CASE REPORT

Early palsy of the sciatic nerve due to heterotopic ossification after surgery for fracture of the posterior wall of the acetabulum

We describe a patient in whom an initially intact sciatic nerve became rapidly encased in heterotopic bone formed in the abductor compartment after reconstruction of the posterior wall of the acetabulum following fracture. Prompt excision and neural release followed by irradiation and administration of indometacin resulted in a full neurological recovery and no recurrence 27 months later.

Lesions of the sciatic nerve after fractures of the acetabulum occur either at the time of the initial injury in the form of acute stretching, laceration and compression or secondary to iatrogenic insult at the time of open reduction and internal fixation (ORIF). Rarely, the nerve can be trapped in a mass of heterotopic ossification (HO) leading to neurological deficit. Gadelrab described a case of paraesthesiae at the back of the thigh, at the front and lateral side of the leg and in the dorsum of the foot with associated weakness of tibialis anterior, extensor hallucis longus and the peroneal muscles six months after open reduction and sutureing of comminuted fragments of the posterior acetabulum. Release of the nerve resulted in complete neurological recovery six months after excision of the HO. Kleiman et al described a case of sciatica and weakness of dorsiflexion of the ankle 4.5 months after ORIF of a fracture of the posterior acetabular wall. Excision of the heterotopic bone resulted in complete sensory recovery, but the motor symptoms did not resolve.

We describe a patient with early entrapment of the sciatic nerve within a mass of HO resulting in an ipsilateral foot drop after operative treatment of dislocation of the hip with a fracture of the posterior wall of the acetabulum, with particular reference to the time of onset of symptoms and the subsequent surgical management.

Case report

A 24-year-old man with no known comorbidities relating to skeletal hyperostosis presented to the emergency department having fallen from a height of approximately 3 m. He had sustained a posterior dislocation of the left hip with an associated fracture of the posterior wall of the acetabulum. This was an isolated injury unaccompanied by trauma to the central nervous system. The Injury Severity Score was 9. Neurological examination of the affected limb was entirely normal. The hip was reduced by closed means and the reduction was maintained by skeletal traction applied via a Steinmann pin in the distal femur. Standard radiographs of the acetabulum and CT showed the presence of a single large fragment of the posterior acetabular wall (Fig. 1).

After five days the hip was explored under general anaesthesia on a radiolucent table. A Kocher-Langenbeck approach was used. The sciatic nerve was protected and the acetabular fragment was fixed to the posterior column using three 3.5 mm screws. A ten-hole neutralisation plate complemented the construct. Before closure of the wound extensive irrigation was carried out and a suction drain inserted. He made an unremarkable postoperative recovery and was discharged six days later on appropriate anti-coagulation therapy. Mobilisation with toe-touch weight-bearing continued for three months. The immediate post-operative neurological function was normal. He had a previous history of peptic ulceration and non-steroidal anti-inflammatory agents were not prescribed as prophylaxis for HO.

When seen four weeks after the operation for clinical and radiological review there was no concern regarding recovery. However, at eight weeks he complained of shooting pains and ‘pins and needles’ in his left foot which had been present for two weeks. Clinical examination revealed subjective paraesthesiae over the left L5 and S1 dermatomes as well as objective loss of power of left tibialis anterior.
and extensor hallucis longus. Radiographs of the left hip comprising anteroposterior and Judet views showed the presence of HO posteromedially to the left hip (Fig. 2). CT showed extensive HO over the posterior aspect of the acetabulum (Fig. 3) and nerve-conduction studies demonstrated conduction block which was consistent with a lesion of the sciatic nerve at the level of the left hip.

He was taken promptly to theatre for excision of the HO. Three doses of peri-operative cephalosporin (cefoxime 1.5 g I.V.) were administered. The acetabulum was re-exposed through the previous incision. A bony bar 15 cm in length was found in the fibres of gluteus medius and minimus. Its superior border extended as far as the greater sciatic notch, and its lower portion was adherent to the sciatic nerve. The nerve was found to be compressed and encased in an osseous tunnel. The bony bar was removed carefully after dissecting it free from the nerve. The superior portion of the heterotopic bone was removed piecemeal, ensuring that the sciatic nerve was decompressed throughout its course (Fig. 4). Monitoring of somatosensory evoked potentials and electromyography were not used during the excision of the HO.

Post-operatively, he had early passive and active physiotherapy. One session of low-dose (7 Gy) radiation was given on the first post-operative day. He was discharged on indometacin 50 mg twice daily combined with a proton pump inhibitor (omeprazole), as a means of protecting the gastric mucosa, for four weeks. Histological examination of the bony specimen showed lamellar bone with irregularly shaped trabeculae and foci of endochondral ossification.

The symptoms improved in the immediate post-operative period. He made a full sensory and motor recovery at two and six months, respectively. He was asymptomatic and fully weight-bearing 27 months after the second operation. He had full power of all muscle groups of his left leg and no associated paraesthesiae. The left hip had a full range of movement and radiological evaluation showed no evidence of reactivation HO, avascular necrosis or post-traumatic osteoarthritis (Fig. 5).

**Discussion**

In association with fractures of the acetabulum the sciatic nerve can be injured because of its close proximity to the dislocated femoral head and/or displaced bony fragments.
An incidence of involvement of the nerve of 10% to 15% at the time of injury can be expected in adults,\(^1\) being predominantly peroneal in distribution.\(^2\) The nerve can also be subjected to iatrogenic injury during internal fixation through the posterior approach.\(^2\) Early post-operative palsies are usually related to a haematoma, whereas delayed presentations can be due to migration of the metalwork or associated with complications related to cement and wear debris in total hip replacement (THR).\(^6\) Stretching of the lumbo-sacral plexus can also complicate THR either early or in a delayed fashion.\(^6\)

Palsy of the sciatic nerve related to HO after surgery for posterior acetabular fracture is rare. Only two cases with complete documentation have been previously reported.\(^3,4\)

The case which we describe is unique in terms of the time to onset of symptoms. Sensory and motor symptoms appeared six weeks after fixation of the fracture, considerably earlier than in the other two reports.

Known risk factors for developing HO include complex fracture patterns, polytrauma with head injury, ankylosing spondylitis, persistence of bone debris, formation of post-operative haematoma and surgical technique.\(^7-17\) None of these applied to our case. The patient was initially operated on early before extensive development of scar tissue and thorough irrigation of the wound followed internal fixation of the fracture. It is possible that male gender\(^7,9\) and possibly a genetic component\(^18\) could have contributed to the early development of this complication.

The extent of HO can be graded on radiographs using the system of Brooker et al,\(^19\) which relies solely on the anteroposterior pelvic view. A modified classification comprising additional Judet views can be used which give a more accurate correlation with the range of movement of the hip.\(^20\) CT is also of value for staging and pre-operative planning.\(^21\) Other imaging methods such as MR can delineate the grade of HO as well as the presence of inflam-
Photographs showing a) the bony bar (white arrow) adherent to the sciatic nerve (black arrow) and b) the total amount of heterotopic bone removed to release the nerve.

Anteroposterior (a), obturator oblique (b) and iliac oblique (c) radiographs of the left acetabulum at final follow-up showing no evidence of recurrent ossification.

Inflammatory phenomena. In the presence of palsy of the sciatic nerve, additional nerve-conduction studies may be of value in accurately localising the level of the injury. Serial electrodiagnostic studies can be used to assess the potential recovery of the nerve and to indicate whether surgery should be performed.

Previously published studies have argued for late excision of the HO to allow for full maturation of the bone and to minimise the incidence of recurrence. This period can be as long as 18 months after the initial appearance of HO. Nevertheless, the presence of acute neurological symptoms and signs as seen in our case necessitated the prompt excision of the HO.

Continuous intra-operative monitoring of the sciatic nerve was not used in the initial operation since the senior author (PVG) has considerable experience in dealing with such cases. Some authors support this practice, but recent evidence suggests that there is no difference in the rates of iatrogenic injury between monitored and unmonitored cases in experienced hands.

Although the use of prophylactic adjuncts post-operatively following primary acetabular fixation for the prevention of HO has been investigated, their use after excision of HO has not been extensively studied. Nonetheless, indomethacin, bisphosphonates, irradiation and free fat transplants have all been used successfully to prevent recurrence after excision of HO formed as a result of hip surgery. Our patient received a single fraction of low-dose radiation 24 hours post-operative and 50 mg of indomethacin twice daily for four weeks with no evidence of recurrence at the final follow-up. Although potential complications of irradiation include carcinogenesis, infertility, genetic alterations, delayed wound healing and osteonecrosis of the femoral head; these adverse effects have not been reported with modern low-dose regimes and were not observed in our patient.
Although a rare occurrence, the early formation of HO resulting in entrapment and neuropathy of the sciatic nerve can complicate surgery for acetabular fracture and the long-term functional outcome. Diagnostic vigilance and prompt decompression followed by adjuvant therapies in the form of radiotherapy and indometacin can lead to a favourable outcome.

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References