

# Acute haematogenous osteomyelitis: microbial conversion and unusual age presentation

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التهاب العظم والنقي الحاد ذو المنشأ الدموي: تحول جرثومي وإطار عمري غير مألوف  
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خلاصة: أجريت دراسة استرجاعية على 110 من حالات التهاب العظم والنقي الحاد ذي المنشأ الدموي رتبة ت. من سنة 1983 إلى سنة 1989. وتبين أن الأطفال دون السنة الواحدة من العمر كانوا أكثر الناس تأثراً. ولم يكتشف أي شخص بالغ بين المصابين. وقد تم استفراد (عزل) العقوديات الذهبية من 72.7% من الحالات. كما أجريت دراسة مستقبلية على 80 حالة في المدة 1992-1997. وتبين أن معظم المصابين كانوا أطفالاً في التاسعة من العمر. وشملت هذه المجموعة 19 مصاباً من البالغين. وقد تم استفراد (عزل) العقوديات الذهبية من 43.7% من الحالات. وهكذا كان هناك اختلاف واضح في معدل الإصابة بالعقوديات الذهبية وفي أعمار المصابين قبل حرب الخليج وبعدها. وربما كان تشغيل الأطفال وسوء التغذية قد سببا تغيرات في الجراثيم المسببة لهذه العدوى وفي الإطار العمري للمصابين في السنوات الأخيرة.

**ABSTRACT** From 1983 to 1989, 110 cases of haematogenous osteomyelitis were studied retrospectively. The most commonly affected were children under 1 year. No adult cases were reported. *Staphylococcus aureus* was isolated from 72.7% of cases. During 1992-1997, 80 cases were studied prospectively. The most commonly affected were children aged 9 years. This group included 19 adults. *S. aureus* was isolated from 43.7% of the cases. There was a clear difference in the incidence of *S. aureus* and age presentation in the cases before and after the Gulf conflict. Working children and malnutrition might have caused changes in the infecting organisms and age presentation in recent years.

## Ostéomyélite nématogène aigüe: conversion microbienne et profil d'âge inhabituel

**RESUME** De 1983 à 1989, 110 cas d'ostéomyélite hématogène ont fait l'objet d'une étude rétrospective. Les sujets les plus fréquemment touchés étaient les enfants de moins d'un an. Aucun cas n'a été signalé chez l'adulte. *Staphylococcus aureus* a été isolé chez 72,7% des cas. Durant la période 1991-1997, 80 cas ont fait l'objet d'une étude prospective. Les sujets les plus fréquemment touchés étaient les enfants âgés de 9 ans. Ce groupe de cas comprenait 19 adultes. *S. aureus* a été isolé chez 43,7% des cas. Il y avait une nette différence dans l'incidence de *S. aureus* et le profil d'âge chez les cas avant et après le conflit du Golfe. Le travail des enfants et la malnutrition ont peut-être entraîné des changements dans les micro-organismes infectieux et le profil d'âge au cours des dernières années.

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## Introduction

*Staphylococcus aureus* is the most common pathogen isolated from patients with acute haematogenous osteomyelitis. It has been reported to be the causative agent in 61%–96% of cases [1–11].

In industrialized countries, acute haematogenous osteomyelitis is uncommon. In developing countries, the disease still exists and the morbidity appears worst in lower socioeconomic groups [12].

We investigated differences in the incidence of the causative agents and age presentation during two economic periods in Iraq.

## Patients and methods

We studied 80 cases of acute haematogenous osteomyelitis prospectively between November 1992 and March 1997. They were compared with 110 cases from 1983 to 1989 reviewed retrospectively. All cases had been admitted to Basra University Teaching Hospitals, which receives patients from all areas of Basra Province.

The selection of cases was based on clinical, bacteriological, radiological and histopathological evidence of osteomyelitis. Only cases with positive bacterial culture were included. The specimens for culture were obtained directly from the infected bone or accumulated material in the soft tissues or blood. The bacteria isolated were identified by the same conventional methods in both studies.

## Results

In the study of 110 patients from 1983 to 1989, children aged  $\leq 1$  year were most commonly affected (16 patients). Mean age was  $6.5 \pm 4$  years and ages ranged from 16 days to 14 years. The socioeco-

Table 1 Organisms isolated from 110 patients during 1983–1989

Microorganism	No.	%
<i>Staphylococcus aureus</i>	80	70.2
<i>Haemophilus influenzae</i>	24	21.1
<i>Streptococcus pyogenes</i>	6	5.3
<i>Salmonella</i> sp. <sup>a</sup>	3	2.6
<i>Pseudomonas aeruginosa</i>	1	0.9
Total	114 <sup>b</sup>	

<sup>a</sup>All the patients had sickle-cell anaemia.

<sup>b</sup>Four patients were infected with two organisms.

nom status was poor for 12 patients (10.9%). *S. aureus* was isolated from 80 patients (72.7%) (Table 1). The second most frequent causative agent was *Haemophilus influenzae* in which all of the infected patients were aged  $\leq 4$  years. Less frequently found were *Streptococcus pyo-*

Table 2 Organisms isolated from 80 patients during 1992–1997

Microorganism	No.	%
<i>Staphylococcus aureus</i>	35	41.7
<i>Klebsiella</i> sp.	10	11.9
<i>Escherichia coli</i>	8	9.5
<i>Streptococcus pyogenes</i>	5	6.0
<i>S. epidermidis</i>	5	6.0
<i>Salmonella</i> sp. <sup>a</sup>	4	4.8
<i>Haemophilus influenzae</i>	3	3.6
<i>Pseudomonas aeruginosa</i>	3	3.6
<i>Proteus</i> sp.	2	2.4
<i>Brucella</i> sp.	1	1.2
Anaerobic bacteria	8	9.5
Total	84 <sup>b</sup>	

<sup>a</sup>All the patients had sickle-cell anaemia

<sup>b</sup>Four patients were infected with two organisms.

genes, *Salmonella* sp. and *Pseudomonas aeruginosa*.

From November 1992 to March 1997, 80 patients were studied. The most commonly affected were children aged 9 years (13 patients). The mean age was  $15.6 \pm 14.8$  years and ages ranged from 3 years to 74 years. There were 19 patients over the age of 16 years. The socioeconomic status was poor for 62 patients (77.5%). *S. aureus* was isolated from 35 patients (43.8%) (Table 2). The second most frequently isolated pathogen was *Klebsiella* sp., followed by *Escherichia coli*, *Strep. pyogenes* and *S. epidermidis*.

The variation in the frequency of *S. aureus* during both periods was statistically significant ( $\chi^2 = 16.27$ ,  $P < 0.01$ ). During both periods, *Salmonella* sp. was only recovered from patients with sickle-cell anaemia.

## Discussion

We found a significant difference in the incidence of *S. aureus* and age presentation

among patients with acute haematogenous osteomyelitis during the 1980s and 1990s. This indicates an emergence of relatively low virulent organisms as causative agents. Older children and adults were found to be more frequently affected in the recent years. During the period of economic sanctions (1990–1997), most families sent their children to work where they might have been exposed to bone trauma. Thus malnutrition [13] and child labour might have played a role in changing the behaviour of causative agents and the unusual age presentation. Although adults are very rarely affected by haematogenous osteomyelitis [12], we found a high rate of infection in adults in the 1990s.

The incidence of *S. aureus* infection was 72.7% during the period 1983–1989. This is similar to that reported in previous studies [3,9]. *S. aureus* incidence was 43.8% during the period 1992–1997. This is lower than that reported in other studies. Previous studies have found the incidence of *S. aureus* to be 61%–95% of cases [1–11].

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### ANNOUNCEMENT

An international course in Laboratory Methods for the Diagnosis of Leptospirosis will be held in Amsterdam, the Netherlands from 19 to 23 February 2001. Further information of course details and a printable application form can be found on the website at:

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Otherwise a brochure and application form can be obtained from:

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