



TIBIAL PLATEAU FRACTURES—OUTCOME COMPARISON BETWEEN AUTOGRAFT AND TRICALCIUM PHOSPHATE

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INTRODUCTION

- Tibial plateau fractures are common injuries that result from indirect coronal and/or direct axial compressive forces
- The resulting fracture pattern is related to the age of the patient and their overall bone quality
- Guidelines in treating these fractures
- Anatomic reduction
- Re-establishment of the tibial alignment
- Sub-chondral bone grafting to support the articular cartilage if necessary
- Stable fixation
- Early mobilization

The primary goal in the treatment of these fractures is restoration of knee joint function

- Bone graft and its substitutes are often used to fill the defects of the tibial plateau fractures
- Primary objective of the use of grafting in a subarticular defect associated with tibial plateau fractures is to prevent the collapse of articular defect
- Bone graft substitutes might be suitable for use with internal fixation if it were biocompatible, readily

available, and offered some structural support for the articular fracture

OBJECTIVE OF THE STUDY

- This study is done to know whether the efficacy of Tri-calcium phosphate is as effective as autogenous iliac bone graft in the management of subarticular tibial plateau defects

MATERIALS AND METHODS

- Twenty acute, closed, unstable tibial plateau fractures (Schatzker's types II through VI) that required open reduction and internal fixation with grafting in Tejasvini hospital Mangalore between 2009 and 2011
- Computerized randomization for the type of grafting was done at the time of surgery

EXCLUSION CRITERIA

- Open fractures
 - Pathological fractures
 - Pediatric fractures
 - Poly trauma patients
- In these twenty cases bone graft was used in 12 patients and Tricalcium phosphate granules in 8 patients

Table 1:

	Bone graft(Group 1)	TCM(Group 2)
Schatzker's type II	1	2
Schatzker's type IV	1	2
Schatzker's type V	4	2
Schatzker's type VI	6	2
Total	12	8

- After open reduction , standard buttress or locking plates were used to fix the fractures and bone graft or tricalcium phosphate was used to fill the defect
- Bone grafts were harvested from the patient's own iliac crest as the consent was taken before surgery and

- Tricalcium phosphate - we used chronOSgranules (synthes)

RESULTS

The age and sex of the patients and the fracture patterns were comparable in the two groups

1 Fracture union

Table 2:

	Range in weeks	Mean in weeks
Bone graft group	10-14 weeks	12.8 weeks
TCP group	12-17 weeks	13.5weeks

p value is >0.05- not significant

2. Blood loss and extra duration of surgery

Table 3:

	Duration mean (app in min)	Blood loss mean (app in ml)	Complications
Bone graft group	20	200	Surgical site infection-one case
TCP group	3	0	Surgical site infection-one case

- We had two patients with articular subsidence in both the groups at early follow up but functionally they had good range of motion
- No patient in either group had loss of internal fixation

3 Knee range of motion

Table 4:

Knee ROM	At 3 months		At 6 months		At 12 months	
	Bone graft N -12	TCP N -8	Bone graft N-12	TCP N -8	Bone graft N -12	TCP N -8
Flexion <90	8 (66.66%)	5 (62.5%)	5 (41.66%)	3 (37.5%)	1 (8.33%)	1 (12.5%)
Flexion 90-120 degrees	4 (33.33%)	3 (37.5%)	5 (41.66%)	3 (37.5%)	7 (58.33%)	4 (50%)
Flexion > 120	0	0	2 (16.66%)	2 (25%)	4 (33.33%)	3 (37.5%)

Case 1 –
37yr/male – TCP



Figure 1:



Figure 2:



Figure 3:



Figure 4:



Figure 5:



Figure 6:



Figure 7:

- Case 2- 37yr/Male Type VI fracture – Bone graft was used with plating



Figure 8:



Figure 9:



Figure 10:



Figure 11:



Figure 12:



Figure 13:



Figure 14



Figure 15:

DISCUSSION

- Autogenous iliac bone graft has been considered the standard for management of subarticular osseous defects associated with intra-articular fractures because of its cited advantages of availability, low cost, and structural support with bone inductive biologic capacity

- Autogenous Bonegrafts Disadvantages

Early complications

Major

Deep infection
Prolonged wound drainage
Large hematoma
Reoperation

Minor

Hematoma
Wound drainage
Severe pain
Temporary sensory loss

Late Complications

Major

Sensory loss
Chronic severe pain
Chronic infection
Unsightly scar
Large bony defect

Minor

Chronic mild pain
Superficial infection
Delayed wound healing
Minor wound problems

- However, iliac bone-graft procurement requires a second surgical procedure, causes pain at a previously uninjured site, and risks the possibility of iatrogenic infection

- Younger and Chapman documented a 9% rate of major complications and a 21% rate of minor complications after 243 autogenous bone-graft harvest procedures, 215 of which were from the iliac crest

- Biomechanical studies have shown that alpha-BSM provides more support of the articular surface than does cancellous bone graft

- Landry et al. and Trenholm et al. found that, at a load of 1000 N applied to the plateaus of cadaveric tibiae with Schatzker type-II fractures, the rate of displacement was 68% lower for subchondral defects filled with alpha-BSM than for those filled with cancellous bone graft

- Bone substitutes advantages over bone graft

- Reduces the duration of surgery
- Less blood loss
- Early mobilization- no pain from the graft site
- No Psychological effect
- No donor site morbidities

Limitations of the study

- Less number of patients
- No longer follow up for degenerative changes
- Does not have all types of plateau fractures

CONCLUSIONS

- Auto graft is gold standard but the duration of surgery is long and may have donor site morbidity

- Since Tricalcium phosphate has got comparable results as auto graft hence operating surgeon can consider it as an alternative to achieve equally good results with lesser complications

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