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Unicondylar Plating in Schatzker V and VI Tibial Plateau Fractures: Balancing Stability with Soft Tissue Safety

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Abstract

Introduction: Schatzker type V and VI proximal tibia fractures are complex injuries involving bicondylar articular disruption and metaphyseal comminution. While dual plating has traditionally been considered the gold standard, unicondylar plating has emerged as a biological alternative with reduced soft tissue complications.

Methods: This retrospective observational study was conducted at a tertiary care center and included 20 adult patients with Schatzker type V/VI proximal tibia fractures. All patients underwent open reduction and internal fixation with a unicondylar periarticular locking plate. Functional outcomes were assessed using Rasmussen and Knee Society Scores.

Results: All 20 patients achieved union, with an average healing time of 16.5 ± 1.2 weeks at final follow-up, Rasmussen scores were excellent in 9 (45%), good in 7 (35%), fair in 3 (15%), and poor in 1 (5%). Knee Society Scores showed good-to-excellent results in 80% of patients, with most regaining satisfactory pain relief and mobility. Mean postoperative knee range of motion was 0–118°. Complications included 2/20 patients (10%) had superficial infections managed conservatively and 1/20 patient (5%) had malunion with acceptable function. No deep infections, implant failures, or non-unions were observed.

Conclusion: Unicondylar plating provides satisfactory union and functional recovery in most Schatzker type V and VI proximal tibia fractures, with fewer wound complications than dual plating.

Keywords: Proximal Tibia Fracture, Schatzker V, Schatzker VI, Unicondylar Plating, Rasmussen Score, Knee Society Score.

Introduction

Proximal tibial fractures represent approximately 1–2% of all fractures, with Schatzker type V and VI bicondylar patterns being among the most challenging to treat due to their complex articular involvement, metaphyseal comminution, and soft tissue compromise [1]. These high-energy injuries are commonly caused by road traffic accidents or falls from a height and require stable fixation to restore joint congruity and function [2].

Dual plating through medial and lateral approaches has traditionally been the gold standard for bicondylar fractures, offering superior biomechanical stability [4, 23]. However, this technique carries significant risks of soft tissue complications [23], including wound breakdown and infection rates up to 23–88% in some series.

To minimize these risks, periarticular unicondylar locking plates have been developed. These plates act as internal fixators, preserving periosteal blood supply while providing angular stability. Several studies, including Gosling *et al.* [5] and Stannard *et al.* [9], have shown favorable outcomes with lateral locked plating, though some authors highlight concerns of varus collapse in fractures with medial comminution [6, 7].

Indian studies by Khatri *et al.* [13] and Moradiya *et al.* [14] have also reported satisfactory outcomes using locking plates for high-energy proximal tibial fractures, though data specific to unicondylar plating in Schatzker type V and VI fractures remain limited.

This study was undertaken to evaluate the functional outcomes of unicondylar plating in Schatzker type V and VI fractures in a tertiary healthcare setting in India.

Materials & Methods

Study Design and Setting: This was a single-centre, retrospective observational study conducted in the Department of Orthopaedics at a tertiary care hospital. Ethical approval was obtained, and informed consent was taken from all patients.

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Inclusion Criteria
- Adults aged 18–80 years
- Radiologically confirmed Schatzker type V or VI fractures
- Closed injuries
- Medically fit for surgery

Exclusion Criteria
- Open fractures
- Pathological fractures
- Associated neurovascular injuries or compartment syndrome
- Refusal to consent

Sample Size
20 patients were included over the study period.
Surgical Technique: All patients underwent open reduction and internal fixation with a periarticular locking compression plate (unicondylar plating). A standard anterolateral /anteromedial approach was used depending on fracture configuration, with careful reduction under fluoroscopy. Screws were inserted in a locking configuration to provide angular stability.
Postoperative Protocol: Early knee range of motion exercises were encouraged. Nil-weight bearing was started for first 6 weeks. Partial weight-bearing was started at 6 weeks & delayed until radiographic callus formation (10–12 weeks), with progression to full weight-bearing at 12–16 weeks.

Outcome Measures
- Rasmussen score (clinical and radiological)
- Knee Society Score (KSS)
- Documentation of complications

Results
Demographics
- **Patients:** 20
- **Mean Age:** 41 years (range 19–72)
- **Sex Distribution:** 13 males, 7 females
- **Mode of Injury:** Road traffic accidents in 70%, falls from a height in 30%

Union and Outcomes:
All fractures united (average 16.5 ± 1.2 weeks)
- **Rasmussen Scores at 6 Months:** Excellent in 9 (45%), good in 7 (35%), fair in 3 (15%), poor in 1 (5%)
- **Knee Society Scores at 6 Months:** 80% good-to-excellent, 15% fair, 5% poor
- **Mean Postoperative Knee ROM at 6 Months:** 0–118°, mean flexion 118°

Complications
- 2/20 patients (10%) had superficial infections, resolved with antibiotics/dressings
- 1/20 patient (5%) had malunion, with varus deformity but functionally compensated
- No deep infections, implant failures, or non-unions

Discussion
In this series, unicondylar plating for Schatzker type V and VI fractures produced reliable union with satisfactory functional outcomes. Nearly 80% of patients achieved good-to-excellent results on standardized scoring systems.
Our outcomes align with international studies by Gosling *et al.* [5] and Stannard *et al.* [9], which demonstrated that lateral locked plating can achieve stability while minimizing soft tissue complications. Similarly, Lee *et al.* [8] emphasized that unicondylar plating can yield comparable results to dual plating, provided medial comminution is absent. [6, 7]
The complications in this study were limited to 2 superficial infections and 1 malunion. The latter occurred in a patient with severe medial column comminution, highlighting the limitation of unicondylar constructs in fractures lacking medial support. This finding corroborates biomechanical studies suggesting that medial buttress fixation may be necessary in select cases.
Indian data by Khatri *et al.* [13] and Moradiya *et al.* [14] reported similar functional recovery with locking plates. Our study reinforces these findings and demonstrates that unicondylar plating is a safe and effective option [11, 12, 15] in resource-constrained settings where dual plating may not be feasible, provided careful patient selection and meticulous technique are followed.
Limitations of this study include the small sample size, short follow-up duration, and absence of a comparative dual plating control group. Long-term outcomes, particularly regarding post-traumatic osteoarthritis, require further evaluation [21, 22].

Tables

Table 1: Master chart

Patient ID	Age	Sex	Mode of Injury	Comorbs	Fracture Type	Plate Type	Union Time (weeks)	Knee ROM (°)	Rasmussen Score	Knee Society Score	Complication
P1	60	M	Fall	DM	Schatzker VI	Lateral	15	118	Excellent	Good-Excellent	None
P2	27	M	RTA	None	Schatzker V	Lateral	19	110	Excellent	Good-Excellent	None
P3	21	M	Fall	None	Schatzker VI	Lateral	15	120	Excellent	Good-Excellent	None
P4	67	M	RTA	HTN	Schatzker V	Lateral	17	112	Excellent	Good-Excellent	None
P5	37	F	RTA	None	Schatzker VI	Lateral	19	114	Excellent	Good-Excellent	None
P6	35	M	RTA	None	Schatzker VI	Lateral	15	108	Excellent	Good-Excellent	None
P7	34	M	RTA	None	Schatzker	Medial	15	107	Excellent	Good-	None

					VI					Excellent	
P8	28	M	RTA	None	Schatzker VI	Lateral	19	117	Excellent	Good-Excellent	None
P9	67	F	RTA	CVA, HTN	Schatzker V	Lateral	18	108	Excellent	Good-Excellent	None
P10	26	M	RTA	None	Schatzker VI	Medial	19	118	Good	Good-Excellent	None
P11	63	F	Fall	DM	Schatzker V	Lateral	17	118	Good	Good-Excellent	None
P12	67	M	RTA	HTN, DM	Schatzker V	Lateral	17	111	Good	Good-Excellent	None
P13	54	M	Fall	DM	Schatzker VI	Lateral	15	104	Good	Good-Excellent	None
P14	25	F	RTA	None	Schatzker V	Lateral	18	115	Good	Good-Excellent	None
P15	57	M	Fall	HTN	Schatzker VI	Medial	14	124	Good	Good-Excellent	None
P16	47	F	RTA	DM	Schatzker VI	Lateral	14	103	Good	Good-Excellent	Superficial infection
P17	22	M	Fall	None	Schatzker V	Medial	15	120	Fair	Fair	None
P18	21	M	RTA	RVD	Schatzker V	Medial	15	125	Fair	Fair	Superficial infection
P19	25	F	RTA	None	Schatzker V	Medial	19	113	Fair	Fair	None
P20	33	F	RTA	None	Schatzker V	Lateral	18	102	Poor	Poor	Malunion

Table 2: Patient demographics and injury characteristics

Variable	Value
Mean age (years)	40.8 (range 21–67)
Sex distribution	Males 13, Females 7
Mode of injury	RTA 14, Fall 6
Fracture type	Schatzker V 10, Schatzker VI 10

Table 3: Union and functional outcomes

Outcome Measure	Value
Mean union time (weeks)	16.6
Mean ROM (°)	118
Rasmussen scores	Excellent 9, Good 7, Fair 3, Poor 1

Table 4: Complications observed

Complication	Number
None	17
Superficial infection	2
Malunion	1

Figures:

Figure 1. A Representative case of post-traumatic right-sided proximal tibia fracture, Schatzker type VI

Preoperative

a) Incision site
b) 6 month follow-up
c) Functional Outcome

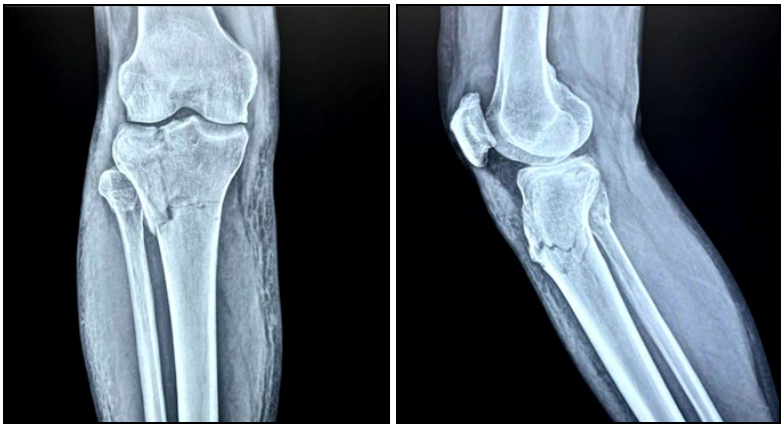

Fig 1(a): Pre-operative radiograph-AP & Lateral

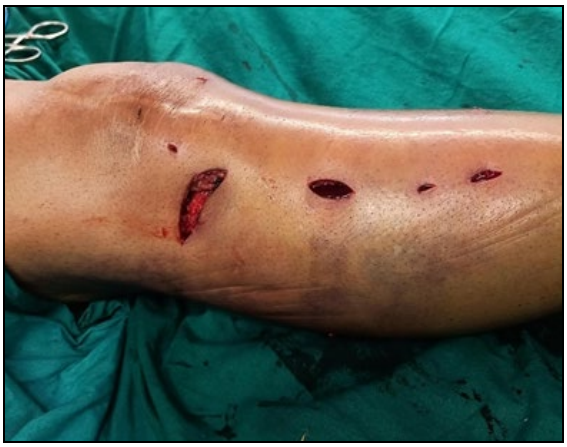

Fig 1(b): Incision Site

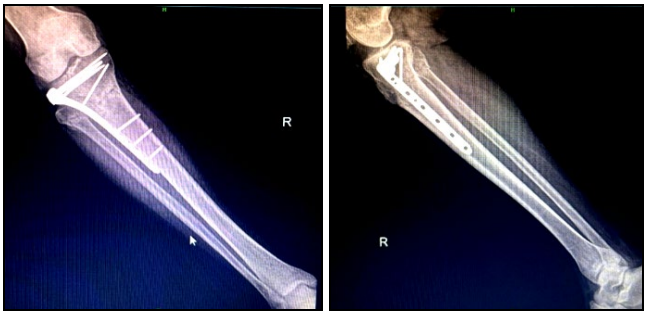

Fig 1(c): Radiograph at 6 month follow-up

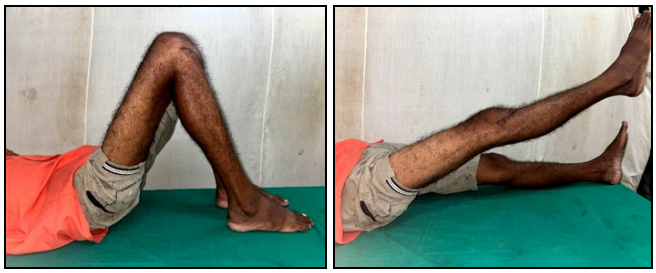

Fig 1(d): Functional outcome at 6 month follow-up

Conclusion

Unicondylar plating provides stable fixation and good functional recovery in Schatzker type V and VI proximal tibia fractures, with a low rate of complications. However, caution is advised in cases with significant medial comminution, where supplemental fixation may be required to avoid malunion.

Clinical Message

Unicondylar plating offers a reliable alternative to dual plating in managing bicondylar tibial plateau fractures, reducing soft tissue complications while maintaining functional outcomes. Proper case selection and surgical technique are critical to success.

Declarations

Patient Consent: Written informed consent for treatment and publication of anonymized clinical details/images was obtained from all patients.

Ethical Approval: Conducted in accordance with institutional policies and the Declaration of Helsinki; institutional approval/exemption documented.

Conflicts of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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References

1. Schatzker J, McBroom R, Bruce D. The tibial plateau fracture. The Toronto experience 1968–1975. *Clin Orthop Relat Res.* 1979; (138):94–104.
2. Rasmussen PS. Tibial condylar fractures. Impairment of knee joint stability as an indication for surgical treatment. *J Bone Joint Surg Am.* 1973; 55(7):1331–50.
3. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the Knee Society clinical rating system. *Clin Orthop Relat Res.* 1989; (248):13–4.
4. Jiang R, Luo CF, Zeng BF, Mei GH. A comparative study of less invasive stabilization system (LISS) fixation and two-incision double plating for bicondylar tibial plateau fractures. *Knee.* 2008; 15(2):139–43.
5. Gosling T, Schandelmaier P, Muller M, Hankemeier S, Wagner M, Krettek C. Single lateral locked screw plating of bicondylar tibial plateau fractures. *Clin Orthop Relat Res.* 2005; (439):207–14.
6. Mueller KL, Karunakar MA, Frankenburg EP, Scott DS. Bicondylar tibial plateau fractures: a biomechanical study. *Clin Orthop Relat Res.* 2003; (412):189–95.
7. Higgins TF, Klatt J, Bachus KN. Biomechanical analysis of bicondylar tibial plateau fixation: how does lateral locking plate fixation compare to dual plate fixation? *J Orthop Trauma.* 2007; 21(5):301–6.
8. Lee MH, Oh JK, Oh CW, Park SH, Kyung HS, Park IH. A multicentre comparative study of unilateral versus dual plating for bicondylar tibial plateau fractures. *Int Orthop.* 2014; 38(3):583–9.
9. Stannard JP, Wilson TC, Volgas DA, Alonso JE. The less invasive stabilization system in the treatment of complex fractures of the tibial plateau: short-term results. *J Orthop Trauma.* 2004; 18(8):552–8.
10. Phisitkul P, McKinley TO, Nepola JV, Marsh JL. Complications of locking plate fixation in complex proximal tibia injuries. *J Orthop Trauma.* 2007; 21(2):83–91.
11. Ehlinger M, Adam P, Abane L, Arlettaz Y, Bonnomet F. Minimally-invasive fixation of tibial plateau fractures using locking plates. *Orthop Traumatol Surg Res.* 2011; 97(8):877–84.
12. Spagnolo R, Pace F, Fabbri L, D'Ambrosi R, Calori GM. Schatzker VI tibial plateau fractures: treatment with lateral locking plates. *Injury.* 2012; 43(8):1176–81.
13. Khatri K, Sharma V, Goyal D, Farooque K, Sharma S. Functional outcomes of Schatzker type V and VI tibial plateau fractures managed with locking compression plates. *Indian J Orthop.* 2014; 48(6):590–4.
14. Moradiya NR, Kiyawat V, Agrawal A. Functional outcome of tibial plateau fractures treated with locking compression plate. *J Clin Orthop Trauma.* 2017; 8(3):225–31.
15. Youssef MA, Khalifa YE, Said GZ. Functional and radiological results of management of complex bicondylar tibial plateau fractures by a single lateral locked plate. *Int Orthop.* 2017; 41(3):493–9.
16. Cole PA, Zlowodzki M, Kregor PJ. Treatment of proximal tibia fractures using the less invasive stabilization system: surgical experience and early clinical results in 77 fractures. *J Orthop Trauma.* 2004; 18(8):528–35.
17. Young MJ, Barrack RL. Complications of internal fixation of tibial plateau fractures. *Orthop Rev.* 1994; 23(2):149–54.

18. Ali AM, Yang L, Hashmi M. Bicondylar tibial plateau fractures managed with the Sheffield hybrid fixator: biomechanical study and clinical results. *J Orthop Trauma.* 2003; 17(6):420–5.
19. Gardner MJ, Yacoubian S, Geller D, Pode M, Mintz D, Helfet DL, *et al*. Prediction of soft-tissue injuries in Schatzker II tibial plateau fractures based on radiographs. *J Trauma.* 2006; 60(2):319–23.
20. Chang SM, Zheng HP, Li HF, Jia YW, Huang YG, Wang X, *et al*. Incidence of compartment syndrome in tibial plateau fractures: a retrospective study. *J Trauma.* 2011; 70(3):E92–7.
21. Gaston P, Will EM, Keating JF. Recovery of knee function following fracture of the tibial plateau. *J Bone Joint Surg Br.* 2005; 87(9):1233–6.
22. Rademakers MV, Kerkhoffs GM, Sierevelt IN, Raaymakers EL, Marti RK. Operative treatment of 109 tibial plateau fractures: 5–27 year follow-up results. *J Orthop Trauma.* 2007; 21(1):5–10.
23. Barei DP, Nork SE, Mills WJ, Coles CP, Henley MB, Benirschke SK. Functional outcomes of severe bicondylar tibial plateau fractures treated with dual incisions and medial and lateral plates. *J Bone Joint Surg Am.* 2006; 88(8):1713–21.