Isolated Medial Plate Fixation for a Medial Tibial Plateau Fracture With Lateral Diaphyseal Extension: An Atypical Bicondylar Tibial Plateau Fracture

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Summary: Treatment of tibial plateau fractures that involve the medial condyle can be challenging. The surgeon must determine whether adequate fixation can be obtained, and more importantly maintained, from the commonly used “lateral only” plate construct. If the medial condyle is not appropriately stabilized, fracture displacement may occur leading to a malunion or nonunion. This case presents a patient who sustained a medial tibial condyle fracture with lateral diaphyseal extension, an atypical bicondylar fracture pattern, due to a fall from height. Medial condyle reduction was obtained and the condylar fracture and the diaphyseal fracture extension were both treated with a medial locking plate only.

Key Words: bicondylar tibial plateau fracture, medial plate fixation, Schatzker IV, Schatzker V, Schatzker VI

INTRODUCTION

Tibial plateau fractures that involve the medial condyle, Schatzker IV, and bicondylar fractures, Schatzker V and VI, can be challenging to treat. There has been an evolution of fracture fixation for bicondylar tibial plateau fractures from the historic anterior incision with bicondylar plating, possibly leading to the poor outcomes of a “dead bone sandwich,” to the theory that the locking lateral plateau plate can be the “fix all” for all bicondylar fracture patterns. It is now understood that bicondylar plating, using both a lateral and medial incision, is often required for adequate fixation of certain bicondylar tibial plateau fractures when the medial condyle is fragmented. Isolated medial condyle fractures are more commonly approached using a medial incision with medial plate fixation and anatomic fracture reduction is recommended. This case report presents an atypical bicondylar fracture pattern, a fracture where the major fragment is the medial condyle, as opposed to the more common lateral condyle, with extension into the lateral diaphysis.

CASE PRESENTATION

A 54-year-old female presented with leg pain after a 4-foot fall from a ladder. She had no previous injury to her extremity but currently complained of significant pain around her knee, denying paresthesias. She had a known history of osteopenia, a diagnosis based on dual-energy x-ray absorptiometry scan, but had not been taking any medications for this diagnosis. Physical examination discovered an edematous knee with a mild effusion and intact skin. Her leg compartments were soft and she had intact sensation and motor function distal to her knee. Both posterior tibialis and dorsalis pedis arteries were palpable. Radiographs revealed a medial condyle tibial plateau fracture (Figs. 1 and 2), and computed tomography confirmed the displaced medial condyle fracture with diaphyseal extension to the lateral tibial shaft (Figs. 3–5).

SURGICAL MANAGEMENT

Preoperative planning included deciding that this fracture should be treated operatively based on the displacement of the medial condyle and the bicondylar nature of the fracture, with the goal being anatomic reduction. It was determined that a postero-medial surgical approach would be needed to obtain a direct
reduction of the medial tibial condyle and that a locking plate would be used because of her history of osteopenia and the bicondylar pattern of the fracture. Surgical consent was obtained and the patient underwent open reduction internal fixation of her bicondylar tibial plateau fracture. A posteromedial surgical approach was used. The pes anserine tendon insertions, which occasionally have to be partially transected and then repaired, were mobilized. Direct reduction of the medial metaphyseal fracture was obtained and then maintained with a “point-to-point” reduction forceps. Drilling a small hole for the points of the forceps helped the clamp remain in position on the slope of the medial tibia. The plate was slid under

FIGURE 1. Preoperative AP radiograph: medial tibial plateau fracture with rotational and angular displacement.

FIGURE 2. Preoperative lateral radiograph: fracture extension posteriorly with displacement of the posterior tibia plateau.

FIGURE 3. Preoperative coronal computed tomography. Medial tibial metaphyseal displacement.

FIGURE 4. Preoperative coronal computed tomography. Fracture extension into the lateral diaphysis of the tibia demonstrating a bicondylar tibial plateau fracture.
and then placed just posterior to the tendon insertions. There was a small area of posterior comminution that was left unaddressed because it was less than 2 mm and the reduction of the main medial cominution of the posterior tibial articular surface with non-contiguous posterior metaphyseal fracture displacement.

FIGURE 5. Preoperative sagittal computed tomography. Com-

FIGURE 7. Postoperative lateral radiograph. The medial plate is placed slightly posterior and the posterior screws positioned to control the posteromedial fracture fragments.

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FIGURE 6. Postoperative AP radiograph reduction of the medial and lateral columns of the bicondylar tibial plateau fracture with a medial locking plate.

FIGURE 8. Four month postoperative AP radiograph.
metaphyseal fracture fragment was anatomic. However, if the posterior fragment had not obtained acceptable reduction, a posterior buttress plate would have been used to achieve reduction in that area. After anatomic reduction of the medial condyle, a locking medial tibial plateau plate was used for fracture fixation (Figs. 6 and 7).

OUTCOMES

Postoperatively, the patient was encouraged to regain full motion of her knee as soon as possible and was limited to toe-touch weight-bearing only for 8 weeks. At her 4 month postoperative appointment, she had range of motion from full extension to 110 degrees, compared with 0–120 at the contralateral knee. Radiographs demonstrated a healed fracture and maintenance of anatomic reduction (Figs. 8 and 9).

DISCUSSION

As with most fractures, the treatment methods of tibial plateau fractures have evolved because of advances in technology and evaluation of clinical outcomes. Schatzker I, II and III fractures, AO-OTA A and B fractures, if they meet operative indications, are commonly treated with a lateral plate using a lateral incision. Schatzker IV fractures are typically approached using a medial incision and fixed with a medial plate. Schatzker V and VI, or AO-OTA C, fractures may sometimes be adequately treated with a lateral plate only, however, many of these fractures require a dual incision and both a lateral and medial plate to obtain and, more importantly, maintain anatomic reduction. The size of the medial and/or postero-medial fracture fragments is often the determining factor if a medial plate is required. Condyle and metaphyseal comminution are also considered when determining if bicondylar plating is warranted. If the medial tibial condyle is not appropriately stabilized, fracture displacement may occur leading to a malalignment of the mechanical axis of the leg or articular incongruity, thus leading to less than optimal outcomes. Fracture fixation must be stable enough to allow immediate motion of the knee. If range of motion in conjunction with fracture and joint stability cannot be achieved, fracture fixation should be revised.

CONCLUSIONS

Medial tibial plateau fractures are often believed of as knee dislocations and can have associated injuries including ligamentous disruption, vascular compromise, and meniscal tears. Varus displacement is common and comminution of the articular surface and metaphysis may occur. These factors, as well as any extension into the lateral column, thus producing a bicondylar fracture, are the common operative indicators for medial condylar fractures, and thus, are the reasons why most medial condylar fractures require operative treatment.

REFERENCES


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