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Chronic osteomyelitis: a continuing orthopaedic challenge in developing countries

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Abstract Nine patients with chronic osteomyelitis, three with problems due to diagnosis, three with dilemmas regarding treatment and three with other complications are presented. It is suggested that although the diagnosis of osteomyelitis in most cases is straightforward, presentation might sometimes be similar to other conditions, which can lead to a dilemma in the diagnosis. Because of the formidable complications, which may be difficult to manage and the difficulty in guaranteeing permanent cure, the best approach is prevention by judicious treatment of acute haematogenous osteomyelitis and of open fractures.

Résumé Présentation de 9 malades atteints d'ostéomyélite chronique: trois avec des problèmes diagnostiques, trois avec des difficultés thérapeutiques et trois avec les plusieurs autres complications. Il apparaît que bien que le diagnostic d'ostéomyélite soit dans la plupart des cas avancé facilement l'aspect peut parfois être trompeur, avec des hésitations diagnostiques. À cause des complications redoutables qui peuvent être difficiles à traiter et la difficulté d'obtenir une guérison, il faut insister sur la prévention par le traitement correct de l'ostéomyélite aigue hématogène et des fractures ouvertes.

Introduction

The diagnosis of chronic osteomyelitis spells a challenge, not only for the patient but also for the attending surgeon, due to the fact that treatment may not be effective because of the high recurrence rates and also due to potential complications. In the majority of patients diagnosis is usually straightforward; however, in some patients, different conditions may present with similar clinical features. This may pose a serious diagnostic problem because some of these conditions may be malignant.

The improvement in both socio-economic status and health care delivery in developed countries has substantially decreased the prevalence of chronic osteomyelitis in their communities. However, unfortunately, in developing countries the situation is different. The incidence of acute haematogenous osteomyelitis is not only high but is either misdiagnosed or under-treated [5]. Apart from this, the increase in trauma, notably from road traffic accidents has resulted in an increase in open fractures and their complications [4]. These factors have meant that the prevalence of chronic osteomyelitis remains high; thus, posing a major orthopaedic challenge not only because of the high prevalence but also due to the difficulty in achieving a definitive cure and preventing serious complications.

The aim of this study was to illustrate some of the challenges in the diagnosis and management of chronic osteomyelitis, particularly for the timing of surgery and possible options following bone loss due to destruction.

Patients and methods

Nine patients with chronic osteomyelitis are presented. Three of the patients had diagnostic problems; three with treatment dilemmas and three with complications.

Diagnostic challenges

Three young patients presented to us with a history of swelling of an extremity. There was no history of discharging sinuses. In one of the patients there was an associated fever. Based on the radiological findings all had initially been diagnosed as having chronic osteomyelitis. One had undergone "saucerization and sequestrectomy" with application of an external fixator. All had undergone biopsy, which showed that they were suffering from malignant tumors, osteosarcoma in two and round cell sarcoma (Ewing's Sarcoma) in one.

Case reports

An 8-year-old girl was referred to us with a history of painful swelling of the right femur associated with fever. Based on radio-

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Fig. 1a Case 1. Ewing sarcoma of the femur. **b.** Osteomyelitis of the femur

Fig. 2 Case 2. Osteosarcoma of the humerus

logical findings she had been diagnosed as having chronic osteomyelitis and was being treated with antibiotic therapy. On examination she appeared healthy and the X-ray showed radiolucent areas in the middle of the shaft surrounded by an onion-peel appearance (Fig. 1a). Our working diagnosis was round-cell sarcoma (Ewing), which was confirmed following biopsy.

A 14-year-old girl presented with a painful swelling of the right arm. Based on the physical findings on examination and X-ray she was initially diagnosed as having chronic osteomyelitis (Fig. 2). However, while undergoing antibiotic treatment, the pain became worse. Another X-ray was taken that showed a pathological fracture of the proximal one third of the humerus. She underwent surgery during which a biopsy was taken. The histological results were of a high-grade osteosarcoma. On referral to our center the tumor had progressed rapidly and she developed metastasis to the lungs and the right femur.

Fig. 3 Case 3. Osteosarcoma of the femur

The third case was a 13-year-old boy, who presented with a painful swelling of the right distal femur. Based on the radiographs (Fig. 3) a diagnosis of chronic osteomyelitis was made and the patient was planned for saucerization and sequestrectomy. At surgery no pus was found. A biopsy was taken and an external

Fig. 4 Case 4. Osteomyelitis of the femur

Fig. 5 Case 5. Osteomyelitis of the femur with extensive destruction

fixator applied because of a pathological fracture. The biopsy revealed an osteosarcoma, and when the patient was referred to us he had a fungating mass, which required palliative amputation.

Treatment challenges

Two patients were referred with a painful swelling of the femur. Both were diagnosed as having panosteomyelitis of the femur. One adult was referred 2 months following a road traffic accident with a grade III open segmental fracture of the tibia. Treatment with external fixation and staged surgical debridement produced a good result.

Case reports

A 6-year-old boy was referred to us with a 3-month history of painful swelling of the right proximal femur. There were no discharging sinuses. Radiographs revealed extensive destruction with a pathological fracture (Fig. 4). Because the involucrum was very weak he was started on antibiotics and surgery deferred to a later date. Subsequent follow up showed progressive control of the infection and at 2 years showed complete healing without necessity to undergo surgery.

Another 6-year-old boy was referred with a history of chronic discharging sinuses of the right femur and a protruding necrotic bone. Radiographs revealed extensive destruction of the femur with very poor involucrum (Fig. 5). Because of this problem staged surgery was planned, first the protruding necrotic bone being nibbled off. Six months later the involucrum was strong enough for a sequestrectomy. Subsequently, infection has been controlled and the involucrum has bridged the whole femur.

A 30-year-old female sustained a grade III open segmental fracture of the right tibia in a road traffic accident. She was brought to us 2 months after the accident with severe discharging sinuses. By then the viability of the middle fragment was

Fig. 6 Case 6. Grade III open tibial fracture

questionable. Despite this an external fixator was applied and she underwent serial debridement procedures to control infection (Fig. 6). Subsequent X-rays showed union of the fractured site.

Fig. 7 Case 7. Tibial bone loss treated with a Phemister graft

Fig. 8 Case 8. Tibial bone loss treated with tibialisation of the fibula

Complications

Three patients with complications of chronic osteomyelitis had also been referred to us.

A 22-year-old young man presented with bone loss of the right tibia due to chronic osteomyelitis in childhood. He could not bear weight on the affected limb. He was given an option of knee disarticulation or a staged bone grafting of the defect for which he agreed. A free tibial graft was used to bridge the defect reinforced with a plate. Subsequent X-rays showed good uptake of the graft (Fig. 7). He is now awaiting lengthening of the tibia by callostasis.

Fig. 9 Case 9. Osteomyelitis of the upper end of femur

A 15-year-old refugee girl presented also with an extensive tibial loss of the right leg due to chronic osteomyelitis. Tibialisation of the fibula starting with the proximal end was done. Subsequent X-rays showed union of the graft site and hypertrophy of the fibula (Fig. 8). She now walks with an external splint.

A 12-year-old female presented with panosteomyelitis of the right femur and a pathological dislocation of the hip (Fig. 9). At surgery the femoral head and neck were found to be necrotic and a resection arthroplasty was done. Though infection has been controlled she remains with a permanent disability.

Discussion

The diagnosis of chronic osteomyelitis is in most cases straightforward as the history and the radiological picture is usually diagnostic. The danger is not to misdiagnose or not detect chronic osteomyelitis but not to detect a more serious pathology. In the cases described the first patient with round cell sarcoma was misdiagnosed as having chronic osteomyelitis. Comparison with the radiographs of another patient with chronic osteomyelitis (Fig. 1b) show how closely they resemble each other. In the absence of discharging sinuses only biopsy may distinguish the two. The other patient's early radiological pictures (Figs. 2 and 3) also closely resemble chronic osteomyelitis.

Although the mistakes described here may not be common, they show that because of the high prevalence of chronic osteomyelitis in this region one tends to diagnose it more readily. This is more liable to occur when the attending clinician has only limited experience and when a radiological picture may be the only aid to diagnosis. In centres with several experienced orthopaedic surgeons, this may not occur easily. But in many of our hospitals the first attending clinician may be a general practitioner without much experience in orthopaedic pathologies. Therefore, it is important that in the absence of discharging sinuses the diagnosis of chronic osteomyelitis should be confirmed or excluded by biopsy.

The treatment of chronic osteomyelitis is radical surgery, removing all the necrotic soft tissue and bone. However, when faced with a pan-osteomyelitis the timing of surgery and extent of surgery is critical. Patient 4 who was cured on antibiotics alone could have had what has been described as "primary subacute pyogenic osteomyelitis" first described by Garre in 1893. This form has been said to be more common in East Africa than the acute form [5]. The onset is usually insidious with no acute febrile illness and general reaction. In patients with sickle cell disease the shaft is more commonly involved than the metaphysis, it may be multifocal and frequently the invading organism is salmonella [1]. Cole [3] has classified childhood chronic osteomyelitis in non-specific and specific groups. The non-specific group include those that are a sequel to a late acute osteomyelitis and those termed as chronic unifocal or chronic multifocal. He argues that the late acute osteomyelitis where *staphylococcus aureus* and other pyogenic organisms are frequently cultured is amenable to surgery and antibiotic therapy. On the other hand chronic unifocal osteomyelitis can be cured with antibiotics alone. In contrast, surgery and antibiotics are largely ineffective in children with chronic multifocal osteomyelitis but the disease appears to be self limiting.

Case 5 was more challenging. When first seen almost the whole femur had been destroyed (Fig. 5). It is in such patients that the decision about when to do surgery and the extent of such surgery is critical. When surgery is done too early the involucrum may not be able to support the limb. Staged surgical procedures may then be the only solution, as was shown in this patient. In another patient with a grade III open fracture (case 6) the middle fragment of the segmental fracture was kept despite the questionable viability. She was thus treated with serial wound debridements while the fracture was immobilised with an external fixator. After control of infection bone union took place and the patient is now able to use her limb.

Bone loss due to destruction is one of the most challenging complications. Bridging techniques may not succeed partly because of the poor state of the remaining bone stock and soft tissue or because of the chance of re-

activation of infection. Amputation may then be the only alternative. However, amputation carries a stigma in many developing countries and the inability to afford a proper prosthesis makes it a poor alternative for many patients. The majority will therefore usually refuse amputation. The two patients with loss of a part of the tibia were treated with bridging techniques. In one a free tibial graft (Phemister) was used with good results. In another tibialisation of the fibula was done. In none of the patients was infection reactivated. They are all now able to use their limbs. However, some complications invariably leave the patient with a permanent disability (case 9). Extension of the disease to the hip joint in this patient resulted in pathological dislocation. At surgery all that could be done was a resection arthroplasty (Girdlestone). Although infection has been controlled she remains with a permanent disability.

Although chronic osteomyelitis is recognized as a very old disease, it still poses formidable challenges despite the improvement of chemotherapy and surgical treatment. Any treatment instituted cannot guarantee permanent cure because of its tendency to recurrence. This means that the best approach is to prevent the onset of chronic osteomyelitis by judicious treatment of acute haematogenous osteomyelitis, and of open fractures, which are the major aetiology of chronic osteomyelitis in our environment.

References

1. Adayokunnu AA, Hundrickse RG (1980) Salmonella osteomyelitis in childhood: a report of 63 cases seen in Nigerian children of whom 57 had sickle cell anaemia. *Arch Dis Child* 55:175-185
2. Cole WG, Dalziel RE, Leith S (1982) Treatment of acute osteomyelitis in childhood. *J Bone Joint Surg [Br]* 64:1200-1201
3. Harris NH, Kilkady-Willis WH (1965) Primary subacute pyogenic osteomyelitis. *J Bone Joint Surg [Br]* 473:526-532
4. Museru LM, Leshabari MT, Grob U, Lisokotala LNM (1998) The pattern of injuries seen in patients in the orthopaedic/trauma wards of Muhimbili Medical Centre. *East Cent Afr J Surg* 4:15-21
5. Nade S (1983) Acute haematogenous osteomyelitis in infancy and childhood. *J Bone Joint Surg [Br]* 65:109-119