

Simultaneous, Isolated Traumatic Bilateral Patella Fractures

Sandesh Madi,^{1,*} Monappa Naik,¹ Sharath Rao,¹ and Sandeep Vijayan¹

¹Department of Orthopaedics, Kasturba Medical College, Manipal University, Manipal, India

*Corresponding author: Sandesh Madi, Department of Orthopaedics, Kasturba Medical College, Manipal University, Manipal, India. Tel: +91-9742149599, Fax: +91-8202571934, E-mail: sandesh.madi@gmail.com

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Abstract

Introduction: Isolated traumatic fractures of both Patellae, occurring at the same time, in an otherwise healthy person, are very rare. The Patella, as a subcutaneous and a cancellous bone, is vulnerable to injury. However, simultaneous injury to both Patellae without the involvement of any other bony injuries occurs infrequently, and only a few cases have been reported in the literature.

Case Presentation: We report a rare case of isolated, traumatic bilateral Patella fracture with unusual fracture patterns and briefly review the literature.

Conclusions: In simultaneous bilateral Patella fractures, good functional outcome can be expected following a stable surgical fixation and a structured rehabilitation regime. However, personality of the fracture determines salvage versus sacrifice of the Patella.

Keywords: Bilateral Patellar Fractures, Traumatic, Tension Band Wiring, Rehabilitation

1. Introduction

Patellar fractures account for only 1% of all skeletal fractures and are mostly unilateral. Both direct and indirect forces play roles in the mechanism of injury. Road traffic accidents with direct impact, dashboard injuries, or fall from a height are some of the direct causes. These accidents usually result in a comminuted fracture pattern. Indirect fracture is seen when there is a sudden and forceful contraction of the quadriceps while trying to decelerate a fall from height, upon touching the ground. Such mechanism usually results in a transverse type fracture pattern. Usually both components are present resulting in various combination of patterns. Surprisingly, despite such common mechanism of forces occurring in everyday trauma, simultaneous and isolated involvement of both Patellae, in an otherwise healthy person, is uncommon to encounter.

2. Case Presentation

A 32-year-old shopkeeper presented to our trauma center following a road traffic accident; he was a cyclist, who was hit by a four-wheel drive. According to the patient, immediately after the collision, he fell onto his knees on the road. He was not able to stand up and there was swelling over both knees. He had no head, chest or abdominal injuries. There were no known medical co-morbidities. On examination, swelling, tenderness, crepitus and abnormal mobility were noted in both knees. There was a 2 × 2 cm superficial abrasion over the anterior aspect of

the right knee. Skin over the left knee was intact and normal. The patient was unable to do active Straight Leg Raising [SLR] on both sides. Clinical examination revealed no long bone fractures. Distal neuro-vascular examination was normal on both sides. Plain X-rays, including anteroposterior and lateral views of both knee joints, were performed. Routine trauma series X-rays, including chest X-ray, pelvis with both hip joints, and lateral cervical spine X-rays were normal. The case was diagnosed as isolated and simultaneous bilateral Patellar fractures and was placed on posterior long leg splints on both sides. On the right side, there was comminution of the lower pole of the Patella, and on the left side there was comminution of the upper pole (Figure 1). All blood investigations were within normal limits.

Surgery for open reduction and internal fixation on both sides was performed under spinal anaesthesia and tourniquet control. We started on the left side first as the overlying skin was normal. A 15-cm midline vertical incision was made over the left knee, centered over the fracture. The fracture was exposed. Torn medial and lateral patellar retinaculum were noted. Thorough joint lavage was given, to clear the debris and haematoma. The joint was inspected for any associated intra-articular bony or soft tissue involvement and was found to be normal. Despite the upper pole being a small fragment and comminuted, tension band wiring fixation was attempted. The fracture was reduced using AO Weber clamps. Two parallel 1.8-mm K-wires were passed from the proximal

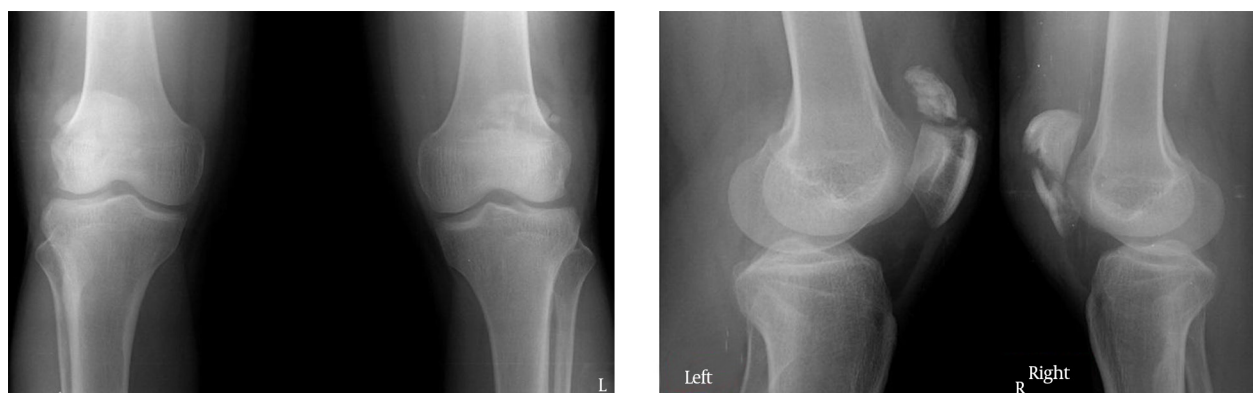


Figure 1. Pre-Operative X-rays (Antero-Posterior and Lateral Views) Both Knees

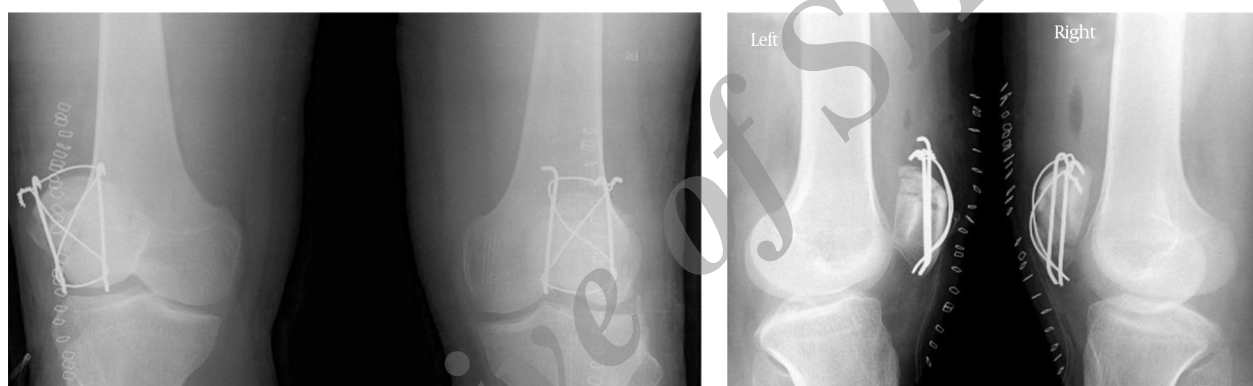


Figure 2. Post-Operative X-rays (Antero-Posterior and Lateral Views) Both Knees

fragment to the distal fragment, through the fracture, about 10 mm under the anterior surface. Using 18-gauge stainless steel wires, tension banding was done and compression was achieved at the fracture site. Reduction was confirmed using intra-operative fluoroscopy. K-wires were bent, cut and deeply buried. Retinaculæ were repaired. The wound was washed and closed layer by layer over a drain. The right side fracture was exposed and fixed by tension band wiring similarly (Figure 2). Knee compression and long knee braces were applied on both sides and patient was shifted out of theatre.

On the first post-operative day the patient was made to sit in the propped position. Assisted straight leg raising exercises were started. Isometric quadriceps and hamstrings strengthening exercises were taught. On the second day, the drains were removed. The patient was taught to stand with the help of crutches and was made to walk two rounds in the ward. Brace support was continued and was removed only during the physiotherapy sessions. Gradual knee bending exercises were initiated after one week, which included active, active assisted and

gravity assisted flexion by sitting at the edge of the couch through 0 - 30 degrees. Similarly, heel slides were also initiated with the patient lying with the supine position. Staples were removed after two weeks and gentle patellar mobility was started. In order to overcome knee stiffness and an extension lag, the patient was encouraged to do open chain quadriceps and hamstrings strengthening exercises. Quadriceps stimulations at highest tolerated current intensity were also carried out to regain strength of the extensor mechanisms. Gradually, 10 degrees of knee bending were increased weekly and brace supports were discontinued at six weeks. The patient was able to bend his knees 90 degrees on both sides by the end of eight weeks. He regained full range of flexion and extension by the end of seventh month (Figure 3) and fracture union was evident radiologically on both sides. At the end of one year, the patient returned to full activity. However, he complained of occasional pain and hardware prominence in both knees on squatting. For these complaints implant removal was performed at the end of one year (Figure 4).



Figure 3. Full Range of Motion in Both Knees at Seven Months, no Extensor Lag Seen



Figure 4. X-rays of Both Knees After Implant Removal

3. Discussion

Patella forms an integral component of the extensor mechanism. It centralizes the forces of the quadriceps muscles and increases its moment arm resulting in an energy efficient terminal extension of the knees. Despite being a subcutaneous and a cancellous bone, fractures of the patella account for only 1% of all skeletal injuries, and bilateral involvement accounts for approximately 2.9% of all lesions of patella (1).

The first case of simultaneous bilateral patella fracture was probably reported by Desault (1817). He noted fractured 'rotula' of each knee, produced by convulsions on the operating table in the lithotomy position (2). Non-traumatic bilateral patella fractures were being reported time and again. However only a handful traumatic simultaneous bilateral fractures were encountered and reported; probably because of less incidence of road traffic accidents.

Cummins, in 1903, reported a case of 62-year-old female who fell and sustained transverse bilateral patellar fractures. The fractures were wired and the lady went on to

perform well for a month until she died suddenly (3).

In 1913, Steinke reported two cases of simultaneous fractures of both patellae. One patient, who was 36 years old, was injured due to a direct blow to the patellae when he was kicked by a horse. Both the patellae were wired with no.18 silver wire, which went on to heal uneventfully. The second case was a 56-year-old male, who tripped while climbing down the stairs and sustained transverse fractures of both patellae. Similar treatment was done and good results were obtained (4). The author had also described forty four similar cases and discussed in detail the mechanism of injury, the fracture patterns, mode of treatment and the outcomes of all these patients. He finally concluded that the operative treatment for fractures of patellae, through wiring, looping or suturing methods, give better results than non-operative methods.

In 1943, Murphy reported a case of an 18-year-old male who had sustained the injury when he crashed his bicycle into a stone-wall (5). On one side, total patellectomy with

quadriceps tendon repair was done and on the other side a mid-thigh plaster cast was applied. Both had healed without any complications.

Lately, in 2011, Cirpar et al. reported a case of a 35-year-old male who had sustained a dashboard injury and fractured both patellae (6). Tension band wiring was done on both sides and the patient recovered well. In 2012, Vinay et al. reported on a 40-year-old male who had sustained injury in a road traffic accident (7). One side was an open transverse fracture fixed with K-wires and the other side was a closed comminuted fracture treated with partial patellectomy. The final outcome was satisfactory.

Tension band wiring using the AO technique is a time-tested operation and must be the procedure of choice, unless there is severe comminution. Conservative management can be employed only in undisplaced fractures. Regardless of the etiology (traumatic/non-traumatic), surgical planning is basically determined by the fracture patterns. Despite some comminution, we preferred wiring of patella in our case on both sides. Extra articular lower pole patella fractures are traditionally treated by partial patellectomy. However, fixation helps maintain the length of the patella and decreases the risk of patella baja without increasing the risk of post-traumatic arthritis (8).

Our patient had a unique fracture pattern injury; right side lower pole and a left side upper pole fracture. To the best of our knowledge, this type of fracture pattern has not been previously reported in the literature. The probable cause for such a pattern is that the patient had an impact on the right knee first followed by the left knee. The soft tissue injury over the right knee suggests that the brunt of the trauma was taken up by the right side. The patient rolled and the left patella was injured with-

out any other bony injuries. Successful outcome of such fractures lies in stable surgical fixation and a structured rehabilitation protocol, as described.

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Footnote

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