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# Suprapatellar tibial nailing for tibial plateau fracture – 4 cases report

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## Abstract

**Background:** Internal fixation with open or minimally invasive plating techniques and circular or hybrid external fixation constructs have been used for the treatment of tibial plateau fracture, with conflicting results. Intramedullary nail fixation with or without supplemental screws produced similar clinical and radiographical results in some retrospective studies.

**Methods:** Retrospective study of patients with tibial plateau fracture treated with tibial nailing combined with supplemental proximal screws/poller screws or plate. The patients were followed at regular intervals, and the results were assessed with the Lysholm Knee score.

**Results:** Four patients were included with a range of age from 28-75 years old. Two patients had a Schatzker VI fracture (one with a segmental fracture with a diaphyseal fracture) and two patients a Schatzker V fracture. A one year follow up was performed, with no complications, all with fracture consolidation and a Lysholm Knee Score with a range between 90-95.

**Conclusions:** The combined use of intramedullary nailing and condylar screws can offer a reliable option for the treatment of tibial plateau fracture with satisfactory results.

**Keywords:** Tibial plateau fracture, intramedullary nailing, suprapatellar approach

## Introduction

Tibial plateau fractures (TPF) account for 1% of all types of fractures, moreover in people's age which over 55 years, tibial plateau fractures account for approximately 8% of all types of fractures [1, 2]. Internal fixation with open or minimally invasive plating techniques and circular or hybrid external fixation constructs have been used for the treatment of this injury, with conflicting results [3].

Efforts have been made to reduce the morbidity and complications of the treatment of these fractures. A novel surgical technique involving the use of intramedullary nailing and condylar bolts has been proposed and biomechanically tested [3-6]. Intramedullary nail fixation with or without supplemental screws produced similar clinical and radiographical results in retrospective studies [7].

The aim of this report is evaluating the short and intermediate term results of treatment of tibial plateau fractures with the suprapatellar tibial nailing and condylar screws or with plate combination.

## Materials and Methods

Were included patients with proximal tibial fracture treated with tibial nailing combined with supplemental proximal screws/poller screws or plate. Age, sex, trauma mechanism, fracture classification, surgery technique, complications, and clinical outcomes (Lysholm Knee score) were collected.

**Surgical technique:** In three patients (A, B and C), first was did the reduction with C-Clamp (Figure 1) and fixation with two lateromedial cannulated screws of the tibial plateau and next the tibial nailing was performed by a suprapatellar approach (Figure 2). In a fourth patient (Patient D), a posteromedial fragment was first fixed with a 3.5mm plate by a Lobenhoffer approach, then tibial plateau was reduced with C-Clamp and fixed with 2 cannulated screws and the tibial nailing was performed by a suprapatellar approach.



**Fig 1:** Reduction of tibial plateau with C clamp



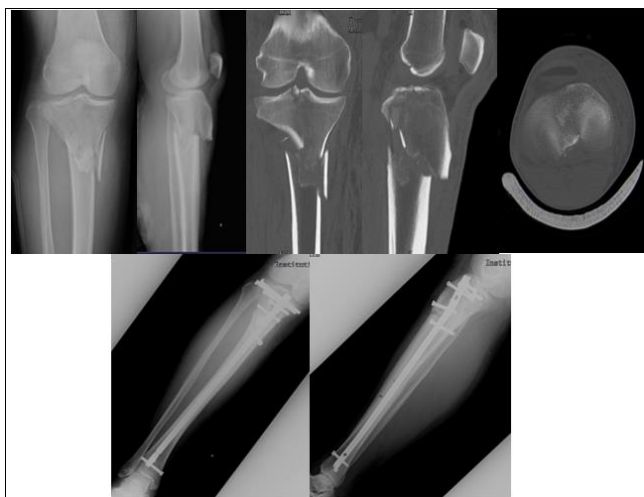
**Fig 2:** Semi-extend Knee position to suprapatellar approach.

**Results:** Four patients were included (Table 1 and figure 3-5), 3 males and one female with a range of age from 28-75 years old and the trauma mechanism was a height fall. Two patients (A and B) had a Schatzker VI fracture (One with a segmental fracture with a diaphyseal fracture) and two

patients (patient C and D) a Schatzker V fracture, one with a posteromedial fragment (patient D). A one year follow up was performed, with no complications, all with fracture consolidation and a Lysholm Knee Score with a range between 90-95.

**Table 1:** Case data.

Case	Gender	Age	Classification	Surgical technique	Lysholm Knee Score
A	Male	55	Schatzker VI	Lateromedial screws + tibial nailing	95
B	Male	45	Schatzker VI	Lateromedial screws + tibial nailing	90
C	Female	75	Schatzker V	Lateromedial screws + tibial nailing	90
D	Male	28	Schatzker V fracture with a posteromedial fragment and diaphyseal fracture	Posteromedial plate + Lateromedial screws + tibial nailing	90



**Fig 3:** Case A. Pre-operative Rx and CT images showing a Schatzker type VI fracture and 1 year rx showing fracture consolidation.



**Fig 4:** Case B. Pre-operative Rx and CT images showing a Schatzker type VI fracture and 1 year rx showing fracture consolidation



**Fig 4:** Case C. Pre-operative Rx and CT images showing a Schatzker type V fracture and 1 year rx showing fracture consolidation



**Fig 5:** Case D. Pre-operative Rx and CT images showing a Schatzker type V fracture and 1 year rx showing fracture consolidation.

## Discussions

The objective of TPF treatment is precise reconstruction of the articular surfaces and stable fragment fixation for early motion [8]. There is no consensus about the optimal surgical technique [3]. Conventional open reduction and internal fixation with dual plating has produced conflicting results as the extensive soft-tissue stripping can create problems that overshadow the benefits of satisfactory reduction of the articular surface and early mobilization of the knee joint [3]. The minimally invasive plate osteosynthesis (MIPO) with locking plates was replaced by skepticism because of the high rates of complications such as deep infection (up to 18%), poor fracture reduction (up to 23%), the need for implant removal (Up to 30%), and irritation at the implant site (up to 12%) [9-11].

The combined use of intramedullary nailing and condylar bolts for the treatment of bicondylar tibial plateau fractures without severe articular depression has been described in 3 previous studies [3, 4, 6]. They all showed short and intermediate-term satisfactory results. Chen *et al* did a cadaveric and animal study that compared the fixation effects of three fixation devices for TPF (steel plate, external fixation and intramedullary nailing). It showed that the axial controlled intramedullary nail fixation has a superior biomechanical characteristic and fixation effect for tibial plateau fractures than steel plate and external fixator [12].

Intramedullary implants, being load sharing devices, distribute axial forces evenly and allow early mobilization and weight-bearing, an important consideration especially for older patients. Furthermore, the infection rate after nailing is lower than that after plating or external fixation. In the event of an open fracture, intramedullary nailing facilitates soft-tissue care better than a plate or a circular frame does. Finally, removal of an intramedullary nail and the condylar bolt is usually a straightforward procedure [3]. The suprapatellar approach allows an improved alignment in both proximal and distal fracture patterns, decreased radiation exposure, relaxation of the deforming forces, ease of imaging, and static positioning [13]. In these cases, the semi extended position of the knee facilitates the reduction of the fractures and makes easier the fluoroscopy without loss of reduction of the fracture.

Limitations of the present study include the unblinded analysis of the results, the absence of a comparison group of patients managed with a traditional operative technique, and the relatively short duration of follow-up. Larger studies comparing this technique with other surgical techniques over a longer period of time are needed.

## Conclusions

The combined use of intramedullary nailing and condylar screws can offer a reliable option for the treatment of bicondylar fractures of the tibial plateau and is associated with specific advantages.

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