Femoral Shaft Fracture in a Hip Arthrodesis: Two Cases of Retrograde Interlocking Nailing

T C Wong, I S Rikhraj

ABSTRACT

Antegrade intramedullary nailing of femoral shaft fractures is a tried and tested treatment modality that has yielded consistently high union rates. Retrograde nailing is controversial as the approach violates the knee joint. We report two cases in which both patients had an arthrodesis of the hip and subsequently suffered a femoral shaft fracture distal to the implant. We feel that this would be an indication for retrograde nailing.

Keywords: arthrodesis, femoral shaft fractures, hip arthrodesis, Intramedullary nailing, retrograde interlocking nailing

Singapore Med J 2004 Vol 45(2):85-87

INTRODUCTION

Femoral shaft fractures following a previous hip arthrodesis are uncommon and pose a challenging problem for the orthopaedic surgeon. Antegrade intramedullary nailing of the femur remains an effective treatment option for shaft fractures, producing a high rate of union, infrequent malunion and a low prevalence of infection[1-4]. Retrograde intramedullary nailing, in contrast, is a relatively newer technique that has been recommended only in specific indications involving multi-system trauma, multi-skeletal injuries, or when an antegrade approach is neither possible nor desirable[5].

We report two cases of femoral shaft fractures in patients with previous hip arthrodesis in which retrograde nailing was subsequently performed.

Department of Orthopaedic Surgery
Singapore General Hospital
Outram Road
Singapore 169608

T C Wong, MBBS
Medical Officer

I S Rikhraj, MBBS, FRCS, FAMS
Senior Consultant

Correspondence to:
Dr Inderjeet Singh Rikhraj
Tel: (65) 6321 4047
Fax: (65) 6224 8100
Email: gooisr@sgh.com.sg

CASE 1

A 57-year-old Chinese man, who had a previous arthrodesis of his left hip with a cobra plate, was admitted in April 2001 to our hospital, following a femoral shaft fracture. The fracture occurred through the distal screw hole of the cobra plate. His other co-morbidity was that of essential hypertension.

He underwent a retrograde interlocking nailing of the left femur after sufficient distal screws of the previous fixation were removed, to ensure that a long enough nail was used to stabilise the shaft fracture. Proximal and distal locking was done. He was discharged a week later, and was ambulating with a walking frame. Union occurred at about 10 months following surgery. He has full range of motion in his left knee with no complaints of pain.

CASE 2

A 37-year-old Malay man, who had a previous arthrodesis of his right hip with a cobra plate, was admitted in July 2001, following a femoral shaft fracture. The fracture occurred just distal to the plate-bone junction (Fig. 1). His other comorbidities were that of dilated cardiomyopathy (LVEF 30%), diabetes mellitus, hypertension, hyperlipidemia and obstructive sleep apnoea that was treated on home CPAP. On admission, he was first placed on Steinmann pin traction while being optimised for surgery. He underwent definitive surgery three days later with a retrograde interlocking nail after removing sufficient distal screws of the previous fixation, to ensure that a long enough nail was used to stabilise the shaft fracture. Proximal and distal locking was done.

He was discharged a week later, and was on a wheelchair. His recovery was slow with serial radiographs confirming bony callus formation. Currently, he has no pain in his right knee and is able to achieve full range of motion.

DISCUSSION

Intramedullary nailing of the femur has been available since Nicolaysen described his principles of intramedullary fixation in 1897. It has proven to be a safe and effective mode of treatment for femoral shaft fractures. The technique of antegrade nailing through the piriformis fossa has been extensively described[3,6], with a success rate of 98%[1].

In 1950, Lezius[7] first introduced a method of fixing intertrochanteric and subtrochanteric fractures using an extra-articular approach through the medial femoral condyle. Kuntscher[8] and others went on to validate this method by describing condylo-cephalic techniques for treating peritrochanteric fractures, with

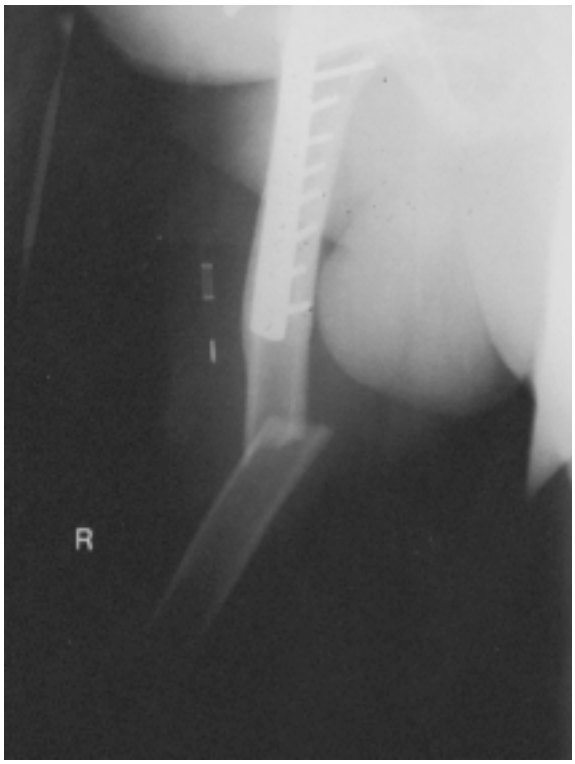

Fig. 1 Case 2 Pre-operative radiograph shows a displaced right femoral shaft fracture.

Fig. 2 Case 2 Post-operative radiograph shows callus formation at the site of the retrograde nailing.

Harris[9] being the first to coin the term of "retrograde" approach. But none of the above techniques were directed towards shaft injuries.

In 1984, Swiontkowski et al[10] approached the problem of femoral shaft fractures by modifying Kuntscher's method. The nail was passed through an extra-articular entry portal, via the medial femoral condyle in a retrograde fashion, with the specific operative indication of ipsilateral fractures of the femoral neck and shaft, producing a 100% union rate at four months post-operatively. Sanders et al[11] adopted this technique in 1993 and expanded the indications to include pregnancy, ipsilateral pelvic or acetabular fractures, injuries involving multiple systems and multiple fractures.

The ideal starting point for retrograde intramedullary nailing remains in line with the long axis of the medullary canal, i.e. through an intra-articular approach[2,3,11,12]. Potential complications to the knee in this intercondylar approach are outweighed by the technical difficulties and associated problems of malalignment and malunion when using an extra-articular approach[10,11].

In a prospective randomised trial comparing the antegrade and retrograde approaches, Tornetta et al[13] showed that there was more problem with alignment using a retrograde technique, although there was no eventual difference in time taken to achieve union and knee pain at time of union. It was concluded that despite the usefulness of retrograde nailing in certain circumstances, it was not better than the traditional antegrade technique and there was still a need for a longer period of follow-up to determine the outcome of the intra-articular knee portal[13]. A similar study by Ostrum et al in 2000 concluded that both techniques yielded comparably high union rates[14].

As there is no definite advantage of the retrograde approach compared to the antegrade approach, with the attendant complication of articular injury and potential for septic arthritis in the former, we feel that there is a limited role for the retrograde technique in femoral shaft fractures. One such indication would be in the patients we have reported, i.e. in those that have had a previous hip arthrodesis. The approach is minimal, with sufficient screws of the previous implant removed without a large exposure, to ensure a long enough nail is used to stabilise the fracture without having to remove the previous implant. Care is also taken to minimise articular injury and copious irrigation helps reduce the risk of septic arthritis and removes bone debris. Patients are then started on continuous passive motion exercises post-operatively in order to reduce the incidence of arthrofibrosis. In both our cases, there were no untoward effects in the ipsilateral knee joints.

In conclusion, we feel that retrograde nailing of femoral shaft fractures is a useful technique in the armamentarium of the orthopaedic surgeon. Its role is, however, still limited. One indication we have identified would be in patients with previous arthrodesis of the hip.

REFERENCES

1. Brumback RJ, Uwagie-Ero S, Lakatos RP, Poka A, Bathon GH, Burgees AR. Intramedullary nailing of femoral shaft fractures. Part II: fracture healing with static interlocking fixation. J Bone Joint Surg 1988; 70A:1453-62.
2. Hansen ST, Winquist RA. Closed intramedullary nailing of the femur. Kuntscher technique with reaming. Clin Orthop 1979; 138:56-61.
3. Winquist RA, Hansen ST, Clawson KD. Closed intramedullary nailing of femoral fractures. A report on five hundred and twenty cases. J Bone Joint Surg 1984; 66A:529-39.
4. Wiss DA, Brien WW, Stetson WB. Interlocking nailing for treatment of segmental fractures of the femur. J Bone Joint Surg 1990; 72A:724-8.
5. Herscovici DJ, Whiteman KW. Retrograde nailing of the femur using an intercondylar approach. Clin Orthop 1996; 332:98-104.
6. Kuntscher G. Intramedullary surgical technique and its place in orthopedic surgery. J Bone Joint Surg 1965; 47A:809-18.
7. Lezius A. Intramedullary nailing of intratrochanteric and subtrochanteric fractures with curved nail. J Int Coll Surg 1950; 13:659-72.
8. Kuntscher G. A new method of treatment of peritrochanteric fractures. Proc R Soc Med 1970; 63:1120-1.
9. Harris LJ. Closed retrograde intramedullary nailing of peritrochanteric fractures of the femur with a new nail. J Bone Joint Surg 1980; 62A:1185-93.
10. Swiontkowski MF, Hansen ST, Kellam J. Ipsilateral fractures of the femoral neck and shaft. A treatment protocol. J Bone Joint Surg 1984; 66A:260-8.
11. Sanders R, Koval KJ, Dipasquale T, Helfet DL, Frankle M. Retrograde reamed femoral nailing. J Orthop Trauma 1993; 7:293-302.
12. Moed BR, Watson JT. Retrograde intramedullary nailing, without reaming, of fractures of the femoral shaft in multiply injured patients. J Bone Joint Surg 1995; 77A:1520-7.
13. Tornetta P, Tiburzi D. Antegrade or retrograde reamed femoral nailing: a prospective randomized trial. J Bone Joint Surg 2000; 82B: 652-654
14. Ostrum RF, Agarwal A, Lakatos R, Poka A. Prospective comparison of retrograde and antegrade femoral intramedullary nailing. J Orthop Trauma 2000; 14: 496-501