Multifocal osteoarticular tuberculosis in children

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ABSTRACT

Purpose. To review records of 16 children with multifocal osteoarticular tuberculosis.

Methods. Records of 7 girls and 9 boys aged one to 14 (mean, 6) years with multifocal osteoarticular tuberculosis were reviewed. Haematological tests and radiographs of the chest, whole spine, pelvis, knees, elbows, hands, and feet were taken. The diagnosis was confirmed histologically. Patients were treated with standard 4-drug antitubercular chemotherapy (isoniazid, rifampicin, ethambutol, pyrazinamide) for 2 months, followed by a 2-drug regimen (isoniazid and rifampicin) for 10 months. Supportive treatment (deworming and nutritional advice) was also provided.

Results. All 16 patients were immunocompetent. Pain and swelling around the lesions were the main symptoms; fever was not common (2 cases only). No patient reported weight loss or night sweats. The mean number of bony lesions was 3.4 (range, 2–15) per patient. Appendicular (hands and feet) involvement was more common than axial (spinal) involvement. Radiological appearances of the lesions were cystic, irregular, lytic, and with or without sequestrum/periosteal reaction. Some lesions were asymptomatic and detected incidentally on radiographs. Only one patient had active chest lesions. Five patients had spinal involvement but no neurological deficit. No patient underwent any surgical intervention, except for diagnostic biopsy. The mean follow-up period was 18 (range, 6–24) months. All patients showed complete healing within one year of chemotherapy. There were residual deformities and restriction of joint movement in patients with advanced articular and axial osteoarticular involvement.

Conclusion. Children with multifocal osteoarticular tuberculosis were usually immunocompetent. Appendicular involvement was common, but concomitant chest involvement was uncommon. Standard multidrug antitubercular therapy and nutritional supplementation achieved good outcome.

Key words: child; tuberculosis, osteoarticular
INTRODUCTION

Multifocal osteoarticular tuberculosis accounts for 5 to 10% of all osteoarticular cases even in tubercular endemic countries, and rarely occurs in non-immunocompromised patients and those with normal pulmonary findings. Its symptoms are constitutional, because of widespread involvement. We reviewed records of 16 children with multifocal osteoarticular tuberculosis.

MATERIALS AND METHODS

Records of 7 girls and 9 boys aged one to 14 (mean, 6) years who presented with multifocal osteoarticular tuberculosis between June 2006 and July 2009 were reviewed (Table). To rule out any co-morbid conditions, haematological tests included haemogram, erythrocyte sedimentation rate (ESR), peripheral blood smear, blood sugar levels, liver and kidney function, hepatitis profile, and human immunodeficiency virus, according to the protocol for diagnosis and management. The Mantoux test was not used because of its doubtful utility. Radiographs of the chest (including shoulders), whole spine, pelvis (with both hips), knees, elbows, hands, and feet were taken. Ultrasonography of the abdomen was performed for detection of visceral involvement. The diagnosis was confirmed histologically through sputum samples, pus (for Ziehl-Neelson staining), ulcer edge biopsy, curetting from the soft-tissue collections, and biopsy from bony lesions and regional lymph nodes.

Patients were treated with standard 4-drug antitubercular chemotherapy (isoniazid, rifampicin, ethambutol, pyrazinamide) for 2 months, followed

<table>
<thead>
<tr>
<th>Sex/age (years)</th>
<th>Upper limb involvement</th>
<th>Lower limb involvement</th>
<th>Axial involvement</th>
<th>Clinical symptoms*</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/1</td>
<td>Left elbow, carpal bones, and 2nd metacarpal</td>
<td>-</td>
<td>-</td>
<td>Swelling and pain in all sites</td>
</tr>
<tr>
<td>F/12</td>
<td>Left elbow</td>
<td>-</td>
<td>T6–9</td>
<td>Swelling, pain, and discharging sinus in left elbow</td>
</tr>
<tr>
<td>F/3</td>
<td>Right elbow</td>
<td>Right 1st metatarsal</td>
<td>-</td>
<td>Swelling and pain in elbow, swelling in foot</td>
</tr>
<tr>
<td>M/3</td>
<td>Left proximal phalanx of the index finger</td>
<td>Left 5th metatarsal</td>
<td>-</td>
<td>Swelling and pain in index finger, swelling in foot</td>
</tr>
<tr>
<td>F/3</td>
<td>-</td>
<td>Right tibia and 1st metatarsal</td>
<td>-</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>F/4</td>
<td>Right proximal phalanx of the index finger</td>
<td>Right proximal phalanx of the 5th toe</td>
<td>-</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>F/4</td>
<td>Left ulna and 1st metacarpal, right 2nd metacarpal</td>
<td>Left tibia, Right calcaneus</td>
<td>-</td>
<td>Swelling, pain, and multiple discharging sinus in both hands</td>
</tr>
<tr>
<td>M/4</td>
<td>Right 5th metacarpal</td>
<td>Right cuboid</td>
<td>-</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>M/7</td>
<td>Right elbow and carpal bones</td>
<td>-</td>
<td>-</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>M/4</td>
<td>Right 3rd metacarpal, left proximal phalanx of the index and ring fingers</td>
<td>-</td>
<td>-</td>
<td>Swelling, pain, and discharging sinus in both hands</td>
</tr>
<tr>
<td>F/11</td>
<td>-</td>
<td>Right proximal tibia, soft-tissue abscess of the left thigh</td>
<td>T9–10, abscess forehead</td>
<td>Swelling and pain in all sites, genu varum, discharging sinus at knee, kyphus in back, swelling in forehead, discharging sinus in left thigh</td>
</tr>
<tr>
<td>M/8</td>
<td>Left 5th metacarpal</td>
<td>Right 1st metatarsal</td>
<td>-</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>M/9</td>
<td>-</td>
<td>Left cuboid</td>
<td>T9–11</td>
<td>Pain in back, swelling in foot</td>
</tr>
<tr>
<td>M/5</td>
<td>Right distal humerus, radius and epiphysis, left proximal ulna and 3rd and 5th metacarpals</td>
<td>Left tibia</td>
<td>Left lateral mass of C1 and facet of C2</td>
<td>Swelling and pain in both sites</td>
</tr>
<tr>
<td>M/14</td>
<td>Right radius</td>
<td>Left calcaneus</td>
<td>-</td>
<td>Painless abscess in forearm, pain in heel</td>
</tr>
<tr>
<td>M/10</td>
<td>Left lower-end humerus and both proximal ulna, right proximal phalanx of the index finger and middle phalanx and the middle finger</td>
<td>Right femoral neck, both tibia, talus, calcaneum, and 1st metatarsal</td>
<td>L3–4, chest</td>
<td>Swelling and pain, multiple discharging sinus all over body</td>
</tr>
</tbody>
</table>

* Not all sites of involvement showed symptoms of pain and swelling
by a 2-drug regimen (isoniazid and rifampicin) for 10 months. Supportive treatment (deworming and therapeutic nutritional advice) was also provided. In spinal tuberculosis, instability and neurological deficit were taken into consideration. Treatment progress was monitored using serial haematological tests and radiographs at months 2, 5, 8, and 12.

RESULTS

All 16 patients were immunocompetent. The mean erythrocyte sedimentation rate at presentation was 37 (range, 12–56) mm/hour. Pain and swelling around the lesions were the main symptoms (Fig. 1); fever was not common (2 cases only). No patient reported weight loss or night sweats. The mean number of bony lesions was 3.4 (range, 2–15) per patient. Appendicular (hands and feet) involvement was more common than axial (spinal) involvement. Radiological appearances of lesions were cystic, irregular, lytic, and with or without sequestrum / periosteal reaction (Fig. 2). Some lesions were asymptomatic and detected incidentally on radiographs. For example, lower-end humeral and proximal ulnar lesions in one patient, and femoral neck and active chest lesions in another. Old pulmonary scars were observed in 2 patients, but were active in one only. Five patients had spinal involvement but no neurological deficit. No patient underwent any surgical intervention, except for diagnostic biopsy.

The mean follow-up period was 18 (range, 6–24) months. All patients showed complete healing within one year of chemotherapy. The mean haemoglobin level improved to 10.2 (from 7.3) gm/dl at completion of treatment. The swelling and abscesses disappeared by 6 (range, 4–12) weeks, whereas sinuses took a mean of 11 (range, 4–14) weeks to heal. Sclerosis around erosive bony and cystic lesions was observed by 8 to 12 weeks, indicating a favourable response to antitubercular drugs. The healing of erosive bony lesions took 24 to 40 weeks. There were residual deformities and restriction of joint movement in patients with advanced articular and axial osteoarticular involvement.

DISCUSSION

There are 2 infection mechanisms of multifocal osteoarticular tuberculosis in children.5 In infants and very young children with no exposure to tuberculosis, tubercular lesions in osteoarticular system occur as a primary complex. These lesions may be multiple and produce exudative reactions. Following sensitisation in bigger children, the typical presentation is usually a solitary lesion, but the bacilli are lying dormant at various sites at the time of initial haematogenous spread (secondary complexes). If the host immunity becomes precarious, these quiescent bacilli at various sites flare up, leading to multiple osteoarticular lesions.

Our hospital is a tertiary paediatric health care centre that admits 25 to 40 new osteoarticular tuberculosis cases per year. 21% were multifocal osteoarticular tuberculosis. With poor nutritional status, widespread acute and chronic pyogenic infections, worm infestations, high tubercular prevalence, the immune system of children in developing countries is constantly under attack, such that quiescent secondary tubercular complexes flare up. In addition, the prevalence of tuberculosis in children is already high.6 In certain regions among persons with extrapulmonary tuberculosis, the frequency of multifocal osteoarticular tuberculosis can be as high as 35%.7 Therefore, the frequency of 5 to 10% reported in the literature may be an underestimate.1,2

The main presentation of multifocal osteoarticular tuberculosis in children is swelling, pain, discharging sinus, deformity, and loss of range of movement.

Figure 1 An 11-year-old girl presenting with swelling and pain in all affected sites, with mild genu varum, discharging sinuses in the knee and left thigh, kypus deformity in the back, and swelling of the forehead. The multifocal osteoarticular tuberculosis involves the right proximal tibia (including epiphysis) and T9–T10 vertebrae. Sequestrum can be seen in the tibial lesion.
Lesions may demonstrate different stages of destruction/healing and not all are symptomatic. This is a result of the interplay between the virulence of the bacilli and local/general immunity of the host. As tubercle bacilli are haematogenous, the lesions may be seen at different stages of development. The number of osseous lesions is usually 4 to 6, and can be as many as 26 in 19 different sites. Multifocal osteoarticular tuberculosis most often involves the axial skeleton (spine), followed by major weight bearing joints and extraspinal tubercular osteomyelitis. It may also involve an unusual bone such as the mandible. In our study, the appendicular skeleton (hands and feet) was most commonly involved. Peripheral manifestation may be due to the distribution pattern of reticuloendothelial cells and haemopoietic tissues in children. The typical osseous lesion in the appendicular skeleton is that of irregular cystic destruction without any reactive bone formation, but atypical presentations have also been encountered. Isotope scans to detect occult lesions and computed tomography to estimate the extent of lesions are useful diagnostic tools. In children, involvement of the chest is rare. The presentation can entail vague visceral symptoms or multiple destructive lesions. Constitutional symptoms may be
lacking, because of the deficient immune system. The associated poor nutritional status of children may mimic the cachexia of malignancy. Other differential diagnoses include low-grade pyogenic osteomyelitis, hyperparathyroidism, fungal infections, and syphilis.10,13,14

Treatment for multifocal osteoarticular tuberculosis is similar to that for solitary osteoarticular tubercular lesions. According to the Revised National Tuberculosis Programme of India,15 ethambutol is administered as part of the treatment regimen for severe extrapulmonary tuberculosis in children. However, careful monitoring for oculotoxicity is necessary, as visual acuity and other vision testing is difficult in children aged <13 years. Surgical intervention may be necessary in spinal tuberculosis with instability or neurological deficit.13,10,16 Supervised follow-up for these children is necessary in view of the growing skeleton, endemic of tuberculosis and other infections, and poor socioeconomic conditions.

In patients with poor host immunity, immunotherapy in the form of thymic peptide and albumin has been used.9 An immunomodulating regimen consisting of Bacillus Calmette-Guerin and diphtheria-tetanus vaccinations and 6 cycles of levimasole for 3 days has also been resorted to.17 Continuing antitubercular treatment for further 12 to 18 months is advised.17 In our study, these methods for boosting patient immunity was not used. Only supportive therapy (deworming and nutritional advice) was given.

REFERENCES