ABSTRACT

Purpose. To review the outcome of less invasive stabilisation system (LISS) plating for complex distal femoral fractures.

Methods. Records of 6 men and 11 women who underwent LISS plating for complex distal femoral fractures from September 2001 to August 2005 were reviewed. One patient who died 12 months after surgery due to a cardiac problem was excluded. The mean age of the remaining patients was 61 years and the mean follow-up period was 12 months. Four patients, 3 of whom had open fractures, had sustained high-energy trauma. According to the AO classification, 8 fractures were type 33A and 9 type 33C.

Results. The mean time to union was 17 weeks. Two patients with non-union underwent a second LISS plating and bone grafting, resulting in a satisfactory final outcome. Delayed radiographic union was observed in one patient, but clinically he was asymptomatic and mobile. The fracture finally united at 9 months.

Conclusion. LISS plating is useful in treating complex distal femoral fractures, resulting in reduced blood loss and low infection rates, while achieving early mobility due to primary stability of the construct.

Key words: bone plates; femoral fractures; fracture fixation, internal

INTRODUCTION

Complex distal femoral fractures are challenging to orthopaedic surgeons and there is no consensus on their treatment. The treatment goals are: early mobilisation, rapid fracture union, and minimal complications. Biological internal fixation is increasingly popular with the introduction of minimally invasive plate osteosynthesis (MIPO). The less invasive stabilisation system (LISS) is based

Less invasive stabilisation system plating for distal femoral fractures

P Kanabar, V Kumar, PJ Owen
Department of Trauma and Orthopaedics, Addenbrooke's Hospital, Cambridge, United Kingdom

N Rushton
Orthopaedic Research Unit, University of Cambridge, Cambridge, United Kingdom

Address correspondence and reprint requests to: Mr Prashant Kanabar, 125, Fordwich Rise, Hertford, SG14 2DF, United Kingdom. E-mail: prashantkanabar@hotmail.com
A biomechanical study has shown that LISS offered greater angular stability and better remodelling than condylar buttress plates or dynamic condylar screw fixation. Moreover, the LISS is suitable for the treatment of complex intra-articular fractures.

**MATERIALS AND METHODS**

Between September 2001 and August 2005, 6 men and 11 women underwent LISS plating for complex distal femoral fractures. Patient demographics, mechanism of injury, associated injuries, type of fracture, open or closed injury, time to union, and complications were recorded (Table). One man who died 12 months after surgery owing to cardiac problems was excluded from the analysis. The mean age of the remaining patients was 61 (range, 34–86) years.

Four patients had high-energy trauma; 3 of them had open fractures (1 Gustilo type 3A and 2 Gustilo type 3B). According to the AO classification, 8 fractures were type 33A and 9 were type 33C (Fig.). The 3 patients with open fractures were preliminarily stabilised using an external fixator. Depending on the fracture pattern, 5-, 9-, or 13-hole LISS plates were applied. The plates were fixed using unicortical screws initially, but in the later cases bicortical screws were used in diaphyseal osteoporotic bone. Where necessary, cancellous lag screws were used for articular reconstruction. Open reduction was achieved through a small incision over the fracture site.
RESULTS

Patients were followed up until satisfactory bone union for a mean period of 12 (range, 6–27) months. 14 patients attained bone union in a mean period of 17 (range, 10–36) weeks. Delayed union was observed radiographically in a 73-year-old man, though he was clinically asymptomatic and mobile. The fracture eventually united at 9-month follow-up. Two patients had non-union due to implant loosening and underwent re-LISS plating and bone grafting with satisfactory final outcomes.

Before their injury, 10 of 16 patients were independently mobile. At final follow-up 5 of them remained so, 3 were walking with a stick and 2 with a frame. After surgery, one patient downgraded from using one stick to walking with a frame, one continued using a frame and 4 continued to be wheelchair-bound. The mean time to full weight bearing was 13 (range, 6–24) weeks, but was 26 weeks for the 2 patients requiring a second operation. The mean range of knee flexion was 93º (80º–130º).

Four patients had mild to moderate discomfort because of the prominent implants. An 85-year-old woman with non-union had the plate lifted off the bone at the proximal end with screw breakage. She underwent re-LISS plating and bone grafting. There was no plate breakage or infection; the angular stability provided by the LISS plate reduced the risk of infection. Two patients had angular mal-alignment of 10º to 15º. Two patients had urinary tract infection; 2 others developed chest infection, which resolved with treatment during their hospital stay.

DISCUSSION

The treatment of complex distal femur fractures requires a thorough understanding of fracture biology. Treatment methods vary from conservative to internal fixation.9–11 Conservative treatment is associated with unsatisfactory outcomes.12,13 Insertion of blade plates is technically demanding; dynamic condylar screws and blade plates require removal of large amount of bone for insertion; condylar buttress plates lack the stability of fixed angle devices and are prone to varus collapse or screw failure.14,15 Retrograde intramedullary nails were not sufficient for stabilising fragmented articular fractures.16,17

In a study on 25 patients (mean age, 61 years) undergoing LISS plating, 18 patients with acute and 4 of the 7 with salvage fractures healed satisfactorily; the remaining 3 developed non-union.18 Other complications encountered in this series included

Figure  Preoperative and postoperative radiographs of (a) AO type 33C/Gustilo 3B open fracture with open patella fracture, (b) AO type 33C fracture, and (c) AO type 33A fracture.
REFERENCES


