

Tuberculosis of the Ribs: A Recurrent Attack of Rib Caries

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Rib tuberculosis is an extremely rare condition with the incidence not exceeding 3 percent of all skeletal tuberculosis. The authors experienced a recalcitrant case of pulmonary tuberculosis accompanied by chest wall cold abscesses involving ribs recurring at a new site in approximately 10 months despite of medical and surgical treatment. The patient has twice taken thoracotomy for abscess drainage and during the second thoracotomy, a partial resection of involved ribs was performed.

Key Words: Rib tuberculosis, thoracotomy

Tuberculosis is relatively common in Korea with its prevalence of about 1.8 percent of population (Joo 1991). Extrapulmonary forms of tuberculosis constitute approximately one-sixth of all cases of tuberculosis in Canada (Enarson *et al.* 1980). Skeletal tuberculosis accounts for one to five percent of all tuberculosis infections (Davidson and Horowitz 1970; Enarson *et al.* 1979; Newton *et al.* 1982; Davies *et al.* 1984). The vertebral lesions in skeletal tuberculosis is relatively common, where as the rib involvement occurs from zero to three percent of all skeletal tuberculosis (Enarson *et al.* 1979; Newton *et al.* 1982; Davies *et al.* 1984). We present an unyielding case of pulmonary tuberculosis accompanying chest wall cold abscesses in this report.

CASE REPORT

An 18-year-old man presented with a two-month old right parasternal pain. The pain which increased

with deep inspiration was thought to be of pleuritic origin. The patient previously had frequent bouts of upper respiratory infection starting his childhood. Tonsillectomy was performed six years ago. No history of tuberculosis was elicited. The patient's father showed radiological evidence of now healed what appeared to be inactive lesion of pulmonary tuberculosis probably contracted in his early life, for which no antituberculous medication was taken. Two months before, the patient experienced rhinorrhea, sore throat, fever, and chill along with anterior chest pain. Chest x-ray taken at a local clinic was normal. The patient admitted that about six weeks afterward, a soft tender nodule developed in the occipital region which resolved spontaneously 2 days later. Subsequently, the patient lost about six kilograms of body weight, and developed an anorexia and became fatigued very easily. Neither cough nor sputum was present.

During the examination, the patient was found to have a fever of 38.0°C. A tender fluctuant mass of about 5×5×5 cu. cm in size was noted along the right mid-parasternal border. Erythrocyte sedimentation rate was 32 mm/hr (Wintrobe method). The skin test for paragonimiasis was negative however, the 5-TU PPD skin test was positive with the diameter of the developed induration 10 mm. Sputum smear and culture were all negative for tuberculosis. At this time, the chest x-rays in PA and lateral views showed multiple round opacities of well-de-

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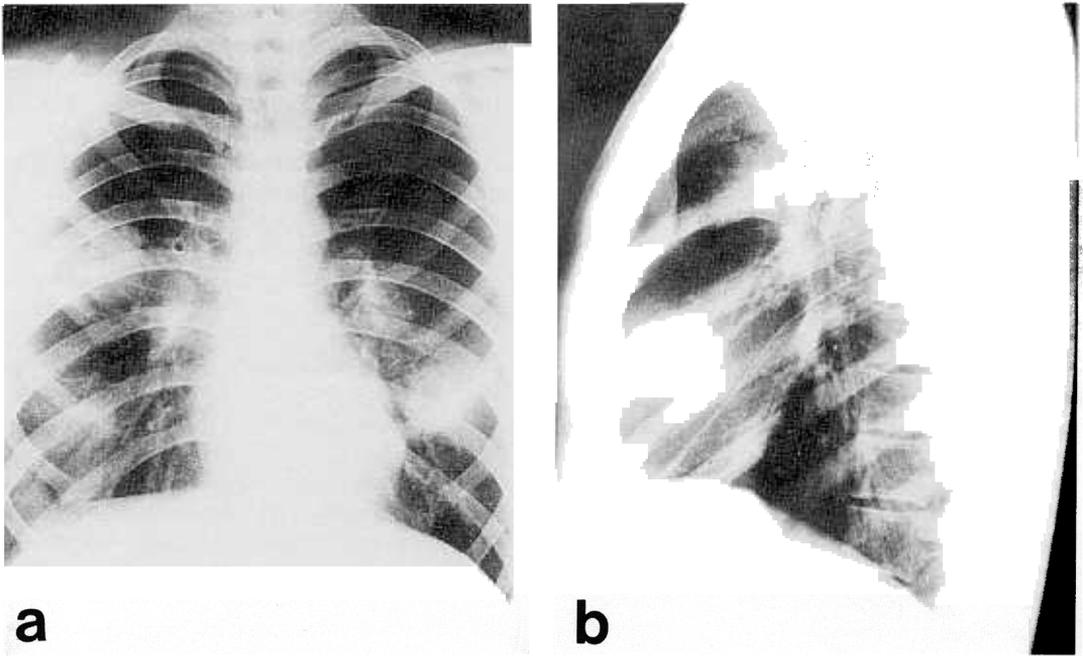


Fig. 1. Chest x-rays; in (a) PA view and (b) lateral view, note the clear-margined round opacities on anterior, posterior and lateral chest walls in both lung fields.

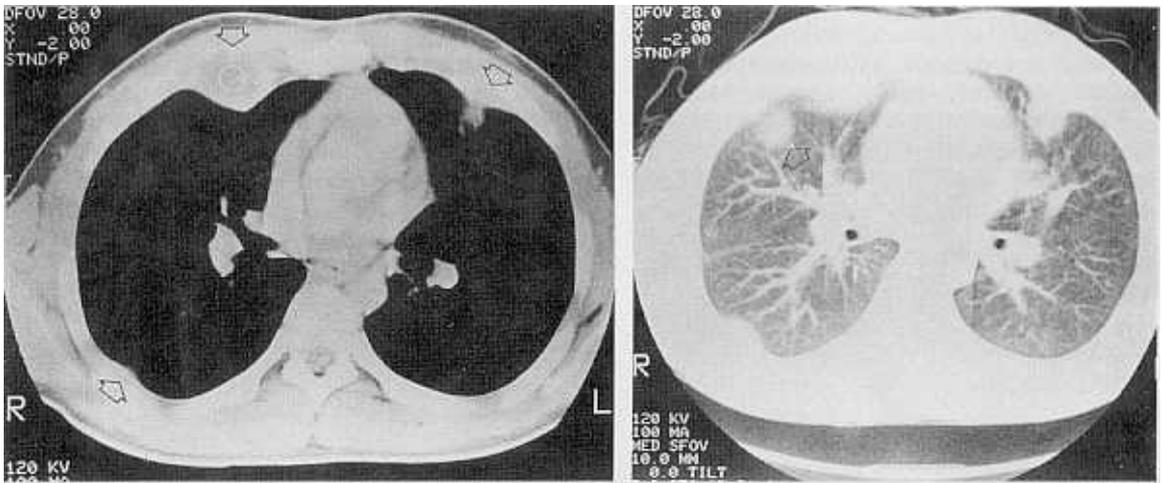


Fig. 2. Initial CT of the chest demonstrating multiple extrapleural lesions along the both chest walls with accompanying parenchymal consolidation, predominantly subpleural in location. The lesion in the right parasternal area shows central low density, a finding consistent with caseous necrosis.

finer margins on the anterior, posterior and lateral chest walls in both lung fields (Fig. 1). Computerized tomogram (CT) of the chest revealed the masses to be multifocal and extrapleural with accompa-

nying parenchymal consolidation, predominantly subpleural in location (Fig. 2). Bone scan showed focal hot uptake in multiple ribs (Fig. 3), consistent with findings on the chest CT. Needle biopsy of the

substernal mass suggested the possibility of tuberculous granuloma. The patient was started on antituberculous regimen of isoniazid, ethambutol, rifampicin, and streptomycin. Repeated chest films two months after the onset of treatment showed no further progression of the lesions but showed no significant shrinkage of the existing lesions as well, which were particularly notable in the right mid-parasternal region. Thoracotomy was then ordered.

During the operation an abscess was noted and it

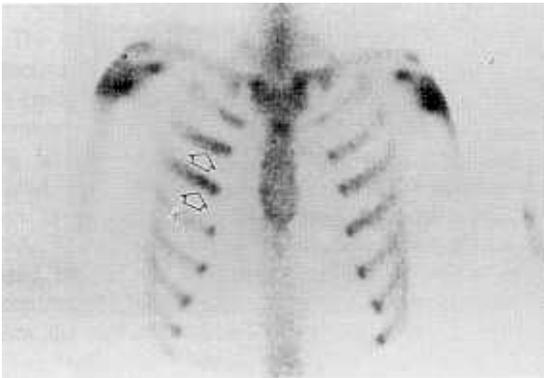


Fig. 3. Bone scan demonstrating focal hot uptakes in the right, anterior 3rd and 4th ribs.

revealed a granuloma with caseation necrosis typical of tuberculosis (Fig. 4) at the partially destroyed costal cartilage of right 4th rib. The patient was continued on the same anti-tuberculosis medication. The chest film taken three months after postoperation showed much clearing of the previous lesions. Several films taken later at regular intervals suggested minimal improvements.

One year after the first presentation, the patient reported a newly developed soft mass protruding from the left posterior chest wall. There was no change in the chest x-rays. However, the chest CT revealed two newly formed extrapleural abscesses at both lower posterior chest wall (Fig. 5). The structural change in the involved ribs was uncertain. Anti-tuberculous medication was switched to the regimen of isoniazid, pyrazinamide, ofloxacin, and tuberactin. Second thoracotomy was performed. During the second thoracotomy, the parts of 10th and 11th ribs on the left side involved were resected with the abscess debridement. Grossly, the soft tissue mass, an encapsulated abscess containing yellowish pus, was densely adherent to the removed rib surfaces. Histology of the abscess indicates the granuloma with caseation necrosis involving of ribs and inner side of the chest wall which is typical of tuberculosis.

The chest CT which was taken four months after

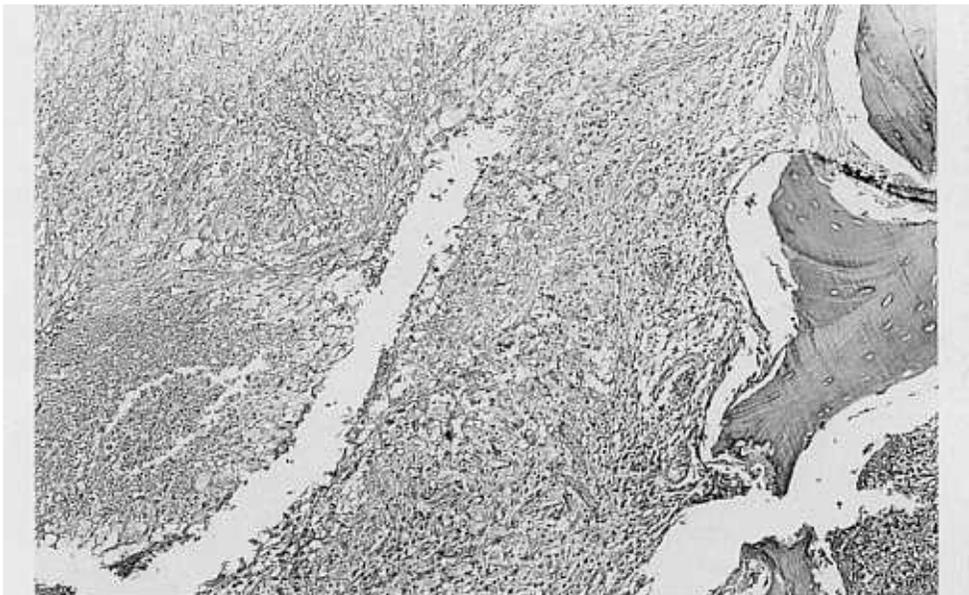


Fig. 4. Confluent tuberculous granuloma with caseation necrosis in the bone marrow of rib (H & E, $\times 100$)

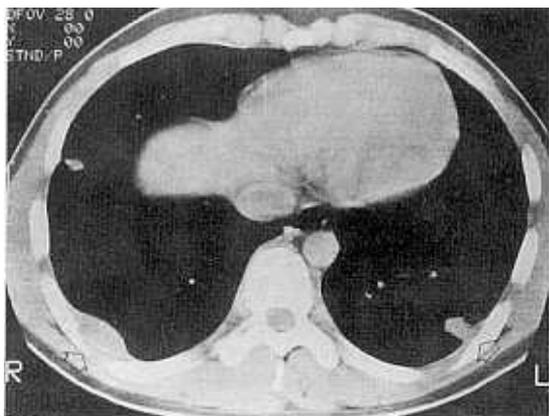


Fig. 5. Follow-up chest CT one year later shows newly developed lesions at both sides of lower posterior chest wall.

the regimen change revealed a marked resolution of the previous chest lesion. The patient who is on antituberculous medication is currently under close observation.

DISCUSSION

Tuberculosis of the ribs usually is presented with rib destruction and extrapulmonary soft tissue mass. The clinical features of the tuberculosis in the case are local pain and subcutaneous chest wall swelling. A distinction should be made between tuberculous chondritis involving costal cartilages and tuberculous osteitis involving bony ribs. The former is known to be more common than the latter and may result in the formation of abscesses and sinuses (Johnson and Rothstein 1952).

The incidence of skeletal tuberculosis has steadily decreased compared to pulmonary tuberculosis (Enarson *et al.* 1979). Next to metastatic malignancy the pathologic lesion of the ribs is rare with tuberculosis as an underlying cause (Brown 1980). The incidence of rib tuberculosis reported in one study was less than 0.1 percent of all hospital admissions due to tuberculosis (Tatelman and Drouillard 1953). The lesion of the ribs still is a continuing diagnostic and therapeutic challenge. Rib tuberculosis occurs about 2.5 times more often in males than in females. Although, it can occur at any age unlike most other forms of bone tuberculosis, a greater incidence is reported between the age fifteen and thirty-five (Tatelman and Drouillard 1953; Davies *et*

al. 1984).

The pathogenesis of rib involvement in tuberculosis is considered in three ways. Solitary rib involvement secondary to hematogenous spread from the lungs or distant focus by activation of latent tuberculous foci (Wiebe and Elwood 1991) is probably most common. Cold abscess of the chest wall involving ribs, however, appears to arise from tuberculosis of the intercostal lymph glands. In this instance, the abscess which may originate from intralesional lymph nodes near internal mammary artery could present near intercostal cartilage. Pus from the abscess may drain forward more commonly along the intercostal nerves than backward (Crofton and Douglas 1981). Auerbach (1942) reported several cases of rupture or extension into lung or pleural space of rib tuberculosis, suggesting a direct spread. In contrast, a direct extension to thoracic cavity and ribs from the adjacent lung may be possible (Kalley 1984; Mary *et al.* 1989; Wiebe and Elwood 1991). In the tuberculosis of the intercostal lymph glands, multifocal cold abscesses of the chest wall, as shown in figure 2, are likely to be originated and extended anteriorly and posteriorly along the involved intercostal nerves.

Dependent pus drain from the previous abscess lesions of the chest wall rather than hematogenous spread is considered to have given rise to the newly developed protruding soft tissue mass in our patient.

Although pleuropulmonary tuberculosis is very common, few reports have documented its association with local rib destruction. Plain films of the chest appear mostly unable to detect early subtle rib changes even in the cases of chest wall mass (Tatelman and Drouillard 1953; Mary *et al.* 1989). Radiological evidence of costochondral tuberculous involvement in the rib tuberculosis is soft-tissue mass-like shadow over the involved costochondral junction as in the Figure 1, and also as was previously described (Tatelman and Drouillard 1953; Brown 1980). Such shadow may be that of cold abscess of the chest wall. Chest wall lesion probably precedes rib destruction. It is demonstrated in the chest CT of our patient at his second presentation, on which rib change, despite the presence of extrapleural abscess, was uncertain.

Bone scan may be useful in screening chest wall mass, especially when plain films are negative (Fogelman 1980). CT is valuable when suspecting skeletal tuberculosis or when the involvement of the surrounding structures by the lesions apparent on plain films is uncertain (Mary *et al.* 1989) as well

as in assessing the patient response to treatment. Magnetic resonance imaging appears superior to CT in not only disclosing and determining the extent of chest wall mass but also in planning for the surgery of chest wall mass (Sharif et al. 1990). The tuberculous rib destruction in the lack of pulmonary tuberculosis, a very unusual case, which may simulate malignancy (Ormerod et al. 1989), remains a diagnostic challenge often requiring needle aspiration or open biopsy.

The role of surgery in the treatment of skeletal tuberculosis is controversial. However, the surgical intervention is undisputable in treating the tuberculous chest wall lesions which is unresponsive to antituberculous medication.

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