TECHNICAL NOTE

A Modified Semi-Lithotomy Position for Approach to Tibial Plateau Complex Fractures: A Technical Note

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Abstract

There is no agreement on the best surgical strategy to manage multicolumnar tibial plateau fracture. The combined approach used by many investigators has been found to be an effective method. However, combined approaches call for repositioning the patient which lengthens the operation time. The sterility of the field of surgery might be jeopardized by repositioning. Intraoperative fluoroscopic imaging is hard to adjust to both parts of the combined positions. To tackle these problems without sacrificing the concept of three-column tibial plateau, we have started to use a combined medial and lateral approach without repositioning the patients using a modified semi-lithotomy position.

Level of evidence: V

Keywords: Combined approach, Fracture, Position, Tibial plateau, Trauma

Introduction

Having been fraught with the potential vulnerability of posterior neurovascular structures, orthopedic surgeons have historically been more inclined toward anterior surgical approaches and techniques. As such, they have been taking advantage of supine patient positioning to avoid posterior critical structures (1). However, the classification of the tibial plateau fractures is now being conceptualized on the basis of a three-column biomechanical unit. The three-column concept of the tibial plateau anatomical-biomechanical unit has been adapted to clinical practice to signify the importance of the posterior column, where if left untended might contribute to poor outcomes (2). Lin et al. described the prone position to treat posterior column tibial plateau fracture. The authors have reported good outcomes in this regard (3). As reported by Luo et al., in three-column tibial plateau fractures with posterolateral corner injury, supine positioning makes visualization and manipulation of the posterior apical spike impossible (4). Most recently, Row et al. improvised a staged method to treat high-energy multicolumnar tibial plateau fractures (5). Several investigators have frequently encountered articular malreduction (6) and have reported it as a source of very poor outcomes (1). As such, investigators keep improving surgical techniques in terms of approach by improving more innovative approaches aimed at facilitating visualization and manipulation of all columns.

Row et al. presented a surgical strategy to manage multicolumnar tibial plateau fracture variants. They have attempted to address the predominant posterior fragment employing a Lobenhoffer approach in the prone position. This approach has been followed by supine patient repositioning for anterolateral column access (5). The strategy has been used by other investigators where they found it an effective method for the treatment of three-column tibial plateau fractures with posterolateral articular injury (1). Combined approaches, however, are not without costs. Repositioning the patient is time-consuming and lengthens the operation time. The sterility of the field of surgery might be jeopardized by repositioning. Intraoperative fluoroscopic imaging is hard to adjust to both parts of the combined positions. To tackle these problems without sacrificing the concept of the three-column tibial plateau, we have started to

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use the combined medial and lateral approach without repositioning the patients.

Technical note

The patient is placed in a modified lithotomy position on a table with removable lower parts. One-half of the lower part opposite to the leg to be operated on is removed and replaced with a lithotomy leg holder. The patient is supine lying on his or her back with head, neck, and in neutral positioning and arms either abducted alongside the patient or abducted to less than 90 degrees. This semi-lithotomy position is achieved by having the unaffected leg rested in the leg holder, while the affected leg is placed on the operating table. A sandbag is placed underneath the buttock on the side opposite to the leg to be operated on [Figure 1]. This enables the surgeon to sit (or stand at his/her convenience) in the space between the two legs while approaching the plateau from the medial side [Figure 2]. Intraoperative fluoroscopic imaging can be effectively obtained. The

Figure 1. Upper left,placing a sandbag beneath the hip opposite to the leg to be operated on ; Upper middle, inserting a leg holder;Upper right, modified semi-lithotomy position. Lower half, removing lower half.

Figure 2. The surgeon can sit while addressing the medial or posterior column from a medial approach.

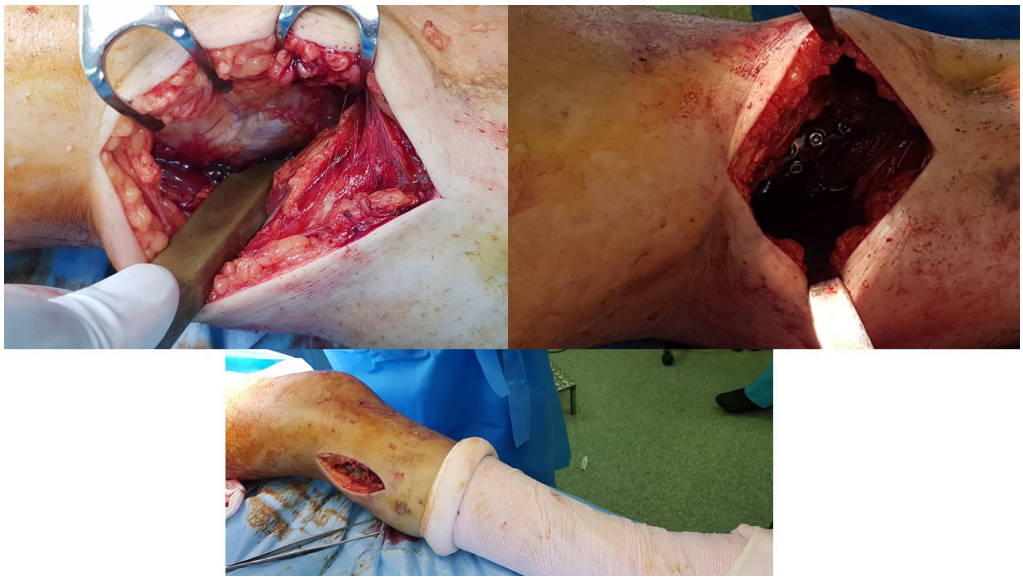

Figure 3. Medial approach to the tibial plateau. The lateral aspect of the tibial plateau could be approached in a standard fashion.

assistant surgeon and nurse scrub will be working on the lateral to the affected leg during the medial approach. For the medial approach, the skin is incised about 10 cm along with the posterior border of the tibia starting from the joint line and extending distally. The incision can be extended "pro re nata". Using the plane between the semitendinosus and medial head of the gastrocnemius the posterior aspect of the tibia can be visualized [Figure 3]. The position of the surgeon and nurse scrub interchanges for lateral approach. The lateral aspect of the tibia can be approached in a standard fashion. Figures 4 shows how lateral, medial, posterolateral, and posteromedial fragments have been addressed with the semi-lithotomy position.

Figure 4. Addressing lateral, medial, posterolateral, and posteromedial fragments with the semi-lithotomy position.

Discussion

By implementing this innovative approach, we have been able to effectively visualize and manipulate all columns with the good articular reduction being possible. We need to acknowledge some limitations to this report. First, it is a single-center study. Due to the complexity and diversity of the patterns usually observed with tibial plateau fractures, the number of the patients we have operated on is pretty small. However, for the same reason, it is unlikely for any investigator to report on sufficiently large sample size. We are hoping that by making this approach known to other surgeons, more widespread implementation of it will enable us to examine it more thoroughly. Secondly, there is no head-to-head comparison of the current technique with other ones. Third, the posterolateral corner could be approached indirectly from both lateral and medial approaches, and reduction could be obtained accordingly. The use of a semi-lithotomy position direct approach to the posterolateral corner might neither be possible nor necessary or even desirable in the light of the fact that posterolateral fractures that are required to be directly addressed are extremely rare. Direct access to post-column can be done via the Lobenhoffer approach. In our hands, we have been able to reduce and fix various combinations of the columns fractured by implementing a combined lateral/medial approach.

In conclusion, the single position-double approach described here was helpful to manage complex tibial plateau fractures. It also helped obtain direct visualization and anatomic articular reduction. Among patients studied, the obtained reasonable functional outcomes were comparable with those in the previously described methods.

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