Management of Comminuted Supracondylar Fracture Femur by Ilizarov External Fixation Versus Internal Fixation:

Systematic Review of Literature

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List of Abbreviations

Abb.	Full term

ABP ..... *Angled blade plate*

ADR ..... *The AO Development Institute*

AO ..... *The Arbeitsgemeinschaft fur Osteosynthesis*

AO-ASIF ..... *AO Association for the Study of Internal Fixation*

AP ..... *Anteroposterior*

ARI ..... *AO Research Institute*

CT ..... *Computed tomography*

DCS ..... *Dynamic condylar screw*

HA-coated p ..... *Hydroxyapatite-coated*

IM ..... *Intramedullary*

LC-DCP ..... *Limited contact dynamic compression plate*

LCP ..... *Locking compression plate*

LISS ..... *Less invasive stabilization system*

LISS-DF ..... *Less invasive stabilization system to the distal femur*

MIPO ..... *Minimally invasive plate osteosynthesis*

ORIF ..... *Open reduction and internal fixation*

PC-Fix ..... *Point contact fixator*

PMMA ..... *Polymethylmethacrylate*

CBP ..... *Condylar buttress plate.*

RCT ..... *Randomized control trail*

ABSTRACT

Background: An estimated 6% of all fractures of the femur account for the distal part of the bone about 0.4% of all adult fractures[1]. A wide variety of treatment modalities have been used for distal femoral fractures yet there is disagreement on the optimal choice of treatment. The management of patients with closed comminuted supracondylar femoral fracture with intact soft tissue and neurovascular state is challenging. It is important to use a technique that can provide secure fixation with minimum handling of tissues, while allowing early knee mobilization and early partial weight bearing. Treatment options for fractures range from the various types of Internal to Ilizarov external fixation for displaced or unstable comminuted fractures. The fixation chosen significantly impacts the outcomes of fracture healing. Although rigid fixation is preferable in the treatment of select fracture types, the process of plate fixation can create its own complications. Achieving a rigid plate/bone construct necessitates some degree of soft-tissue stripping and devitalization of the underlying bone. Closed reduction and external fixation by Ilizarov type external fixators import minimum surgical trauma and allow early mobilization of the knee joint in addition to treatment of fractures with severe comminution, an open wound, poor skin or osteoporotic bone. On the other hand complications associated with the use of external fixation for definitive treatment of distal femoral fractures involve osteomyelitis, pin tract infection, septic arthritis, loss of reduction, delayed union or non-union requiring bone grafting and limited knee motion through arthrofibrosis[2].

Objective: This systematic review aims to cover this lack in comparing management of comminuted supracondylar fracture femur by Ilizarov external fixation versus internal fixation.

Material and Method: Systematic review will be done on comminuted supracondylar fracture femur and its management by Ilizarov external fixation versus internal fixation. We used Medical Subject Headings (MeSH) terms and key words to generate sets for the following themes: comminuted supracondylar fracture femur and its management. We then used the term “AND” to find their intersection. No limits were used, except for language (non English excluded). This basic approach was modified as necessary to search each electronic database.

Results: In our review we included fifteen studies to compare 361 participants who underwent internal fixation and 48 participants. We found Ilizarov external fixation to be superior to Internal fixation in terms of union and good overall knee lambert score with a significant P-value.

Conclusion: Based on currently available evidence comparing outcomes of both fixation techniques we conclude that in the presence of a compliant patient and a skilled surgeon Ilizarov external fixation found to be superior to Internal fixation in terms of union and good overall knee lambert score with a significant P-value while found to have similar results to internal fixation in terms of fixation failure rate, secondary surgical procedures and deep infection rate with insignificant P-value.

Keywords: Fracture - Distal Femur - Supracondylar - Femoral.

Introduction

INTRODUCTION

An estimated 6% of all fractures of the femur account for the distal part of the bone about 0.4%of all adult fractures.[1]

The fractures occur in a bimodal distribution. One group including patients below 40 years of age predominantly males sustaining high energy trauma such as traffic accident or a fall from height. The other group is consisting of patients >50 years predominantly females with osteoporosis who sustain relatively low energy trauma.[2]

No promising definition of what constitutes the femoral "supracondyle" it may be taken as fractures from articular surface to 5cm above metaphyseal flare. The characteristics of this zone include a widening canal, thin cortex and poor bone stock.

Comminuted fractures of the distal femur are difficult to treat because of the problems arising from anatomical reconstruction of the articular surfaces and good stabilization of the fragments must be achieved.[3] However, conservative treatment often produces poor results, so the trend of treatment has shifted to surgical management.[4]

A wide variety of treatment modalities have been used for distal femoral fractures yet there is disagreement on the optimal choice of treatment.

A few authors have suggested that best results can be obtained with [5], initial skeletal traction followed by cast immobilization, the use of a condylar buttress plate with or without medial plating [6], locked plate [7] and external fixation.

Bone grafting rates in the treatment of supracondylar femur fractures have been reported to range between 23% and 87%.[8]

Plating fixation produces many disadvantages: it requires open reduction with extensive soft tissue dissection making cancellous bone grafting imperative in order to promote the healing but on the other hand it significantly reduces malunion rate.[9]

Closed reduction and external fixation by Ilizarov type external fixators import minimum surgical trauma and allow early mobilization of the knee joint in addition to treatment of fractures with severe comminution, an open wound, poor skin or osteoporotic bone.[10]on the other hand complications associated with the use of external fixation for definitive treatment of distal femoral fractures involve osteomyelitis, pin tract infection, septic arthritis, loss of reduction, delayed union or non-union requiring bone grafting and limited knee motion through arthrofibrosis.[11]

There has been a gradual shift away from open reduction of fractures with large internal fixation devices to a more biological approach aiming to preserve the osteogenic tissues, reduce the amount of bone removed and stabilize the fracture by means of external fixation. The use of such surgical techniques has substantially reduced the risk of infection, delayed union and pseudo arthrosis. Open and closed supracondylar femoral fractures in polytraumatized patients with multiple fractures are at a risk for anesthesia complications. Internal fixation with plates and screws implies major surgery with blood loss and consequent hemodynamic imbalance.[12]

To the best of the authors' knowledge no published systematic review exists comparing the qualities of the two techniques in the acute treatment of comminuted supracondylar fractures of the distal femur.

This systematic review aims to cover this lack in comparing management of comminuted supracondylar fracture femur by Ilizarov external fixation versus internal fixation.

Aim of the Work