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(CASE REPORT)

Lobbenhaufer approach to treat tibial plateau fracture: How and Why?

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Abstract

Introduction: Tibial plateau fractures involving the posterior column are complex and often underdiagnosed without advanced imaging. Proper identification and surgical planning are essential for optimal outcomes. The Lobenhoffer approach, described in 2003, provides direct access to the posteromedial tibial plateau and facilitates stable fixation.

Case Presentation: We report the case of a 57-year-old male involved in a motorcycle accident who sustained a split-depression fracture of the lateral tibial plateau with an associated, initially missed, posteromedial fragment identified on CT. Emergency management included closed reduction and external fixation. After soft tissue recovery, definitive fixation was performed in two stages: first, a prone posteromedial approach according to Lobenhoffer was used to reduce and stabilize the posteromedial fragment with a T-plate in antiglide configuration. Second, the patient was positioned supine for lateral plateau fixation via a standard anterolateral approach. Postoperative imaging showed good fracture reduction. Recovery was uncomplicated with protected weight-bearing and progressive rehabilitation.

Discussion: The posteromedial approach enables safe access to posterior tibial plateau fractures without crossing the popliteal fossa, minimizing neurovascular risk. Literature supports its biomechanical and clinical advantages in achieving stable fixation and good functional outcomes.

Conclusion: The Lobenhoffer approach is a reliable and minimally invasive option for managing posteromedial tibial plateau fractures, allowing for direct visualization, accurate reduction, and secure fixation.

Keywords: Tibial plateau fracture; Posteromedial column; Lobenhoffer approach; CT scan; T-plate fixation; Fracture reduction

1. Introduction

Tibial plateau fractures are complex injuries, particularly when involving the posterior column, due to soft tissue considerations and challenging fracture patterns [6-8]. The classification by Luo (2010) divides the plateau into three columns: medial, lateral, and posterior [1]. Chang et al. further subdivided the posterior column into posterolateral and posteromedial segments [2]. Posteromedial fractures are often underdiagnosed without CT imaging, leading to inadequate treatment planning. The Lobenhoffer approach, described in 2003, offers direct access to the posteromedial and posterior tibial plateau, enabling accurate reduction and stable fixation. This case report presents the surgical management of a posteromedial tibial plateau fracture using the Lobenhoffer approach, emphasizing its utility in visualizing and stabilizing posterior fragments.

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2. Case report

A 57-year-old man was involved in a motorcycle accident and sustained a closed injury to the left knee. Initial X-rays revealed a split-depression fracture of the lateral tibial plateau (Fig. 1).

Figure 1 Separation fracture of the external plateau

A CT scan identified an associated posteromedial fragment that was not visible on plain radiographs (Fig. 2).

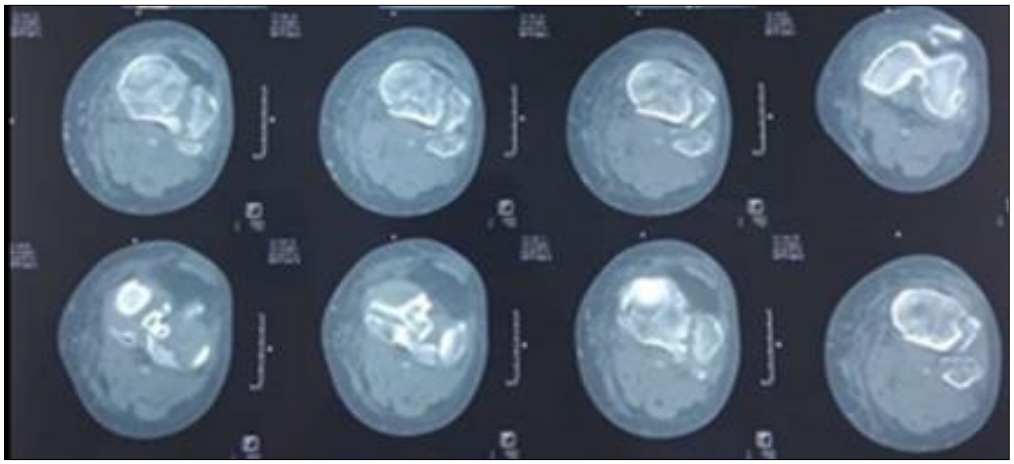

Figure 2 Axial view objectifying posteromedial fragment on CT scan

The patient underwent urgent closed reduction and application of a knee-spanning external fixator. Definitive fixation was delayed until soft tissue conditions improved.

Surgical treatment was carried out in two steps using a dual approach:

- **Step 1**: In the prone position, a posteromedial approach according to Lobenhoffer was performed (Fig. 3). A 4-5 cm incision was made along the medial border of the gastrocnemius without crossing the popliteal fossa. The small saphenous vein was identified and protected. The fascia of the medial gastrocnemius was incised, and the muscle retracted laterally. The pes anserinus tendons were retracted medially or released if needed. Blunt dissection was carried down to the popliteus, which was gently released subperiosteally to expose the posteromedial fracture fragment. Submeniscal arthrotomy was not required.

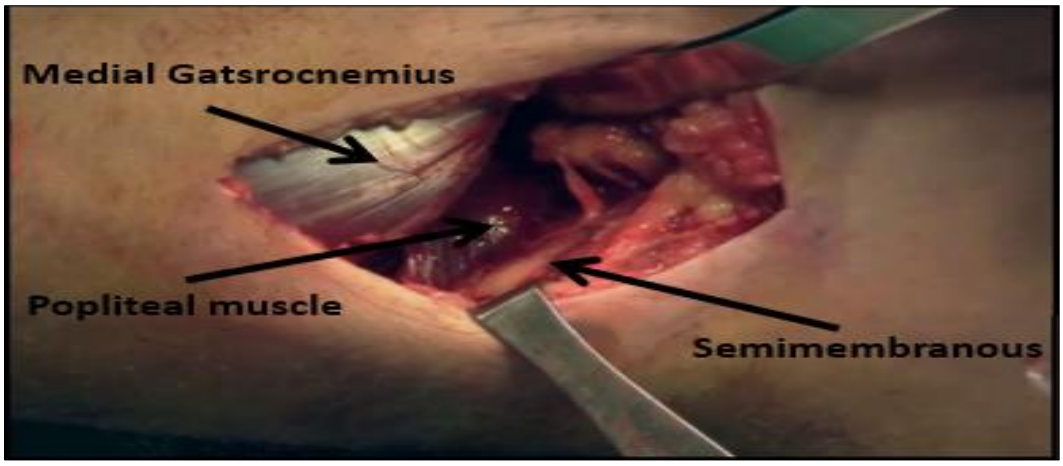

Figure 3 Lobbenhaufer approach

Fracture reduction was achieved using axial traction, knee extension with valgus stress, and anterior pressure on the fragment. A T-plate was applied in an antiglide fashion for stabilization. Closure was done in layers.

- **Step 2**: With the patient in the supine position, the lateral plateau was addressed through a standard anterolateral approach. Open reduction and internal fixation were completed. Postoperative imaging confirmed satisfactory reduction (Fig. 4).

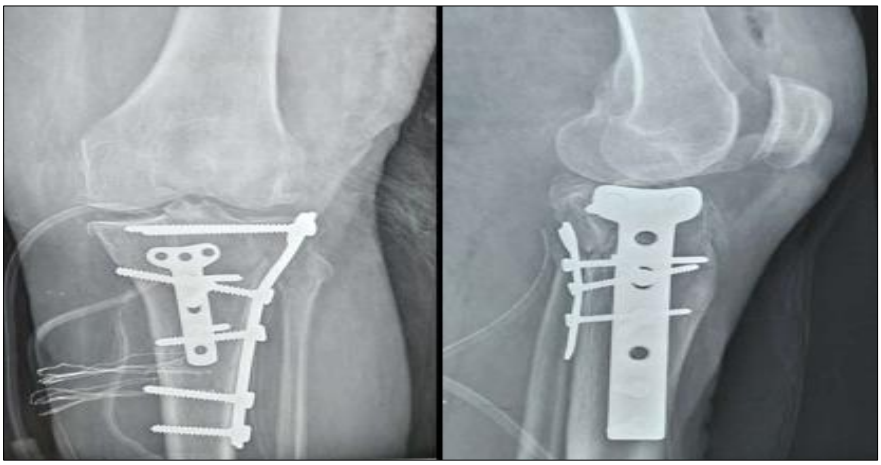

Figure 4 Post-operative x-rays

The patient was placed on a toe-touch weight-bearing protocol for 12 weeks, with range of motion exercises as tolerated. Recovery was uneventful, and the surgical approaches provided good exposure and stable fixation.

3. Discussion

High-energy tibial plateau fractures are uncommon and challenging to treat [9]. They are often associated with significant soft tissue injuries, including ligament, meniscal, and neurovascular damage [10].

The posteromedial approach to the proximal tibia was described by Galla and Lobenhoffer in 2003 for treating Moore type I fractures, which involve posteromedial separation of the tibial plateau [3]. This approach allows good exposure of the fracture site by elevating the popliteus muscle subperiosteally, after retracting the medial gastrocnemius laterally and the semimembranosus medially, while preserving surrounding soft tissues [3].

The prone position used in this approach helps achieve fracture reduction through axial traction and knee hyperextension [4]. Unlike other posterior approaches (Bendayan et al., Bhattacharyya et al., Trickey), the Lobenhoffer approach avoids crossing the popliteal fossa, making it less invasive and safer for the neurovascular structures [5].

Zeng et al. compared several fixation methods including anteroposterior lag screws, anteromedial and lateral locking plates, and posteromedial buttress plating. They found that posteromedial fixation offered the best biomechanical stability [11].

In a clinical study, Arjona-Gimenez et al. treated 14 patients with posteromedial tibial fractures using the Lobenhoffer approach. At two-year follow-up, 8 patients (57.1%) had excellent to good outcomes, 3 (21.4%) had fair outcomes, and 3 (21.4%) had poor results. The authors concluded that the approach was simple, effective, and associated with minimal complications [12].

4. Conclusion

The posteromedial Lobenhoffer approach is low-risk and is essential for planning complex tibial plateau fractures. It allows satisfactory joint reduction and compression of the posteromedial fragment.

Compliance with ethical standards

Acknowledgments

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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