color Doppler study, the collection was showing peripheral vascularity.

Thereafter, a Non Contrast Computed Tomography (NCCT) scan was performed. It showed permeative lytic destruction of the middle third of body of sternum (more on right side) and extruded sequestrum. Associated anterior soft tissue component in the form of hypodense collection and posterior retrosternal component are noted. The retrosternal component extended upwards till the upper third of body of sternum and inferiorly till the lower third of body of sternum (FIGURE 5 and 6). Furthermore, there was no evidence of any underlying pleuro-pathological abnormality or mediastinal lymphadenopathy in the NCCT scan.

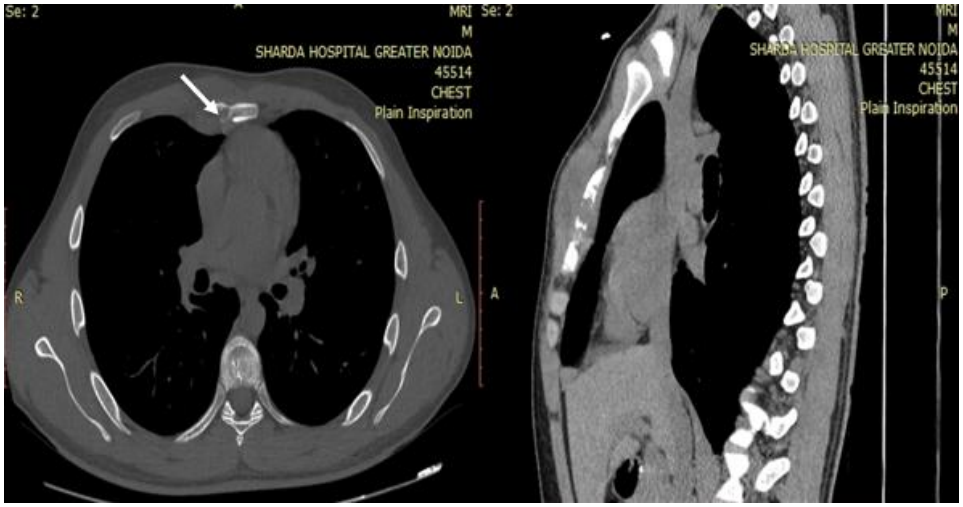

Figure 5 and 6 – Axial and Right Parasagittal Non Contrast CT images reveal permeative lytic destruction of middle third of body of sternum with extruded sequestrum. Associated anterior soft tissue component in the form of hypodense collection and posterior retrosternal component are also noted (white arrows).

In the thoracic MRI examination, an anterior soft tissue component was identified, displaying a hypointense signal on T1-weighted images and hyperintense signal on T2-weighted as well as STIR sequences with multiple hypointense septations within. Destruction of underlying sternal bone was noted. Retrosternal component of thickness approx 6 mm is noted. (FIGURE 7). On post contrast study, the anterior soft tissue component showed peripheral rim enhancement with central non enhancing area. Post - contrast enhancement is also noted in the body of sternum and the retrosternal soft tissue component (FIGURE 8).

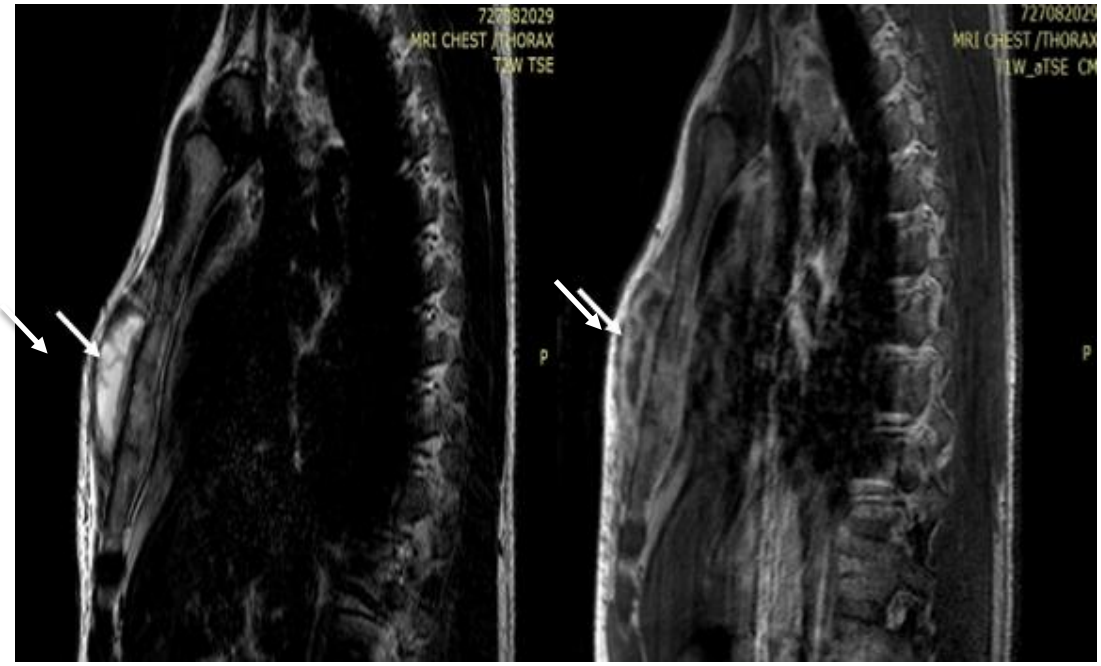

Figure 7 (Left) - T2W para-sagittal section through the thorax shows a hyperintense area anterior to the sternum (arrow), with internal hypointense septations within the middle third of the body of sternum showing heterogeneous hyperintense signal.

Figure 8 (Right) - T1W para-sagittal section through the thorax reveals a heterogeneously hypointense collection anterior to the body of sternum showing peripheral contrast enhancement with central non enhancing area (arrow).

Following this, FNAC was obtained under ultrasound guidance. The specimen revealed gram negative bacilli on Ziehl - Neelsen stain, which confirmed mycobacterial etiology. (FIGURE 9).

The patient had been prescribed ATT treatment for 6 months. On follow up examination after 9 months of diagnosis, the patient was asymptomatic and the anterior chest wall swelling had completely subsided.

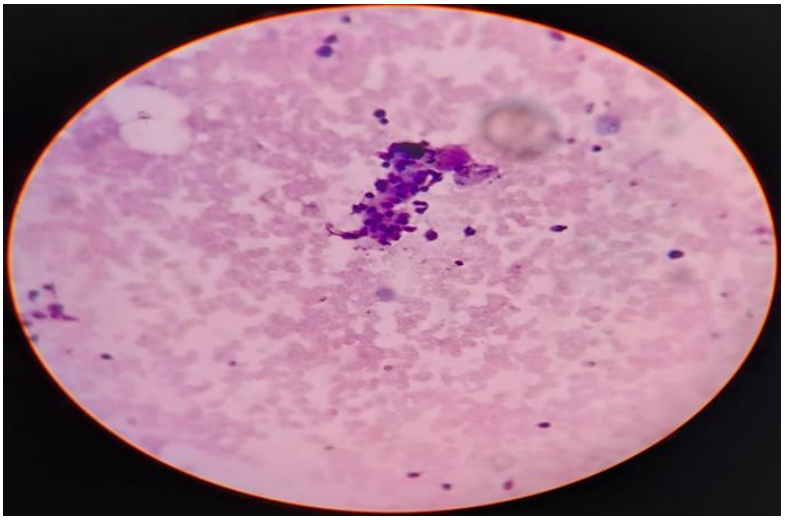

Figure 9 – ZN staining of the specimen reveals gram negative bacilli.

III. Discussion

Tuberculosis is an infectious disease with worldwide prevalence, known to have been occurring since thousands of years. [1] But after more than a century of scientific advancements and persistent pharmaceutical breakthroughs, mankind has not yet been able to effectively eradicate this ancient, dangerous disease.

Between 1% and 5% of Tuberculosis cases include skeletal infections, with the vertebral column and weight-bearing joints, in particular, being the most frequently affected sites. [3]

Tubercular osteomyelitis affecting the sternum is an uncommon variant of extra-pulmonary tuberculosis [4,5,6] , representing merely 1-2% of all joint and bone tuberculosis cases. Consequently, there is a scarcity of literature on this particular condition.

Infections seldom affect the sternum, and when they do, they are typically pyogenic in origin. Generally, patients with a history of sternotomy, blunt chest trauma, vigorous cardiopulmonary resuscitation, or the insertion of subclavian intravenous lines are susceptible to infections caused by staphylococci or pseudomonas bacteria.Tuberculosis affecting the sternum is infrequent, manifesting in merely 0.3% of all reported tuberculosis cases. Haematogenous spread and contiguous spread from the lungs, pleura, or mediastinal lymph nodes are thought to be the two primary pathways of dissemination of infection. Despite the well-established association between immunocompromised states and susceptibility to tubercular infections, our patient was identified as immunocompetent. [7,8]

Our patient presented with a small localized swelling in the region of body of sternum along the right paramedian plane. The clinical picture in case of sternal osteomyelitis due to tubercular etiology, is typically insidious. The patient exhibits both pain and swelling at the affected site, which differs from the more rapid clinical progression observed in pyogenic osteomyelitis. [9]

The initial imaging in our case involved a lateral Chest Radiograph which revealed a lytic lesion within sternal body along with adjacent soft tissue swelling in the anterior chest wall. Subtle underlying bony erosions could be seen. This raised the clinical suspicion of a possible infective etiology following which an Ultrasound was requisitioned. Ultrasound stands as the main imaging technique for evaluating superficial abscesses and collections, given that high-frequency transducers provide excellent resolution for soft tissues.

Ultrasonographic examination revealed an ill-defined, hypoechoic collection with multiple septations within, situated in the subcutaneous layer. The underlying bone was lytic and the collection was observed to extend posteriorly to involve the retrosternal plane through a bony defect. On Color Doppler, low grade peripheral vascularity was seen which suggested chronicity of collection. This is in contrast to pyogenic abscesses, which usually manifest with collection that are thicker, have more echogenic contents, and marked vascularity on colour doppler imaging. [9] Moreover, Ultrasound was also used for performing Fine Needle Aspiration Cytology in our patient.

Several research investigations have underscored the significance of ultrasound as a primary method. [8,10]

CT scan remains indispensable for delineating bony erosions, sequestrum formation. [7,9,10] The associated soft tissue component can be assessed and the exact extensions can be deciphered. Moreover, any coexisting pulmonary, pleural or mediastinal lymph nodal source of infection can be evaluated on CT in order to provide more supportive evidence of the etiological agent. There was no underlying pleuro-pathological abnormality or any enlarged mediastinal lymph nodes in our patient, as revealed by the NCCT scan.

MRI is also helpful in evaluation of soft tissues, localizing the exact extent of infection, and to look for any changes in the marrow of the involved bone. Atasoy et al were one of the pioneers in describing MRI appearances of sternal tuberculosis in their study conducted in 2002, describing a bone marrow signal intensity that appears hypointense on T1-W images and hyperintense on T2-W images. These findings have been consistently observed in subsequent studies. [9] The MRI findings have remained relatively unchanged in the subsequent studies carried out by others and have been reported to be very similar to the findings delineated by Atasoy et al in their study.

In our case, the anterior soft tissue component showed hypointense signal on T1W and hyperintense signal on T2W as well as STIR sequences with multiple hypointense septations within, similar to the findings described by Atasoy et al. Findings of destruction of underlying sternal bone on CT were correlated with the MRI findings. Additionally, post contrast MRI study, showed peripheral rim enhancement of the anterior soft tissue component along with central non enhancing area.

The diagnosis of tuberculosis of the sternum is almost unchallenged in the current study, particularly when there is no history of sternotomy. The confirmation of the diagnosis can be achieved through guided fine-needle aspiration cytology (FNAC), as demonstrated in our case, where gram-negative bacilli were observed on Ziehl-Neelsen staining.

The suggested therapy involves an intensive regimen of four drugs during the initial two months, followed by a continuation phase with three drugs for an additional 10-16 months, contingent upon the patient's specific response. [3]

Because tubercular abscesses usuallyfollow an indolent course, active drainage is usually unnecessary.

We have presented the clinico-pathological and multi-modality imaging features of a case of primary sternal tuberculosis- an infrequent manifestation of a commonly occurring disease that is rarely suspected as the cause of chest pain in patients with such symptoms.

References

[1] Hershkovitz I, Donoghue HD, Minnikin DE, May H, Lee OY, Feldman M, Galili E, Spigelman M, Rothschild BM, Bar-Gal GK. Tuberculosis Origin: The Neolithic Scenario. Tuberculosis (Edinb). 2015 Jun;95 Suppl 1:S122-6.

[2] Prasad S, Wakhlu A, Misra R, Aggarwal A, Lawrence A, Gupta RK. Features Of Extra-Spinal Musculoskeletal Tuberculosis: A Retrospective Study From An North Indian Tertiary Care Institute. Indian J Rheumatol. 2017;12:146–151.

[3] Held MFG, Hoppe S, Laubscher M, Mears S, Dix-Peek S, Zar HJ. Epidemiology Of Musculoskeletal Tuberculosis In An Area With High Disease Prevalence. Asian Spine J. 2017;11:405–411.

[4] Sharma S, Juneja M, Garg A. Primary Tubercular Osteomyelitis Of The Sternum. Indian J Pediatr. 2005;72:709–10.

[5] Allali N, Dafiri R. Tuberculosis Of The Sternum. J Radiol. 2005;86:655–6.

[6] Saifudheen K, Anoop TM, Mini PN, Ramachandran M, Jabbar PK, Jayaprakash R. Primary Tubercular Osteomyelitis Of The Sternum. Int J Infect Dis. 2010;14:E164–6.

[7] Anand P, Sarin N. Isolated Sternal Tuberculosis Presenting As A Chest Wall Abscess: A Case Report. Iran J Med Sci. 2018;43:440–443.

[8] Grover SB, Arora S, Kumar A, Grover H, Katyan A, Nair DM. Caught By The Eye Of Sound" - Epigastric Swelling Due To Xiphisternal Tuberculosis. Pol J Radiol. 2017;82:41–45.

[9] 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;26:112–115.

[10] Grover DSB, Rai DV, Grover DH, Kumar DD, Kundra DR, Gautam DVK, Et Al. Imaging Diagnosis Of Sternal Tuberculosis- A Report Of Two Cases Of The Ancient Disease With A New Demeanour. Radiol Case Rep. 2021;16(10):3125–33.