

Sternal Osteomyelitis due to Arrow-head Injury: A Rare Case Report

Dhawal Sharma¹, Snehal Dixit¹, Himanshu Shah², R.P. Bharaney¹, B.M. Halvadia¹, Rahul Patel¹, Kamlesh Tharwani¹ and Bhaskar²

Departments of Cardiothoracic and Vascular Surgery¹ and Anaesthesia², Dhiraj General Hospital and S.B.K.S. Medical College and Research Institute, Sumandeep Vidyapeeth, Wagodia, Gujarat, India

ABSTRACT

Sternal osteomyelitis secondary to penetrating trauma is an uncommon entity and only few cases have been reported. We report a case of sternal osteomyelitis in a patient with sickle-cell anaemia with a unique past history of arrow-head injury who presented with signs and symptoms of sternal infection. Imaging studies suggested osteomyelitis and the patient underwent sternal debridement, with a successful outcome. [Indian J Chest Dis Allied Sci 2012;54:255-257]

Key words: Sternum, Osteomyelitis, Debridement, Trauma, Sickle-cell anaemia.

INTRODUCTION

Sternal osteomyelitis as a complication of sternotomy or antecedent trauma is referred to as secondary sternal osteomyelitis which has become more common in the past two decades, largely related to the increased frequency of coronary artery bypasses grafting. Primary sternal osteomyelitis has no contiguous focus of infection and cases occur most commonly in intravenous drug abusers.

CASE REPORT

A 38-year-old tribal man presented to the surgery department with a three months history of a painful chest swelling and induration over the lower end of the sternum. The swelling had been steadily grown in size for three months before presentation and had become increasingly tender and painful. The pain increased with movement and deep inspiration. He had sustained an arrow-head injury three months before presentation, with no known fractures; he denied any other history of recent trauma or drug abuse. Upon examination, the patient was afebrile with stable vital signs and without apparent distress. A warm, tender (2cmx2cm) lower sternal firm swelling was palpable with scarring and puckering, and without any discharge, with erythema all around. The rest of the physical examination was unremarkable. His haemoglobin level was 9.5 g/dL at presentation, and his peripheral smear was

diagnostic of sickle-cell anaemia with sickling test positive. White cell count was 7000/ μ L with a normal differential. Test results for human immunodeficiency virus were negative. Chest radiograph (postero-anterior view) was unremarkable. Despite appropriate antibiotics and local wound care, the infectious process did not improve. Further work-up proceeded with a lateral sternal radiograph that showed erosion of the anterior cortex and increased soft-tissue density overlying the sternum (Figure 1). Computed tomography of thorax (Figure 2) was suggestive of an osteolytic lesion in the lower end of the sternum with enhancing soft tissue anteriorly with no evidence of retrosternal fluid collection.

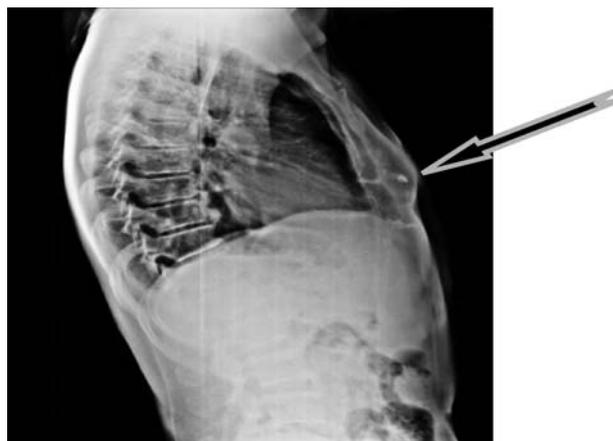


Figure 1. Radiograph of the sternum (lateral view) showing the erosion of the anterior sternal table (arrow), and the increased overlying soft-tissue density.

[Received: January 16, 2012; accepted: May 16, 2012]

Correspondence and reprint requests: Dr Dhawal Sharma, Resident (2nd year), (General Surgery), Room No. 209 N.R.I. Hostel, Sumandeep Vidhyapeeth, Pipariya, Wagodia-391 760, District-Vadodra (Gujarat), India; E-mail: dhawal_sharma123@yahoo.com



Figure 2. Computed tomography of thorax showing osteolytic lesion in lower end of sternum with enhancing soft tissue anteriorly.

The anterior sternal periosteum and infected sternum was aggressively debrided in the operating room with excision of complete tract. The posterior sternal periosteum was left intact and bilateral pectoralis flaps were used to provide well-vascularised and conforming soft tissue coverage and negative suction drain was kept in presternal plane. Surgical histopathologic examination confirmed chronic sternal osteomyelitis with findings of chronic inflammation and fibrosis in the pre-sternal soft tissue specimens. Appropriate antibiotic administration was continued post-operatively. The patient made an uneventful recovery with good wound healing and no recurrence to date.

DISCUSSION

Sternal osteomyelitis is a relatively rare but life-threatening condition. It is typically classified as primary when no focus of infection can be identified or secondary when it occurs as a complication of median sternotomy or chest trauma.^{1,2} In the pre-antibiotic era, sternal osteomyelitis was often associated with *Staphylococcal bacteraemia* and sepsis, with a high associated mortality. However, mortality associated with sternal osteomyelitis has decreased dramatically with the advent of antibiotics. In more recent decades, there has been an increased incidence of primary sternal osteomyelitis in intravenous drug abusers, with a predilection for *Pseudomonas* osteomyelitis. In addition, there is often an antecedent history of blunt trauma.³

Sternal osteomyelitis can present with anterior sternal pain, tenderness, redness, swelling and systemic toxicity.⁴ Physical examination often underestimates the extent and severity of infection particularly in immunocompromised patients. Due to the rarity of the condition, the diagnosis and appropriate treatment are often delayed.⁵ The differential diagnosis is broad and should include

cellulitis, soft-tissue abscess, benign and malignant soft-tissue tumours, and bony tumours.

Diagnosis of sternal osteomyelitis requires a high index of suspicion and a needle or open bone biopsy. Plain radiographs and computed tomography are the central radiographic components in the work-up, whereas conventional tomography and magnetic resonance imaging offer little additional information. Nuclear isotope scans including Technetium 99m and Gallium 67 are useful but are non-specific.

Coagulase-positive *Staphylococcus aureus* is the predominant species responsible for both primary and secondary sternal osteomyelitis, although *Pseudomonas aeruginosa* is predominant among intravenous drug abusers.³ Haematogenously disseminated osteomyelitis in intravenous drug abusers has a high propensity for spinal involvement and septic arthritis of the sternoclavicular joint.⁶ *Salmonella*, *Klebsiella*, *Aspergillus* and *Mycobacterium tuberculosis* have also been reported as causal organisms of sternal osteomyelitis.⁷ Primary sternal osteomyelitis is often clinically subacute, unlike the clinically virulent secondary osteomyelitis of the sternum.

Primary sternal osteomyelitis can be treated with a limited but complete resection of the anterior periosteum and infected bone, rather than radical sternal resection as in cases of secondary sternal osteomyelitis.⁸ If not grossly infected, the posterior sternal periosteum should be left intact to maintain the integrity of the mediastinum.⁸ If a large sternal resection is warranted, a staged resection has been advocated by some to maintain chest wall stability. As an adjunct to thorough debridement of infected bone, immediate muscle flap reconstruction provides well-vascularised soft tissue coverage and bulk that conforms to fill dead space. This approach decreases recurrence of infection and time to complete healing.⁹ Although successful treatment of sternal osteomyelitis has been reported with antibiotics alone,¹⁰ early surgical management provides definitive treatment resulting in decreased morbidity and more cost-effective treatment. Medical management incurs the morbidity of a prolonged course of medication, interference with work and other daily activities, and the possibility of treatment failure necessitating surgical debridement.

REFERENCES

1. Maier HC. Infection of the costal cartilages and sternum. *Surg Gynecol Obstet* 1947;84:1038-44.
2. Culliford AT, Cunningham JN Jr, Zeff RH, Som OW, Teiko P, Spencer FC. Sternal and costochondral infections following open heart surgery: a review of 2594 cases. *J Thorac Cardiovasc Surg* 1976;72:714-26.
3. Boll KL, Jurik AG. Sternal osteomyelitis in drug addicts. *J Bone Joint Surg Am* 1990;72-B:328-9.

4. Lin JC, Miller SR, Gazzaniga AB. Primary sternal osteomyelitis. *Ann Thorac Surg* 1996;61:225-7.
5. Sharif HS, Clark DC, Aabed MY, Aideyan OA, Haddad MC, Mattsson TA. MR imaging of thorax and abdominal wall infections: comparison with other imaging procedures. *Am J Roentgenol* 1984;154:989-95.
6. Jara FM, Yap A, Toledo-Pereyra LH, Magilligan GJ Jr. The role of surgery in primary osteomyelitis of the chest wall. *J Thorac Cardiovasc Surg* 1979;77:147-50.
7. Brown RB, Trenton J. Chronic abscesses and sinuses of the chest wall: the treatment of costal chondritis and sternal osteomyelitis. *Ann Surg* 1952;135:44-51.
8. Mir-Sepasi MH, Gazzaniga AB, Bartlett RH. Surgical treatment of primary sternal osteomyelitis. *Ann Thorac Surg* 1975;19:698-703.
9. Jeevanandan V, Smith CR, Rose EA, Malm JR, Hugo NE. Single stage management of sternal wound infection. *J Thorac Cardiovasc Surg* 1990;99:256-62.
10. Sant GR. Primary sternal osteomyelitis. *J R Coll Surg (Edin)* 1979;24:368-9.

HINDUJA HOSPITAL

6th National Update in Respiratory Medicine

14th -16th December, 2012

The 6th course in this annual series of Updates in Respiratory Medicine will be held at the P.D. Hinduja National Hospital & Medical Research Centre from 14th - 16th December, 2012. This 3-day course is designed for respiratory physicians, chest registrars and PG's in internal medicine with a special interest in respiratory medicine. An expert National & International Faculty will discuss various topics at the cutting edge of respiratory medicine.

Limited seats!!

The last course was oversubscribed: please register early to avoid disappointment.

- Course Directors** : Dr. Zarir F. Udwadia & Dr. Ashok A. Mahashur
- Registration fees** : Rs. 3000/- (Consultants), Rs. 1500/- (PG's)
- Register online (mandatory)** : www.hindujahospital.com/communityportal/events/
- Mode of payment** : Online/Cheque(local only)/DD in the favour of
"P.D. Hinduja National Hospital & Medical Research Centre"
- Contact** : Ms. Rutuja Natu & Ms. Sony Robins
Event Coordinators
Marketing Department
P. D. Hinduja National Hospital & Medical research Centre
Veer Savarkar Marg, Mahim, Mumbai - 400 016 (Maharashtra)
- Telephone no.** : 022-24447704 / 05
- E-mail** : events.hindujahospital@gmail.com
marketing@hindujahospital.com

Hinduja Hospital is recognized by MMC for CME points

Kindly visit our website www.hindujahospital.com for other details

**Delegates have to arrange their own accommodation*