

Tuberculosis of bones and joints: diagnostic approaches

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Summary. *Mycobacterial and routine aerobic and anaerobic cultures were made prospectively from 22 patients with bone and/or joint tuberculosis. Mycobacteria were found on direct smear in 6 patients (27.3%), on culture in 14 (63.6%) and on histological section in 5 (22.7%). In one patient routine culture at operation revealed growth of Nocardia asteroides and Moraxella catarrhalis in addition to a positive culture of mycobacteria. Routine sinus culture showed growth of Staphylococcus epidermis in 3 out of 8 patients with draining sinuses. Thus, isolation of avirulent pyogenic bacteria from an operative or sinus specimen does not exclude the possibility of tuberculosis. Mycobacteria can often be identified from sinus-track culture in patients in whom operative culture, histopathological and clinical examination have failed to confirm the diagnosis of tuberculosis. Tuberculosis should be suspected if there are pus cells without pyogenic bacteria on direct smear, if there is no growth of any pyogenic bacteria or if there is growth of Staphylococcus epidermidis alone on routine aerobic and anaerobic sinus cultures.*

Résumé. *Des cultures de routine et à visées mycobactériennes ont été faites prospectivement sur 22 patients présentant une tuberculose osseuse ou articulaire. Une mycobactérie a été trouvée à l'examen direct chez 6 patients (27,3%) par culture chez 14 patients (63,6%) et par examen histologique chez 5 patients (22,7%). 8 patients présentaient une fistule productive et chez 3 d'entre-eux, les cultures de routine ont montré la présence de staphylocoques épidermidis confirmant que l'isolation d'une bactérie pyogène à partir d'un prélèvement opératoire ou d'une fistule n'exclue pas la possibilité de tuberculose. Les mycobactéries peuvent souvent être isolées à partir du produit de fistule chez des patients pour lesquels les cultures de*

prélèvements opératoires, l'étude histologique et clinique n'ont pas pu conserver le diagnostic de tuberculose. La tuberculose aurait été suspectée si à l'examen direct il y a du pus sans présence de bactérie pyogène ou si les cultures ne montrent pas de développement de bactérie pyogène ou encore si on isole seulement du staphylocoque épidermidis par cultures de routine aérobie et anaérobie à partir du produit de fistules.

Introduction

The definitive diagnosis of tuberculosis is by demonstration of tubercle bacilli but in many instances the diagnosis is established on the basis of supporting evidence from clinical, radiological, histological, haematological and immunological studies. Mycobacteria cannot be isolated from all patients with tuberculosis and histological examination is not diagnostic unless the section is positive for acid-fast bacilli and typical tubercles are seen.

Specimens for mycobacterial culture can be obtained directly from the infected site during operation or from a sinus track. Many investigators have regarded the sinus track as being unreliable for the isolation of pathogens in bone infection [1–3], but others have found this technique helpful [4–6].

Materials and methods

A prospective study of 22 patients with bone and/or joint tuberculosis was carried out from September 1994 to January 1997. In all instances, the diagnosis of tuberculosis was confirmed by the demonstration of tubercle bacilli in direct smear and/or mycobacterial culture and/or histological section.

Specimens submitted for bacteriological diagnosis included syringe-aspirated material or infected tissue which had been obtained during surgery. Specimens from sinus tracks were collected by syringes from 8 patients, by a technique pre-

viously described [6]. The aspirated material was centrifuged and the sediment was used for mycobacterial culture and direct Ziehl-Neelsen staining. Direct Gram staining without centrifugation was also undertaken. The specimen was inoculated into at least 2 bottles of Lowenstein-Jensen medium for mycobacterial culture and on routine culture media which was cultivated under aerobic and anaerobic conditions. Ziehl-Neelsen stain was used for the demonstration of acid fast bacilli (AFB) in histological section. Mycobacteria and pyogenic bacteria were identified using conventional methods [7].

Results

The age of patients ranged from 26–82 years (mean, 51 years); 16 were males and 6 were females. The vertebrae were the most common sites which were involved (10 patients).

A direct smear revealed fields full of neutrophils or pus cells in 19 patients. Acid-fast bacilli were found on direct smear in 6 (27.3%) and on histological section in 5 (22.7%). The mycobacterial cultures were positive in 14 patients (63.6%).

Eight patients presented with draining sinuses, and 6 of them had positive mycobacterial cultures. The operative cultures were positive in only 2 out of 7 patients. An operation was not performed on one patient because the diagnosis of tuberculosis had been confirmed by sinus culture. In one patient, in whom the provisional diagnosis was an infected diabetic foot, the diagnosis of tuberculosis was based entirely on sinus culture. No clinical or histopathological suspicion of tuberculosis had been found and the operative culture was negative.

Routine aerobic and anaerobic operative cultures consistently yielded no growth of pyogenic bacteria. The only exception was a patient with spinal tuberculosis in whom the operative culture revealed a heavy mixed growth of *Nocardia asteroides* and *Moraxella catarrhalis* in addition to a positive mycobacterial culture. This patient did not have a sinus thus excluding the possibility of external contamination. Growth of *Staphylococcus epidermidis* occurred on routine aerobic and anaerobic cultures in 3 of the sinus specimens from tuberculous patients. The finding of no growth on aerobic and anaerobic sinus cultures in 3 other patients raised the suspicion of tuberculosis.

Discussion

Mycobacteria cannot necessarily be identified by means of a single test in every patient with bone or joint tuberculosis. However, tuberculosis is to be strongly suspected if direct Gram or Ziehl-Neelsen staining of operative or sinus material shows neutrophils or pus cells without pyogenic bacteria, after excluding a sterile abscess or the presence of a retained foreign body, when aerobic and anaerobic routine cultures do not yield growth of any pyogenic bacteria or when routine culture of a draining sinus yields growth of *S. epidermidis* alone, especially in adults or elderly patients without previous history of pyogenic osteomyelitis. In the author's series *S. epidermidis* contaminated the sinuses of 3 out of 8 patients. This organism is a predominant normal skin commensal [8] that easily colonises a sinus track.

In this study, sinus cultures were found to be more efficient than operative cultures for the isolation of mycobacteria. The sinus track usually represents the site of collection and drainage of an extensively infected bone or joint where the specimen can be collected by a syringe; the aspiration can be repeated several times, particularly when routine aerobic and anaerobic cultures are negative. The sinus specimen can be centrifuged and the sediment used for direct smear and mycobacterial culture.

Patzakis et al. [9] recommended that specimen cultures from several sites of bone infection should be obtained in order to avoid missing the causative agents. The assumption of many investigators [1–3] that the sinus track is an unreliable source for isolation of pathogens of bone infection is not valid, and the identification of mycobacteria from this source may permit the avoidance of unnecessary operation. It may provide confirmation of the diagnosis even if the clinical findings, operative cultures and histopathology are not suggestive of tuberculosis. Mousa [6] noted that a cotton swab specimen is unreliable for isolation of mycobacteria because sufficient material for centrifugation can not be obtained.

The present study showed that isolation of pyogenic bacteria from an operative specimen does not exclude the possibility of tuberculosis. Pyogenic bacteria of low virulence may be present in patients in whom immunosuppression occurs as a result of chronic tuberculosis [7, 8]. These organisms may be transmitted from the respiratory tract by the blood and lodged in a widely necrotic tissue.

Operative and sinus material should be obtained by a syringe rather than a cotton swab and mycobacterial culture undertaken in all suspected cases of tuberculosis, even when routine culture has yielded a growth of pyogenic organisms.

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