

## Research Article

# Repair Results of Lateral Meniscus Tears Associated with Tibial Plateau Fractures

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### Abstract

**Objectives:** Meniscus rupture is not uncommon in tibial plateau fractures. Studies have reported meniscus tear in 10-47% of all tibial plateau fractures. Therefore, defining and treating the accompanying lesions in the lateral meniscus and ligaments affects the clinical results of lateral tibial plateau fracture treatment. In this study, the repair results of lateral meniscus tears accompanying tibial plateau fractures were evaluated.

**Methods:** In our clinic, 10 patients out of 26 patients who underwent open reduction and internal fixation with the diagnosis of tibial plateau fracture between September 2015 and December 2018 had simultaneous lateral meniscus injuries. Fracture in the tibial plateau was fixed by open reduction technique using anatomical lateral tibia proximal locking plate-screw. After osteosynthesis, meniscus repair was performed with No: 2.0 non-absorbable vertical sutures. In the postoperative period, the patients were evaluated with Lysholm, Tegner, HSS and KSS scores.

**Results:** The mean HSS knee score in the postoperative period was 80.75 (77-82). The mean CSR knee score was 90.25 (85-94) and the CSR function score was 97.5 (90-100). There was a slight decrease in activity (5.8-5) according to the Tegner scoring compared to the preoperative period. The mean Lysholm score was 89.75.

**Conclusion:** Approximately one-third of patients with lateral tibial plateau depression fracture are expected to have a meniscus tear requiring repair. If the lateral meniscus rupture associated with tibial plateau fractures is overlooked, knee pain, insertion and early arthrosis may develop. Meniscus repair results after bone fixation are also good. Therefore, it should be kept in mind that ligament injuries and especially lateral meniscus tear may occur in tibial plateau fractures and surgery should be planned accordingly.

**Keywords:** Lateral meniscus tear, tibial plateau fractures

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Tibial plateau fractures constitute 1% of all fractures. In particular, the incidence of lateral tibial plateau fractures that cause metaphyseal division or joint surface depression is higher than medial and bilateral tibial plateau fractures.<sup>[1]</sup> It is not uncommon for meniscus rupture to accompany the tibial plateau fractures. Studies have reported meniscus tear in 10-47% of all tibial plateau fractures.<sup>[2-4]</sup> In some studies, this rate was reported to be higher (36-61%).<sup>[5, 6]</sup>

Therefore, defining and treating the accompanying lesions in the lateral meniscus and ligaments affects the clinical results of lateral tibial plateau fracture treatment. Neglect or omission of such soft tissue injuries has negative effects on clinical outcomes.<sup>[7]</sup> At the same time, the results of meniscus repairs on this ground are not well known.

In this study, the repair results of lateral meniscus tears accompanying tibial plateau fractures were evaluated.

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## Methods

Ethics committee approval was received from Acibadem University Medical Research Evaluation Board with decision number 2019/18-4 dated 21.11.2019.

In our clinic, 10 patients out of 26 patients who underwent open reduction and internal fixation with the diagnosis of tibial plateau fracture between September 2015 and December 2018 had simultaneous lateral meniscus injuries. 9 of 10 patients were male and 1 was female. The mean age of the patients was 46.6 (38-57) and the mean follow-up was 24.2 months (18-36).

3 patients had Schatzker type 6 fractures, 5 patients had type 3 and 2 patients had type 2 fractures. The joint capsule was removed along with the lateral meniscus to control the joint face restoration during surgery. Longitudinal rupture was seen in the lateral meniscus body in 6 patients and in the anterior horn of the lateral meniscus in 4 patients. None of the patients had ligament lesions.

The mean time from trauma to surgery was 2 days. Under general or spinal anesthesia, the patient was operated in a supine position and a tourniquet on the thigh. Then, a 10 cm long skin incision was made in the anterolateral direction of the knee to expose the joint and reach the fracture (Fig. 1, 2).

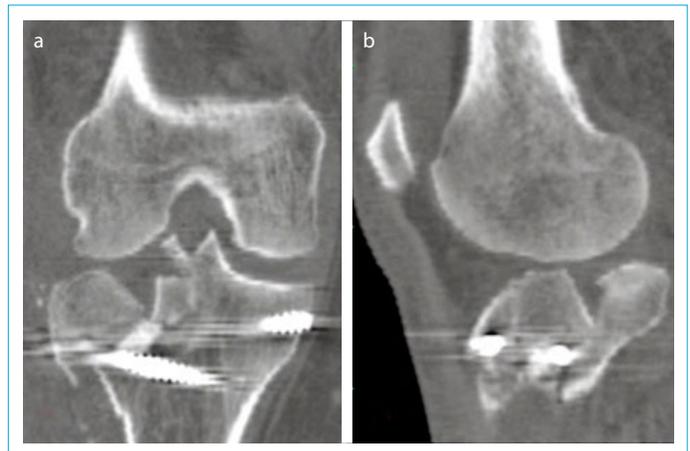
All patients were operated by the same surgeon using implants of the same brand. Fracture in the tibial plateau was fixed by open reduction technique using anatomical lateral tibia proximal locking plate-screw (Fig. 3). 8 patients underwent grafting with chips allograft due to bone defect in the lateral tibial plateau. After osteosynthesis, meniscus repair was performed with No: 2.0 non-absorbable vertical sutures. The joint capsule was then closed.

In the postoperative period, patients were evaluated with Lysholm, Tegner, HSS and KSS scores.

## Results

The mean postoperative HSS knee score was 80.75 (77-82). The mean CSR knee score was 90.25 (85-94) and the CSR function score was 97.5 (90-100). There was a slight decrease in activity (5.8-5) according to the Tegner scoring compared to the preoperative period. The mean Lysholm score was 89.75. One patient who had decreased range of motion due to arthrofibrosis at 5 months postoperatively underwent arthroscopic arthrolysis.

The repaired meniscus tissue was completely healed during arthroscopy. After the treatment, the knee range of motion of this patient reached full. No post-operative meniscus symptoms were observed in any patient. Knee MRI showed that all repaired meniscus were healed.



**Figure 1.** Preoperative coronal and sagittal CT images of the patient who was operated in another center.



**Figure 2.** Intraoperative view of torn and displaced lateral meniscus.



**Figure 3.** AP and lateral X-Rays of patient at postoperative 3 years.

## Discussion

The aim of this study was to evaluate the repair results of lateral meniscus tears accompanying traumatic tibial plateau fractures. It is known that 36% to 61% of tibial plateau fractures are associated with meniscus tears.<sup>[5, 6]</sup> Meniscal tear rates in tibial plateau fractures were reported as 54% by Hohl, 37.5% by Bombaci, 30% by Berkman, 50% by Honkonen, 17% by Tscherne and 35% by Lachiewicz.<sup>[7-12]</sup> In our study, this rate was 38.4%.

With a better understanding and treatment of meniscus ruptures in the field of orthopedic surgery, it is well understood that proper use of meniscus repair or meniscectomy in the protection of the meniscus will contribute to the prevention of cartilage loss. The incidence of osteoarthritis after knee trauma varies between 17% and 28.9%.<sup>[13, 14]</sup>

The most important factor in the development of osteoarthritis is impaired joint compliance. The presence of meniscus lesions has also been associated with long-term post-traumatic osteoarthritis.<sup>[15, 16]</sup>

If meniscus is damaged, it must be repaired.<sup>[17]</sup> If the damage to the meniscus is too large and cannot be repaired, meniscectomy should be performed.<sup>[18]</sup>

Ringus et al.<sup>[19]</sup> Reported an 8-fold increase in the risk of lateral meniscus rupture in patients with joint depression of more than 10 mm on preoperative computed tomography. In our study, arthroscopy was not used. Some studies suggest arthroscopy-assisted treatment, but also argue that arthroscopic assisted surgery is superior to open surgery for soft tissue and joint surface integrity.<sup>[20]</sup>

However, in high-energy tibial plateau fractures, especially Type 4-5-6, arthroscopic treatment carries the risk of fluid extravasation and compartment syndrome. At the same time, no additional arthroscopy was performed because of the open surgery for anatomic joint restoration.

Concerning preoperative MRI, Barrow et al.<sup>[21]</sup> Emphasized the importance of MRI in the identification of concurrent meniscus, connective and soft tissue injuries. The limitation of our study may be the lack of MRI in the preoperative period. However, these patients did not routinely perform MRI because of trauma and open surgery. In this study, all lateral meniscus tears were fixed intraoperatively and repaired.

Stahl et al.<sup>[17]</sup> Reported that they had a much lower incidence of pre-repaired meniscus tears than those detected by MRI before surgery.

In our study, the clinical scores of the patients who underwent lateral meniscus repair clearly showed that the patients benefited from the surgery.

Approximately one-third of patients with lateral tibial plateau depression fracture are expected to have a meniscus tear requiring repair. If the lateral meniscus rupture associated with tibial plateau fractures is missed, knee pain and early arthrosis may develop in the knee.<sup>[15]</sup> The results of meniscus repair after bone fixation are also promising. Therefore, it should be kept in mind that ligament injuries and especially lateral meniscus tear may occur in tibial plateau fractures and surgery should be planned accordingly.

## Disclosures

**Ethics Committee Approval:** Ethics committee approval was received from Acibadem University Medical Research Evaluation Board with decision number 2019/18-4 dated 21.11.2019.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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