CASE REPORT

Iliofemoral distraction and hip reconstruction for the sequelae of a septic dislocated hip with chronic femoral osteomyelitis

K. Nagarajah, N. Aslam, P. McLardy Smith, M. McNally

From The Nuffield Orthopaedic Centre, Oxford, England

We describe a technique of ‘cross-hip distraction’ to reduce a dislocated hip with subsequent reconstruction of the joint for septic arthritis with extensive femoral osteomyelitis. A 27-year-old woman presented with a dislocated, collapsed femoral head and chronic osteomyelitis of the femur. Examination revealed a leg-length discrepancy of 7 cm and an irritable hip. A staged technique was used with primary clearance of osteomyelitis and secondary reconstruction of the hip. A cross-hip monolateral external fixator was used to establish normal anatomy followed by an arthroplasty. A good functional outcome was achieved. The use of cross-hip distraction avoids soft-tissue and nerve damage and achieved improved abductor function before arthroplasty.

Osteomyelitis is difficult to treat with a reported incidence of 4.5 per 100,000 for acute presentations. Untreated osteomyelitis and septic arthritis will result in bone destruction, avascular necrosis, dislocation, growth abnormalities and damage to articular cartilage.\(^1\) With the development of antibiotics mortality has been dramatically reduced with long-term sequelae occurring in only 5%.\(^2\) In children haematogenous osteomyelitis accounts for 82% of cases and *Staphylococcus aureus* is the causative organism in 70%\(^1\) of infections. Antibiotics are the mainstay of treatment of acute compared with chronic osteomyelitis which requires a staged approach with initial clearance followed by reconstruction.\(^4\)

We present a case report about the management of a complex reconstruction of the hip involving extensive femoral osteomyelitis, a dislocated hip and avascular necrosis/collapse of the femoral head following septic arthritis in a 27-year-old woman. A staged approach was used with clearance of femoral osteomyelitis, cross-hip distraction and total hip replacement.

Case report

A 27-year-old woman presented with a 14-year history of chronic osteomyelitis of the right femur. This had been treated, before her referral to us, by repeated debridement. On presentation she had both local and systemic symptoms of infection with fever, pain, a discharging sinus and chronic anaemia. She had pain in her back and right knee thought to be from mechanical causes. Examination revealed 90° flexion, 10° internal rotation and 15° external rotation of the hip. Abduction was absent and all movements were painful. There was a leg-length discrepancy of 7 cm. There were multiple scars around the hip and distal femur with active discharge from two sinuses distally. Radiographs revealed complete loss of the femoral head and pseudarthrosis of a high-riding femoral neck with a false acetabulum consistent with type IV B deformity described by Choi et al\(^5\) (Fig. 1). There was also distal femoral growth arrest with resultant shortening and angular deformity. MRI showed chronic osteomyelitis affecting the entire right femur with multiple sequestra and intramedullary collections in the proximal and distal femur (Fig. 2).

Initial surgical treatment included reaming of the femur and excision of the distal disease through a lateral window. This was followed by prolonged antibiotic treatment. Microbiology specimens revealed *Staph. aureus* and histology confirmed active disease.

After operation, the patient’s thigh pain decreased but she continued to have severe pain in her hip. Blood indices (white cell count, erythrocyte sedimentation rate, C-reactive protein) returned to normal. A repeat MRI 3.5 years after initial excision showed no active infection; reconstruction of the hip was therefore planned.

A monolateral external fixator was placed across the hip (Fig. 3). The hip was gradually
MRI shows osteomyelitis affecting the entire femur. There are focal collections in the intramedullary cavities in both the proximal and distal femur with multiple sequestra.

Radiographs of the right hip and femur with dislocation and absence of femoral head. Diffuse changes in the femur are consistent with extensive osteomyelitis.

Radiograph showing the monolateral external fixator spanning the hip joint.

Radiograph showing the position of the femoral neck in relation to the true acetabulum at the end of distraction.
distracted at 1 to 1.5 mm per day. This was complicated by pain and a minor pin track infection, treated by oral antibiotics. There was no evidence of nerve dysfunction during lengthening. Distraction was continued until leg lengths were equal. The total fixator time was two months (Fig. 4). The fixator was then removed and the patient was rested in skin traction until the pin sites were healed and dry. On the fourth day, a hybrid total hip replacement was performed (Fig. 5). Through a lateral approach using part of the old scar, the acetabulum and femur were identified with some difficulty. A reasonable fit was achieved with an uncemented Trilogy (Zimmer) acetabular component with screws. Following partial excision of the proximal femur, a CPT stem (Zimmer, Warsaw, Indiana) was inserted with gentamicin cement. Deep samples were taken from the femur and acetabulum. No evidence of infection was found. Vancomycin and meropenem were used both intra- and post-operatively. A prolonged course of oral rifampicin and doxycycline was chosen. Post-operatively the patient recovered well. At three weeks, she suffered an acute dislocation when she tried to stand after sitting on the floor. This was reduced by closed manipulation. She has had no further dislocations. She regained good hip movements after physiotherapy which focused on strengthening the abductors.

The patient retains excellent function with no recurrence of infection and no hip or thigh pain 12 months after total hip arthroplasty.

**Discussion**

Extensive femoral chronic osteomyelitis is a difficult condition to treat. The principles of treatment are based upon the stage of the disease, but in the presence of a dislocated hip and an absent femoral head one faces a formidable task. Traditionally, in the presence of osteomyelitis of the femur and dislocation, excision arthroplasty would have been the first choice. Although the Girdlestone procedure\textsuperscript{6,7} may reduce pain, the functional outcome is often poor. Studies of the conversion of a Girdlestone pseudarthrosis to an arthroplasty have shown improvements in the Harris hip score,\textsuperscript{8} personal satisfaction and activities of daily living, but only in the absence of infection.\textsuperscript{9,10} Even in the case of infected total hip arthroplasties, two-stage revision has achieved a 92% infection-free rate with improvement in the Harris hip score.\textsuperscript{11}

Grill\textsuperscript{12} described cross-hip distraction in six hip dislocations diagnosed late. A Wagner fixator (Synthes, Monument, Colorado) was used after extensive muscle release to distract the hip followed by open reduction and pelvic osteotomy. Complications included femoral neck fracture in one and varus bowing of the femoral neck in two. This technique has also been used in the treatment of avascular necrosis of the femoral head in children\textsuperscript{13} and central fracture-dislocation of hip\textsuperscript{14} with a good outcome. Distraction with a Kalnherz external fixator\textsuperscript{15} and marginal osteotomy has been used in the management of the sequelae of a septic hip. The outcome was a stable hip but at the expense of limitation of movement. Lai, Liu and Liu\textsuperscript{16} have shown good results with Wagner iliofemoral distraction followed by total hip replacement in 20 congenitally dislocated hips. Irreducibility, overshortening, nerve palsy, dislocation and femoral fractures were avoided. Leg length was regained with an improved Harris hip score. Manzotti et al\textsuperscript{17} described hip reconstruction and lengthening in 15 patients using a hybrid Ilizarov method for late sequelae of septic arthritis of hip. The mechanical axis was corrected with proximal femoral osteotomy and lengthening through a distal osteotomy with satisfactory results although a late total hip replacement may be difficult.

Treatment of the chronically dislocated hip is controversial with most studies focusing on congenital dislocation and dysplastic hips. Femoral shortening, either by metaphyseal resection or subtrochanteric osteotomy, trochanteric osteotomy with distal advancement and soft-tissue release have been advocated.\textsuperscript{18-20} These procedures are technically demanding and need careful study of the anatomy. A wide range of prostheses has been advocated. Dislocation and nerve palsy are the most common complications followed by failure of the implant, nonunion of the osteotomy site and peri-prosthetic fracture. The reported incidence of nerve injury is in the range of 5% to
6% for an acute correction. A large intra-operative blood loss has been documented with a total post-operative complication rate of 33%.20

We are unaware of any previous report of a staged management of total femoral osteomyelitis with septic dislocation of the hip and avascular necrosis of the femoral head. Our treatment plan allowed clearance of infected bone as a first priority. We waited for three years before considering reconstruction of the hip. We considered normal blood indices and MRI scan to be sufficient evidence to exclude active infection but this was confirmed with an intra-operative specimen. Pre-operative aspiration may have helped to support the absence of infection. Our patient had taken no antibiotics for 2.5 years before this scan. Iliofemoral distraction was a safe and effective technique, restoring a near-normal hip centre and facilitating a more straightforward joint replacement. The alignment of the fixator was critical. Gradual distraction produced lengthening of the contracted abductor muscles and we believe contributed to the excellent post-operative functional recovery. Pin-site infection did occur but did not affect outcome after prompt treatment. This technique provided solutions to a combination of difficult problems with resulting good function, equal leg lengths, pain relief and arrest of chronic infection.

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References


