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To study the functional outcome of surgically managed proximal tibia plateau fracture

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Abstract
Background: Tibial plateau fractures are one of the common intra-articular fractures,. Advances in mechanization and acceleration of travel have resulted in increase in road traffic accidents which is associated with increase in number of tibia plateau fracture. In the younger population, these injuries are associated with an increased incidence of complications like, infection, restriction of motion, and loss of reduction (2). The study aimed to determine the functional outcome of surgically managed proximal tibia plateau fracture.
Methods: 46 cases of proximal tibial fractures were treated by using open reduction and internal fixation and studied from January 2021 to December 2022 in at our institute.
Results: All the selected 45 cases were followed up. The average time for union of fracture was 14 weeks ranging from 18-20 weeks? Full weight bearing was not permitted for minimum 12 weeks or until radiological signs of fracture union. An average mean time for achieving range of motion was around 7 days with ranging from 4-13 days. We observed cases of postoperative complications that included infections, persistent pain, stiffness and loss of reduction.
Conclusions: Surgical management of proximal tibia plateau fractures with various modalities like cancellous screw, buttress plate, locking compression plate etc depending upon the fracture type gave good reduction, stable fixation to maintain articular surface and to achieve early mobilization to provide optimal knee function and reduced post-operative complications.

Keywords: Proximal tibia plateau, scthazker type, buttress plate, Rasmussen scoring system, internal fixation

Introduction
Tibial plateau fractures are common intra-articular fractures, representing 1.2% of all fractures. [1]. Most injuries affect lateral tibial condyle (55 to 70%) and isolated medial condyle fractures occur in 10 to 23% whereas the involvement of bicondylar lesions is found in 10 to 30% of the reported series [2] Advances in mechanization and acceleration of travel have resulted in increase in road traffic accidents which is associated with increase in number of tibia plateau The knee joint is complex and most commonly injured joint now days because of increased motor vehicle accidents and sports related injuries.
Each tibia plateau fracture type has its own features morphology and respond differently to different modalities of treatment. Apart from tibial plateau, meniscal tear and ligament injuries should also be assessed [3] tibia plateau fracture can be associated with fracture around knee joint which can include patella, femur and surrounding soft tissue. A better choice of implants good internal fixation, soft tissue care, good proper intra op and post op all aseptic precautions are needed to have good outcome Thus shift from the conservative management to internal fixation of fractures as a treatment modality. Conservative treatment at any age, is complicated by knee arthritis/stiffness, persistent pain malunion and nonunion. Open reduction and internal fixation has been implicated by using good choice of implants like locking compression plates, buttress plate, L plate to achieve good outcome and optimal knee function.

Aims and Objectives
- To restore the anatomy of articular surface congruity of tibia plateau by operative treatment.
- Early mobilization of knee joint.

- To assess the range of motion of knee joint after surgical treatment.
- To assess the union of fractures after internal fixation.
- To minimize the complications.

Methods

This study was conducted during January 2021 to December 2022. 46 patients who were treated surgically for proximal tibial plateau fracture using open reduction and internal fixation with various modalities at our tertiary care centre.

Inclusion criteria

1. Adult patients over age 18 yrs upto 65 yrs of agr both male and female having proximal tibia fracture
2. Patients with closed fracture of proximal tibia
3. Radiological diagnosis of fracture with classificatiosn based on schatzker classifications type 1,2,3,4
4. Patient willing to be part of study and follow up.

- All cases will be treated with open reduction and internal fixation.
- Fixation can be done by Cannulated cancellous screw fixation, T or L-plate buttress plate, Locking Compression Plate.
- Follow up and assessment will be performed using modified Rasmussen's Clinical and Radiological criteria.

Exclusion criteria

Patients with age above 65 yrs
Patients with head injury, neurological deficit
Patients with medical contraindications to surgery
Pateints with compound fracture of proximal tibia and soft tissue injury around knee
Patienst with distal neurovascular deficit
Patients on immunosuppressive therapy
Patients with manifest infection.

Radiological assessment of fracture with Schatzker's classification [3, 4, 5].

Table 1: Schatzker classification [3, 4, 5]

Type I	Pure cleavage
Type II	Cleavage combined with depression
Type III	Pure central depression
Type IV	Fractures of medial condyle
Type V	Bicondylar fractures
Type VI	Plateau fracture with dissociation of metaphysis and diaphysis

The following protocol was followed after patients were admitted and planned for surgery

The study comprise of 46 patient with proximal tibia fracture admitted in male and female ward admitted in male and female ward in our hospital. Demographic data of the patients were obtained from data sheet recorded at admission in the hospital. All patients were subjected to same protocol of investigations in the form of xray (knee with leg lateral and antero posterior) and CT (knee with leg plain) scans, temporary splints, limb elevations and ice fomentation to decrease the swelling, After confirmation of diagnosis on CT scan and xray patient classifying the fracture type patient posted for surgery after taking operative consent with anesthetic fitness. Operative planning done according the fracture type and choice of implant. All patients will be assessed after taking consent for clinical pictures during intra op with and post op period for operative timing, blood loss intra operative, and post operative complications, hospital stay Post patient were explained phyisotheray with anterior slab application with immediate mobilization with non-weight bearing. Check dressing will be done on 2nd, 5th and 8th day. Isometric quadreiceps exercises and intermittent and knee range of motion encouraged from 2nd day 1.suture removal done will be done on 12th day

Then follow up after 1st, 2nd, 3rd, and 6th month. The radiologic evaluation and function al assessment was done according Rasmussens scoring system.

Table 2: Modified Rasmussen criteris for clinical Assessment [3, 4, 5].

Clinical characteristics	Score
Pain	
None	6
Occasional	5
Stabbing pain in certain position	3
Constant pain after activity	1
Significant rest pain	-3
Walking capacity	
Normal walking capacity for age	6
Walking outdoor more than one hour	5
Waling outdoor 15 min - 1 hr	3
Walking outdoor <15 min	1
Walking indoor only	0
Wheel chair or bed ridden	-3
Knee extension	
Normal	4
Lack of extension <10º	2
Lack of extension >10º	0
Lack of extension >20º	-2
Total range of motion	
Full	6
At least 120º	5
At least 90º	3
At least 60º	1
<60º	-3
Power of quadriceps	
Grade 5	2
Grade 3-4	1
Grade <3	-2
Maximum scores	30
Excellent	28-30
Good	24-27
Fair	20-23
Poor	<20

Assessment of complications

- Pain,
- Knee stiffness
- Loss of reduction
- Infections

Results

Table 3: Age wise distribution of the study

	Frequency	Percent
20-30	15	32.6
30-40	18	39.1
40-50	8	17.4
50-60	4	8.7
>60	1	2.2
Total	46	100.0
		Range (20-63)

Table 4: Sex wise distribution of the study

	Frequency	Percent
F	3	6.5
M	43	93.5
Total	46	100.0

Table 5: Mode of injury wise distribution of the study

	Frequency	Percent
Accidental self-fall	4	8.7
Fall from height	3	6.5
RTA	39	84.8
Total	46	100.0

Table 6: Complication wise distribution of the study

	Frequency	Percent
Nil	31	67.4
Infection	2	4.3
Loss of reduction	2	4.3
Pain	6	13
Stiffness	5	10.9
Total	46	100.0

Table 7: Range of motion achieved in days and union time in weeks

	N	Minimum	Maximum	Mean
Rom in days	46	4	13	6.15
Union time in weeks	11	11	14	12.18

A B

Fig 1: A) Clinical Image Knee Complete Extesnion B) Clinical Image Knee Complete Flexion

Discussion

The majority of depressed tibial plateau fractures are caused due to high-speed motor vehicle accidents, violent trauma and fall from height where fractures results from direct axial compression usually with a valgus (more common) or varus moment and indirect shear forces. The proximal tibia is most likely to be subjected to a valgus force because of the normal 5 to 7 degrees of valgus alignment of the knee and because of a propensity to be struck from the lateral side. A valgus force loads the lateral tibial plateau to failure from direct impact with the lateral femoral condyle. Combination of valgus and axial compression produces lateral side depression split depression, or less commonly, lateral split or total lateral condyle fractures (the classic "bumper fracture"). These are serious injuries as they frequently result in functional impairment, as they affect knee alignment, stability and movement. Tibial plateau fractures have evolved as a fascinating therapeutic challenge in the past two centuries. The indications for non-operative versus operative treatment vary widely among surgeons as do the specific methods of treatment for many fracture configuration and concomitant lesions. The objective of treatment of tibial plateau fractures is precise reconstruction of the articular surface. Stable fragment fixation allowing early mobilization and repair of all concomitant ligamentous and other soft tissue lesions. Conservative treatment at any age may be complicated by knee stiffness, malunion and non-union. In a study on 42 patients with a mean age of 42 years (age range: 16-70 years) and a mean follow-up of 2.7 years, Lachiewicz *et al*. showed excellent results in more than 80% of patients who underwent ORIF [11], our study has similar results as compared to above study

Aim of treatment in intra-articular proximal tibia fractures is to obtain stable congruous joint permitting early range of motion

An average flexion of 0-1140 was achieved by less soft tissue damage, better implant placement and physiotherapy, similar also reported by Cole *et al*. (0- 1220) and Egol *et al*. (0-1090). [12, 13] Similarly, Rademaker *et al.* revealed excellent radiographic outcomes in ORIF [11].

Recent trend is to do minimal invasive surgeries as much as possible. Many centers have shown good results with arthroscopic assisted internal fixation, hybrid external fixator, minimal internal fixation supplemented with external fixation, Illizarov ring fixation and most recently the MIPPO (minimal invasive percutaneous plate osteosynthesis) [8, 9,10].

We presented the clinical study of surgical treatment of 46 closed proximal tibial fractures. The analysis of the results were made in terms of gender, age, mode of injury, y, range of motion achieved and union time needed, types of fracture (Schatzker's classification), period of immobilization, complications and clinical results.

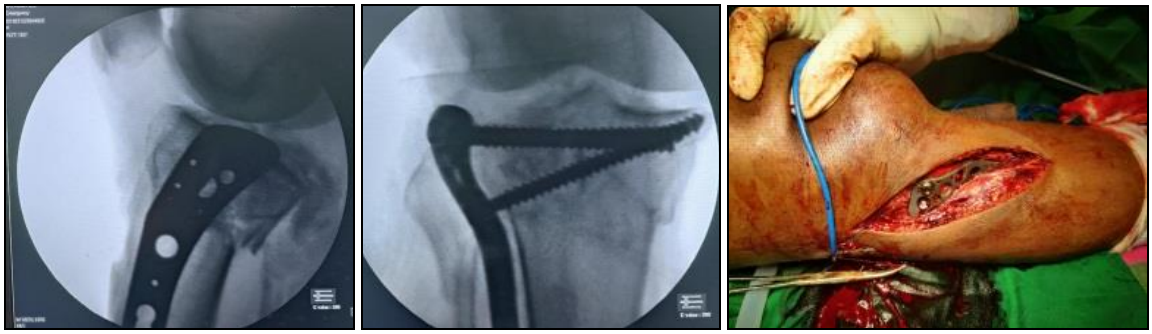

Fig 2: Results were comparable with other documented standard studies of Schatzker and Seppo *et al.* [14]

Conclusion

With the advancement of mechanization and increase in acceleration have resulted in incidence of proximal tibia plateau fracture this population involve mostly young population so optimum treatment is necessary for good outcome. With inherent less soft tissue coverage infection and wound dehiscence have increased comparably. Our aim of treatment is to obtain anatomic reduction, congruite joint line, rigid and stable fixation. Surgical management has excellent to good outcome as compared to conservative management there has been reduction in the period of immobilization with less chances of knee stiffness and arthritis which will give us good functional outcome of the knee joint.

Conflict of Interest

Not available

Financial Support

Not available

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