Management of Complex Distal Femur Fractures: Comparative Study between Ilizarov External Fixation and Double Plating

Thesis

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List of Abbreviations

Abb.		Full term
DCP	:	Dynamic compression plate
DCS	:	Dynamic condylar screw
FD	:	Falling down
FFH	:	Falling from height
LC-DCP	:	Limited contact dynamic compression plate
ROM	:	Range of motion
RTA	:	Road traffic accident
W	:	Week
ORIF	:	Open reduction internl fixation
PC-Fixator	:	Point contect fixator
LCP	:	Locking compression plate

INTRODUCTION

Fractures of the distal femur are complex injuries that can be difficult to manage and may result in long term disability and prolonged morbidity.[1] They comprise 4-6% of all femoral fractures. [2] They occur in a bimodal distribution: 15-50 years of age, predominantly in males, sustaining high-energy trauma, and above 50 years of age predominantly in females, with osteoporosis, who sustain relatively low energy trauma. [3] Osteoporosis leads to comminution and may pose problems for fixation. Eighty-five percent of distal femoral fractures occur above 50 years. [4]

Three main problems are commonly observed in these fractures. First, adequate exposure of articular surface, particularly of medial femoral condyle and coronal plane fractures is exhausting. Second, the standard implants used for other types of distal femoral fracture such as the condylar blade plate and supracondylar nails are not helpful for articular surface reduction and fixation. Third, in setting of medial comminution and short distal segment, there is high incidence of loss of fixation and varus collapse.[5]

Various treatment options for comminuted or unstable fractures of the distal femur were proposed, including double

plating, and anatomically contoured plates[5]. With advances in fracture care were applied to these difficult injuries,so clinical results improved. First, indirect reduction and improved maintenance of the fracture biology was popularized by Mast et al and others. Second, improvement in implant design occurred, leading to fixed angle plates such as the 95° angle blade plate and dynamic condylar screw. These fixed-angle implants impart a measure of stability to plate fixation in this area not previously available. In particular, they resist relative shortening of the medial side that may result in varus deformity [6]

Many different fixation methods have been described including condylar buttress plate and retrograde supra-condylar inter-locking nail. The superior results that have been obtained with these devices in fractures of the distal part of the femur that do not have major condylar comminution have made them the standard of care for the management of these injuries[7].

Several fracture patterns occur in the most distal part of the femur, however, for which these devices cannot be effectively used. Ninety-five degree blade-plates and screw plates necessitate a minimum of three to four centimetres of intact bone in the distal part of the femur for adequate purchase of the condylar fragment. All of these implants are therefore contraindicated in patients who

have a very distal supracondylar fracture of the femur or fracture with marked comminution of the condyles[8].

The condylar buttress plate has been widely used in such patients because of the surgeon's freedom to insert multiple cancellous-bone screws selectively into major condylar fragments for fixation of the fracture. Unfortunately, the condylar buttress plate may provide insufficient fixation of certain comminuted fractures, especially distal fractures that have fragmentation of the medial cortex of the femur or segmental loss of bone. [9]

Muller et al. proposed treatment of low transcondylar fractures having medial comminution and loss of medial cortex, with a lateral condylar buttress plate combined with a medial buttress plate and bone grafting. The advantage of applying double plating is complete and anatomical reconstruction of these severe injuries, facilitation of preliminary K-wire fixation from all directions around the distal end of femur, comfortable application of the medial plate, ideal fixation of medial and lateral Hoffa fractures, complete grafting of bony defects at all locations with good impaction, addressing associated internal knee derangement whenever possible, lower incidence of suprapatellar area adhesions, and uncomplicated wound healing. It will also be highly valuable in revision surgery after implant failure and nonunion of C3-type injuries, and in addressing comminuted

distal femur fracture combined with ipsilateral displaced tibial plateau fractures.[10]

The role of external fixation in the treatment of distal femoral fractures is either limited to temporary fixation, before formal reconstruction is possible, or as a definitive fixation in some complex fractures. Like minimally invasive techniques, the use of external fixation allows stabilisation without extensive soft tissue disruption, a shorter operating time, low blood loss, minimal surgical exposure, the lack of periosteal stripping with possible quicker healing of the fracture, and greater mechanical stability than with a mono lateral external fixator. [11]

With the Ilizarov system the diverging olive wires offer good stability and a firm compression effect on the condyles. Tensioned wires of small diameter gave sufficient stability, even in osteoporotic bone.[12]

AIM OF THE STUDY

This is a prospective randomized comparative clinical study to evaluate the efficacy, advantages and disadvantages of open reduction and internal fixation using double plating in comparison to Ilizarov fixation in the management of highly comminuted unstable distal femoral fractures.