Arthrodesis of a Dislocated Hip: An Unusual Complication of Küntscher Nailing of the Femur

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ABSTRACT

A 43-year old man who had a severe head injury requiring surgery to evacuate the extradural haemorrhage and post-operative ventilation and ICU care had Küntscher nailing of his femoral fracture 18 days after his injury. He subsequently developed osteomyelitis, malrotation of the femur, heterotopic ossification, hip dislocation, avascular necrosis and bony ankylosis of the dislocated hip. To our knowledge, this is the first reported case of a patient with this combination of complications, and factors that have contributed to these and measured to prevent them will be discussed.

Key words: femoral fracture, intramedullary nailing, complications, infection, hip dislocation, arthrodesis

INTRODUCTION

Intramedullary nailing as a treatment for femoral shaft fractures was described by Küntscher in 1940.[1] Since then, closed interlocking nailing has become the treatment of choice for most femoral shaft fractures in the developed countries. However, open Küntscher nailing still has a role in the treatment of some femoral fractures in the developing countries because they are considerably cheaper than interlocking nails and do not require the use of an image intensifier during nail insertion.

Complications after femoral nailing have been well described. The incidence of deep infection following open nailing has been reported to be between 3 to 13%.[2] Malunion may occur, especially in the presence of a comminuted fracture.[3,4] Heterotopic ossification after intramedullary nailing is found in 60-68% of cases.[5,6] Avascular necrosis of the femoral head may also occur after intramedullary nailing, especially in adolescents.[7,8] We report a patient who not only developed osteomyelitis, malrotation of the femur, heterotopic ossification, and avascular necrosis of the hip but also hip dislocation and bony ankylosis of the dislocated hip following open Küntscher nailing of the femur.

CASE REPORT

A 43-year male pedestrian was hit by a lorry and sustained fractures of the parietal bones, a left frontoparietal extradural haemorrhage and cerebral oedema, closed fractures of the shaft of the left femur and humerus. His Glasgow Coma Scale (GCS) on admission was 7/15. An emergency craniectomy and evacuation of the extradural haematoma was performed, during which a tear of the sagittal sinus bled profusely and his condition became too unstable for further surgery. Post-operatively, he had a GCS of 3/15 but improved gradually with ventilation and ICU care. A second evacuation of the extradural haematoma was performed after 4 days and a tibial pin was also inserted for skeletal traction. He was then transferred to an orthopaedic ward 12 days after his injury. An open intramedullary nailing of the femur was performed 18 days after his accident. Surgery was performed in a lateral position and a 12mm x 38cm straight, slotted Küntscher nail was inserted in standard retrograde manner after reaming to 13 mm with hand reamers. The nail was noted to be about 3.5 cm proud during surgery. Post-operatively, he was well and was transferred back to his local hospital. He was not given indomethacin or other

Figure 1. The patient's radiograph 6 weeks after intramedullary nailing showing heterotopic ossification at the hip, a prominent nail, malrotation and callus on the medial part of the femur. The hip was in joint at this stage.

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NSAIDs to prevent heterotopic ossification.

He was reviewed at 6 weeks, where a fluctuant gluteal bursa was noted but the patient was pain free. Radiographs of the left femur (Figure 1) were taken and it was felt that the femur had united. The nail did not show further migration from earlier radiographs. He was allowed to fully weight-bear and was discharged from follow-up.

He returned to the clinic 18 months following surgery and complained of intermittent discharge from the left thigh for the previous 2 months and was referred to the authors. He had only slight discomfort and had no systemic symptoms of infection. On examination there was a sinus over the middle part of the lateral incision on the left thigh but no surrounding erythema. The left leg showed a true shortening of 5 cm. The left hip was fixed in 30^0 flexion and 20^0 abduction and the leg was in 65^0 external rotation.

He was admitted and haematological investigations showed an ESR of 65 mm/hr (0-20mm/hr), haemoglobin of 12.1 g/dl (14-17 g/dl) and a white cell count of 7.7 $x10^9$/L (4-11$x10^9$/L). Radiographs showed a dislocation of the left hip with destruction of the femoral head and the hip appeared arthrodesed in the dislocated position (Figure 2). The right hip was normal. He was commenced on intravenous antibiotics while waiting for a sinogram, which showed that the sinus communicated with the osteomyelitic bone. The sinus healed over the next few days and the patient then declined surgery and was discharged with oral antibiotics. The ESR had returned to 10 mm/hr, and an outpatient CT scan of the pelvis was arranged.

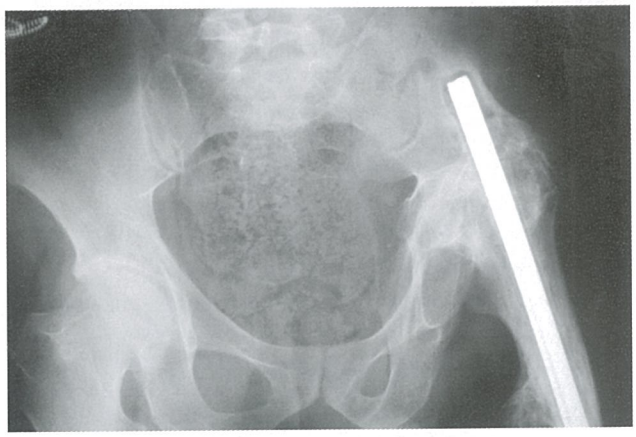

Figure 2. The patient's radiograph when he presented to the clinic, showing a dislocated and arthrodesed hip. The fracture had united.

He developed further discharge and was admitted for surgical debridement. At surgery, only a minimal amount of purulent material was noted. 6 cm of the nail and about 1/4 of the circumference of the nail was visible due to bone loss on the anterolateral aspect of the femur. There was only 3-4 mm of longitudinal movement and the nail could not be rotated. The sinus was completely excised and necrotic bone debrided and thoroughly irrigated with saline. The fascia was lightly apposed and the skin left open. The wound healed well and he was discharged on oral antibiotics for a month.

Eighteen months following surgical debridement, the patient remained well and was completely pain free. There was no further discharge from the thigh. He found a shoe raise unhelpful and was managed by masterful neglect.

DISCUSSION

A factor which contributed to the development of these complications in this patient is his severe head injuries and low intellect. This restricted his participation with his rehabilitation and may also have affected his ability to communicate his complaints. Malrotation of the femur occurred after surgery as the patient had not regained muscle control and this allowed the unrestrained leg to fall into external rotation.[4] An interlocking nail would have prevented this type of malrotation.

The rate of deep infection after open nailing appears to be higher than that after closed interlocking nailing (less than 1%).[2] Küntscher[9] advocated the use of an entry point on the greater trochanter to reduce the risk of septic arthritis although in clinical practice, the piriformis fossa has rarely ever been associated with septic arthritis. The nail in this case exited at the junction of the femoral neck and greater trochanter, and this together with the slotted nature of the excessively prominent nail allowed direct communication of the infection from the shaft into the hip joint. Movement of the leg is likely to accentuate the flow of purulent material between the femur and the hip, and the septic arthritis resulted in the gradual destruction, avascular necrosis, collapse, and dislocation of the femoral head.

The incidence of heterotopic ossification following severe head injuries has been reported to be between 11-22%.[10,11] It has been reported in 60% of patients after intramedullary nailing of the femur, although in only 11% was it severe enough to cause near complete or complete osseous ankylosis of the hip.[5] Marks et al[6] reported an incidence of 68% and found a positive correlation between the amount of heterotopic bone and head injury, and ventilator and ICU days. Keret et al[12] suggested that patients with a head injury may be at increased risk of heterotopic ossification after interlocking nailing. Although Marks et al[6] found no significant relationship between nail prominence and bone formation, the mean prominence of the nails above the greater trochanter in their study was less than 5mm, and this may not necessarily be sufficient to cause impingement or further trauma. The repeated trauma and erosion from the excessively prominent nail (3.5 cm) in this case, however, is likely to have also contributed to the development of bony ankylosis. Therefore, prophylactic treatment for such cases that are at a very high risk of developing heterotopic ossification should be considered, and it is also important to ensure that the nail is not left unduly proud.

The present position of the hip and leg is poor functionally. However, any surgical management to deal with this is fraught with difficulties. Normally, we would have removed the nail but the hip is arthrodesed in an abducted position and any attempt to remove the nail from the proximal end would require taking down of the arthrodesis. This may result in a painful and unstable hip. It is possible to remove the nail from the distal end by osteotomising the distal femur, and then correcting the malunion simultaneously. This would require stabilisation with implants, with a further risk of infection and also

non-union. Hip arthroplasty in the presence of a previous infection, dislocation and malunion would be very difficult. Industrial saws would be required if the removal was done through the fracture site and the risk of an inadvertent fracture during nail extraction should be considered. As the patient did not complain of pain, and taking these difficulties into account, management by masterful neglect would seem to be the most appropriate treatment at the present moment.

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