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Case Report

Patellar Tendon Rupture in Floating Knee Injury: Case Report

Salman Ghaffari [1], **Alireza Kazemi** [2] *, **Shahin Talebi** [3]

[1] Associate Professor of Orthopedic Surgery, Orthopedic Research Center, Mazandaran University of Medical Science, Sari, Iran
[2] Resident of Orthopedic Surgery, Orthopedic Research Center, Mazandaran University of Medical Science, Sari, Iran
[3] Assistant Professor of Orthopedic Surgery, Orthopedic Research Center, Mazandaran University of Medical Science, Sari, Iran

* **Corresponding Author:** Orthopedic Research Center, Mazandaran University of medical science, Sari, Iran.
Email: alireza.kazemi85@gmail.com

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Abstract

Ipsilateral fractures of the femur and tibia result in a flail knee joint condition referred to as "floating knee". Associated knee ligament injuries are common and have been reported to be frequently missed in initial evaluations. We report the diagnosis and treatment of the concomitant patellar tendon rupture during fixation of the distal femur and proximal tibia fractures in a patient who presented with floating knee and a history of osteomyelitis. This case further highlights the paramount importance of careful assessment of the knee in patients who present with floating knee injuries. We also recommend that MRI and ultrasonography be used to prevent ignored patellar tendon ruptures in such patients; particularly when physical exam is challenging or an intra-articular injury is present.

Keywords: Floating Knee, Proximal Tibia, Distal Femur, Fracture, Patellar tendon.

Introduction

Ipsilateral fractures of the femur and tibia result in a condition referred to as "floating knee" that was first described by Blake and McBryde in 1975 (1). The level of energy that could lead to this type of injury is immense, frequently resulting from high-velocity trauma, particularly motor vehicle accidents. Floating knee is usually seen in patients with multiple injuries; associated fractures have been reported in 44% of cases (2). Because of serious concomitant injuries to other organs, patients have high morbidity and mortality. A mortality rate upon admission of up to 10% and a 9% risk of amputation during the first 24 hours have been reported in the literature (3). Moreover, joint and knee ligament injuries are a common finding in patients who present with floating knee injury; the incidence could be as high as 50% (4). Despite high incidence rates, associated knee ligaments injuries have been reported to be usually missed, which further highlights the importance of a thorough physical examination of the knee joint at presentation (5).

Floating knee is a complex condition and could pose a therapeutic challenge. Current guidelines recommend early fixation of femoral and tibial fractures to improve the prognostic outcomes, including mobilization, and to decrease the incidence of thromboembolic events. Early diagnosis of ligamentous injuries is also of great importance, as the involvement of the knee joint has been reported to be a major contributing factor in patients with poor outcomes (5).

Dickob et al. consider knee joint mobility more important than stability and therefore recommend secondary ligamentous repairs. However, fresh patellar tendon ruptures need immediate surgical restoration for optimal return to pre-injury functional status. Unfortunately, there is a high chance of missing this injury in floating knee cases. In addition, surgical repair of patellar tendon ruptures is more challenging in the presence of ipsilateral fractures of the proximal tibia and distal femur (6). There are few published reports on the diagnosis and management of patellar tendon rupture in cases with floating knee (7). In a more recent publication, Vaidyanathan et al. reported a case of floating knee following a high-energy road traffic accident with ruptures of the medial patellofemoral ligament, patellar tendon, and vastus medialis oblique muscle. They indicate that these associated injuries had been missed initially and were detected while closing the surgical wounds in a flexed position following further exploration (8).

We report the diagnosis and treatment of patellar tendon rupture during fixation of distal femur and proximal tibia fractures in a case of floating knee injury with a history of osteomyelitis.

Objectives

The main aim is to present our experience in treating this injury and to make suggestions on the best diagnostic approach to detect potential patellar tendon rupture during fixation of floating knee fractures.

Case report

A 49-year-old woman presented to the emergency department of Imam Khomeini Hospital, Sari, Iran following a car-to-car collision that caused severe trauma on her left side in January 2019. In addition to multiple organ injuries, she had ipsilateral fractures of the proximal tibia and distal femur as shown in Figure-1. The patient had a history of osteomyelitis for 34 years and presented with numerous scars and fibrotic tissue around her knee.

The tibia fracture was fixed by dynamic compression plate (DCP) using the anteromedial approach. The distal femur fracture was fixed by anatomical plate (Figure-2). There was no possibility of examination for the diagnosis of patellar tendon rupture during the initial physical examination, and consequently, the patellar tendon rupture was missed. It was noticed after surgical incision, during fixation of the distal femur as depicted in Figure-3. The rupture was repaired with Krackow sutures and augmented with number 5 Ethibond Excel (Ethicon, Somerville, NJ) polyester sutures between the patella and tibial tuberosity. If this tendon rupture had been missed, the extensor mechanism of the knee would have been disrupted. In the post-operative clinical assessments the extensor mechanism of the knee was preserved in our patient (Figure-4).

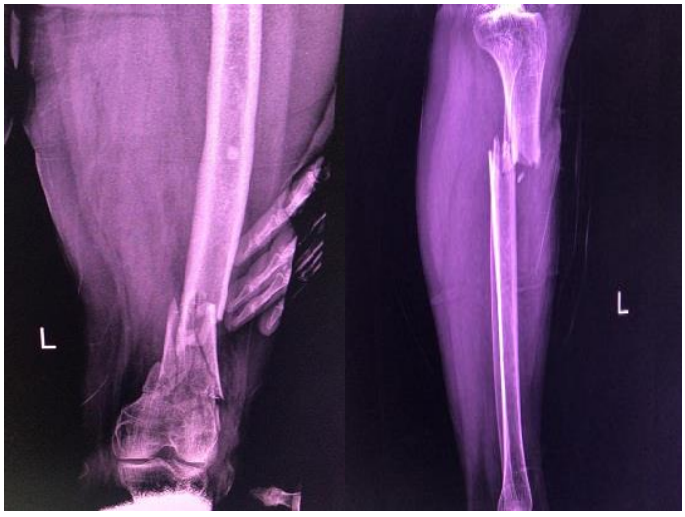

Figure-1. Proximal tibia and distal femur fractures

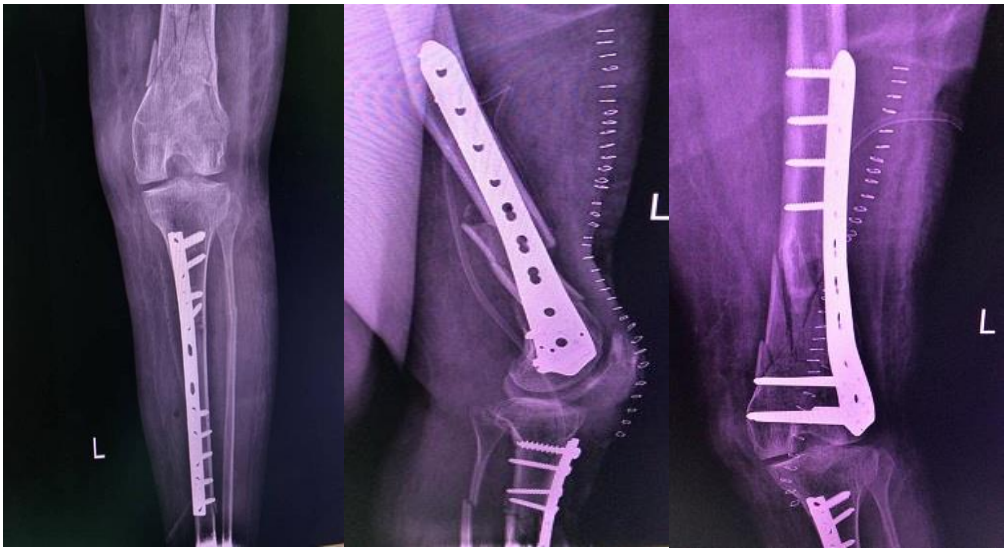

Figure-2. Post-operative fixation of the fractures

Figure-3. Patellar tendon rupture

Figure-4. Post-operative follow-up

Discussion

The incidence of ipsilateral femoral and tibial fractures leading to "floating knee" is on the rise as observed by epidemiological studies. Such condition is most frequently observed among male patients younger than 30 years of age involved in road traffic accidents (5, 9). This disturbing trend could pose a significant therapeutic challenge to the treatment of multiple trauma patients, due to the complex nature of the fracture and associated soft tissue and vascular injuries (6). The most optimal management protocol in these patients has been a matter of debate, and the complication rates based on different treatment modalities remain high; yet, there is a general consensus on the early stabilization of both fractures (10).

Patellar tendon ruptures are rare but require an immediate repair to improve the functional outcome; delayed treatment is often difficult. Nevertheless, despite the importance of early diagnosis this injury is usually easily neglected and missed initially (8). Physical examination cannot be thoroughly done in some patients and the patellar tendon rupture could be missed due to the presence of knee hemathrosis, obesity, and multiple trauma (11). The diagnosis of patellar tendon ruptures is made on the basis of a palpable and painful defect in the tendon and the detection of patella alta established by lateral radiographs. In these cases, magnetic resonance imaging and ultrasonography are useful diagnostic tools in identifying an ignored patellar tendon rupture, particularly when physical exam is challenging or an intra-articular injury is present (12). In this case report, during fixation of the distal femur after surgical incision, a patellar tendon rupture was detected and repaired accordingly. Inability to diagnose the initially missed patellar rupture would have disrupted the extensor mechanism of the knee. Furthermore, the repair facilitated initial weight-bearing and prevented secondary operations lowering the risk of surgical complications and infection.

Our report is in line with Vaidyanathan et al., who emphasize the importance of detailed and careful secondary survey to detect potentially missed ligamentous injuries in patients who present with floating knee (8). Moreover, a retrospective study in patients with floating knee showed that only 6% of knee ligament injuries had been correctly diagnosed at initial assessment, and 32% of patients presented during follow-up with knee instability and missed ligamentous damage (13). In another study, Szalay et al. reported laxity of the knee ligaments in 53% of these cases and underscored careful knee assessment, particularly in patients with sustained tibial fracture (14). We further emphasize the importance of careful assessment of knee ligamentous injuries in cases suffering from ipsilateral fractures of the femur and tibia. If we had used a minimally invasive approach, the patellar tendon rupture could have been missed. We propose that MRI and ultrasonography are of great diagnostic value in identifying patellar tendon ruptures in cases of this type.

Conclusions

This case report further highlights the paramount importance of careful assessment of the knee in patients who present with floating knee injuries. We also recommend that MRI and ultrasonography be used to prevent ignored patellar tendon ruptures in such patients, particularly when physical exam is challenging or an intra-articular injury is present.

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Authors' Contribution

All authors pass the four criteria for authorship contribution based on the International Committee of Medical Journal Editors (ICMJE) recommendations.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

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