



Percutaneous fixation of tibial plateau fractures by cannulated cancellous screws with respect to postoperative complications and hospital stay

KEYWORDS

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ABSTRACT

Introduction: Improvements in surgical techniques and implants, has favoured a trend towards surgical managements like Percutaneous fixation of tibial plateau fractures by cannulated cancellous screws .These minimally invasive techniques are being developed and utilized in all branches of surgery. The advantages of reduced morbidity and decreased hospital stay are well documented However success of the surgical management needs reevaluation so the purpose of the current study is to evaluate percutaneous fixation of tibial plateau fractures by cannulated cancellous screws with respect to postoperative complications and hospital stay.

Materials and Methods: It is a prospective analytical study of 2 year duration. A total of 13 patients with tibial plateau fractures were selected and managed surgically. Patients were followed up at 2nd week , then 6th week ,later 3rd month & 6months and 12 and annually thereafter. At the final follow up, functional outcome (pain, walking capacity, extension lag, range of motion, and stability) was evaluated.

Results: No patient in our series had early postoperative complication. One patient develop knee joint pain 16 months after operation due to early osteo-arthritic changes.

Conclusion: Percutaneous fixation of tibial plateau fractures by cannulated cancellous screws fairly reasonable treatment alternative for minimal postoperative complications and hospital stay.

INTRODUCTION

Intraarticular and extraarticular fractures of the proximal tibia present a wide spectrum of soft tissue and bony injury patterns that can produce permanent impairments. For patients treated operatively the residual disabilities are not only attributed to the severity of the injury but also to the complication and side effects of the operative intervention.¹

Currently, intra-articular lesions are best treated with meticulous anatomic reduction and rigid fixation of the articular fragments using internal fixation techniques. This approach, however, also can produce soft tissue problems and fixation failures.² Poorly placed incisions and extensive dissection tends to compromise the overlying soft tissue envelop. It may result in soft tissue necrosis and deep wound infections.³ Although salvage with local or free flap is possible; knee function and motion may remain limited. To avoid these problems and maintain bony reduction concepts such as indirect reduction and biological fixation have been developed.^{4,2,5}

These minimally invasive techniques are being developed and utilized in all branches of surgery. The advantages of reduced morbidity and decreased hospital stay are well documented. Closed reduction and percutaneous pinning has been used in the treatment of selected fractures, in particular intracapsular hip fractures, while arthroscopy is the basic tool in treating all types of internal derangement of the knee and is being employed in many other joints. The used of combination of these two techniques in the treatment of tibial plateau fractures is not new.⁶

There has otherwise been little attention focused on minimally invasive techniques in the tibial plateau fractures. The purpose of the current study is to evaluate percutaneous fixation of tibial plateau fractures by cannulated cancellous screws with respect to postoperative complications and hospital stay .

MATERIALS AND METHODS

Between January 1999 to December 2002, 10 men and 3 women aged 20 to 60 years underwent closed reduction and percutaneous screw fixation for closed tibial plateau fractures with >8 mm depression or displacement. The causes of injury included high-velocity road traffic accident (n=9), fall from height (n=3), and others (Blow, assault, spot injuries etc n=1). According to the Schatzker classification, patients were classified into type I (lateral fracture) (n=5), type II (lateral fracture with depression) (n=5), type IV (any medial fracture) (n=3). Associated injuries included polytrauma (n=2), minor injuries / local abrasions (n=2) compartment syndrome (n=1). Patients with head injury & nerve injuries were excluded.

This study was approved by the ethics committee of our hospital. Informed consent was obtained from each patient. Appropriate emergency treatment was given for associated head, chest, and/or abdominal injuries after haemodynamic stabilisation. Anteroposterior and lateral radiographs of the knee joint were obtained. Computed tomography was not performed unless there was articular depression. Lower tibial pin traction was applied and the limb was rested over a Bohler-Braun splint.⁷ Patient characteristics, injury mechanism, injury pattern (based on Schatzker classification)⁶, distal neurovascular status, and associated injuries were recorded using a predesigned proforma. Patients were operated on as soon as they were medically fit.

A preoperative template was prepared using traction radiographs. Closed reduction was achieved using manual ligamentotaxis with traction in extension under image intensifier control. A femoral distractor was used in patients with comminution. Both sides (medial and lateral) of the proximal tibia were thumped to dislodge the depressed articular fragment. Reduction was held temporarily with one- or 2-pointed reduction forceps, and then fixed percutaneously with cancellous screws (6.5 mm) and washers. The direc-

tion and the number of screws (≥ 2) used were based on the fracture pattern and orientation. Articular congruency was checked under a C-arm in anteroposterior and lateral views. The limb was then immobilised in a groin-to-ankle slab (cylinder slab). The rehabilitation protocol was standard for all patients. Patients were encouraged to perform isometric quadriceps exercises, ankle pump, and toe

movements. Analgesia and antibiotics were given. The slab was removed after 3 weeks, and the knee joint was examined for tenderness, swelling, and instability.

Gradual knee bending and extension exercises were advised with non-weight-bearing crutch walking for further 3 weeks. Early mobilization was started within one week in 8 cases. 5 cases having depressed plateau fractures were mobilized after third week of plaster immobilization. Full weight bearing advised only after complete union of fracture, usually after 12 weeks, in most of cases.

Patients were followed up at 2nd week, then 6th week, later 3rd month & 6 months and 12 and annually thereafter. At the final follow up, functional outcome (pain, walking capacity, extension lag, range of motion, and stability) was evaluated.

Result

Table I: Postoperative Complication:

Type of Complication	No. of Cases	Percentage %
Early: Vascular injury	-	-
Nerve injury	-	-
Infection	-	-
Skin sloughs	-	-
Thrombophlebitis	-	-
Loss of fraction reduction	-	-
Compartment syndrome	-	-
Deep vein thrombosis or pulmonary embolism	-	-
Late: Delayed union /Non-union	-	-
Extension lag	-	-
Instability	-	-
Angular deformity	-	-
Painful implant	2	14%
Traumatic arthritis	1	7%

No patient in our series had early postoperative complication. One patient develop knee joint pain 16 months after operation due to early osteo-arthritic changes.

Table II: Hospital Stay:

No. of Cases	Minimum	Maximum	Average
13	5 day	42 days	10.46

Most of the patients having isolated injuries were discharged after fifth postoperative day. Prolonged hospitalization required for patients having multiple injuries and associated complication compartment syndrome.

DISCUSSION

The knee joint is one the commonly injured joint. It is the largest and most complex joint, exposed to exterior. It helps in mobility and stability of the lower limb and hence locomotion. The functional capacity of any person depends on its integrity. The fractures around the knee joint are on increase.

Fractures of the tibial condyles account for 1% of all fractures and 8% of the fractures in the elderly groups. The ideal outcome after a tibial plateau fractures is stable, painless, non-osteoarthritic knee joint with a range of mo-

tion that is adequate for functional requirements. There is virtual universal agreement that reduction and stabilization of displaced fragments, early mobilization and delayed weight-bearing are necessary to achieve an optimal result; however, controversy exists as to how these aims should be achieved. The debated is divided between two major groups, one favoring non-operative management and the other favoring operative treatment. Non-operative option includes traction and early mobilization, plaster cast immobilization, and cast bracing while operative treatment usually comprised open reduction and buttress plating with bone grafting (Schatzker et al, ⁶ 1979). Difficulties with conservative treatment include inadequate reduction, instability, and prolonged hospitalization, and knee stiffness, development of early osteoarthritic changes while open reduction and internal fixation is a difficult operation, even in experienced hands. It requires extensive exposure of the knee joint, compromise the soft tissue and devascularise the bone fragment. It is occasionally complicated by deep infection, wound dehiscence.

Reduction by closed ligamentotaxis or assisted by arthroscopy and percutaneous fixation are methods that seek to combine the attributes of both operative and non-operative philosophies while at the same time avoiding the complications of both. They have become feasible alternatives because use of image intensification and cannulated screws allows precise placement of the fixation device.

Various studies have been done in the past regarding the tibial plateau fractures by M-Hohl, Rasmussen ⁸, Porter, Schatzker's and others to which we compared our results.

Porter et al have studied only lateral plateau fracture (compression or split compression); Dremann et al have studied central depression, split compression, bicondylar comminuted; M Hohl has studied all types; Rasmussen et al have studied all fractures types; Schatzker's et al ⁹ have studied all types. Our study is based on observations of 13 patients of tibial plateau fractures, Schatzker's type I to type IV, treated with closed reduction and percutaneous internal fixation with cannulated cancellous screws. However we did not come across with any case of Schatzker's type III tibial plateau fracture.

Hohl and Luck ¹⁰ have studied 227 cases with follow-up of 2-13 years. Robert's 100 cases with follow-up of 1-12 years; Apley 60 cases with follow-up of 1-10 years; Rasmussen ²⁰⁴ cases with follow up of 4-11 years, Burn et al 278 cases, Duwelius and Connolly ¹¹ et al 12 cases. Our study includes 13 cases in a total period of 3 years in a prospective manner. We have analyzed the data in relation to age, sex, cause of injury, various types of fracture and compared and contrasted the result with other series.

The average age of 40 years was observed in our series. This is due to the fact that this is the working age group with increased mobility. Hence they are more exposed to the exterior and consequently more injured.

In present series, all cases were treated with closed reduction and percutaneous internal fixation with cannulated cancellous screws. There were no early complication related to surgery such as superficial or deep infection, damage to neurovascular structures, deep vein thrombosis. There were one case of Schatzker's type IV tibial plateau fracture with poor results. She had significant loss of fracture reduction, developed early osteoarthritis 16 months after trauma and knee joint pain affecting her daily acti-

vates. A total of 2 patients required removal of implant because of local discomfort after fracture had healed.

Hospital stays (Table II) for most of the patients in our series having isolated tibial plateau fractures were discharged after first check dressing, usually on fifth postoperative day. Prolonged hospitalization of 6-7 weeks was required for 2 patients having multiple bony injuries and 1 patient with compartment syndrome. The average hospital stay required in our series was 10.46 day.

The study of 30 patients with cast brace for fracture of proximal tibia, George A et al reported that, associated injuries or medical problems account for all hospitalization greater than 2 weeks, in their cases. Dennis Bo Jensen, studied a comparison of conservative and surgical treatment of tibial plateau fractures, their result suggests that prolonged hospitalization was needed for patient treated conservatively (Avg. = 7 weeks) as compared to patient treated operatively (Avg. = 4 weeks).

Conclusion :

We believe that Percutaneous fixation of tibial plateau fractures by cannulated cancellous screws fairly reasonable treatment alternative for minimal postoperative complications and hospital stay.

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