

An experience with a rare diagnosis of isolated tuberculosis of sternum at JNMC Hospital, Aligarh, India

Wasif M. Ali, MBBS, MS, Mohammad H. Beg, MS, MCh, Muddassir Rashid, MBBS, MD, Uzma Zafar, MBBS, MD, Syed N. Abbas, MBBS, DMRD.

ABSTRACT

الأهداف: تشخيص الدرن المعزول من عظم الصدر لدى المرضى الذين يحضرون إلى المستشفى ولديهم علامات وأعراض الإصابة بالدرن.

الطريقة: أجريت دراسة تطلعية بمستشفى كلية جواهرلال نيهرو الطبية بمدينة أليجاره بالهند في الفترة ما بين يوليو 2000م إلى يوليو 2006م. تمت الدراسة على 2512 مريض مصاب بالدرن. وتؤكد التشخيص باستعمال الفحوصات المختلفة مع معالجة المرضى بمضادات الدرن و المتابعة الطبية للعامين التاليين.

النتائج: تبين من خلال دراستنا وجود 19 مريضاً يعاني من الدرن المعزول من عظم الصدر كانت الصفة الرئيسية عدم الإحساس بالراحة خلف عظم القص (100%) بينما 14 مريضاً (73.6%) حضروا إلى المستشفى وهم يعانون من خراج قديم في عظم الصدر. تمت معالجة جميع المرضى بنجاح لمدة 12 شهراً بمضادات الدرن عقبها متابعة منتظمة لمدة عامين تحسباً لحدوث أي انتكاسة.

خاتمة: نختم دراستنا بأن درن عظم الصدر نادر الحدوث ويجب الأخذ بعين الاعتبار أهميته كتشخيص مميز لدى المرضى الذين يحضرون إلى المستشفى وهم يعانون من وجود آفات مزمنة في عظم الصدر خاصة في الدول النامية/ المستوطنة. إضافة إلى ذلك، تعتبر المعالجة لمدة 12 شهراً بمضادات الدرن مثالية لتحقيق الشفاء بدون أي خطورة لحدوث انتكاسة.

Objective: To diagnose isolated tuberculosis of the sternum in patients presenting with signs and symptoms suggestive of tuberculosis.

Methods: A prospective study conducted at Jawaharlal Nehru Medical College (JNMC) Hospital, Aligarh, India from July 2000 to July 2006 of 2512 patients presenting with a suspected case of tuberculosis. Cases were confirmed using different investigations along with treatment of the patients with antitubercular treatment (ATT), with further follow up for next 2 years.

Results: Nineteen patients were suffering from isolated tuberculosis of sternum. The main presenting feature was retrosternal discomfort (100%) while 14 (73.6%) patients presented with a cold abscess of sternum. All the patients were treated successfully with 12 months of ATT and followed up for 2 years for any relapse.

Conclusion: Although tuberculosis of sternum is rare, it should be considered as an important differential diagnosis in patients presenting with chronic lesions of the sternum, particularly in endemic/developing countries. Twelve months of treatment with ATT is optimal for achieving cure without any risk of relapse.

Saudi Med J 2008; Vol. 29 (4): 580-583

From the Departments of Surgery (Ali, Beg), and Radiodiagnosis (Rashid, Abbas), and Pathology (Zafar), Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh (Uttar Pradesh), India.

Received 23rd December 2007. Accepted 10th March 2008.

Address correspondence and reprint request to: Dr. Muddassir Rashid, Department of Radiodiagnosis, Jawaharlal Nehru Medical College Hospital, Aligarh Muslim University, Aligarh 202002, Uttar Pradesh, India. E-mail: beighmuddassir@yahoo.com

Historically, tuberculosis of the sternum is a well-recognized cause of sternal infection, and was first reported by Vaugh.¹ Recently, an increase in sternal tuberculosis has been recorded due to widespread use of immunosuppression, evolution of multidrug resistant *Microbacterium tuberculosis*, sternotomy wound post coronary artery bypass grafting, and with the rising incidence of human immunodeficiency virus (HIV) infections in developing/endemic countries.² Most of the patients have primary focus of infection in the lungs or pleura, as pulmonary or pleural tuberculosis. Whereas the lungs are the main target of primary infection, extra pulmonary tuberculosis is reported to constitute 15-20% of all cases.³ Skeletal tuberculosis is still rarer, and accounts for only 1-5% of all the tubercular infections.⁴ It has been further estimated that sternum accounts for

1.1% of bone and musculoskeletal tuberculosis, and up to 7% of all chest wall tuberculosis.⁵ Sternal tuberculosis has rarely occurred after BCG vaccination.⁶ The aim of our prospective study was to reach the diagnosis of isolated tuberculosis of sternum in patients presenting with signs and symptoms suggestive of tuberculosis, and to confirm this using different investigations along with treatment of the patients with antituberculous treatment (ATT) with further follow up for next 2 years.

Methods. A prospective study was conducted at Jawaharlal Nehru Medical College Hospital, Aligarh, Uttar Pradesh, India from July 2000 to July 2006. The patients included were those attending the Cardiothoracic and Vascular Surgery (CTVS) outpatient department during July 2000 to 2006, and presenting as a suspected case of tuberculosis. The study protocol was sent to institutional ethical committee and following its approval, all the patients attending the CTVS outpatient department with symptoms of weight loss, decreased appetite, and evening rise of temperature, and those with sternal swelling and presternal discharging sinuses were included in the study. Those patients who could not be followed up for 2 years were excluded from the study. An informed consent was taken from all the patients, and then a battery of investigations was performed first to diagnose tuberculosis, and then to ascertain that the patient is a case of isolated tuberculosis of the sternum. The various investigations performed were hemogram with erythrocyte sedimentation rate (ESR), anteroposterior and lateral chest radiographs, sputum for acid fast bacilli (day 1, 2, and 3), and enzyme linked immunosorbent assay (ELISA). In cases with discharging sinus, a sinogram was also performed (Figure 1). Additional investigations with computed

tomography(CT) scan of thorax, ultrasonography (USG) of abdomen, fine needle aspiration cytology (FNAC), and biopsy were carried out in selected cases.

All the data were recorded on a standard form, and the results were subjected to statistical analysis using SPSS 14.0 software program. The data was used to determine the age and gender distribution of the disease, incidence of various symptoms in the patients, and utility of different investigations that were carried out.

Results. Our study included 2512 patients with signs and symptoms of tuberculosis. Initial investigation by hemogram with ESR, chest radiography, sputum for acid- fast bacillus (day 1, 2, 3), and ELISA revealed that 2489 had features of pulmonary tuberculosis, 143 (5.7%) had chest wall tuberculosis, and involvement of sternum was found only in 23 (0.9%) cases. These 23 patients with sternal tuberculosis were further investigated using CT scan of thorax (Figure 2) and USG abdomen. A CT scan revealed an underlying mediastinal lesion extending up to the sternum in 2 cases, and pulmonary tuberculosis in another 2 cases. After ruling out the presence of tuberculosis anywhere in the body, finally 19 (0.75%) patients with isolated tuberculosis of the sternum were found, which were later confirmed using FNAC (in cases of palpable lump), and biopsy (in cases of discharging sinus) (Table 1). The main presenting features in patients with isolated tuberculosis of sternum were retrosternal discomfort in 19 (100%), weight loss of approximately 10% in 15 (78.9%), palpable mass in 14 (73.6%), and discharging sinus in 5(26.3%) (Figure 3). Of the 19 patients with sternal tuberculosis, 12 were males and 7 females (male: female ratio 1.7:1). Most of the patients were in the



Figure 1 - Sinogram showing an irregular wall sinus tract with multiple branches extending in different directions.

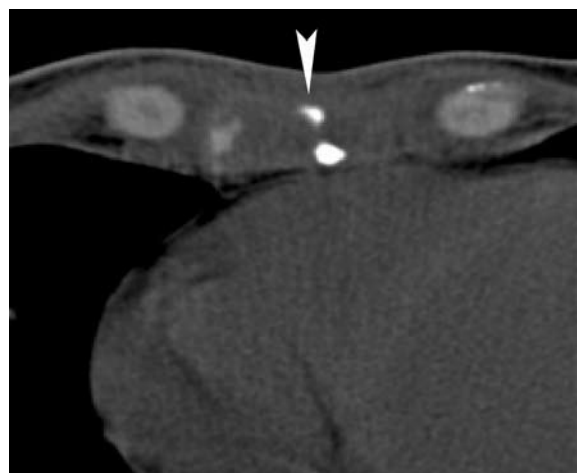


Figure 2- Computed tomography of thorax showing destructive lesion of the sternum.

40-60 years age group (63.15%) with age range 1-69 years (Table 2). The patients diagnosed with isolated sternal tuberculosis (19) were put on 12 months of ATT with 4 drugs (isoniazid, rifampicin, ethambutol, and pyrazinamide) for the first 3 months, and on 2 drugs (isoniazid, rifampicin) for the next 9 months. All the patients showed improvement within 2 weeks (average) of treatment in the form of decrease in discharge from the sinus, and retrosternal discomfort. There was an average gain of 5% of weight within 3 months of initiation of therapy. The swelling almost subsided



Figure 3 - Clinical photograph showing a chronic non healing sinus of the sternum.

Table 1 - Results of investigations.

| Investigation | Number of patients | Positive results |
|-------------------|--------------------|------------------|
| Chest radiography | 2512 | 2489*† 23‡ |
| Sputum for AFB | 2017 | 1679 |
| ELISA | 72 | 72 |
| CT scan of thorax | 23 | 19§ 2 2¶ |
| USG abdomen | 23 | 0 |
| FNAC | 14 | 14 |
| Biopsy | 5 | 5 |

*out of these, 143 patients had also lesions in the chest wall, † - pulmonary tuberculosis (TB), ‡ - sternal TB, § - isolated sternal lesion, || - associated mediastinal pathology, ¶ - associated pulmonary pathology, AFB- Acid fast bacilli, ELISA- enzyme linked immunosorbent assay, CT- computed tomography, USG- ultrasonography, FNAC - fine needle aspiration cytology

Table 2 - Age at presentation.

| Age group in years | Number of patients | |
|--------------------|--------------------|---------|
| | n | (%) |
| 0 - 12 | 1 | (5.2) |
| 12 - 40 | 3 | (21) |
| 40 - 60 | 12 | (63.15) |
| > 60 | 2 | (10.5) |

within an average period of 8 months, and discharge stopped after an average period of 10.5 months. The patients were further followed up for the next 2 years, and none of the patients showed any relapse.

Discussion. The sternum is an unusual site for tubercular infection, and tubercular osteomyelitis of the sternum is even more infrequent.⁷ Isolated tuberculosis of sternum is rare and difficult to diagnose.⁸ In children it is still rarer. Sharma et al⁹ reported a single case of a 12-year-old child of isolated tuberculosis of sternum. Even in endemic countries there are only a few reported cases,¹⁰⁻¹² and even more so in the absence of immunosuppression.^{13,14} Sternal tuberculosis has been reported after open-heart surgery^{10,15-17} in patients with thalassemia,¹⁸ after BCG vaccination,¹⁹ in heroin addicts, in HIV positive patients,²⁰ and with disseminated and miliary tuberculosis.²¹ Tuberculosis of the sternum generally occurs from the activation of latent tuberculous lesion formed during hematogenous or lymphatic dissemination of pulmonary tuberculosis.²² Sometimes a primary tubercular pathology of mediastinal lymph nodes may extend into the sternum.^{23,24} Evolution of cold abscess in the chest wall has been described by experimental studies of Burke.²⁵ The process begins with the invasion of pleural space by tubercular bacilli leading to a local or widespread pleuritis. From the pleural space some of the bacilli reach the parasternal lymph nodes setting up a caseating granulomatous reaction. Following rupture of the nodes, the caseating material burrows anteriorly into the chest wall to form a cold abscess.²⁵

The clinical features of sternal tuberculosis include retrosternal pain, discharging sinus, and palpable lump, in addition to other constitutional symptoms of tuberculosis. In our study of 19 patients of isolated tuberculosis of the sternum, none had a previous history of tuberculosis, and an average size of the palpable swelling at presentation was 1.7 cm, and sinus was present in 5 patients, which developed after bursting of the cold abscess. In an appropriate clinical setting, the evidence of discharging sinus or cold abscess of sternum should raise suspicion of sternal tuberculosis. Although there are various schools of thoughts regarding optimal treatment of tuberculosis of the sternum, such as drugs, debridement, irrigation system, muscle flap reconstruction, and the World Health Organized recommended standard 6-month regimen, which according to bacillary load, clinical evaluation and response to ATT, can be extended to 9 to 12 months, however, from our study we refer that combination chemotherapy (ATT) for 12 months is the optimal treatment for isolated tuberculosis of sternum, without any risk of relapse. Similar results have been published

in a recent study carried out by Khan et al.²⁶ In their study of 14 patients, Khan et al²⁶ found that all patients responded well to the antitubercular therapy: 10 with primary therapy, 2 needed second-line therapy, and 2 required surgery (debridement). Complete healing was seen in all the cases with no evidence of recurrence at 2-year follow-up. Thus, an early and adequate treatment with multidrug ATT avoids the need for surgery in most of the patients.

We conclude that tuberculosis of the sternum is a rare presentation with preponderance towards middle-aged males. It should be considered as an important differential diagnosis in chronic lesions of the sternum particularly in endemic/developing countries. The ATT for 12 months is the optimal treatment for isolated tuberculosis of sternum without any risk of relapse. Our study, however, may not convey the exact prevalence of sternal involvement, as our study group was based on a selected group of patients presenting to the Cardiothoracic Vascular Surgery Department, and we recommend a larger hospital based study with a longer follow up to clearly establish the disease burden, and also to establish any surgical indications in case of failure of medical treatment.

References

- Vaughn RT. Acute osteomyelitis of the sternum: woody presternal phlegmon: osteotomy and drainage. *Surg Clin North Am* 1918; 5: 253-262.
- Dhingra VK, Rajpal S, Gupta UA, Aggarwal JK, Mandal AK, Chowdhury V, et al. Young man with midline swelling over the front of chest. *Indian J Tuberc* 2005; 52: 93-98.
- Iseman MD. Extrapulmonary tuberculosis in adults: clinicians guide to tuberculosis. 1st ed. Philadelphia (PA): Lippincott; 2000. p. 145-197.
- Enarson DA, Ashley MJ, Grzybowski S, Ostapkowicz E, Dorken E. Non-respiratory tuberculosis in Canada. Epidemiologic and bacteriologic features. *Am J Epidemiol* 1980; 112: 341-351.
- Newton P, Sharp J, Barnes L. Bone and joint tuberculosis in Greater Manchester 1969-1979. *Ann Rheum Dis* 1982; 41:1-6.
- McLellan DGJ, Philips KB, Corbett CE, Bronze MS. Sternal osteomyelitis caused by Mycobacterium tuberculosis: a case report and review of literature. *Am J Med Sci* 2000; 319: 250-254.
- Aslam M, Rajesh A, Entwisle J, Jeyapalan K. Pictorial review: MRI of the sternum and sternoclavicular joints. *Br J Radiol* 2002; 75: 627-634.
- El-Kharras A, Jindal M, Achemlal L, Atmane M, Chaouir S, Amil T, et al. [Isolated tuberculosis of sternum: Two cases] *Presse Med* 2004; 33: 1579-1581.
- Sharma S, Juneja M, Garg A. Primary tubercular osteomyelitis of the sternum. *Indian J Pediatr* 2005; 72: 709-710.
- Aggarwal BK, Kamath SG, Shatapathy P. Tubercular sternal, osteomyelitis and mediasfinifis after open heart surgery. *Indian Heart J* 1997; 49: 313-314.
- Jhamb DK, Bhatnagar MK, Verma S, Lahoti D, Verma NP. Tubercular cold abscess over the manubrium sterni. *J Assoc Physicians India* 1989; 37: 357.
- Mohammadi A, Howell JM. Sternal tuberculosis. *J Emerg Med* 2007 Oct 31 [Epub ahead of print]
- Watts RA, Paice EW, White AG. Spontaneous fracture of sternum and sternal tuberculosis. *Thorax* 1987; 42: 984-985.
- Ashour M, Pandya L. Tuberculosis of sternum. *Ann Saudi Med* 1990; 10: 57-59.
- Rubinstien EM, Lehmann T. Sternal osteomyelitis due to Mycobacterium tuberculosis following coronary artery bypass surgery. *Clin Infect Dis* 1996; 23: 202-203.
- 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: 1365-1366.
- 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: 245-249.
- Kataria SP, Avasthi R. Sternal tuberculosis in combination with thalassemia. *J Assoc Physicians India* 1993; 41: 472.
- Simila S, Liedes E, Kinnunen P. Sternal abscess as a complication of BCG-revaccination. *Tubercle* 1988; 69: 67-69.
- Martos JA, Olm M, Miro JM, Mallolas J, Letang E, Brancos MA, et al. Chondrocostal and chondrosternal tuberculosis in 2 heroin addicts infected with the human immunodeficiency virus. *Med Clin (Barc)* 1989; 93: 467-470.
- Kalra OP, Sharma BK, Banerjee CK, Khosla VK. Sternal involvement in disseminated tuberculosis. *J Assoc Physicians India* 1988; 36: 292-293
- Fadiran OA, Akintan B, Oluwole SF. Tuberculous orchitis co-existing with tuberculosis of sternum: a case report. *Cent Afr J Med* 1999; 45: 45-47.
- Shah J, Patkar D, Parikh B, Parmar H, Varma R, Patankar T, et al. Tuberculosis of sternum and clavicle: imaging findings in 15 patients. *Skeletal Radiol* 2000; 29: 447-453.
- Sarlak AY, Gundes H, Gundes S, Alp M. Primary sternal tuberculosis: a rare unhealed case treated by resection and local rotational flap. *Thorac Cardiovasc Surg* 2001; 49: 58-59.
- Burke HE. The pathogenesis of certain forms of extrapulmonary tuberculosis; spontaneous cold abscesses of chest wall and Pott's diseases. *Am Rev Tuberc* 1950; 62: 48-67.
- Khan SA, Varshney MK, Hasan AS, Kumar A, Trikha V. Tuberculosis of the sternum: a clinical study. *J Bone Joint Surg Br* 2007; 89: 817-820.