

CHARCOT ARTHROPATHY AFTER ACETABULAR FRACTURE

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Three middle-aged patients with diabetes sustained fractures of the acetabulum which were treated by open reduction and internal fixation. In each, rapid dissolution of the femoral head occurred with minimal discomfort, typical of a Charcot arthropathy. The patients had no other evidence of neuropathic arthropathy. Charcot changes may occur after high-energy trauma in patients with diabetes.

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Charcot arthropathy is a severely destructive form of arthritis which results from the loss of proprioceptive neurosensory function. It is associated with tabes dorsalis, leprosy, syringomyelia, surgical cordotomy, paraplegia, spina bifida, multiple intra-articular steroid injections, massive osteochondral allografts and the systemic peripheral neuropathies which may occur in alcoholism, pernicious anaemia and, commonly, diabetes mellitus.¹⁻¹³

Three middle-aged patients with diabetes are described who sustained high-velocity fractures of the acetabulum which were treated surgically. None had any previous evidence of a neuropathy. They developed a rapidly destructive arthritis of the hip, with surprisingly few complaints of pain.

CASE REPORTS

Case 1. A 50-year-old woman with hypertension and a history of diabetes mellitus for nine years, which was controlled with an oral hypoglycaemic agent, was involved in a motor-vehicle accident. She sustained a posterior dislocation of the left hip with a comminuted fracture of the posterior wall of the acetabulum (Fig. 1a). Neurological examination was normal. Within six hours of injury the hip was reduced and placed in skeletal traction with the leg

held in abduction. Two days later through a Kocher-Langenbeck approach with osteotomy of the greater trochanter, open reduction and internal fixation of the acetabulum was carried out with interfragmentary screws and dual posterior buttress plates (Fig. 1b). Continuous passive motion (CPM) was used for 48 hours after operation and the patient was discharged after nine days, walking non-weight-bearing on crutches. Six weeks later there was radiological evidence of an erosive arthropathy involving the femoral head, but with little discomfort (Fig. 1c). An aspiration arthrogram was normal. A cemented total hip arthroplasty was carried out two months after the injury. Intraoperative cultures and tissue biopsies were normal.

Case 2. A 61-year-old woman with hypertension, osteoporosis and a non-insulin-dependent diabetes for six years was involved in a motor-vehicle accident. She sustained a fracture of the intercondylar part of the left humerus, the intercondylar arc of the left femur, the left medial malleolus, a transverse fracture of the left acetabulum with a comminution of the posterior and superior walls and an open-book fracture of the pelvis with a diastasis through the pubic rami (Fig. 2a). The sensory and motor components of the sciatic nerve were intact.

The four limb fractures were treated by open reduction and internal fixation. Through an extended iliofemoral approach, a large impacted fragment of the superior acetabular wall was elevated, grafted and fixed with a spring plate. The fracture of the posterior wall was secured with interfragmentary lag screws and a second spring plate. Both spring plates were placed under a buttressing 3.5 mm reconstruction plate (Fig. 2b). Immediately after operation CPM was used for the knee and hip. She developed deep-vein thrombosis in the thigh and pelvis which required anticoagulation. She remained in hospital for three weeks and was not able to walk for three months. She then began to mobilise using a platform walker, bearing partial weight on the left leg. Despite minimal complaints of pain, radiographs showed progressive collapse of the femoral head, narrowing of the joint space and proximal migration of the limb (Fig. 2b). One year after the accident she had a hip arthroplasty. Joint aspiration and intraoperative cultures showed no bacterial growth. The transverse component of the acetabular fracture had healed. An avascular fragment of the superior wall had collapsed causing incongruity of the articular surface, and there was a deficiency of bone

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Fig. 1a



Fig. 1b



Fig. 1c

Case 1. Figure 1a – An anteroposterior (AP) radiograph showing a comminuted fracture of the posterior wall of the acetabulum with dislocation of the head of the femur. Figure 1b – A postoperative AP radiograph showing fixation of the fractures with lagged interfragmentary screws and dual buttress plates. Figure 1c – Six weeks later there is dissolution of the femoral head and shortening of the limb. Cultures from an aspiration arthrogram produced no bacterial growth.

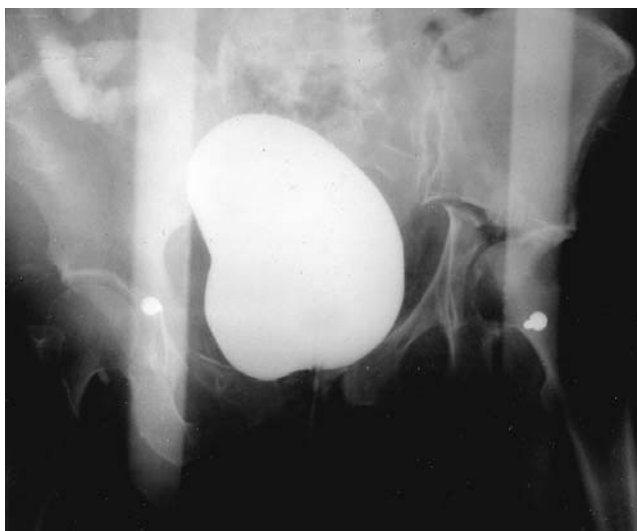


Fig. 2a



Fig. 2b

Case 2. Figure 2a – An acute anteroposterior retrograde cystogram showing a posterior dislocation of the hip and a transverse acetabular fracture with involvement of the posterior and superior wall. There is also an AP compression (open-book) fracture of the pelvis with diastasis of the anterior pelvic ring through a fracture of the left pubic ramus. Figure 2b – An AP radiograph four months after operation showing dissolution of the femoral head with shortening of the limb. The acetabulum had been fixed with dual spring plates and a buttressing 3.5 mm reconstruction plate. An aspiration arthrogram showed negative Gram stains and cultures. The patient had surprisingly few symptoms.

involving a 90° arc of the posterior and superior rims of the acetabulum. The hip was revised using an oversized uncemented bipolar prosthesis with a 62 mm head. No metal was seen in the joint at the time of revision.

Case 3. A 42-year-old woman with a history of brittle, insulin-dependent diabetes for 11 years, was involved in a motor-vehicle accident in which she sustained a transverse fracture of the left acetabulum involving the posterior wall, and an unstable dislocation of the hip. She had a peroneal nerve palsy. The dislocation was reduced and maintained with traction through a pin in the distal femur in slight flexion and 35° of abduction of the hip. Eight days later she had an open reduction and internal fixation through a triradiate approach. The acetabulum was fixed with a posterior 3.5 mm reconstruction plate which secured the posterior column and buttressed the posterior wall. Lag screws were placed in the superior pubic ramus and in the fragment of the posterior wall. CPM was needed for one week and she was discharged walking non-weight-bearing on crutches. Two weeks later she fell at home with loss of reduction of the fracture. Since she had few symptoms further operation was refused. Five months after operation radiographs showed dissolution of the femoral head. She complained of increasing pain and stiffness and after eight months had an uncemented total hip arthroplasty. Intraoperative tissue Gram stains and cultures did not show evidence of bacterial growth. She has subsequently had three revisions for acetabular loosening.

DISCUSSION

Charcot arthropathy commonly affects the foot in diabetic patients.^{2,5,8-11} Usually, with larger joints, syringomyelia or tabes dorsalis may be the cause. None of our patients in this series had a history of previous problems with a foot. All had palpable pedal pulses, and were middle-aged with adult-onset diabetes. The clinical picture in these patients is consistent with the insidiously destructive course of Charcot arthropathy.^{1,5,8-11,13} Other causes of rapid erosive joint destruction are usually painful and include infection, tumours, or collagen vascular disease. Our patients showed no evidence of these disorders.

None had clinical evidence of peripheral neuropathy and in two of the three there was no injury to a nerve. The hip is innervated by branches of the femoral, obturator and superior gluteal nerves and by the nerve to the quadratus femoris. The superior gluteal nerve is the only afferent nerve to the hip which shares some radicular innervation with the common peroneal nerve, since both arise from the posterior divisions of the lumbosacral plexus. The other afferent nerves supplying the hip are all derived from either the lumbar plexus (femoral and obturator nerves) or the anterior divisions of the sacral plexus (nerve to the quadratus femoris) and are components of the tibial nerve.¹⁴ Thus, the peroneal nerve in isolation is not involved in the

joint denervation seen in the one patient who had peroneal palsy.

Diabetes mellitus is known to cause increased peripheral nerve fragility, lowering the threshold for injury.^{2,3,7,11} Experimental studies of Charcot joints have shown that procedures such as dorsal root ganglionectomy or transection of articular afferent nerves, which destroy the afferent supply, do not alone correlate with the rate or severity of joint degeneration, but when trauma is then applied there is a rapid progression of joint destruction.⁸ An element of macro or repetitive microtrauma is necessary before the classical picture of Charcot destruction occurs in a joint with subclinical disturbance of protective pain sensation.^{1,5,6,8,9,11}

Two of the hips had dislocated which may have rendered the femoral head avascular, and in one a fragment of the superior acetabular wall was seen to be devitalised at the time of the subsequent arthroplasty. The rapidity of the destructive joint changes and the lack of accompanying symptoms, however, are inconsistent with the natural history of simple avascular necrosis, although Ohsawa et al⁹ argue that avascularity and the resultant osteonecrosis are requisites for Charcot arthropathy.

Johnson⁴ reviewed an extensive series of Charcot joints and found that most untreated fractures of the neck of the femur in patients with tabes failed to unite. Those who had internal fixation of the fracture still developed Charcot hips and patients with a hemiarthroplasty had a high incidence of dislocation. He therefore recommended immobilisation in a hip spica for all such fractures.

Complex fractures of the acetabulum in middle-aged patients with diabetes are difficult to treat. Traction is unsatisfactory. Internal fixation allowed early mobilisation, but devitalised fragments of the acetabulum did not heal and caused problems later after arthroplasty. Romness and Lewallen,¹⁵ in a retrospective study of total hip arthroplasty at a mean of 7.5 years after acetabular fracture, reported a four- to fivefold increase in the incidence of loosening and revision of the acetabular component. Less than half of the fractures had been treated surgically. Charcot arthropathy has traditionally been a contraindication to total joint arthroplasty, but there have been reports of good results with a short-term follow-up;^{11,12} none of the hips had previously sustained fractures of the acetabulum.

Our observations should alert surgeons to the possibility of neuropathic arthroplasty in patients with diabetes who sustain fractures of the acetabulum.

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