Original Article

Canulated Screw Fixation for Tibial Plateau Fracture in Adults

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Abstract

Objective: To determine percutaneous screw fixation (PSF) as fair treatment option for Schatzker type I, closed tibial plateau fracture in adults.

Patients and Methods: 30 male and female adults between the ages of 20 and 40 were included. Only displaced Schatzkar type I closed tibial plateau fractures without any associated injury or complication were included. Type II, III, IV, V and VI, fractures with infection, patients with other severe injuries and neurovascular compromise fractures were excluded. Patients were followed weekly for one month, every alternate week for four months, thereafter monthly for up to six months to assess range of motion, deformity, union or any other complication.

Results: Mean healing was 11.6 weeks. Mean hospital stay was 8.4 days. The overall clinical results were excellent in 20 (66.6%), good in 8 (26.6%), fair in 2 (6.6%) cases.

Conclusion: Percutaneous screw fixation provided better results in close displaced type I Schatzker tibial plateau fracture in adults. It is minimally invasive and achieved articular anatomical reduction, rigid fixation and early mobilization.

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Introduction

Plateau fracture of the tibia is very important in load-bearing region of human body and its fractures are 1% prevalent from all fractures, and its treatment is also very difficult. These are joint fractures requiring reduction that is as anatomic as possible, stable fixation allowing early rehabilitation so as to obtain the best possible functional results[1,2] and decreasing the risk of the complications, especially the posttraumatic arthritis.[3] Plateau fractures of the tibial introduce a wide range of wounds with fractures range including different degrees of the surface depression of joint and displacement.[4] Screws and plates are the standout amongst the most regularly utilized treatment, however there additionally complications like injury issues, contamination, distortions, and the stiffness are not known to be less.[5,6] Another choice is negligibly intrusive strategy utilizing closed reduction and percutaneous fixation (internal) or sympathetic external fixation.[7,8]

The treatment results for plateau fractures of the tibia are conflicting.[9] Closed decrease (in light of ligamentotaxis standards) and fixation (internal by percutaneous canulated screws stays away from the issues of both surgical and conservative management. Though, it is not appropriate for a wide range of plateau fractures of the tibia, especially grossly comminuted and strongly depressed and open fractures.[10] Insignificantly intrusive strategy of closed reduction by ligament axis and fixation by percutaneous screws consolidates attributes to both operative and un operative is more logical and gives good and useful results.[11] Subsequently in lights of these advantages, we present our clinical results for this method.

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This descriptive study conducted at orthopedic department of a public sector hospital. All the Schatzker type I tibial plateau fracture, not more than one week old were treated surgically by close methods with two cannulated screws under image intensifier. In this study only cases without any associated complications were included. Out of 30 patients 06 patients directly admit-ted at orthopedic department while 24 cases received at causality civil hospital Hyderabad where after maintaining the emergency and Advanced Trauma and Life support protocol, back splint above knee applied immediately to reduce the intensity of pain, after that patients were sent to radiology room where, two views antero-posterior and lateral were taken for each case, after assessing the radiograph, displaced type I fractures attempted for close reduction under sedation in emergency room. In case of failure patients were counseled for percutaneous screw fixation. After getting consent, and fitness for surgery, patient were shifted for screw fixation under image intensifier.

Patients were operated on traction table in supine position for the purpose of good access of image intensifier for antero posterior and particularly lateral view. The affected limb from mid thigh to distal part of lower leg was cleaned and draped at the time of operation. Fracture reduction had performed through closed methods of principle of ligamentotaxis. Valgus or Varus strain had utilized along with traction. Compression clamp had utilized, when essential to take collectively fracture fragments. Later verifying the reduction under C-arm image intensifier, guide wire passed from lateral to medial side, after confirming their position in both condyles inanteroposterior and lateral views, drill bit of 3.7 mm chosen for drilling over the guide wire and finally appropriate cannulated screw with or without washer inserted tightened and the same maneuver done for the another screw. Placement of both screws was parallel to each other.

Antiseptic dressing and posterior slab above knee applied for one week with intravenous antibiotics for 48 hours, followed by oral antibiotic for 7 to 10 days. Post-operative check radiograph were taken and soakage of dressing assessed. On 2nd day of surgery patients were encouraged on crutches with no weight bearing on operated leg. Back slab removed within 3 to 5 days and patients were encouraged for quadriceps exercises including isometric and isotonic. Almost all patients were followed weekly in first month, then every alternate week for four months followed by monthly for up to 6 months to assess functional outcome of knee including quadriceps strength and range of motion, union, any deformity or any other complication. Patients were not allowed for weight bearing till evidence of healing clinically and radiologically.

Results

There were 30 patients of both gender age of 20 to 40 years, male 24 (80%) and female 6 (20%) (Mean age was 28.25 years). Common age group in this study was 20 – 30 years. In this study commonest mechanism of injury was road traffic accident in 23 (76.6%) cases, following by 5 (16.6%) had fall from height and remaining 2 (6.6 %) cases had sports injury.Time period between surgery and partial weight bearing was 8.92 weeks (range 8 – 12 weeks).Union ranged from 10 to 24 weeks. The mean healing time was 11.6 weeks. Clinical results obtained in this study were excellent in 14 (46.6%) cases, good in 10 (33.3%) and fair in 6 (20%). Complications observed in this study included the following: wound infection in 2 (10%),

Table 1: Basic Characteristics (N = 30).

Age Groups	No. of Patients (%)
Age Groups	
20 – 30	21 (70%)
31 – 40	09 (30%)
Gender	
Male	24 (80.0%)
Female	06 (20.0%)
Cause of Injury	
RTA	23 (76.6%)
Fall	05 (16.6%)
Sports	02 (6.6%)

Male: Female Ratio = 4:1

Table 2: Time to Achieve Union (N = 30).

Time (Weeks)	No. of Patients	% Age
10 to 12	14	46.6%
13 to 16	10	33.3%
17 to 20	6	20%

screw loosening in 4 (20%); pain during walking occurred in 3 (15%); knee stiffness observed in 2 (20%); ankle stiffness in 1(5%) and delayed union in 1 (5%).

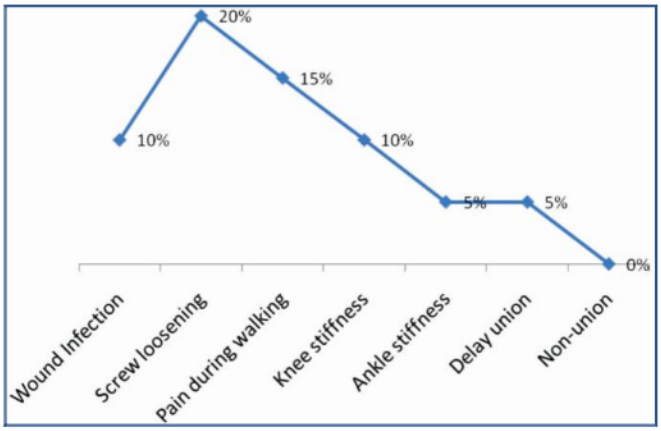


Fig. 1: Complications (N = 30).

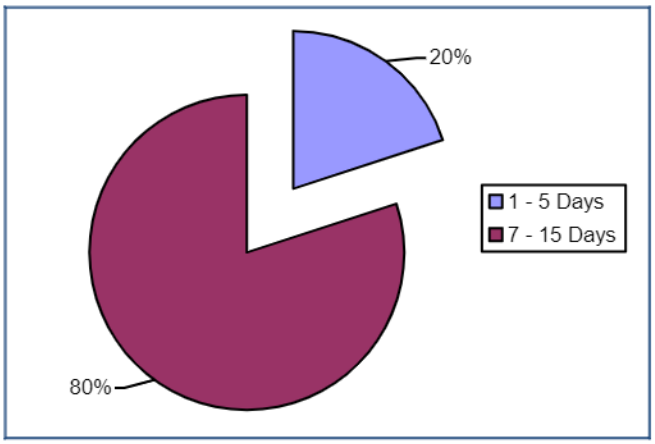


Fig. 2: Hospital Stay (N = 30).

Washer acts like the 1hole plate, give the buttress effect.

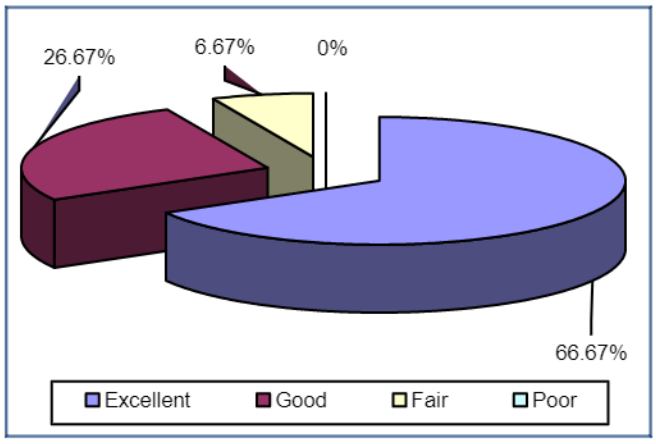
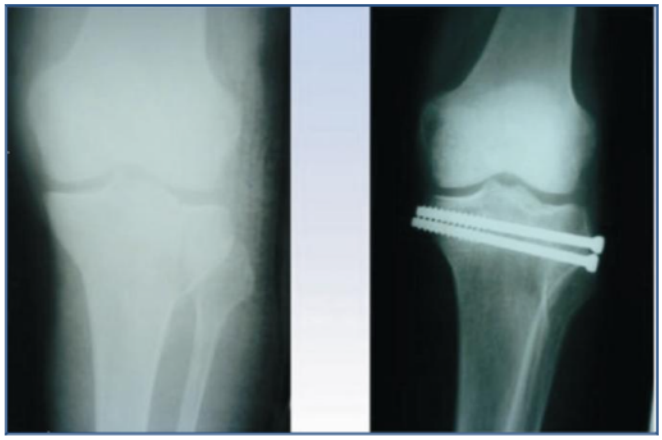


Fig. 3: Clinical Results (N = 30).



Preoperative **Postoperative**

Discussion

Plateau fractures of the tibia, are most common intra articular fractures. Any fracture affects morbidity and impacts quality of life. The perfect result after Plateau fractures of the tibia is a stable, without pain, non-osteoarthritis knee with a movement of functional range. All patients in this study were managed surgically by close percutaneous internal fixation.[13] Minimal internal fixations have advantages like less handling of the skin and soft tissue and chances of infection.[14,15] As we included only displaced Schatzkar type I fracture so cannulated screw fixation with washer by close means proved nice operative method even this is appropriate procedure for fractures type II, IV and V.

The male to female ratio was 4:1, which indicates the traditional life style of Sindh province where most of the females are restricted to their homes. The higher rate of fracture in males indicates the male dominant society where males remains outside for job purpose and have responsibility of their families on their shoulders. Comparatively, male to female ratio shared by Camacho[16] is 4:1 and Ozturkmen Y[17] 2.1:1.

The fractures were most common in the 20 to 30 age. Other studies also demonstrated at this fracture having big prevalence in younger age. As well as Kataria H[18] stated age 20 – 60 year along with mean of 32 years. Shrestha BK[19] demonstrated that mean age was 37 years and RTA commonest cause of tibial

fracture.[20] Farmers, homemakers, retired persons have a relatively lower incidence of fractures as they travel infrequently, while workers and laborers commute frequently and are prone to violent injuries encountered on the roads or due to industrial accidents. Homemakers normally sustain fractures due to falls either falling from roof, while climbing ladders or stools or while picking up objects from high places such as wardrobe. This study demonstrated most common causes of tibial plateau fractures to be road traffic accidents 23 (76.6%), falling from heights 5 (16.6%) and sports injury 2(6.6%). Ngim NE[20] noted that road traffic accident (RTA) are the leading cause of limb injuries accounting for 76.8% of all cases (53 patients). Most of the road traffic accidents (52.8%) involved motorcyclists and/or riding on pillion seats. Assault accounted for 10.1% (7 cases), fall 4.3% (3 cases) and gunshot 5.8% (4 cases) and cause of the hit by an object found in 2.9% of cases. In our study 2 patients had infection which was superficial and treated with antiseptic dressing and intravenous antibiotic according to culture and sensitivity. Shrestha BK[19] reported that 6 (7.4%) were with superficial wound infections. In other studies complications included screw loosening 4 (20%), pain during walking in 3 (15%) patients, knee stiffness 2 (20%), ankle stiffness in 1 (5%) and delayed union in 1 (5%). Comparable studies have observed similar findings.[21,22] Hospitalization greatly impacts the patient both financially and psychologically. Treatment ideally should limit hospitalization. In this study hospitalization range was from 1 to 15 days. These findings were comparable to other studies like as Camacho SP et al, reported hospital stay 21.25 days.[16] Excellent results were attained in 20 (66.6%) patients and good in 8 (26.6%); fair in 2 (6.6%) patients. On other hand Shrestha BK[19] mentioned excellent results were in 44 (54.3%) cases, following by good, fair and poor with percentage of 21 (25.9%), 5 (6.1%) and 11 (13.5%) respectively.

Conclusion

Percutaneous cannulated screw fixation for closed tibial plateau fractures is minimally invasive, enables early mobilization with minimal instrumentation, and achieves satisfactory outcomes without any anatomical deformity or functional impairment as often seen with conservative management.

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