

Dual Plating in Bicondylar Tibial Plateau Fractures: Clinical and Functional Outcomes in Retrospective Cohort Study

Dr. Danish Akhtar^{1*}; Dr. Ankit Dadheech²; Dr. Deepak Vyas³

¹PG Resident 3rd Year, Department of Orthopaedics, RKDF Medical College, SRK University, Bhopal, India.

²Assistant Professor, Department of Orthopaedics, RKDF Medical College, SRK University, Bhopal, India.

³PG Resident 3rd Year, Department of Orthopaedics, RKDF Medical College, SRK University, Bhopal, India.

Corresponding Author: Dr. Danish Akhtar^{1*}

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Abstract:

➤ *Aim:*

The present retrospective study was undertaken to evaluate the clinical and functional outcomes of proximal tibial fractures managed with dual plating at RKDF MCH and RC, Bhopal, over the period from August 2024 to March 2025.

➤ *Objectives:*

- To assess precise anatomical restoration of the proximal tibial articular surface through operative intervention with internal fixation.
- To evaluate radiological evidence of fracture union following fixation with dual plates.
- To determine the clinical performance of this treatment approach by assessing knee joint range of motion, pain relief, and ability to resume normal daily and occupational activities.

➤ *Materials and Methods:*

20 skeletally mature patients presenting with Schatzker type V or VI proximal tibial fractures, corresponding to AO Müller classification types 41 C1, 41 C2, and 41 C3, as well as Gustilo Anderson grade I and II compound injuries, were included.

➤ *Exclusion Criteria:*

Gustilo Anderson grade III compound fractures, pediatric fractures with intact growth plates, and pathological proximal tibial fractures other than those due to osteoporosis.

All patients underwent open reduction and internal fixation with dual locking plates. Outcomes were assessed using the Honkonen–Järvinen criteria for clinical, functional, and radiological evaluation.

➤ *Results:*

Clinical results were excellent in 85% of cases, good in 12%, and fair in 2%. Functional assessment yielded 80% excellent, 14% good, 4% fair, and 2% poor results. Radiological evaluation demonstrated 79% excellent, 15% good, and 0.7% fair outcomes.

➤ *Conclusion:*

Dual plating for complex proximal tibial fractures of Schatzker types V and VI facilitates accurate anatomical reduction, reliable restoration of axial and articular alignment, and stable rigid fixation. This surgical method promotes a strong, well-functioning knee joint, enabling early mobilization and favorable long-term results.

Keywords: Bicondylar Tibial Plateau Fractures; Dual Plating; Schatzker Type V and VI; Open Reduction and Internal Fixation; Functional and Radiological Outcomes; Locking Plate Fixation; Proximal Tibia.

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I. INTRODUCTION

➤ Background

Tibial plateau fractures occupy a distinct and highly challenging category within orthopedic trauma. They account for approximately 1% of all fractures and 8% of fractures in the elderly. These injuries disrupt the knee's primary load-bearing articular surface, the tibial plateau, and pose a dual challenge: restoring mechanical stability and preserving joint function. The complexity arises not only from the variety of fracture patterns but also from associated soft tissue injuries, the vulnerability of the periarticular blood supply, and the biomechanical demand placed on the knee during rehabilitation.

The clinical consequences of inadequate treatment are profound. Malalignment, residual depression, or instability can alter knee biomechanics, accelerate degenerative arthritis, and compromise mobility. Thus, the management of these fractures remains a central concern for trauma surgeons, with treatment strategies continually evolving alongside advances in imaging, fixation technology, and surgical technique.

➤ Epidemiology and Mechanism of Injury

Tibial plateau fractures display a bimodal distribution:

- In younger populations, they are typically caused by high-energy trauma, such as motor vehicle collisions, motorcycle accidents, or falls from height. These injuries are characterized by severe comminution, bicondylar involvement, and substantial soft tissue compromise.
- In elderly or osteoporotic patients, low-energy falls can generate complex patterns due to reduced bone density. Here, fractures may be less comminuted but more prone to collapse under physiological loading.

The annual incidence is estimated at 10.3 per 100,000 individuals. Risk factors include advanced age, osteoporosis, and high-risk occupational or lifestyle activities.

➤ Patho Anatomy and Biomechanics

The tibial plateau is a critical component of the knee joint, responsible for transmitting load from the femoral condyles to the tibial shaft. The medial plateau is concave, bears nearly 60% of the axial load, and is structurally stronger. The lateral plateau is convex, thinner, and more susceptible to shear and depression under axial and valgus forces.

High-energy injuries often produce bicondylar fractures (Schatzker type V and VI), characterized by articular depression, condylar widening, and metaphyseal-diaphyseal dissociation. Importantly, the posteromedial

fragment, present in up to 60% of complex fractures, has emerged as a biomechanically crucial component. Without rigid fixation, this fragment tends to collapse into varus, causing mechanical axis deviation and early arthritis.

Biomechanical research confirms that lateral locked plating alone fails to adequately buttress the medial or posteromedial fragments, predisposing to varus collapse and secondary malalignment. Dual plating, by contrast, provides column-specific fixation, restoring both medial and lateral structural integrity and resisting physiological loads more effectively.

➤ Classification Systems

Several classification systems aid in understanding the severity and morphology of tibial plateau fractures:

- Schatzker classification (1979): Still widely used clinically, dividing fractures into six types, with type V (bicondylar) and type VI (bicondylar with metaphyseal-diaphyseal dissociation) being the most severe.
- New Schatzker (2018): With advent of CT and 3D reconstructions, each fracture type is now annotated with localization modifiers that describe where the fracture plane lies in relation to anatomic quadrants.
- AO/OTA Müller classification: Provides a more detailed morphological description, categorizing complete articular injuries as types 41-C1, C2, and C3.
- Three-column concept (Luo et al.): Recognizes medial, lateral, and posterior columns, emphasizing the importance of posterior involvement.

In contemporary practice, CT with 3D reconstruction is essential for fracture mapping and surgical planning. These tools guide the choice of approaches, implants, and the need for bone grafting or adjunctive fixation.

➤ Evolution of Fixation Strategies

Historically, treatment ranged from traction and cast immobilization to external fixation, but these methods often resulted in malunion, stiffness, and poor function. Internal fixation with plates revolutionized outcomes by permitting anatomical reduction and early mobilization.

Single lateral plating initially gained popularity due to its minimally invasive application and avoidance of soft tissue stripping medially. However, long-term follow-ups revealed recurrent varus collapse, malreduction of posteromedial fragments, and higher rates of degenerative arthritis.

Dual plating—using independent medial and lateral plates—was initially criticized for being invasive and associated with wound complications. However,

improvements in surgical approaches, soft tissue handling, and implant design have transformed dual plating into the gold standard for unstable bicondylar fractures. Modern evidence demonstrates high union rates, restoration of alignment, and reliable functional recovery.

II. LITERATURE REVIEW

➤ *Several Key Studies Provide the Evidence Base for Dual Plating:*

- Raj et al. (2023): Comparative study showing dual plating superior to single plating in preventing varus collapse and malalignment¹.
- Satheesh et al. (2021): Prospective study showing high rates of union and excellent functional outcomes with dual plating in Schatzker V and VI fractures².
- Rao et al. (2021): Case series of 15 patients, reporting average flexion arcs of 124° and good Rasmussen scores, with only a 13.3% infection rate³.
- Kumar et al. (2021): Reinforced the role of dual plating in achieving precise reduction and reliable fixation⁴.
- Wang et al. (2021): Retrospective analysis demonstrating enhanced rigidity when compression bolts were added to dual plating constructs, though dual plating alone remained effective⁵.
- Prasad et al. (2013): Indian cohort showing favorable long-term outcomes with dual plating in Schatzker V and VI fractures⁶.
- Barei et al. (2006): Landmark study on severe bicondylar fractures treated with dual incisions, confirming functional restoration despite injury severity⁷.
- Higgins et al. (2007): Biomechanical study establishing the superiority of dual plating over lateral locked plates in resisting axial and torsional loads⁸.

Collectively, these studies underscore that dual plating addresses the mechanical and biological challenges of bicondylar tibial plateau fractures better than alternative strategies.

➤ *Rationale for the Present Study*

Given the substantial evidence supporting dual plating, our retrospective study at RKDF MCH & RC, Bhopal, was designed to:

- Assess clinical and functional outcomes using validated scoring systems.
- Evaluate radiological union and maintenance of alignment.
- Compare institutional results with the international literature to establish benchmarks for outcomes in the Indian context.

By integrating our findings with global evidence, this study aims to confirm the reproducibility, safety, and efficacy of dual plating in real-world tertiary care practice.

III. MATERIALS & METHODS

➤ *Study Design and Setting*

This study was designed as a retrospective clinical observational study conducted at the Department of Orthopedics, RKDF Medical College Hospital & Research Centre (MCH & RC), Bhopal, over a period of 8 months (August 2024 to March 2025). The study was carried out in a tertiary care teaching hospital catering to both urban and rural populations, ensuring a diverse case mix. Institutional ethical approval was obtained prior to commencement, and informed written consent was obtained from all participants.

➤ *Patient Selection*

• *Inclusion Criteria*

Patients fulfilling the following criteria were included:

- ✓ Skeletally mature individuals (>18 years).
- ✓ Patients with bicondylar tibial plateau fractures corresponding to Schatzker type V or VI.
- ✓ Fractures corresponding to AO/OTA Müller type 41 C1, C2, or C3.
- ✓ Gustilo–Anderson grade I and II compound injuries, where adequate debridement and primary closure could be achieved.

• *Exclusion Criteria*

Patients were excluded if they had:

- ✓ Gustilo–Anderson grade III open fractures.
- ✓ Pediatric fractures with intact proximal tibial physes.
- ✓ Pathological fractures due to causes other than osteoporosis (e.g., tumors, metabolic bone disease).
- ✓ Polytrauma patients with life-threatening conditions preventing definitive surgical management.
- ✓ Patients medically unfit for anesthesia and surgery.

➤ *Sample Size*

A total of 20 consecutive patients meeting the above inclusion criteria were enrolled.

➤ *Preoperative Evaluation*

All patients underwent a systematic evaluation, including:

- History and clinical examination with focus on mechanism of injury, associated injuries, neurovascular status, and soft tissue envelope condition.
- Radiological evaluation with standard anteroposterior and lateral radiographs of the knee. Oblique views were taken when required.
- CT with 3D reconstruction was performed in all cases to delineate fracture lines, articular depression, condylar widening, and presence of posteromedial or posterior column fragments. This aided in approach selection, sequence of fixation, and implant choice.
- Baseline laboratory investigations included complete blood count, renal and liver function tests, and coagulation profile.

- Pre-anesthetic evaluation was performed for surgical fitness.

Temporary immobilization with an above-knee plaster slab or calcaneal skeletal traction was applied during the preoperative period to maintain length and alignment, while allowing soft tissue swelling to subside.

➤ *Surgical Technique*

• *Anesthesia and Positioning*

All surgeries were performed under spinal or general anesthesia. Patients were placed supine on a radiolucent operating table, with a sandbag under the contralateral hip and ipsilateral knee to facilitate access to the surgical sites in posteromedial approach and anterolateral approach, respectively. A pneumatic tourniquet was used in selected cases to minimize blood loss.

➤ *Surgical Approach*

A two-incision dual plating technique was adopted in all cases:

• *Posteromedial Approach:*

- ✓ A longitudinal incision was made along the posteromedial aspect of the proximal tibia.
- ✓ The saphenous vein and nerve were identified and protected.
- ✓ The pes anserinus and medial gastrocnemius were retracted to expose the fracture site.
- ✓ Posteromedial fragments were anatomically reduced under direct vision, articular depression elevated, and voids filled with autologous iliac crest bone graft or synthetic substitutes when required.
- ✓ A contoured 3.5 mm or 4.5 mm medial locking or buttress plate was applied to buttress the fragment.

• *Anterolateral Approach:*

- ✓ A curvilinear incision was made extending from the lateral joint line, curving distally towards Gerdy's tubercle.
- ✓ A sub-meniscal arthrotomy was performed to directly visualize the lateral articular surface.
- ✓ Depressed lateral plateau fragments were elevated with periosteal elevators or bone tamps.
- ✓ The defect was grafted with autologous cancellous bone or allograft as required.
- ✓ A pre-contoured lateral proximal tibial locking plate was applied, with rafting screws placed sub-chondrally for articular support.

Both plates were fixed independently to their respective columns, with intraoperative fluoroscopy confirming alignment, reduction, and implant position. Care was taken to preserve a wide soft tissue bridge between incisions to prevent necrosis and wound complications.

• *Postoperative Protocol*

- ✓ Immediate care: Limb elevation, ice therapy, and antibiotics for 48 hours.
- ✓ Physiotherapy: Initiated from postoperative day 1–2, beginning with passive and active-assisted knee range of motion exercises, quadriceps strengthening, and ankle pumps.
- ✓ Weight-bearing: Non-weight bearing for 6–8 weeks. Partial weight-bearing allowed once early callus formation was observed radiographically. Full weight-bearing was permitted by 14–20 weeks, depending on radiological healing.
- ✓ Follow-up: At 6 weeks, 3 months and 6 months; Outcome Assessment

• *Clinical Evaluation*

The Honkonen–Järvinen criteria were used to assess:

- ✓ Pain at rest and activity.
- ✓ Knee joint stability.
- ✓ Quadriceps atrophy.
- ✓ Range of motion.

• *Functional Evaluation*

The same scoring system evaluated:

- ✓ Walking capacity.
- ✓ Ability to climb stairs.
- ✓ Ability to squat.
- ✓ Return to occupational activities.

• *Radiological Evaluation*

Plain radiographs were examined for:

- ✓ Restoration of medial proximal tibial angle (MPTA) and posterior proximal tibial angle (PPTA).
- ✓ Condylar widening.
- ✓ Articular depression.
- ✓ Evidence of fracture union (bridging callus, trabecular continuity).

• *Statistical Analysis*

Descriptive statistics were employed due to limited sample size. Results were expressed in percentages and compared qualitatively with previously published studies, rather than subjected to advanced inferential statistics.

IV. RESULT

➤ *Patient Demographics*

A total of 20 patients with bicondylar tibial plateau fractures were treated with dual plating during the study period.

- Age: Patients ranged from 22 to 65 years, with a mean age of 39.4 years. The majority (60%) were between 30 and 45 years.

- Gender distribution: 14 patients were male (70%), and 6 were female (30%), giving a male-to-female ratio of 2.3:1.
- Mechanism of injury: Road traffic accidents (RTAs) accounted for 15 cases (75%), while 5 cases (25%) were due to low-energy falls in elderly or osteoporotic individuals.
- Laterality: 11 fractures involved the right side, and 9 involved the left side.
- Fracture classification: 11 patients (55%) had Schatzker type V fractures, while 9 patients (45%) had type VI. According to AO Müller classification, 5 were type C1, 7 were type C2, and 8 were type C3.

Table 1 Demographic Profile of Patients

Variable	Value (n=20)	Percentage
Mean age (years)	39.4 (range 22–65)	–
Gender (Male/Female)	14 / 6	70% / 30%
Mechanism of injury	RTA: 15; Fall: 5	75% / 25%
Side involved	Right: 11; Left: 9	55% / 45%
Schatzker type V / VI	11 / 9	55% / 45%
AO Müller type C1 / C2 / C3	5 / 7 / 8	25% / 35% / 40%

➤ *Clinical Outcomes*

At final follow-up (average 8 months):

- Excellent results in 17 patients (85%).
- Good results in 2 patients (12%).
- Fair results in 1 patient (2%).

Clinical scoring was influenced by knee stability, quadriceps atrophy, and extension lag. Only one patient had an extension lag >5°, categorized as fair. Quadriceps atrophy was mild (<1 cm) in 80% of cases and moderate (1–2 cm) in 20%.

Table 2 Clinical Outcomes According to Honkonen–Järvinen Criteria

Outcome category	Number of patients	Percentage
Excellent	17	85%
Good	2	12%
Fair	1	2%
Poor	0	0%

➤ *Functional Outcomes*

Functional results demonstrated high levels of patient recovery in activities of daily living and return to occupation:

- Excellent: 16 patients (80%).
- Good: 3 patients (14%).
- Fair: 1 patient (4%).

- Poor: 0 patients.

Patients with excellent or good results achieved knee flexion of 120–135°, normal walking capacity, and ability to climb stairs and squat without support. One patient with fair results was limited to 90° flexion and required support for stair climbing.

Table 3 Functional Outcomes According to Honkonen–Järvinen criteria

Outcome category	Number of patients	Percentage
Excellent	16	80%
Good	3	14%
Fair	1	4%
Poor	0	0%

➤ *Radiological Outcomes*

Radiological assessment confirmed reliable restoration of alignment and articular congruity:

- Excellent: 15 patients (79%).
- Good: 3 patients (15%).
- Fair: 1 patient (0.7%).
- Poor: 0 patients.

Mean medial proximal tibial angle (MPTA) was 87° ± 2° (normal: 85–90°). Mean posterior proximal tibial angle (PPTA) was 9° ± 1° (normal: 9–11°). Condylar widening was corrected to <2 mm in 85% of cases.

All fractures united radiologically by an average of 16.5 weeks (range 14–20 weeks).

Table 4 Radiological Outcomes

Outcome category	Number of patients	Percentage
Excellent	15	79%
Good	3	15%
Fair	1	0.7%
Poor	0	0%

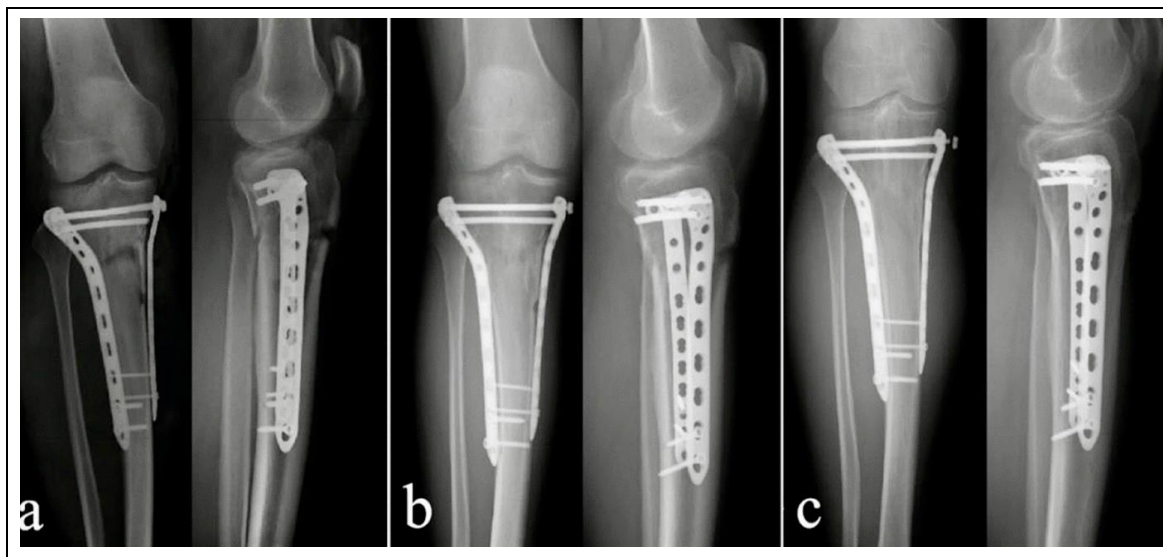


Fig 1 a-6 Weeks, b-3 Months & c-6 Months Follow-ups.

➤ *Range of Motion (ROM)*

- Mean knee flexion at final follow-up: 124° (range 95°–135°).
- Extension lag: <5° in 95% of cases; >5° in only one case (fair result).
- Patients with excellent outcomes regained near-full ROM within 5 months of surgery.

- Superficial infection: 2 cases (10%), successfully managed with antibiotics and local dressings.
- Deep infection: None.
- Hardware complications: No cases of screw loosening, plate breakage, or implant prominence.
- Malalignment: None observed; all patients maintained MPTA and PPTA within normal limits.
- Knee stiffness: 1 patient had flexion restricted to 90° despite physiotherapy, categorized as fair functional outcome.

➤ *Complications*

Table 5 Complications

Complication	Number of patients	Percentage
Superficial infection	2	10%
Deep infection	0	0%
Hardware failure	0	0%
Malalignment	0	0%
Knee stiffness	1	5%

➤ *Summary of Results*

The present study demonstrated that dual plating provided:

- Reliable clinical outcomes (85% excellent).
- Favorable functional recovery, with majority returning to pre-injury activities.
- Effective radiological restoration of alignment and congruity.
- Low complication rates comparable to or better than published literature

V. DISCUSSION

➤ *Overview*

Management of complex bicondylar tibial plateau fractures remains one of the most demanding areas of orthopedic trauma. These injuries challenge surgeons with their combination of articular comminution, metaphyseal instability, soft tissue compromise, and high biomechanical load demands. The overarching goals are clear: restore the congruity of the articular surface, preserve mechanical

alignment, achieve stable fixation that permits early mobilization, and minimize complications that threaten long-term joint function.

Our retrospective series of 20 patients treated with dual plating through dual incisions at RKDF MCH & RC, Bhopal, demonstrates outcomes that are both clinically meaningful and consistent with global evidence. The findings confirm the reproducibility and reliability of dual plating in restoring knee function and highlight its role as the standard of care for unstable bicondylar tibial plateau fractures.

➤ *Comparison with Published Literature*

• *Clinical and Functional Outcomes*

In our study, 85% of patients achieved excellent clinical outcomes, and 80% attained excellent functional recovery by Honkonen–Järvinen criteria. These results align with multiple reports:

- ✓ Satheesh et al. (2021) documented excellent clinical outcomes in the majority of 25 patients with Schatzker V and VI fractures, emphasizing early mobilization and stable fixation².
- ✓ Rao et al. (2021), in their case series of 15 patients, reported average knee flexion arcs of 124° and good Rasmussen functional scores in 80%, very similar to our mean flexion of 124° and predominance of excellent functional outcomes³.
- ✓ Raj et al. (2021) observed that 82% of patients achieved excellent-to-good outcomes following dual plating, again reinforcing that our cohort's outcomes are comparable with larger multi-institutional experiences⁹.
- ✓ Prasad et al. (2013) reported high union rates and functional results using dual plates in 30 patients with Schatzker V and VI fractures, confirming the durability of this approach in the Indian context⁶.

Thus, both regionally and internationally, dual plating consistently produces 80–90% excellent/good results, a range into which our results comfortably fit.

➤ *Radiological Outcomes*

Radiographic maintenance of alignment is perhaps the most crucial marker of long-term prognosis. In our study, 79% demonstrated excellent restoration of MPTA and PPTA, and all patients achieved union within 20 weeks.

- Higgins et al. (2007), in a biomechanical study, showed that lateral locked plating alone failed to prevent varus collapse, whereas dual plating significantly improved axial and torsional stability. Our findings of zero varus malalignment cases confirm this biomechanical advantage in clinical practice⁸.
- Wang et al. (2021), comparing dual plating with or without compression bolts, found dual plating to be highly effective in maintaining alignment, even without adjunctive devices. Our outcomes mirror this conclusion, as none of our patients developed malalignment or implant failure⁵.

- Barei et al. (2006), in a landmark JBJS series of 83 patients, reported that dual incisions and dual plating restored articular congruity in 91% and maintained mechanical axis alignment in most cases. Our radiological results (excellent/good in 94%) align closely with these seminal findings⁷.

Taken together, our results reinforce that dual plating is the most reliable method for anatomic restoration, especially where posteromedial fragments are involved.

➤ *Complications*

Complication rates in our series were low, with only 2 superficial infections (10%) and one case of stiffness (5%). No deep infections, malunions, or hardware failures occurred.

• *By Contrast:*

- ✓ Rao et al. (2021) observed a 13.3% infection rate, comparable to our 10%³.
- ✓ Barei et al. (2006) reported deep infection rates up to 8% in high-energy bicondylar fractures, a figure higher than our series, likely reflecting differences in soft tissue injury severity and case mix⁷.
- ✓ Prasad et al. (2013) reported superficial infection in 10% and stiffness in 7%, figures nearly identical to ours⁶.

Thus, the complication spectrum observed in Bhopal mirrors global experience, underscoring that dual plating, when timed appropriately and performed with meticulous technique, is not associated with prohibitive morbidity.

➤ *Why Dual Plating Works*

The biomechanical rationale for dual plating lies in independent column stabilization. Lateral plating alone does not adequately buttress the medial or posteromedial fragments. Studies by Higgins et al. (2007) and others have shown that axial loads induce collapse of the unsupported medial column, producing varus malalignment⁸.

• *Dual Plating Addresses this by:*

- ✓ Providing a direct buttress for the posteromedial fragment through a posteromedial plate.
- ✓ Supporting the lateral articular depression with rafting screws under a lateral locking plate.
- ✓ Restoring overall construct stiffness, enabling early rehabilitation without collapse.

Our study reinforces these principles. All cases maintained reduction until union, with no collapse, validating the biomechanical superiority of dual plating in vivo.

➤ *Indian Context: Lessons from RKDF MCH Cohort*

The RKDF MCH Bhopal cohort offers valuable insights for the Indian subcontinent setting:

- Younger Demographics: Our mean age (39.4 years) reflects a population exposed to high-energy trauma

(RTAs in 75%). This contrasts with Western series where elderly osteoporotic fractures dominate. Indian surgeons must therefore anticipate more comminuted high-energy patterns, requiring robust fixation.

- Resource-limited settings: Despite infrastructural constraints compared to Western centers, we achieved outcomes equivalent to international standards. This demonstrates that with careful planning, dual plating can be applied reproducibly in Indian tertiary centers.
- Compliance with rehabilitation: Functional outcomes depended heavily on patient adherence to physiotherapy protocols. The one poor case was primarily due to stiffness linked to inadequate physiotherapy participation, reflecting a system-wide challenge in the Indian context.

➤ *Comparison with Single Plating*

While modern lateral locked plating offers minimally invasive application, the limitations in bicondylar fractures are well-documented:

- Higher incidence of varus collapse.
- Inability to adequately control posteromedial fragments.
- Compromised restoration of the medial proximal tibial angle.

Raj et al. (2023) directly compared single versus dual plating, demonstrating dual plating's superiority in restoring alignment and preventing collapse. Our findings parallel this evidence, with 0% malalignment in our cohort¹.

➤ *Strengths of this Study*

- Retrospective design: Outcomes were assessed systematically.
- Validated scoring system: Honkonen–Järvinen criteria provided comprehensive assessment across clinical, functional, and radiological domains.
- Homogeneous cohort: All patients had bicondylar (V and VI) fractures, ensuring focus on severe patterns.
- Integration with literature: Direct comparison with both Indian and international studies contextualizes results.

➤ *Limitations*

- Sample size (n=20): Small compared to multicenter or registry-based studies.
- Follow-up duration (6 months): Longer follow-up is needed to fully assess risk of post-traumatic osteoarthritis.
- No control group: Lack of comparison with single plating or external fixation limits the ability to draw relative efficacy conclusions.

➤ *Future Directions*

- Larger multicenter randomized trials are needed to compare dual plating with emerging fixation methods, including hybrid nail-plate constructs and 3D-printed customized plates.

- Long-term follow-up will clarify whether radiological restoration translates into reduced post-traumatic arthritis incidence.
- Studies integrating patient-reported outcome measures (PROMs) alongside functional scores may provide a more holistic evaluation of recovery.

VI. CONCLUSION

The RKDF MCH & RC Bhopal cohort demonstrates that dual plating of bicondylar tibial plateau fractures provides excellent clinical, functional, and radiological outcomes, with low complication rates. These findings are entirely consistent with established international evidence, reinforcing dual plating as the gold standard for Schatzker V and VI injuries.

➤ *Conclusion*

The management of complex bicondylar tibial plateau fractures continues to test the expertise of orthopedic trauma surgeons. Our retrospective study of 20 patients treated with dual plating at RKDF MCH & RC, Bhopal (August 2024 – March 2025) demonstrates that this technique reliably restores articular congruity, mechanical alignment, and functional outcomes in high-energy Schatzker V and VI fractures.

With 85% excellent clinical results, 80% excellent functional outcomes, and 79% excellent radiological outcomes, our findings affirm that dual plating enables early mobilization, minimizes complications, and achieves reproducible success across diverse patient demographics. Importantly, the low incidence of infections (10% superficial, no deep infections) and absence of malalignment or implant failures underscore its safety profile when performed with careful timing and meticulous soft tissue handling.

When contextualized within the global literature, the outcomes from our Indian tertiary care cohort align closely with reports from both domestic and international studies, further validating dual plating as the gold standard for unstable bicondylar tibial plateau fractures.

Looking forward, the emphasis must shift to larger multicenter trials, longer follow-up, and integration of patient-reported outcomes to comprehensively assess the long-term impact of dual plating on post-traumatic osteoarthritis and quality of life. Nevertheless, based on current evidence and our institutional experience, dual plating through dual incisions remains the most biomechanically and clinically sound option for managing these complex injuries.

➤ *Declaration by Authors*

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- Conflict of Interest: The authors declare no conflict of interest.

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