Acute hematogenous osteomyelitis of childhood in Saudi Arabia.
Why does treatment fail?

Saleh Al-Harby, FRCS

ABSTRACT
Objectives: To study the acute hematogenous osteomyelitis of childhood in Saudi Arabia and to evaluate the methods of treatment. Design: The records of all children of 12 years and below admitted during a 2-year period with clinical and radiological evidence of acute hematogenous osteomyelitis were studied. Results: Of the 128 children studied, the male to female ratio = 1.8:1. Pain and loss of function were the most common presenting features. Loss of function alone was the main clinical sign in the first four years of age. The tibia were involved in 36.7% of cases. Staphylococcus aureus accounted for 81% of the causative organisms. Nineteen patients progressed to chronic osteomyelitis. There was no significant difference between surgical and conservative treatment as regards to failure (p>0.05). Conclusions: Acute hematogenous osteomyelitis of childhood is considered as one of the recognized health problems in Saudi Arabia. Prompt institution of the proper therapy is essential at the early stage of this curable disease.

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Keywords: Osteomyelitis, childhood, acute.

Acute hematogenous osteomyelitis is a common disease of childhood in developing countries.1,2,3 Over the past two decades, many reports have shown that acute hematogenous osteomyelitis can be cured.1,4,5 The risk of chronic osteomyelitis remains a major reason for seeking to improve the rate of cure of this disease. The choice of antibiotics, the duration of treatment and the value of early surgical intervention are the three main areas of debate regarding management of patients with acute hematogenous osteomyelitis. Delay in instituting proper conservative treatment, persistence with conservative treatment and inadequate surgery, are the factors which lead to bad results in this curable disease.1,3,6,7 This paper presents the clinical experience of 128 children with proven acute hematogenous osteomyelitis. Our findings are compared with other studies.3,6,8,9

Materials and methods A review was carried out of the medical records of all children following their first attack of acute hematogenous osteomyelitis who had been admitted to Riyadh Central Hospital, Saudi Arabia between October 1990 and September 1992. Patients in whom the diagnosis was made on clinical grounds only, or in whom there were deficient medical records were excluded from the study. Out of 340 children surveyed 128 were found to fulfill the criteria of diagnosis which was the isolation of the organism from the site or the blood and/or the presence of radiological bone changes. All patients were under the care of orthopedic surgeons. A variety of antibiotics were used. The average follow up was three years, the shortest being nine months.

Results Of the 128 children included in this study, 83 were male (64.8%) and 45 were female (35.2%) (male-female ratio = 1.8:1). Their ages ranged from three months to twelve years (Fig. 1) mean (± SD) 6.5 (3.9) years. Pain and loss of function were the most common presenting signs and symptoms in 123 children (96%). Loss of function alone was the main clinical sign in the first four years of age. Forty-seven patients had the infection in the tibia (36.7%). There was no preference for either side of the body. Five patients (3.9%) had more than one site involved. Forty-two children (32.8%) had a relevant history of injury and 57 (44.5%) were seen in the first 48 hours after onset of their symptoms. Fever of more than 38 °C was found in 50 children (39%) upon admission. At the time of admission, leucocytosis was found in 58 patients (45.3%) and a raised erythrocyte sedimentation rate (ESR) in 68 (53%). Anemia (hemoglobin less than 10 grams per 100 milliliters of blood) was seen in 10 patients.

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Twenty patients (15.6%) had positive blood culture and 90 (70.3%) had positive culture from the site of infection. Microorganisms were isolated from the blood and the pus in 98 patients (76.6%). Staphylococcus aureus accounted for (81%) of the causative organisms, and the remaining were group A Streptococci (6%), Haemophilus influenzae type b (5%), and other gram negative bacteria were seen in the remaining 8% of organisms isolated. There were 8 children (6.3%) known to have sickle cell disease and Salmonella was isolated from 2 of them (25%). Ninety-nine patients (77.3%) had early surgical drainage and pus was found in 93 children (72.7%) (Table 1). Twenty-nine patients (22.7%) were treated conservatively by rest, analgesics and antibiotics. Twenty seven of the patients treated conservatively responded rapidly to the treatment and had no recurrence. Only 2 patients (6.9%) had remained febrile for more than ten days and progressed to the chronic form of the disease in spite of the initiation of antibiotic therapy from the first 48 hours of the onset of symptoms (Table 1). Of the 19 patients who progressed to chronic osteomyelitis (14.8%), 17 (89.5%) had late diagnosis (more than five days) and were treated surgically. The failure rate among the surgically and conservatively treated patients was 17.2% and 6.9% respectively (Table 1). Chi square and Fisher exact test showed no significant difference between the two groups as regards failure rates ($p>0.05$).

**Table 1 - The number and percentage of failure seen in two methods of treatment of osteomyelitis**

<table>
<thead>
<tr>
<th>Type of treatment</th>
<th>Surgical</th>
<th>Conservative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Cured</td>
<td>82</td>
<td>82.8</td>
<td>27</td>
</tr>
<tr>
<td>Failed</td>
<td>17</td>
<td>17.2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>77.3</td>
<td>29</td>
</tr>
</tbody>
</table>

**Discussion** Acute hematogenous osteomyelitis in children is showing a world wide decrease in developed countries although it is still one of the recognized health problems in Saudi Arabia. This was shown in this study by the fact that 128 confirmed cases were treated in a 2-year period. The pattern of presentation of this disease seen in this 2-year series is generally similar to that reported elsewhere. Early diagnosis (in the first 48 hours) is still based on the clinical evaluation of the patient in spite of the availability of the advanced laboratory equipment which has facilitated confirmation of the diagnosis. Pain, loss of function, local tenderness over the bony metaphysis and the slight periosteal thickening detected by careful and gentle palpation of the affected area of the superficial bones are important physical signs and symptoms seen in the early phase of this disease. The general agreement among the clinicians managing acute hematogenous osteomyelitis which is immediate initiation of the proper treatment is broad and unclear. The role of surgical treatment of acute osteomyelitis is underestimated by one group and over emphasized by others. This study has shown that 14.8% of the cases have progressed to chronic osteomyelitis which is considered as a failure of the treatment during the acute phase of the disease, in agreement with other studies (Table 2). The failure rate among the surgically treated patients (17.2%) was apparently higher than that of the conservatively treated patients (6.9%).
Table 2 - Comparison of the failure rate of treatment of acute osteomyelitis in children from different studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Number of patients</th>
<th>Failure rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocky et al</td>
<td>1970</td>
<td>113</td>
<td>18.6</td>
</tr>
<tr>
<td>Mollan et al</td>
<td>1977</td>
<td>93</td>
<td>19.4</td>
</tr>
<tr>
<td>Gillespie et al</td>
<td>1981</td>
<td>655</td>
<td>20.3</td>
</tr>
<tr>
<td>Cole et al</td>
<td>1982</td>
<td>64</td>
<td>17.2</td>
</tr>
<tr>
<td>Current study</td>
<td>1995</td>
<td>128</td>
<td>14.8</td>
</tr>
</tbody>
</table>

However, pus was found in 93 (93.9%) out of 99 children explored which justified this method of treatment. The increased number of failures among this group cannot be attributed to surgery since operation was only carried out on those in whom virulence of the organism, delay in starting the treatment or inadequate antibiotic therapy had allowed pus to form. In agreement with Blockey et al. and Edwards et al., this study has shown that failure of treatment was significantly rare in infants and neonates. Based on our findings, we believe that there is no significant difference between conservative and surgical treatment in terms of failure. However, this has to be interpreted cautiously.

Conclusion Acute hematogenous osteomyelitis of childhood as a curable disease is one of the recognized health problems in Saudi Arabia. Awareness of the importance of early clinical diagnosis among treating physicians and the prompt institution of the appropriate treatment can reduce the occurrence of chronic osteomyelitis. The debate between those who propose routine operations and those who advocate surgical treatment on patients who fail to respond to antibiotic therapy is complex and has been an issue for decades. This issue can be clarified in a carefully controlled prospective clinical trial.

References