



Case Report

An old unicondylar tibial plateau fracture (Schatzker type III) with tibial shaft fracture: A case report

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ABSTRACT

Introduction: and importance: Unicondylar tibial plateau fractures with tibial shaft fractures are extremely rare among the elderly group of people. The traditional treatment method is to apply double plates to fix unicondylar tibial plateau fractures combined with tibial shaft fractures respectively, but this fixation method can disrupt the blood supply around the soft tissues and increase the rate of postoperative infection and fracture non-union. In this paper, we would analyse an old unicondylar tibial plateau fracture (Schatzker type III) with tibial shaft fracture which admitted to our department and discussed the efficacy of using intramedullary nails and plates in the treatment of these fractures.

Case presentation: A 78-year-old woman with an old unicondylar tibial plateau fracture combined with tibial shaft fracture was presented in this case. Using an intramedullary nail combined with a plate to achieve good results.

Clinical discussion: This case represents a rare case of an unicondylar tibial plateau fracture with a tibial shaft fracture. In this case, the tibial plateau fracture was first incised and internally fixed with a 9-hole plate across the fracture line of the tibial shaft, followed by fixing the tibial shaft fracture with an intramedullary nail. This treatment helped us successfully reset the unicondylar tibial plateau fracture with tibial shaft fracture and provided a satisfactory outcome for the patient.

Conclusion: Using intramedullary nails combined with plates to treat unicondylar tibial plateau fractures with tibial shaft fractures allowed for a predictable healing result.

1. Introduction and importance

Tibial plateau fractures account for 1% of all types of fractures, moreover in people's age which over 55 years, Tibial plateau fractures account for approximately 8% of all types of fractures [1,2]. In 1974, Schatzker published his classification of tibial plateau fractures and described six main types [3]. However, unicondylar tibial plateau fractures with tibial shaft fractures are less uncommon. Therefore, Schatzker's classification system lack of specific description or classification of these fractures.

In this case study, we present a type of old unicondylar tibial plateau fracture with three-dimensional computed tomography (CT) visualization of a depressed lateral plateau without separation of the epiphysis, that belongs to Schatzker type III, along with a fracture of the middle tibial shaft. This report was approved by the hospital ethics committee and conducted with the informed consent of patient and her families. The work has been reported in line with the SCARE criteria [4].

2. Case presentation

A 78-year-old female with no history of drug allergy, chronic diseases and family diseases who had a fall a month ago that resulted in severe pain, swelling and deformity of her left knee and lower leg, preventing her from standing and walking. Initially, she was treated conservatively with external fixation in a cast but with poor results. Physical examination showed limited movement of her left knee with no signs of compartment syndrome. Sensation and distal limb pulses were intact. On admission, the affected limb was immobilized with a brace and underwent radiologic evaluation.

Anteroposterior and lateral view radiographs of the knee showed a depressed lateral tibial plateau fracture (Schatzker type III) on the left side, combined with a tibial shaft fracture (Fig. 1). Three-dimensional computed tomography (CT) showed depression of the lateral tibial plateau with an intact epiphysis, accompanied by the fracture of tibial shaft (Fig. 2).

Abbreviations: CT, computed tomography; AP, anteroposterior.

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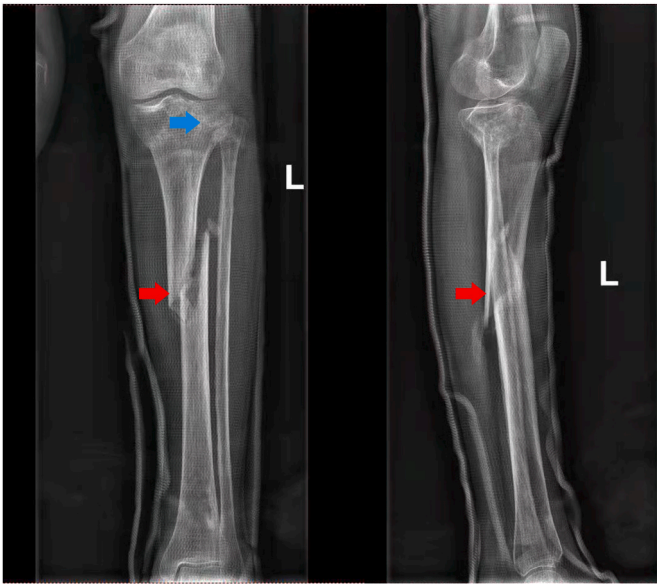


Fig. 1. Preoperative anteroposterior (AP) and lateral view of the knee: A left tibial plateau fracture (Schatzker type III, blue arrow) combined with an ipsilateral tibial stem fracture (red arrow). AP = anteroposterior. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

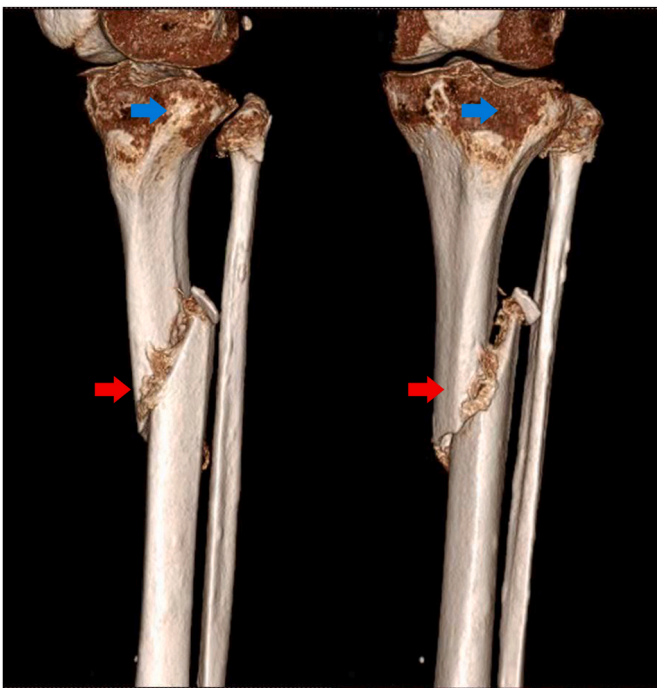


Fig. 2. Three-dimensional computed tomography (CT) shows depression of the lateral tibial plateau (blue arrow) with an ipsilateral mid tibial stem fracture (red arrow). CT = computed tomography. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

After discussion, the surgical plan was determined to be the use of a plate and an intramedullary nail. After introducing the operation plan, possible risks and complications to the patient, the patient signed the operation consent. The operation was performed by two senior attending physicians under the supervision of the director. Preoperative intravenous antibiotics were routinely administered. The tibial plateau

fracture was first incised and internally fixed, followed by fixing the tibial shaft fracture with an intramedullary nail. First, the tibial plateau fracture was repositioned through a standard anterolateral approach and the allograft bone was implanted in the lateral recess of the tibial plateau. In this case, the patient was an elderly woman with severe osteoporosis and insufficient support from an intramedullary nail, a plate across the fracture line of the tibial shaft was selected for fixation to the lateral tibial shaft to enhance the stability of this region. After confirming the anatomical repositioning of the fracture under C-arm X-rays, a 9-hole anatomical plate was placed on the lateral side of the proximal tibia with the distal end of the plate crossing the tibial shaft fracture line, and then the plate was temporarily fixed to the metaphysis with unicortical screws of appropriate length. The subchondral screws were then placed through the proximal part of the plate, away from the expected insertion position of the intramedullary nail, and the distal screw holes were temporarily left unscrewed.

Next, the knee was flexed and a longitudinal incision was made from the left tibial tuberosity to the inferior border of the patella to show the anterior border of the tibial plateau, and a 9*285 mm intramedullary nail was screwed in 1 cm above the tibial tuberosity. Then, after confirming satisfactory fracture repositioning under C-arm X-rays, a total of four locking nails were placed in sequence, both distally and proximally. Subsequently, the unicortical screws at the metaphysis were replaced with bicortical screws and the screws were placed into the hole at the distal end of the plate (Fig. 3). Elevation of the lateral plateau articular surface and the repositioning of the tibial shaft fracture were confirmed on immediate postoperative X-rays.

Active and passive functional exercises of the quadriceps muscle and ankle flexion and extension training were started on the second postoperative day, and weight-bearing was restricted for 3 months.

3. Clinical discussion

Unicondylar tibial plateau fractures with tibial shaft fractures are rare injuries. Erik et al. reviewed a prospective orthopaedic trauma database over a 10-year period and identified 1586 tibial shaft fractures, of which 50 patients had combined tibial plateau fractures (3.2%) [5]. In the present case, an unicondylar tibial plateau fracture (Schatzker type III) with a tibial shaft fracture can be observed.



Fig. 3. Postoperative anteroposterior (AP) and lateral view of the knee. AP = anteroposterior.

For the treatment of the case, both strong fixation of the tibial plateau and tibial shaft are required. Plates are eccentric fixation, and fixation of tibial shaft fractures with plates alone will lead to a reduction in the overall grip on the tibia, and incision and repositioning are highly susceptible to complications such as skin necrosis, infection, and bone discontinuity [6]. Since its invention, the intramedullary nails had gradually become the gold standard for long bone diaphyseal fractures due to its minimal trauma and good prognosis [7]. Wang et al. showed that intramedullary nail fixation had a significantly low risk of wound complications and associated with limited time for reunion compared with MIPPO [8]. Because tibial plateau fractures are intra-articular fractures and tibial plateaus are weight-bearing joints, it is difficult to fix and support the joint surface with intramedullary nails alone [9]. Moreover, the treatment of tibial plateau fractures with intramedullary nailing is highly susceptible to incomplete repositioning such as anterior displacement of the proximal tibia [10].

In 2008, Erik et al. proposed the use of plates in combination with intramedullary nails to treat ipsilateral noncontiguous unicondylar tibial plateau and shaft fractures [5]. This treatment can combine the advantages of plates and intramedullary nailing to fix both the tibial plateau and the tibial shaft. However, Keating et al. concluded that in fractures involving both the tibial plateaus and the shafts, the plates of the proximal fracture prevent fixation with intramedullary nails [11]. Due to concerns about interferences between the intramedullary nails and the plates, clinicians often apply double plates to fix tibial plateau and tibial shaft fractures separately. Although such fixation was sturdy and allowed early movement, traditional double plate internal fixation required extensive incision and periosteal debridement, which seriously affected soft tissue and bone healing and increased the incidence of infection as well as skin necrosis and nonunion of the fracture [12].

The authors concluded that this technique can be used for tibial shaft fractures located in the middle segment as long as the intramedullary nail entry point is not involved. Precise evaluation prior to surgery can avoid interference of screws with dilation and placement of intramedullary nails during plate fixation of the tibial plateau, and intra-operative C-arm X-rays can ensure that screws do not interfere with dilation and placement of intramedullary nails.

4. Conclusion

Even though this method is relatively uncommon, unicondylar tibial plateau fractures with tibial shaft fractures are effective and should not be ignored. Using intramedullary nails and plates to treat unicondylar tibial plateau fractures with tibial shaft fractures allows for predictable healing and the safe and effective use of the optimal implant.

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Ethical approval

The ethical committee approval was not required give the article type (case report). However, the written consent to publish the clinical data of the patients was given and is available to check by the handling editor if needed.

Consent

Written informed consent was obtained from the patient for

publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Tianyi Ji: literature review, data collection. Zhengming Lv: data validation and supervision.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.103927>.

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