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CASE REPORT

Interlocking nailing with the Seidel nail in fractures of the humeral diaphysis in Paget's disease : A report on two cases

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Three diaphyseal humeral fractures in two patients with polyostotic Paget's disease are presented. Two fractures were treated with closed intramedullary interlocking nailing using the Seidel nail, with good results.

INTRODUCTION

Paget's disease of bone is a localised disorder of bone remodelling. Its aetiology remains obscure. Genetic, individual and environmental factors have been implicated. Geographic clustering has been described, and a focus of high prevalence has been reported in the area surrounding our hospital (*9*). There has been a tendency toward an increase in the diagnosis of the disease over the last decade (*11*).

Diaphyseal fractures of the humerus are rare in Paget's disease and their treatment is controversial (*12*). We believe that intramedullary interlocking nailing offers some advantages in these patients. There are no recent reports on this topic.

CASE REPORTS

Case 1

An 82-year-old man fell and fractured his left humerus in March 1993. Radiographs revealed a transverse fracture through the middle third of the humerus that had all features of established Paget's disease (fig 1a). Following radiographic work up, the diagnosis of polyostotic Paget's disease was made, with occurrence in the cranium, spine, pelvis, femur, tibia, humerus and clavicle.

Laboratory studies showed normal serum calcium and phosphorus levels. The serum total alkaline phosphatase was 3829 units per liter (normal, 98-279).

Calcitonin was used to control bone turnover. It was administered subcutaneously in doses of 200 IU per day for one month, starting the day of injury. The fracture was stabilised with a compression plate with six screws through a posterior approach. A plaster cast was applied ; it was removed when clinical and radiological signs of union were noted, one month after surgery. At this point the patient started a program of rehabilitation. Five months later, he was pain free with normal elbow and shoulder motion (fig 2b).

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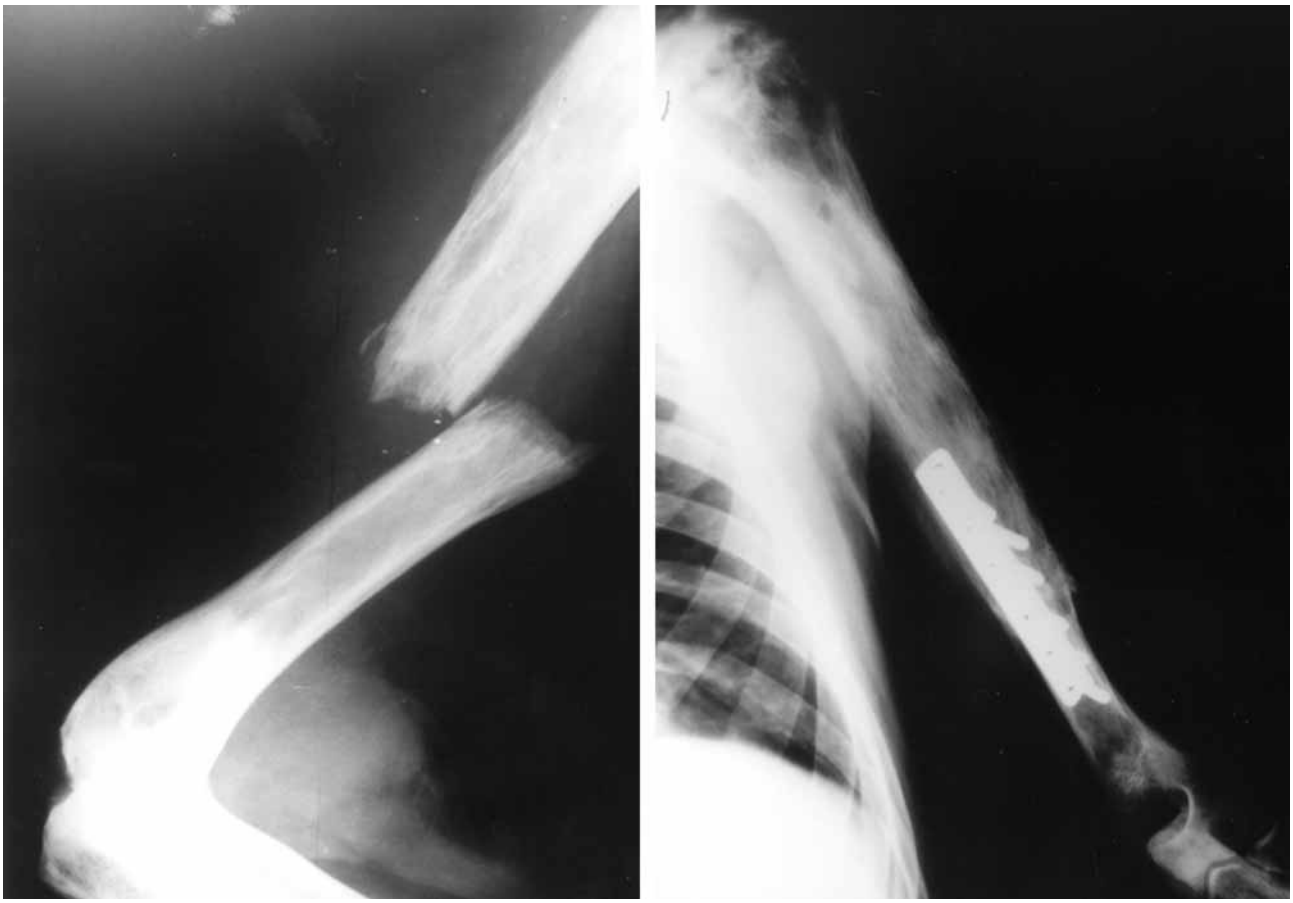

Fig. 1. — Case 1. Transverse fracture of the diaphysis of a humerus with Paget's disease (a) and radiograph showing union of the fracture after fixation with a plate five months later (b).

Fourteen months after the fracture, the patient fell again at home, sustaining a new humeral fracture at the proximal extremity of the plate (fig 2a). The plate was removed and a Seidel nail (7 mm in diameter) was inserted. With the patient in a semi-seated position, with the arm draped free and hand held, the nail was inserted through the rotator cuff and the humeral head. Closed reduction under image intensifier control was carried out by manual traction. By tightening the screw in the proximal part of the device, the distal fins of the nail flared out and increased tension on the endosteal cortex of the distal humerus. A proximal interlocking screw ensured adequate fixation. The blood loss was minimal.

The patient tolerated the procedure well and was discharged. Early mobilisation of the affected extremity was encouraged. Six weeks later, clinical and radiological union was obtained. When last reviewed, two years after the second operation, the patient was free of pain, he had 90° of abduction in his shoulder and he has returned to his previous activities (fig 2b).

Case 2

A 74-year-old man fractured his left arm in September 1998 following a fall from his height. He had difficulty moving the arm prior to injury owing to a stroke. Radiographs showed a transverse

Fig. 2. — Case 1. Fracture proximal to the plate (a) and radiological union with Seidel nail (b)

fracture of the medial third of the humerus (fig. 3a). The bone showed the classical features of Paget's disease : lytic areas, thick trabeculae, cortical thickening and bony enlargement. Radiological studies of other parts of the skeleton revealed polyostotic Paget's disease. The serum alkaline phosphatase was 2528 units per liter (normal, 98-279). The rest of the serum analysis was normal. Calcitonin was administered daily during fracture healing.

The fracture was treated with a Seidel nail (9 mm in diameter). Postoperative mobilisation was initiated immediately. Forty days later there was no pain and radiographs showed union (fig. 3b). The patient had full elbow motion and 80° abduction of the shoulder without pain. He returned to his previous activities and was satisfied with the treatment. At the last review, two years after surgery, the situation remained unchanged.

DISCUSSION

Pathological fractures are a common complication of Paget's disease. They occur most frequently in the femur (*3, 8, 12*). The humerus is involved in 2% of patients with Paget's disease (*5*), and the absolute frequency of pathological humeral fractures is 2% to 10% of all the fractures in affected patients (*2, 5*). The frequency of fracture in a humerus affected by Paget's disease could be as high as 86% (*12*). Most fractures of the humerus are in the diaphysis (*8, 12*). Fracture is also frequent when a sarcoma complicates the disease (*13*).

Fig. 3. — Case 2. Radiograph showing fracture of the left humeral diaphysis affected by Paget's disease (a) and radiological union with Seidel nail (b).

Whereas internal fixation is considered the treatment of choice for femoral fractures in Paget's disease, conservative treatment has been used most frequently in humeral fractures (*2, 3, 5, 8*). Most results were good following conservative treatment, but cases of non-union have been reported (*4, 7*). Moreover, immobilisation can further exacerbate osteopenia and provoke metabolic complications of hypercalcaemia and hypercalciuria (*6, 10, 15*). The goal of operative treatment of a fracture in Paget's disease is to restore a normal axis in the limb and to allow early function, which will prevent mineral loss and additional weakening of the bone.

As happened in one of our cases, plate fixation predisposes to fracture because stress is concentrated at the proximal and distal ends of the plate (*8*). The use of long plates bridging the pathological area of the bone, as advocated by Berruex (*1*), may be considered excessive.

Interlocking nailing of the humerus avoids opening the fracture site and provides sufficient stabilisation to allow immediate postoperative rehabilitation. When affected by Paget's disease, the humerus is usually less curved than the femur, and there are fewer difficulties for intramedullary fixation. The Seidel nail, despite the relatively poor rotational stability provided by its distal locking mechanism (*14*), offered sufficient stability for union in our experience.

Intramedullary nailing may be technically difficult in some cases with obliteration of the

medullary cavity owing to Paget's disease. When it is technically feasible, it allows early mobilisation. It also has biomechanical advantages as compared with plate and screw fixation, as it provides mechanical reinforcement of the humeral diaphysis over its whole length, whereas plate fixation is followed by stress concentration at the extremities of the plate, which may facilitate new fractures. This advantage is provided by any type of interlocking nailing and is not specific to the Seidel nail, which is often considered a suboptimal implant owing to its sometimes insufficient distal interlocking.

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