Percutaneous Fixation Of Tibial Plateau Fractures By Cannulated Cancellous Screws With Respect To Time Required For Fracture Union In Relation To Type Of Fracture

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Abstracts: Background: 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 revaluation so the purpose of the current study is to evaluate percutaneous fixation of tibial plateau fractures by cannulated cancellous screws with respect to time required for fracture union in relation to type of fracture. Methodology: 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 & 6 months and 12 and annually thereafter. Average period of radiological union was noted for Type I fracture & other types of fractures. Results: In all cases fracture united within 14 weeks. Average period of radiological union was 12 weeks. Type I fracture required less time (Avg. 10.6 weeks) for union than other types of fractures. Conclusion: Percutaneous fixation of tibial plateau fractures by cannulated cancellous screws fairly reasonable treatment alternative for minimal time required for fracture union and hence functional outcome and hence functional outcome. [Bagul J NJIRM 2015; 6(6):31-34]

Key Words: Tibial plateau fractures, Cannulated Cancellous Screws, Time taken for union

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Introduction: The lateral side of the knee joint is most commonly injured during road traffic accidents, which results in torn ligaments, sprains, and fractures of one or both condyles.[1] Tibial plateau fractures are intra-articular fractures caused by high-velocity trauma. They are usually associated with neurovascular injury, compartment syndrome, compounding of fractures, and crushing of soft tissues. Associated injuries at and around the knee joint are more common and severe in patients with fracture-dislocation.[1,2]

Currently, intra-articular lesions are best treated with meticulous anatomic reduction and rigid fixation of the articular fragments using internal fixation techiques. This approach, however, also can produce soft tissue problems and fixation failures.[3] poorly placed incisions and extensive dissection tends to compromise the overlying soft tissue envelop3ed. It may result in soft tissue necrosis and deep wound infections.[4] 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.

The treatment outcomes for tibial plateau fractures are inconsistent.[5] Closed reduction (based on ligamentotaxis principles) and internal fixation (with percutaneous cancellous screws and washers) avoids the disadvantages of both operative and conservative treatments. However, it is not suitable for all types of tibial plateau fractures, particularly grossly comminuted and depressed fractures, Schatzker type-VI fractures, and open fractures.[4,5] Tibial plateau fractures are usually associated with communition and soft tissue injury. Percutaneous treatment of these complex fractures is intended to reduce soft issue complications and postoperative stiffness of the knee joint. We assessed the time required for fracture union in relation to type of fracture In addition, these fractures may have significant socio-economic influence, mainly due to time taken to come back to regular work in order to assess the effect of these injuries on functional outcome

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 depression.The causes of injury included high-velocity road traffic accident (n=9), fall from hight (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. 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 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 direction 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 weigh bearing advised only after complete union of fracture, usually after 12 weeks, in most of cases. Average period of radiological union was noted for Type I fracture & other types of fractures.

Results: The table below show that tibial plateau fractures are more common in adults below 50 years, which is the most active period of life. The youngest patient in our series was 24 years old and oldest patient was 60 years old.

Table 1: Distribution of cases according to age

Sr. No.	Age Group (Years)	No. of Patients	Percentage
1	21-30	3	24
2	31-40	5	38
3	41-50	3	24
4	51-60	2	14
	Total	**13**	**100**

Table 2: Sex Distribution

Sex	No. of Patients	Percentage
Male	10	76
Female	3	24
Total	13	100%

Majority or our cases was males. Probably due to frequent exposure to high velocity injuries and trauma.

Table 3: Time required for Fracture Union in Relation to type of Fracture

Type of Fracture (According to Schatzker's classification)	Time required for Fracture Union (in weeks)		
	Minimum	Maximum	Average
Type I	8	13	10.6
Type II	10	14	11.8
Type III	-	-	-
Type IV	12	13	12.3%

In all the cases, fracture united within 14 weeks. Average period of radiological union was 12 weeks. Type I fracture required less time (Avg. 10.6 weeks) for union than other types of fractures.

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 open an 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, pains-free, non-osteoarthritic knee joint with a range of motion that is adequate for functional requirements. There is virtual universal agreement that reeducation and stabilization of displaced fragments, early mobilization and delayed weigh-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 [7], and cast branching while operative treatment usually comprised open reduction and buttress plating with bone grafting. Difficulties with conservative treatment include inadequate reduction, instability, and prolonged hospitalization, and knee stiffness, development of early osteoarthritic changes while open reeducation and internal fixation is a difficult operation, even in experienced hands. [8] 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. [9]

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. [10]

In present series of 13 patients; there were 10 male and 3 female patients. A male to female ratio was 3.1:1. The increased incidence of fracture of tibial plateau in male may attribute to active outdoor lifestyle of males. [11]

The union was not a problem in our series of 13 patients. All the fractures of tibial plateau were untied within 14 weeks. Average time required for radiological union was 12 weeks. It was observed that comparatively less time required for union of Schatzker's type I tibial plateau fractures (Average = 10.6 weeks). (Table 3)

Thomas A et al, in their presented series of 27 cases of tibial plateau fractures treated conservatively with case brace, reported average time required for union was 10 weeks.

Paul F et al, [9] noted average time required for union was 13.5 weeks in their 46 cases of isolated tibial plateau fractures; treated by open reeducation and internal fixation using AO techniques.

Edward A et al [10] in their 22 cases treated with open reduction and internal fixation; using AO technique, observed that union occurred in all cases between 10-12 weeks.

160 cases in Dennis Bo Jensen series, treated conservatively (87 cases) and operatively (73 cases), average time required for union was 12 weeks.

Finally, we are aware that this study has a number of limitations including a follow-up period of less. We believe that it provides useful information with regard to the time required for fracture union and hence functional outcome.

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