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Subacute osteomyelitis presenting as a bone tumour

A review of 21 cases

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Summary. *Twenty-one patients with subacute osteomyelitis who were initially considered to have bone tumours were reviewed, with an average follow up of 3 years. The clinical symptoms were not specific and laboratory investigations were normal. The radiographic findings were limited osteolysis surrounded by bone sclerosis in 14 cases, osteolysis without definite borders in 6, and onion-layer periosteal bone formation in one. The preoperative diagnoses included osteoid osteoma, osteosarcoma, chondroblastoma, Ewing's sarcoma, giant cell tumour, fibrosarcoma, eosinophilic granuloma, and bone tumour of unknown aetiology. The definitive diagnosis was made by surgical biopsy, histology and cultures which grew staphylococcus in 9 cases. The gross specimens all showed lymphocytes, plasma cells and granulation tissue with osteogenesis. All the patients recovered completely; 17 were treated with antibiotics and immobilisation, and 4 did not need an antibiotic. There was no recurrence of infection after curettage and excision of the infected tissues.*

Résumé. *Vingt et un patients atteint d'une ostéomyélite subaiguë, considérée initialement comme une tumeur osseuse, ont été traités à l'hôpital Cochin et revus avec un recul moyen de 3 ans. La douleur, l'apyrexie, la normalité presque constante des résultats biologiques ne permettaient pas d'orienter le diagnostic. La radiographie mettait en évidence 14 fois une ostéolyse au sein d'une ostéocondensation, 6 fois une ostéolyse mal limitée et 1 fois une ossification périostée en "bulbe d'oignon". Compte tenu de tous ces éléments, le diagnostic retenu avant l'intervention était 8 fois celui d'un ostéome ostéoîde, 3 fois celui d'un ostéosarcome, 5 fois celui d'une autre tumeur (un chondroblastome, un sarcome d'Ewing, une tumeur à cellules géantes, un fibrosarcome et un granulome éosinophile). Cinq fois un diagnostic de présomption tumorale a été retenu sans autre précision. Le diagnostic final a été établi par biopsie-curetage et examen bactériologique. Le germe le plus fréquemment retrouvé était un staphylocoque doré (9 fois). L'examen histologique de la pièce opératoire montrait une infiltration lympho-plasmocytaire avec ostéogenèse. Ces 21 patients ont guéris avec une antibiothérapie adaptée et une immobilisation 17 fois. La guérison a été obtenue en l'absence d'antibiothérapie dans 4 cas.*

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Introduction

Subacute osteomyelitis is a distinct entity and different from other forms of osteomyelitis. Brodie first described an isolated bone abscess in 1843 [2]. Later others reported that osteomyelitis could mimic a bone tumour [3, 4].

Our series confirms the difficulty of differentiating osteomyelitis from bone tumours.

Table 1. Data for the 21 cases

Case	Age	Sex	Diagnosis delay (months)	Site	Radiograph	Bone Scan or MRI or CT Scan	E. S. R.	Preoperative diagnosis	Culture
1	32	M	5	Distal tibia	Osteolysis	Extension soft tissue	21	Giant cell T.	*Staph aureus*
2	24	M	5	Distal humerus	Radiolucency	Hypodensity	24	Chondro-blastoma	Negative
3	14	M	6	Distal humerus	Radiolucency	No	6	Eosino-philic gra	Negative
4	21	F	15	T-10	Normal	Nidus	92	Osteoid osteoma	No culture
5	27	F	1	Proximal femur	Onion skin appearance	Hyperostosis	39	Ewing's sarcoma	*Staph aureus*
6	15	M	24	Distal femoral	Osteolysis	Osteolysis	16	Osteo-sarcoma	*Staph aureus*
7	30	M	12	Proximal tibia	Nidus	No	15	Osteoid osteoma	No culture
8	23	M	18	Calcaneus	Nidus	Increased uptake	1	Osteoid osteoma	*Pseudomonas*
9	28	M	54	Distal tibia	Radiolucency	Increased uptake	6	Osteoid osteoma	*Staph aureus*
10	21	M	5	Proximal humerus	Osteolysis	Osteolysis	40	Osteo-sarcoma	*Staph aureus*
11	41	M	2	Proximal femur	Osteolysis	Extension into soft tissue	75	Osteo-sarcoma	*Staph aureus*
12	7	M	1	Distal femur	Hyperostosis	No	6	Osteoid osteoma	No culture
13	33	M	4	Distal femur	Osteolysis	Extension soft tissue	10	Fibro-sarcoma	*Staph aureus*
14	29	F	5	Hip (ischium)	Hyperostosis	Increased uptake	24	Tumour	No culture
15	70	F	36	Distal femur	Hyperostosis	Increased uptake	21	Osteoid osteoma	Negative
16	33	F	12	Distal femur	Hyperostosis	Hyperostosis	20	Osteoid osteoma	*Staph aureus*
17	43	F	48	Distal radius	Hyperostosis	No	18	Tumour	*Escherichia coli*
18	35	M	5	Proximal femur	Radiolucency	Increased uptake	73	Tumour	No culture
19	50	F	2	Distal femur	Radiolucency	No	30	Tumour	*Fuso Bactérium*
20	18	M	4	Distal tibia	Nidus	Increased uptake	1	Osteoid osteoma	No culture
21	15	M	48	Proximal femur	Radiolucency	Cortex destroyed	2	Tumour	*Staph aureus*

Patients and methods

This retrospective study included 21 patients, 14 men and 7 women, who were treated in our department from 1973 to 1994 (Table 1). Four were from Black Africa. The mean age was 29 years (range 7.5 to 70 years) at the time of diagnosis. The commonest site was the metaphysis of the long bones.

The most frequent presenting symptom was pain with an average duration of 14 months, range 1 to 54 months). Nineteen of the patients had a normal body temperature.

The white cell count showed an increased leucocytosis (WBC) in only 2. The sedimentation rate (ESR) was only abnormal in 6 ($\geq$30 mm).

Gledhill's classification was used for the radiographic findings [7]:

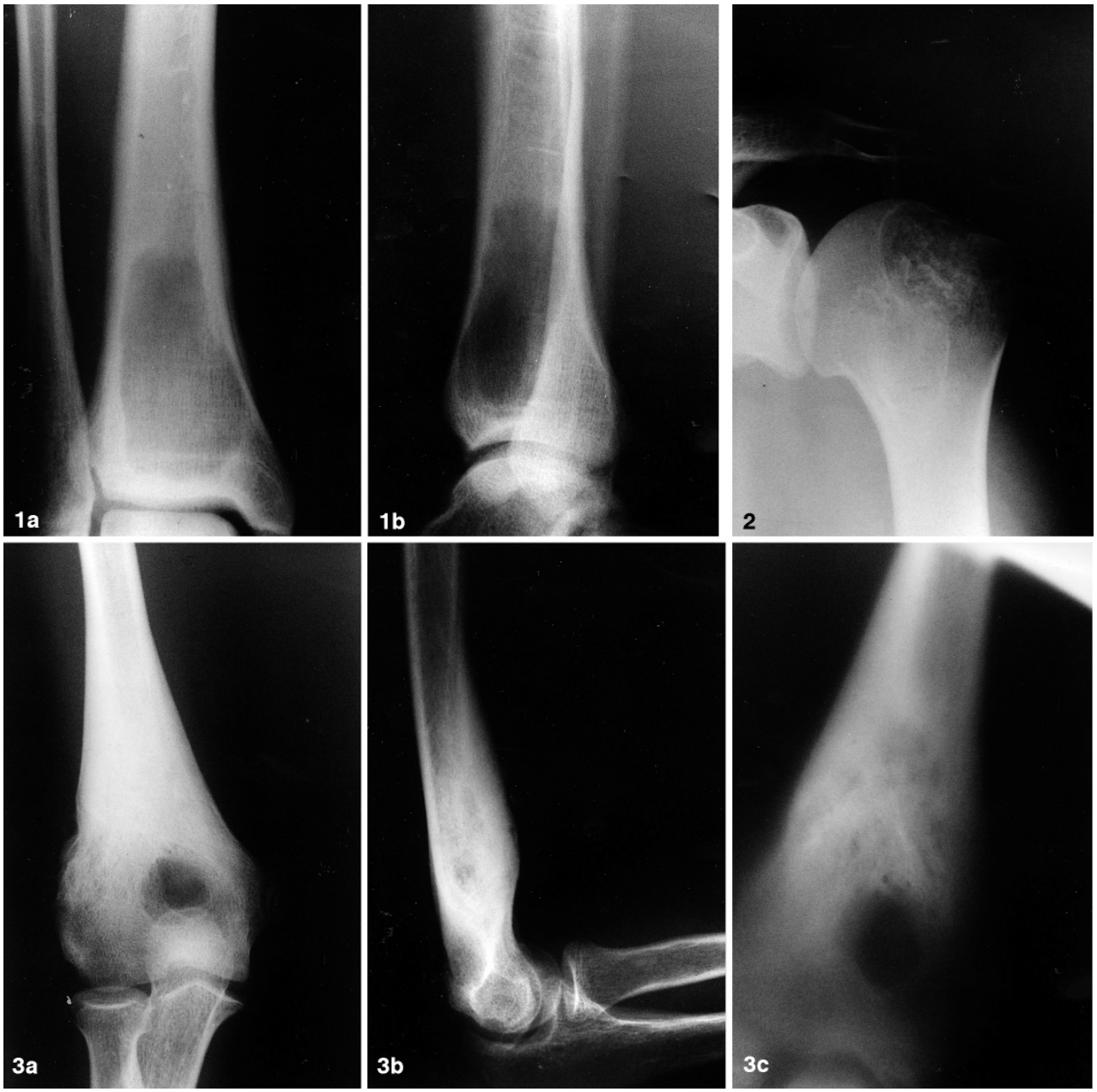

Fig. 1. Case 1. **a, b** Radiographs showing metaphyseal osteolysis in the distal end of the tibia

Fig. 2. Case 2. Radiographs showing a radiolucent lesion with central calcification in the upper outer part of the humerus

Fig. 3. Case 3. **a, b** Radiographs shows a sclerotic lesion in the distal humerus. **c** Anteroposterior tomography shows a cystic lesion

- Type I – 5 cases with solitary localised osteolysis surrounded by reactive new bone formation,
- Type II – 6 with a radiolucent metaphyseal lesion with cortical lysis,
- Type III – 10 with diaphyseal osteolysis associated with excessive cortical reaction, and
- Type IV – 1 with diaphyseal subperiosteal ossification with onion skin layering.

In one case, there was no radiographic abnormality, but a CT scan showed a lesion in the thoracic spine.

Results

In every case a surgical biopsy and/or bacteriological examination was needed for diagnosis. Purulent fluid was found in 7, a nidus in 3, soft brain-like material in 2, and in all the others there was nonspecific white sclerotic new bone formation.

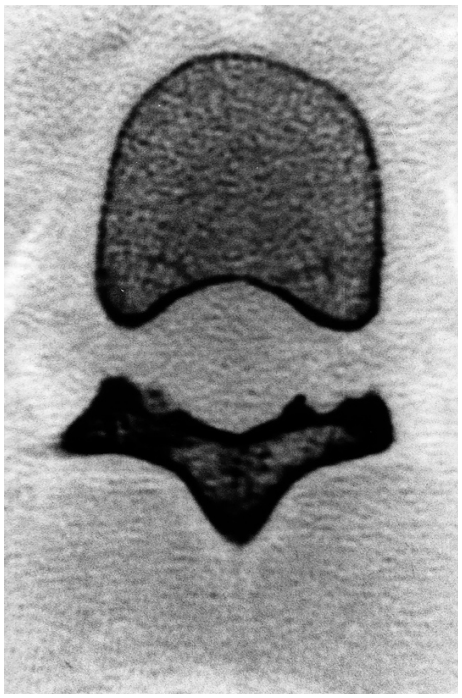

Fig. 4. Case 4. CT shows a cystic lesion, like a nidus, in the right lamina of the T10 vertebra

Cultures and sensitivities in 18 cases showed methicillin sensitive staphylococcus aureus in 9, escerichia coli in 1, pseudomonas aeruginosa in 1, fusobacterium in 1, and negative findings in 6.

The outcome was good in all cases and the average follow up was 3 years (range 6 months to 20 years). Antibiotics and immobilisation were used in 17 patients; 4 had surgical treatment without antibiotics.

Five cases which gave us most difficulty in diagnosis are described:

Case 1

A man, 32 years of age, complained of severe throbbing pain in the right lower tibia for 5 months, relieved by aspirin. There was local swelling. The WBC count and the ESR were normal. Radiographs showed metaphyseal osteolysis at the lower end of the tibia (Fig. 1 a, b). A CT scan indicated that the process extended into the soft tissues.

A preoperative diagnosis of a giant cell tumour was made, but at operation there was evidence of infection with pus appearing as soon as the periosteum was incised. The bone was white and sclerotic, with no signs of a tumour.

Histology showed a nonspecific osteomyelitis and tissue culture isolated a methicillin-sensitive staphylococcus.

His recovery was favourable after 3 months treatment with pefloxacin. There were no preoperative findings which pointed to the correct diagnosis.

Case 2

A man, 24 years of age, had pain in the left upper humerus with nonspecific clinical symptoms. The WBC count was normal, but the ESR was 24 mm/hr. Radiographs showed a radiolucent lesion in the epiphysis (Fig. 2) which had a low density on MRI. The preoperative diagnosis was a benign chondroblastoma.

At biopsy, thick yellow fluid poured from the lesion. Cultures were negative. Histology suggested a septic inflammatory lesion with changes in the leucocytes.

He recovered after taking cefalexin for 3 months. Osteomyelitis is uncommon at this site, and infection was not considered as a preoperative diagnosis.

Case 3

A boy, 14 years of age, had pain in the lower end of the humerus for 6 months. He had stiffness of the elbow; the WBC count and the ESR were normal. The alkaline phosphatase was 171 IU. Radiographs showed a bone cyst just above the lateral condyle (Fig. 3 a, b) with blurred margins on tomography (Fig. 3 c). The preoperative diagnosis was an eosinophilic granuloma.

Biopsy revealed white nodular tissue. Cultures were negative. Histology showed chronic subacute osteomyelitis on two occasions.

Treatment with cefalosporin for 3 months was successful.

Case 4

A woman, 21 years of age, had constant severe back pain which was relieved by aspirin, but worse on pressure over the thoracic vertebrae. The ESR was 93 mm/hr. No lesion was found on radiographs, but a bone scan showed increased uptake in the T10 vertebra. CT showed a nidus-like lesion in the lamina (Fig. 4). The preoperative diagnosis was osteoid osteoma.

The lesion was excised and the outcome was good without antibiotics. This is a very rare site for osteomyelitis.

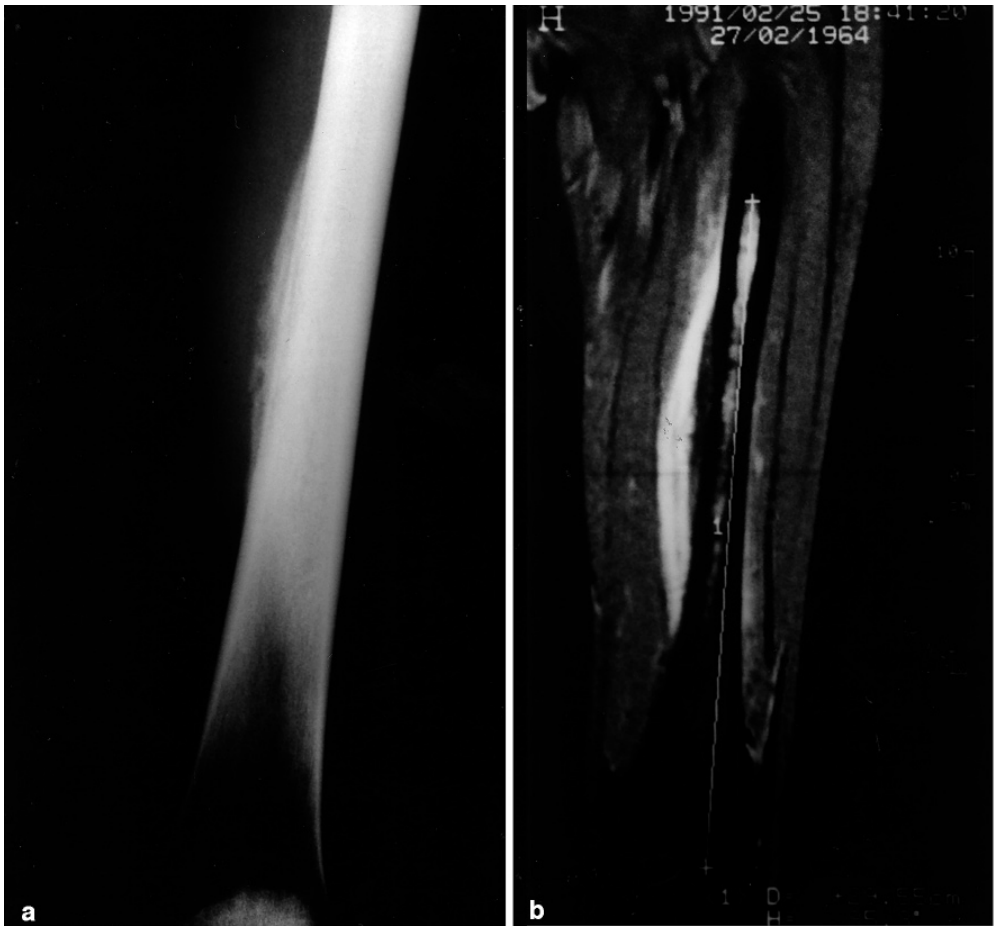

Fig. 5a, b. Case 5
a Radiographs showing onion layering of the subperiosteal new bone. **b** MRI shows an extension of the lesion into the soft tissues

Case 5

A woman, 27 years of age, had constant nagging pain over her left lower femur, and there was a tender swelling, but no redness. The WBC was 6900 and the ESR 39 mm/hr.

Radiographs showed an onion layering and a moth-eaten appearance of the cortex (Fig. 5a). CT scan showed central calcification with subperiosteal new bone formation. The findings were enhanced by gadolinium on the MRI (Fig. 5b). The preoperative diagnosis was Ewing's sarcoma.

At operation there was septic brain-like tissue involving bone and soft tissue. Culture and histology showed signs of osteomyelitis.

The condition resolved completely with penicillin G. The radiographic findings had suggested a malignant lesion; only the raised ESR and the inflammatory syndrome were in favour of osteomyelitis before operation.

Discussion

Subacute osteomyelitis is often difficult to differentiate from bone tumours [3, 4, 9, 11, 12, 15, 17], and is distinguished from other forms of osteomyelitis because of the modified relationship between the virulence of the bacteria and the resistance of the host [1, 6, 7, 10].

Clear signs of infection are usually absent. Pain of moderate intensity is a constant feature and may suggest the diagnosis [2, 6, 7, 13, 16]. The pain was a consistent complaint in our series occurring at night in half of the patients; it was sometimes relieved by aspirin, raising the possibility of an osteoid osteoma. An incorrect diagnosis was often made before operation [3, 6, 11, 14].

Laboratory investigations were inconsistent and not helpful. Only 2 of our patients had a leucocytosis and this, when present, may not indicate osteomyelitis [8]. The ESR was not usually raised and in 70% of patients it was below 30 mm/hr [6, 9, 14].

The radiographic findings showed a variety of changes none of which are diagnostic. The most common appearance was a dense zone around a radiolucent area similar to an osteoid osteoma. Cortical sclerosis, radiolucent zones or a periosteal reaction may mimic a malignant lesion [5]. Reports, however, suggest that the appearance is often similar to a Ewing's tumour [3, 5, 8, 12, 14]. Bone scanning, CT scanning and MRI [5] are often helpful in subacute osteomyelitis and are not needed routinely, but these methods of imaging may be essential in the diagnosis of lesions in atypical sites such as the vertebral bodies and the hip joint.

A surgical biopsy is mandatory to establish the diagnosis and treatment should not be started without the histology of the lesion and bacteriological cultures. In our cases, the most constant pathological features were lymphocytes, plasma cells and spicules of bone [3, 9, 12, 14].

The need for antibiotics after the lesion has been cleared surgically is controversial [6], and recovery has been reported in 25% without such medication [7]. All our patients, except 4, were immobilised after biopsy and curettage and were given antibiotics, intravenously for the first 4 to 7 days, then by mouth for 3 to 4 months. No recurrences have occurred in the series.

Curettage of the abscess found at biopsy is an essential part of treatment and we also believe that antibiotics should be used postoperatively.

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