

# Comparative study of tibial plateau fractures treated with autograft and tricalcium phosphate

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## Abstract

Primary objective of the use of grafting in a subarticular defect associated with tibial plateau fractures is to prevent the collapse of articular defect. Autogenous iliac bone graft has been the most frequently recommended treatment for defects associated with unstable tibial plateau fractures. Despite the wide acceptance of autogenous iliac bone graft as the so-called gold standard, complications of graft harvest, ranging from temporary pain and numbness to long-term functional impairment are well documented. Twenty acute, closed, unstable tibial plateau fractures (Schatzker's types II through VI) that required open reduction and internal fixation with Computerized Randomization for the type of grafting of the subarticular defect was done at the time of surgery. The age, weight, height, and sex of the patients and the fracture patterns were comparable in the two groups. All fractures united in both groups within the same time period (an average of three months); Union was determined by the treating surgeon clinically as the ability of the patient to bear full weight without pain and, radio graphically, as the disappearance of the fracture lines on the three-month follow-up anteroposterior and lateral radiographs.

**Keywords:** Tibial plateau fractures, with autograft, tricalcium phosphate

## Introduction

- Tibial plateau fractures are common injuries that result from indirect coronal and/or direct axial compressive forces <sup>[1]</sup>.
- The resulting fracture pattern is related to the age of the patient and their overall bone quality.
- Bone graft and its substitutions 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.
- Autogenous iliac bone graft has been the most frequently recommended treatment for defects associated with unstable tibial plateau fractures.
- Despite the wide acceptance of autogenous iliac bone graft as the so-called gold standard, complications of graft harvest, ranging from temporary pain and numbness to long-term functional

Impairment are well documented.

- 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 <sup>[2]</sup>.

### Methodology

- Twenty acute, closed, unstable tibial plateau fractures (Schatzker's types II through VI) that required open reduction and internal fixation with.
- Computerized Randomization for the type of grafting of the subarticular defect 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:** Schatzker's type fracture

	Bone graft	TCM
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.
- Tricalcium phosphate-we used chrons granules (synthes).

### Follow up included

- Standard radiograph-fracture union, articular.
- Subsidence, loss or premature resorption of the graft.
- Knee range of motion assessment at three months.
- Six months and twelve months.

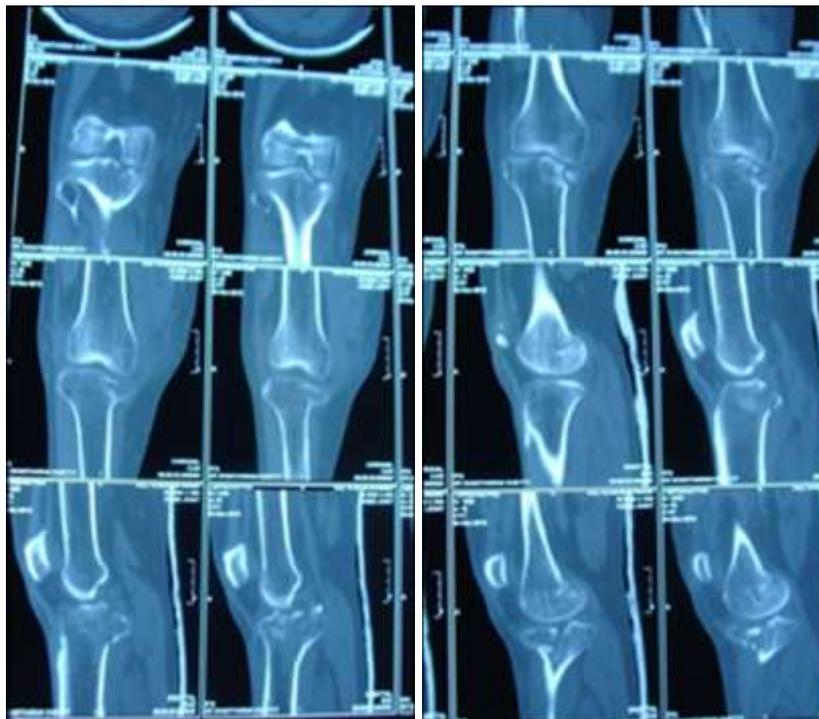
### Results

- The age, weight, height and sex of the patients and the fracture patterns were comparable in the two groups.
- All fractures united in both groups within the same time period (an average of three months).
- Union was determined by the treating surgeon clinically as the ability of the patient to bear full weight without pain and, radio graphically, as the disappearance of the fracture lines on the three-month follow-up anteroposterior and lateral radiographs.
- Two surgical site infections, one in each group, resolved with local wound care and antibiotics.
- We had two patients with articular subsidence in both the groups at early follow up but functionally there were good in range of motion.

- No patient in either group had loss of internal fixation.

**Table 2:** Outcome

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 90-120 degrees	8 (66.6%)	5 (62.5%)	4 (33.3%)	3 (37.5%)	2 (16.6%)	1 (12.5%)
Flexion > 120	3 (25%)	2 (25%)	5 (41.6%)	4 (50%)	5 (41.6%)	4 (50%)
Full extension	1 (8.3%)	1 (12.5%)	3 (25%)	1 (12.5%)	5 (41.6%)	3 (37.5%)





## 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 [3].
- However, iliac bone-graft procurement requires a second surgical procedure, causes pain at a previously uninjured site, and risks the possibility of iatrogenic infection [4].
- 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 [5].
- Biomechanical studies have shown that alpha-BSM provides more support of the articular surface than does cancellous bone graft [4, 5].
- 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.
- Limitations of the study.
  - Less number of patients in the study.
  - Postoperative computed tomography scans were.
  - Not obtained as this was not considered the.
  - Standard of care in any of the study sites, but they.
  - May have allowed a more accurate determination of.
  - The amount of subsidence.
  - No longer follow up for degenerative changes.

## Conclusion

- Autograft is gold standard but the duration of surgery is long and may have of donor site morbidity.
- Since tricalcium phosphate has got comparable results as autograft hence operating surgeon can consider it has an alternative to achieve equally good results with lesser complications

## References

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