

# Isolated Bilateral Traumatic Patellar Fracture: A Case Report

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**Abstract Background:** Patellar fracture accounts for approximately 1% of all skeletal fractures. Bilateral fracture of the patella is even rarer, comprising less than 3% of all patellar injuries. **Case Description:** A 28 year old man presented with bilateral patellar fracture after car accident and direct dashboard injury while driving, with superficial abrasion on both fracture sites. Mentioned fracture had transverse fracture pattern which was fixed with two Kirschner wire following tension band principle. Our patient was able to squat, sit in crossed leg position and perform his household activities by the end of 2<sup>nd</sup> month. He regained his full strength and ability to perform normal daily activities by the end of 6<sup>th</sup> months, without any post-operative complaints. **Discussion:** A case of bilateral patellar fracture as a consequence of dashboard injury is presented and pathomechanical and operative management and follow up of such injuries is discussed.

**Keywords:** *bilateral, Patellar fracture, transverse fracture, Kirschner wire, post-operative complications*

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## 1. Introduction

Fracture of the patella accounts for approximately 1% of all fractures. This type of fracture mostly happens to patients in their 2<sup>nd</sup> to 5<sup>th</sup> decades and has higher prevalence in male patients. [1] Patellar fracture may result from direct, indirect or combined injury patterns. [2] The patella is prone to injury from a direct blow as a consequence of its anterior location and thin overlying soft tissue envelope. [3] Direct injuries may result from a low energy event, such as after falling down from sitting or standing height or high energy events like a dashboard injury in a motor vehicle collision. Combined fracture patterns are often due to direct high energy injuries. [4] A patient with patellar fracture in high energy injuries should be evaluated for potential hip dislocation, ipsilateral femoral neck, shaft or distal femur and proximal tibial fractures. [5] Bilateral patellar fractures are relatively rare, which frequently associated with pathologic fracture in patients with underlying mineral bone diseases. [6] However, there are only 3 reported case of traumatic bilateral patellar fracture in completely healthy patients. [7,8] We report a very rare case of isolated bilateral fracture in a young healthy male patient without any underlying disease who managed by fixation with two Kirschner wires.

## 2. Case Report

A 28 year old man presented to emergency department after car accident while driving the car. Patient suffered

from direct dashboard injury. Physical examination revealed grossly swollen knee joints with superficial abrasion over both knees. At primary evaluation, there was no evidence of fascial, thoracic, abdominal, pelvic or spinal injury. Radiography of bilateral knee joints showed multifragmental displaced fracture of both knees with more communication on left knee and more displacement in upper and lower poles of right knee joint. Radiographic study of spine, pelvis and femur showed no evidence of fracture or soft tissue swelling. (Figure 1) Due to skin and soft tissue damage, joint and fracture site undergone cylindrical splint and jons bandage support for 14 days. After re-evaluation, patient was taken up for open reduction in operation room under intrathecal block. The patient placed in supine position with a tourniquet applied on the proximal thigh. Since direct midline incision give access to the retinaculum damage without developing flaps to the surgeon, we used this approach. Both fractures were taken up for open reduction an internal fixation at the same time with two surgeons. The fracture was reduced and held with patellar clamp and the articular surfaces were evaluated for any possible malreduction. We used a 3.5 full thread lag screw in left side plus two 2 mm Kirschner wires to maintain reduction. Also, an 18 gauge wire was used to encircle the patella and crossed over anterior surface of the patella in a "figure of eight" suture. On the right side, we use 2 mm Kirschner wires to maintain reduction. Also, an 18 gauge wire was used for same purpose as left side. (Figure 2) Both limbs were sequentially tightened to apply tension equally across the fracture sites. Retinacular defects on both knees were repaired and wounds was thoroughly washed and closed in

layers. Both knees were kept in full extension with a cylinderic splint after operation. The splints replaced with two hinged knee immobilizers one week later and isometric quadriceps strengthening exercised and gradual range of motion exercises were started for the patient. Gradual weight bearing was started at 5<sup>th</sup> week and patient

regained full weight bearing without support, 3 weeks later. By the end of 8<sup>th</sup> week, patient was able to squat, sit in crossed leg position and perform his household activities independently. Patient regained his full strength and ability to perform normal daily activities by the end of 6<sup>th</sup> month, without any post-operative complaints.



**Figure 1.** Pre-operative radiography shows bilateral multi-fragment displaced fractures. Displacement is more pronounced in the upper and lower parts of the right knee



**Figure 2.** Post-operative radiography shows bilateral usage of a 3.5 full thread lag screw in left side plus two 2 mm Krischner wires plus an 18 gauge wire to encircle the patella in a “figure of eight” suture

Written informed consent was obtained from the patient with ethical approval of Ethics Committee of Akhtar Hospital.

### 3. Discussion

The patella is the largest sesamoid bone of the body which lies within quadriceps tendon and the infrapatellar ligament. [9] Fractures of the patella may result from either direct or indirect mechanisms. A direct blow mostly results in comminution, articular damage and anterior soft tissue injury. In case of indirect injury, when the force of the fall overwhelms the resistance to knee flexion, the extensor mechanism fails and results in either tendons rupture or bone break. Later type of force usually results in transverse fracture. [10] Although a patellar fracture must be suspected in all patients who have sustained a direct high-energy blow to the anterior knee and who cannot actively extend their knee or patients who cannot perform a straight-leg raise after a flexion injury or fall; [11] isolated bilateral patellar fractures are relatively rare, accounting for 2.9% of all these fracture types and mostly happen as stress fractures or as complication of chronic underlying diseases such as osteoporosis, primary hyperparathyroidism and renal failure with secondary hyperparathyroidism. [12] Of note, our presented has no history of endocrine or metabolic bone disease. Fracture patterns of patella could be divided to transverse fracture in mid patella which is the most common type, followed by comminuted and vertical fracture, which the later represent a very small group of fracture patterns. [13] Also, patellar sleeve fracture is specified for children. [14] On the other hand, isolated bilateral patellar fractures mostly happen as open fractures and minimal displacements, [15] which was not observed in this presented case. Radiography is preferred to other imaging modalities such as computed tomography (CT) scanning, bone scanning and magnetic resonance imaging (MRI). Anteroposterior (AP), lateral, and tangential or merchant views are the optimal radiographic views for evaluating such fractures. In case of normal AP radiographs in a patient with a high suspicion of patellar fracture, lateral view can be helpful in evaluating the trabecular arrangement and comminution and separation of fracture fragments of patella. [16] CT scanning is a useful modality in patients with normal radiographic images. Also, CT scanning can prevent treatment delay and identification of intra-articular loose bodies. MRI can demonstrate bone marrow or soft tissue injury with a great detail. [17] The treatment of patellar fractures depends on fracture type, size of fragments and integrity of the extensor mechanism. Non-operative management may be beneficial in patients with normal extensor mechanism and minimal intra-articular step-off. However, most of the patients with unilateral patellar fractures who sustained a high energy blow or patients with bilateral patellar fractures, as in our case, require surgery in order to maintain the function of patella and restore extensor mechanism continuity. Operative management is not advocate in patients whose pre-operative risk evaluation is not promising or in those who are not able to regain function of the patella, such as patients with joint ankylosis. [18,19,20] Every effort should be made to preserve the anatomical and functional

role of patella, to avoid poor outcomes which can occur when greater than 40% of patella is removed. [21] Small fracture fragments may be excised or repaired with suture or screw fixation. Patellar fractures with more than 2 mm articular displacement or 3 mm fragment separation, comminuted fractures with articular surface disruption and osteochondral fractures with displacement also necessitate operative management. [22] However, our case undergone open reduction surgery with a 3.5 full thread lag screw in both sides with two 2 mm Krischner wires to maintain reduction. There are possible post-operative complications in patients with patellar fracture, which these complications increases in case of bilateral patellar fracture, such as symptomatic hardware which is the most common complain, followed by anterior knee pain, loss of reduction which happens in 20% of patients, especially in osteoporotic bones, osteonecrosis in proximal fragments, infection, stiffness and non-union, which partial patellectomy is indicated in such disorder. [23,24] However, our presented case regains normal abilities such as squat and sit in crosse leg position by the end of 2<sup>nd</sup> months and regained his ability to perform his daily activities at the end of 6<sup>th</sup> months without any post-operative complications. In such cases with injury around the bilateral knee, urgent management with stable fracture fixation, spirited physiotherapy with early active range of motion exercises and weight bearing are essential to avoid unwanted sequela.

### Conflict of Interest

The authors have no competing interests.

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