OSTEOMYELITIS IN A GENERAL HOSPITAL

A FIVE-YEAR STUDY SHOWING AN INCREASE IN SUBACUTE OSTEOMYELITIS

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We have reviewed 60 patients with primary bone infections; 21 of these (35%) had subacute osteomyelitis, a figure which supports other recent observations that this variant of bone infection is becoming more widespread. In this group open culture and biopsy were necessary in order to exclude bony malignancy, and a raised erythrocyte sedimentation rate proved a useful diagnostic aid.

All the patients with acute osteomyelitis or with vertebral infection responded to primary treatment, but five of those with subacute osteomyelitis had recurrences.

With the declining incidence of acute osteomyelitis there is an apparent increase in subacute osteomyelitis. We have been impressed by the diagnostic and therapeutic problems presented by this subacute form, and we present a review of the primary bone infections treated at a general hospital over a period of five years.

PATIENTS AND METHODS

From 1980 to 1985 60 patients were admitted to the Royal Surrey County Hospital with a diagnosis, confirmed bacteriologically or histologically, of primary osteomyelitis. They were classified into four groups:

Acute osteomyelitis was seen in 21 patients who presented with bone infection of sudden onset associated with systemic illness. Infection was confirmed by blood culture or by culture from a specimen taken at operation. *Subacute osteomyelitis* was diagnosed in 21 patients whose illness had an insidious onset and whose symptoms had been present for more than two weeks. In this variant of the disease there are no systemic symptoms and no acute infection. None of our 21 patients had had antibiotic therapy for any reason in the preceding six months.

Chronic osteomyelitis was seen in eight patients; in them

the infection had been present for more than three months. *Vertebral osteomyelitis* was seen in 10 patients.

The clinical records and radiographs of all patients were studied retrospectively; their age, sex, the site of infection, and the response to treatment were all compared. A summary of the findings is shown in Table I.

RESULTS

Figure 1 shows that acute and subacute osteomyelitis are more common in the first two decades of life whereas spinal and chronic osteomyelitis occur with increasing frequency after the fifth decade. There was no significant difference in sex distribution.

Site of infection. Acute osteomyelitis occurred more frequently in the tibia, the femur, and the humerus and, moreover, always occurred at the metaphysis (see Fig. 2). Subacute osteomyelitis occurred in a much wider variety of bones and at variable sites within the affected bones. Vertebral osteomyelitis affected the cervical spine in one patient, the thoracic spine in five and the lumbar spine in four (Table I). Chronic osteomyelitis involved the metatarsals and calcaneum.

Associated factors. In the acute and subacute group, six patients had a history of trauma. In seven of the eight patients with chronic osteomyelitis, five were diabetics, one was on steroid therapy for polyarteritis nodosa and another had a peripheral neuropathy of unknown cause. Three patients with vertebral osteomyelitis had had recent urinary tract surgery.

Radiographic changes. The radiographic changes seen in all the acute cases were lytic metaphyseal lesions; in five patients the lesions were not distinguishable until more than a week after presentation. The radiological changes in subacute osteomyelitis (Figs 3 to 8) were of four types,

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Fig. 1

Age of the 60 patients with osteomyelitis.

sometimes occurring in combination: lytic; lytic with a sclerotic margin (Brodie's abscess); new periosteal bone; and cortical erosions.

Of these, the metaphyseal lesions were all lytic; the rest included four lesions with ill-defined sclerotic changes, two with cortical thickening, two with discrete lucent areas with a sclerotic margin and one with patchy necrosis of the diaphysis. Chronic and vertebral osteomyelitis were characterised by a varying pattern of lysis and sclerosis, but in four patients with vertebral osteomyelitis these developed up to six weeks after presentation.

Histology. The diagnosis of subacute osteomyelitis was made purely on histological grounds in 10 patients; in eight of these, the diagnosis had not been suspected.

Diagnostic accuracy. The diagnosis on admission is shown in Table II.

Treatment and outcome. Acute osteomyelitis. These patients were initially managed with antibiotics and rest. Antibiotics were given for a minimum of six weeks and unless the organism cultured was other than *Staphylococcus aureus*, a combination of either flucloxacillin or erythromycin together with fusidic acid was used. Early surgical intervention (Trueta and Morgan 1954; Harris

Table I. Symptoms and results of haematological, bacteriological and radiographic investigations in the 60 patients

	Acute (21)	Subacute (21)	Chronic (8)	Vertebral (10)
Symptoms				
Duration	8-48 hours	0.5-18 months	3-24 months	1-10 weeks
Local pain	21	21	-	All
Pyrexia (37°C)	20	-	-	7
Haematology				
Raised WBC	11	3	3	3
ESR > 16	21	12 (17*)	8	10
Bacteriology				
Positive blood culture	5 (19*)	1 (9*)	-	1 (5*)
Peroperative specimen	6 (8*)	7 (15*)	8	3 (5*)
Organism				
<i>Staphylococcus aureus</i>	9	7	7	2
<i>Streptococcus pyogenes</i>			1	1
<i>Mycobacterium tuberculosis</i>				2
<i>Klebsiella</i>	1			
<i>Pseudomonas</i>				1
<i>Proteus</i>				1
<i>Bacterium coli</i> (unspecified)				1
Radiographic changes (site)				
Epiphysis	-	1	-	1 (cervical)
Metaphysis	11	12	8	5 (thoracic)
Diaphysis	-	8	-	4 (lumbar)

WBC, white blood count

ESR, erythrocyte sedimentation rate in the first hour

* Test not done on remaining patients

Fig. 2

Sites of osteomyelitis in 60 patients.

Fig. 3

Subacute osteomyelitis was diagnosed in the fibula of an eight-year-old girl who presented with a history of pain for one month.

Fig. 4

This patient was thought to have an osteoid osteoma, but biopsy showed that the cortical thickening of the tibia was due to subacute osteomyelitis.

1962; Mollan and Piggot 1977) was not employed, and operation was undertaken only in those patients who failed to respond to antibiotics and rest within 48 hours, or in whom pus was detectable clinically (Blockey and Watson 1970; Blockey and McAllister 1972). None of the acute cases relapsed.

Subacute osteomyelitis. The majority of patients underwent biopsy and curettage as a neoplasm could not be excluded. Flucloxacillin or erythromycin in combination with fusidic acid was given to all patients, except one, whether they were treated by operation or not; the one exception was a patient who made an uneventful recovery after surgery alone. Five patients (23%) in this

group failed to respond to surgery and/or antibiotics. One patient with an affected distal ulna had two recurrences despite treatment by curettage and with antibiotics; another with a lesion in the pubis had a relapse four months after treatment, and a diabetic patient developed progressive radiographic changes 18 months after treatment. Another two patients with lesions in the clavicle had recurrences after more than two years.

Vertebral osteomyelitis. Bacteriological investigation was carried out in all 10 patients, four by fine-needle aspiration and six by operation. The appropriate antibiotic was prescribed for more than two months in all cases. Treatment failed in two patients: one developed a

Fig. 5

Fig. 6

Lateral and anteroposterior radiographs showing a lytic lesion with a sclerotic margin, a typical Brodie's abscess; a similar appearance was often seen in subacute osteomyelitis.

Fig. 7

A 53-year-old woman had a three-month history of pain and an ill-defined sclerotic lesion in the pubis; the WBC was normal but her ESR was 62 in the first hour. A diagnosis of subacute osteomyelitis was made.

Table II. Diagnosis on admission compared with final diagnosis

Correct diagnosis	Initial diagnosis
Acute osteomyelitis	19 correct 1 Still's disease 1 septic arthritis
Subacute osteomyelitis	12 suspected cases 5 osteosarcoma or Ewing's sarcoma 3 osteoid osteoma 1 recorded as "for exploration"
Chronic osteomyelitis	All correct
Vertebral osteomyelitis	2 back strain 1 multiple myeloma 1 breast metastasis 1 pyrexia of unknown origin 1 "functional"

raised erythrocyte sedimentation rate and a positive bone scan four years after treatment and responded to another course of antibiotics, while the other presented late with advanced disease of the cervical spine and died. *Chronic osteomyelitis.* All patients were cured by local excision and antibiotics.

DISCUSSION

Statistics from the Office of Population, Censuses and Surveys based on a 10% sample of all hospital discharges show a decreasing prevalence of all forms of osteomyelitis since 1962 (Fig. 9). Subacute osteomyelitis, however, has received increasing attention in the literature (Harris and Kirkaldy-Willis 1965; King and Mayo 1969; Gledhill 1973; Harris 1983; Ross and Cole 1985), and the relatively large number of patients with this form of bone infection may indicate either an alteration in the pathogenicity of the organism, a change in host resistance or an increased awareness of the condition. The similar age distribution and causative organism in both acute and subacute osteomyelitis suggest a common aetiology. In our series the relatively high incidence of the subacute form was not due to suppression of an acute infection by antibiotic therapy.

Our findings confirm that accurate diagnosis in subacute osteomyelitis at presentation is difficult: this is due to the absence of obvious signs of local infection in most cases, the absence of pyrexia, and the normal white cell count. The variable radiographic picture – with a combination of lysis, new bone formation, cortical erosion and periosteal new bone – may mimic either a benign or a malignant tumour (Gledhill 1973; Cabanela et al. 1974; Bonakdar-pour and Gaines 1983; Harris 1983). It is also important to stress that, unlike radiographic changes in acute osteomyelitis, those in the subacute form are not always at the metaphysis.

Our findings also confirm that the erythrocyte sedimentation rate is frequently elevated in all forms of osteomyelitis and that this, combined with the typical

clinical picture, should arouse suspicion. Surgical exploration and biopsy may be the only way to confirm or exclude the diagnosis of subacute infections.

Despite the presumed low pathogenicity of the organisms causing subacute osteomyelitis, recurrence after primary treatment was a problem in our series as in others (King and Mayo 1969; Blockey 1983; Lindenbaum and Alexander 1984). While curettage and antibiotics have been the preferred method of treatment (Harris and Kirkaldy-Willis 1965; King and Mayo 1969; Collert and Isacson 1982), others have managed patients with typical lesions of the epiphysis or metaphysis with antibiotics alone and were successful in 87% of cases (Ross and Cole 1985). We believe, however, that surgery is frequently necessary to establish the diagnosis. The

Fig. 8

This patient had a three-week history of pain after being struck by a cricket ball. There is erosion of the cortex and some new bone formation. Although the possibility of a tumour was considered, culture from a biopsy specimen revealed *Staphylococcus aureus*.

correct duration of antibiotic therapy has not been established. Five of our 21 subacute cases relapsed after six weeks of antibiotics; however, no organisms were cultured in any of those who relapsed and it is possible that they did not receive the correct antibiotic.

In our series the incidence of chronic osteomyelitis was low, reflecting the declining numbers of patients

Fig. 9

Estimated number of patients discharged from hospital after treatment for osteomyelitis, periostitis and other infections involving bone for the years 1962-82 (figures for 1964 and 1966 not available).

with chronic bone infections after inadequate treatment of acute infections. An interesting feature is the high incidence of diabetics with chronic osteomyelitis of the foot secondary to diabetic neuropathy.

The clinical features of vertebral osteomyelitis in our series were typical, but the accuracy of primary diagnosis was compromised by the prevalence of back pain and a low index of suspicion in spite of a raised erythrocyte sedimentation rate in all cases. An interesting group were three patients with vertebral osteomyelitis in the thoracolumbar region which had occurred after urological procedures complicated by Gram-negative bacteraemia; the diagnosis in these patients was delayed by the late development of radiological changes, and an awareness of this sequence of events should increase diagnostic accuracy. The culture of fine-needle aspirates taken under radiological control in these cases was positive in four out of six patients and was a considerable advance in their management, as it obviated the need for open biopsy.

In conclusion we found that subacute osteomyelitis is becoming more widespread; its insidious onset, lack of systemic symptoms and non-specific radiological changes present a diagnostic problem but it should be suspected if there is an elevated erythrocyte sedimentation rate. Prolonged antibiotic therapy may be necessary.

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