**Multifocal Tuberculosis of the Chest Wall without Pulmonary Involvement**

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**Key words.** Tuberculosis ; BCG vaccination ; sternum ; rib.

**Abstract.** Skeletal tuberculosis (TB) is usually seen in association with a primary pulmonary focus. However, it is being increasingly recognized that the former may be encountered without the latter, particularly in children. Sternal lesions have been frequently reported in infants, presumably secondary to Bacillus Calmette-Guerin (BCG) vaccination. Herein we report a case of rib TB and a cold abscess in a child who had previously had sternal TB; that diagnosis had been missed at the time. Timely treatment of apparently solitary skeletal lesions may reduce the number of multifocal cases of skeletal TB in children.

**Introduction**

Tuberculosis (TB) has become a significant international public health problem largely because of widespread immigration, non-immunization of elderly people and infection with the human immunodeficiency virus. It is transmitted by droplet spray of Mycobacterium tuberculosis and may manifest itself as pulmonary or extrapulmonary infection (1, 2). Skeletal TB as an extrapulmonary entity is uncommon, accounting for less than 10% of cases. Rib TB is rarer still and may show as a cold abscess of the chest wall or may mimic a number of other diseases such as pyogenic abscess, eosinophilic granuloma, malignant tumours, or enchondromas of the chest wall (1-5). Multifocal bone involvement is most often seen in patients with suppressed immune response and concomitant pulmonary infection (4, 6). Sternal TB has been reported as a complication of BCG vaccination in children (6, 7). Herein we describe a case of rib TB and chest wall abscess in a child with a previous history of sternal disease.

**Case report**

A healthy looking two-year-old girl was admitted with a one-week history of a painless chest wall mass. A firm, fixed 6 × 7 cm mass was noted over the anterolateral aspect of the left chest wall. The skin overlying the mass appeared normal and she was afebrile. A scar was noted over the sternum (previous surgery) and on her left shoulder (previous BCG). Chest radiograph revealed a 4 cm osteolytic lesion on the anterolateral aspect of the left seventh rib. Computed tomography (CT) confirmed the rib lesion and showed an adjacent 6 cm soft tissue mass with central low attenuation and peripheral rim enhancement (Fig. 1). Initial radiological differential diagnoses included chondroma and Ewing’s sarcoma.

Nine months earlier the patient had undergone surgery for a sternal mass, when histological examination had shown nonspecific granulomatous inflammatory disease. She was treated with wide spectrum antibiotics before discharge. A retrospective review of the previous CT revealed hypodensity within the medulla and preserved cortices in the corresponding rib. The previous and recent chest radiographs and CT scans showed no evidence of pulmonary TB. Mycobacterial culture of her gastric aspirate was negative but an intra-dermal Mantoux (PPD) test yielded a 15 mm induration.
Considering the previous history and the positive Mantoux test, the presumed diagnosis was TB of the rib with cold abscess.

During operation the disease was confined to 2/3 of the anterolateral portion of the 7th rib with no evidence of pleural or pulmonary involvement. Surgical management consisted of excision of the cold abscess and near total resection of the destroyed 7th rib, followed by primary closure. The stability of the chest wall was well preserved and the use of any prosthetic material or muscular flap was unnecessary. Histological examination showed caseation and epithelioid giant cells and tubercle bacilli were cultured from the resected rib. The wound healed without any complications and the patient was discharged on antituberculosis treatment. Further screening with radionuclide bone scan showed no other TB focus. The patient was free of disease one year after surgical intervention and the antituberculosis treatment was stopped.

Discussion

The prevalence of TB is less than 1% in developed countries but has become a significant international public health problem largely because of widespread immigration (2, 10). It is still a significant public health problem in Turkey, despite having decreased from 56% in the early 1960s to less than 5% in the 1990s (9, 10, 11). Apart from the classical pulmonary cases, extrapulmonary TB may involve lymph nodes, pleura, skin, and the genito-urinary and skeletal systems (1, 2). Skeletal involvement among children is seen at its peak in the first decade of life. However, only a few cases were reported under the age of one and it is likely that they were complications of BCG vaccination, which is routinely recommended as a public health measure in countries with a high incidence (1% and over) of TB infection. Complications of BCG vaccination occur in 3.3% of patients, after 6-9 months of vaccine administration. These include regional or extra-regional localized and disseminated disease (9). TB of the sternum secondary to BCG vaccination is rare and considered secondary to haematogenous extension or via the internal mammary nodal chain. BCG osteomyelitis and cold abscess have been reported in 1/3000-5000 in Finland and Sweden (7-10).

Rib tuberculosis is also uncommon, accounting for only 1% of cases. It may be secondary to haematogenous or lymphatic dissemination, or from direct extension from the underlying pleura or lung (1, 3, 6-8). Rib TB may present with painless nodular lesions on the chest wall with subsequent cold abscess formation and/or a draining sinus (5-7). Clinically, a cystic, or doughy and painful, or non-tender fluctuating mass is usually seen. In our case the mass covering the antero-lateral part of the sixth and seventh rib shafts was firm and fixed on palpation, but painless. The skin overlying the mass looked normal.

Skeletal TB is generally solitary but multiple lesions may be found at different stages of development owing to a haemorrhagic mode of the spread of bacilli at different times. A suppressed host immune response is said to predispose to multifocal bone involvement, often seen with concomitant pulmonary infection, and reported in 3-10% of cases (4, 6). Our case was free of any concomitant pulmonary disease. PPD test resulted in a 15 mm induration in our patient and she was regarded as infected with TB. There was no index case for TB that could infect the patient in the family or family relatives and it was considered that the disease was a complication of BCG vaccination.

Conventional x-rays fail to detect early skeletal disease in children, and the diagnosis of lesion is delayed until bone destruction with overlying soft tissue changes. Besides, the radiological picture is variable and the lytic bony lesions may easily be confused with osseous, inflammatory or neoplastic diseases, either primary or metastatic (5, 10). The extent of bone lesion and the degree of soft tissue involvement may be defined better by CT scan, whereby unsuspected lesions may be recognized, as reported by Morris et al. (4). Unfortunately, the rib abnormality was not picked-up in our patient during management of the sternal lesion nine months earlier. CT is also useful in defining the appropriate site for biopsy. We did not use magnetic resonance imaging (MRI), which is helpful in discriminating between abscess and granulation tissue (4). Radionuclide bone scan may be negative in the early stages of the disease. It also is non-specific, in that it does not differentiate between lytic tuberculous lesions or malignancy (4). We did, however, use bone scan in search of other osseous lesions of TB.
Uncomplicated tuberculous bone lesions may resolve under medical therapy but intervention is required to establish the diagnosis (5, 6, 8). Fine needle aspiration of the lesion may establish a diagnosis of tuberculosis but is not always reliable (6). Tissue biopsy may yield tuberculoid lesions, acid-fast bacilli on direct smear or positive culture for tubercle bacilli (1).

Surgical excision with primary closure is recommended for patients who fail to improve after 3 to 4 weeks of antituberculous therapy or under conditions such as unstable or deformed bone structure, bearing a high risk of sinus formation (5-7). According to Kaufmann as cited by Morris et al. (4), it is necessary to resect a part of the rib, even if it is macroscopically normal, because the origin of the abscess is deeper. We undertook early surgery mostly because of the age of our patient and the possibility of delaying the true diagnosis. Resection of the seventh rib along with the abscess and leaving the pleura intact was considered sufficient in our case. The abscess was confined to the rib and there was no need for extensive debridement. The patient was free of disease one year after surgical intervention, and antituberculosis treatment was stopped according to current protocol.

We can speculate that vaccination related sternal TB may be higher than expected. We advocate screening for possible concomitant lesions in children with apparently solitary skeletal lesions. We believe that the rib lesion, being very small during the initial admission, might not have progressed into a destructive lesion if it had been diagnosed correctly and treated appropriately. It may also be appropriate to commence antituberculous treatment in children presenting with an osteolytic bone lesion and positive PPD in regions where TB is prevalent.

References