Use of a Retrograde femoral nail for peri-prosthetic fractures below a sliding hip screw: Surgical Technique And Cases

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Abstract

As the population ages the prevalence of patients with osteosynthesis of proximal femoral fractures is likely to increase, and therefore a concomitant rise in the incidence of peri-prosthetic fractures about these implants can be expected. Peri-prosthetic femoral fracture below a sliding hip screw presents a challenging injury, the management of which is complicated by previous proximal femoral mal-union, the need to avoid the creation of stress-risers and the morbidity of soft tissue injury with extensile approaches for fixation.

Removal of side plate screws from a sliding hip screw enables passage of a retrograde femoral nail with proximal locking performed through the side plate and nail.

Two clinical cases are presented with successful use of the described technique

We present a surgical technique for the management of these injuries that respects anatomy, soft tissues and biomechanics, and recommend its use.

INTRODUCTION

Fractures of the proximal femur are among the commonest of injuries presenting to acute orthopaedic departments, and while recent studies suggest the overall incidence may decrease slightly over time, they will remain a constant drain on orthopaedic department resources [1, 2, 3]. Despite a non-evidence based increase in the use of intra-medullary nails for the treatment of inter-trochanteric fractures [4], the gold standard treatment for both stable and unstable inter-trochanteric fractures remains the sliding hip screw [5]. As many of these fractures occur in patients suffering from recurrent falls, there is a risk of subsequent fracture below the level of previous fixation. The anatomy of the proximal femur is often abnormal following healing of a proximal femoral fracture, making identification of a suitable entry point for an antegrade intramedullary nail difficult. A retrograde nail that stops at the level of the side plate creates a stress riser predisposing to further fracture. Removal of the side plate and formal open reduction with plate fixation is an extensive procedure accompanied by soft tissue damage and blood loss, and is not ideal from a biomechanical point of view. Removal of the sliding hip screw also leaves the femoral neck unprotected risking further fracture.

We present a surgical technique for dealing with these difficult fractures that balances these anatomical, biomechanical and soft tissue difficulties.

SURGICAL TECHNIQUE

The patient is positioned supine, with the knee flexed over a rest, allowing entry to the knee for standard passage of a retrograde femoral nail.

The previous incision used for the insertion of the sliding hip screw is re-opened and the plate exposed, with removal of the side plate screws. The number removed is dependant on the size of side plate, but enough should be removed to allow overlap of the nail and side-plate.

Dependent on the fracture pattern, the fracture is reduced and the femur prepared for standard retrograde nailing using flexible reaming as deemed appropriate.

Choosing the length of the nail is important, and it is better to err on the side of shorter rather than longer, as this will enable adjustment of the insertion depth of the nail to line up with the side plate holes without the risk of protrusion of the nail into the knee. End caps can be used once the nail is inserted to add length if required.

The nail is then inserted and advanced under image guidance until a depth gauge or K-wire can pass through the side plate and most distal of the proximal locking holes of the femoral nail. The insertion handle of the femoral nail can be used to rotate the nail within the femoral canal in order to facilitate passage of the interlocking screw, which is inserted.

Depending on the nail used, it may be possible to pass a second screw using the same technique, or insert an a-p locking screw if the option is available.

Distal jig based locking of the femoral nail is then performed and any remaining side-plate screw holes re-used if room will allow.

CASE 1

An 82-year-old female patient presented following a simple fall, with a spiral femoral fracture below a sliding hip screw implanted 6 years previously for an intertrochanteric fracture. Proximal femoral anatomy precludes removal of the implant and antegrade nailing. The retrograde nail locked through the side plate technique is used with success.

Figure 1

Figure 1: Case 1 pre-operative radiograph

Figure 2

Figure 2: Case 1 pre-operative radiograph

Figure 3

Figure 3:Case 1 post-operative radiograph

Figure 4

Figure 4: Case 1 post-operative radiograph

CASE 2

A 78-year-old female patient presented following a simple fall with a spiral femoral fracture below a sliding hip screw implanted 2 years previously for an intertrochanteric fracture. Proximal femoral anatomy precludes removal of the implant and antegrade nailing. The retrograde nail locked through the side plate technique is used with success.

Figure 5

Figure 5: Case 2 pre-operative radiograph

Figure 6

Figure 6: Case 2 pre-operative radiograph

Figure 7

Figure 7: Case 2 post-operative radiograph

Figure 8

Figure 8: Case 2 post-operative radiograph

DISCUSSION

The sliding hip screw remains the gold standard treatment for the treatment of intertrochanteric fractures [$_5$], both stable and unstable.

The incidence of proximal femoral fractures may decrease as

osteoporosis treatments improve [1, 2, 3], but they will remain a constant source of work for orthopaedic units. However, as the population ages, the prevalence of patients with in situ proximal femoral osteosynthesis may be expected to increase with a concomitant rise in the fracture types seen in this report.

The use of a similar technique has been described in the treatment of ipsilateral femoral neck/shaft fractures but not for peri-prosthetic fractures below a sliding hip screw [6].

A theoretical risk of this procedure is mixing titanium screws with a steel nail, or vice versa, thus risking galvanic corrosion. However, we feel that the chance of this causing a clinical problem in this population is remote.

We believe that the technique described offers an excellent solution to a difficult fracture population. It leaves the proximal femur protected by the sliding hip screw, avoids creation of a stress riser between the two implants and offers optimum biomechanical stabilisation of the femoral fracture.

A previous biomechanical study has supported the use of this technique in a cadaveric model [7], but we have not seen the technique described in a clinical setting.

We recommend its use.

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References

1. Chang KP, Center JR, Nguyen TV, Eisman JA. Incidence of hip and other osteoporotic fractures in elderly men and women: Dubbo Osteoporosis Epidemiology Study. J Bone Miner Res. 2004 Apr;19(4):532-6.
2. Chevalley T, Guilley E, Herrmann FR et al. Incidence of hip fracture over a 10-year period (1991-2000): reversal of a secular trend. Bone. 2007 May;40(5):1284-9.
3. Löfman O, Berglund K, Larsson L, Toss G. Changes in hip fracture epidemiology: redistribution between ages, genders and fracture types. Osteoporos Int. 2002 Jan;13(1):18-25.
4. Forte ML, Virnig BA, Kane RL et al. Geographic variation in device use for intertrochanteric hip fractures. J Bone Joint Surg Am. 2008 Apr;90(4):691-9.
5. Parker MJ, Handoll HH. Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults. Cochrane Database Syst Rev. 2008 Jul 16;(3):CD000093.
6. Oh CW, Oh JK, Park BC et al. Retrograde nailing with subsequent screw fixation for ipsilateral femoral shaft and neck fractures. Arch Orthop Trauma Surg. 2006 Sep;126(7):448-53.
7. Harris T, Ruth JT, Szivek J et al. The effect of implant overlap on the mechanical properties of the femur. J Trauma. 2003 May;54(5):930-5.

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