

Irreducible, incarcerated vertical dislocation of patella into a Hoffa fracture

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ABSTRACT

Rotational dislocations of patella, which involve rotation of the patella around a horizontal or vertical axis are rare. These rotational dislocations of patella are difficult to reduce by close methods. These dislocations can have associated osteochondral and retinacular injury. We report a case of a 20-year-old male who presented with swelling and pain in the right knee following a motor cycle accident. Radiological evaluation using the computed tomography revealed a patellar dislocation with a concomitant Hoffa fracture. Patella was rotated around the vertical axis and was incarcerated into the Hoffa fracture. This is a very rare injury and first of its kind to be reported. The difficulties in diagnosis, mechanism of injury and management have been discussed. We feel closed reduction of such an injury is likely to fail and open reduction is recommended.

Key words: Hoffa fracture, medial patellofemoral ligament, patella dislocation

MeSH terms: Patella dislocation, ligament, femoral fracture, quadriceps muscle

INTRODUCTION

Traumatic lateral patellar dislocation is a relatively common problem. Rotational patellar dislocations are rare where patella rotates about its horizontal or vertical axis and are classified accordingly as horizontal or vertical dislocations. Rotational patellar dislocation is most often irreducible and has a high incidence of chondral damage.¹ We report a case of an irreducible vertical axis dislocation of the patella where the patella was found incarcerated into a coronal fracture of the lateral femur condyle (Hoffa fracture). We discuss the injury mechanism, management and the outcome.

CASE REPORT

A 20 year old male patient presented with pain and swelling in his right knee following a motorcycle accident.

On examination, the knee was found to be swollen and locked in 15° of flexion. The patella was found dislocated with restricted mobility and pain. Skin over patella was contused. There were no other bony injuries or visceral injuries. There was no distal neurovascular deficit distally. Anteroposterior and lateral radiographs revealed a lateral patellar dislocation with a fractured lateral femoral condyle [Figure 1a and b]. A computerized tomography (CT) scan revealed incarceration of the vertically dislocated patella (articular surface facing laterally) into a coronal fracture of the lateral femoral condyle (Hoffa fracture) [Figure 2a and b]. An open surgical approach was adopted to minimize chondral damage. Intraoperatively the patella was found incarcerated under tension, 1 cm tear in the medial retinaculum on the

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Access this article online	
Quick Response Code:	Website: www.ijoonline.com
	DOI: 10.4103/0019-5413.139883



Figure 1: (a and b) Anteroposterior and lateral radiographs of knee joint showing dislocated patella and Hoffa fracture of femur

superomedial aspect, a partial avulsion of the quadriceps tendon and a complete tear of the medial patellofemoral ligament (MPFL).

A lateral parapatellar arthrotomy was performed to facilitate atraumatic repositioning of the patella without major chondral damage and for better visualization of the fracture of the lateral femoral condyle [Figure 3]. Inspection of the patella following relocation revealed minimal chondral damage of patellar articular surface. Articular loose fragments from medial facet of patella were removed. The Hoffa fracture was fixed with two cancellous screws from the posterolateral aspect directed anteriorly and the lateral arthrotomy was closed. The tear in the MPFL and the medial retinaculum and quadriceps tendon were repaired with heavy nonabsorbable sutures.

Postoperatively the knee was immobilized for 3 weeks followed by supervised active and passive range of motion exercises. At 8 weeks the patient was allowed partial weight bearing walking using crutches and allowed to bear full weight after radiological union. At 3 months followup radiographs showed good alignment of the patella and fracture union in

an anatomical position [Figure 4]. Clinically patellar tracking and patellar gliding were normal and pain free with knee flexion ranging upto 100° without extensor lag. A further improvement in flexion of up to 30° was achieved after manipulation of the knee joint under anesthesia. At 2 year followup, the patient is pain free with clinically normal knee function without any radiographic evidence of degenerative joint changes [Figures 5, 6a and b]. The screws were removed at patient's request. His knee osteoarthritis outcome score was 93.5 and international knee documentation committee score was 93.1 at the end of 2 years.

DISCUSSION

Vertical patellar rotational dislocations are rare where the patella dislocates rotating along its longitudinal axis and ends up with articular surface facing outwards.² In rotational dislocations, patella can dislocate into the intercondylar notch, it can be impacted into the lateral condyle or wedged into the lateral gutter.² Hoffa fractures are coronal fractures of the femoral condyle which may occur in isolation or

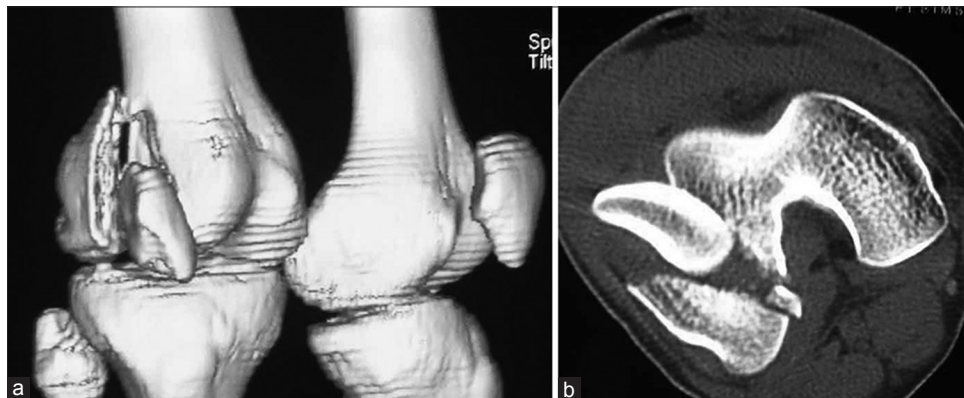


Figure 2: (a and b) Computed tomography scan showing incarcerated vertically dislocated patella into Hoffa fracture



Figure 3: Intraoperative photograph showing incarcerated patella with articular surface facing outward



Figure 4: 3 months followup radiograph of knee anteroposterior view showing union of Hoffa fracture

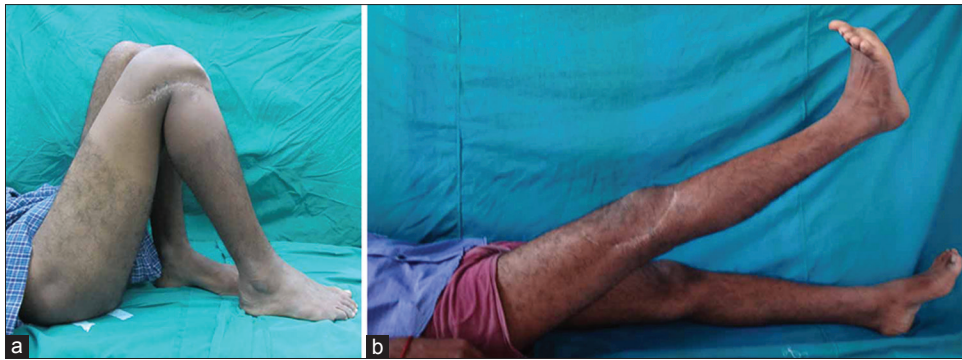


Figure 5: (a and b) 2 years followup clinical photograph of patient showing near normal range of knee flexion and extension without extensor lag

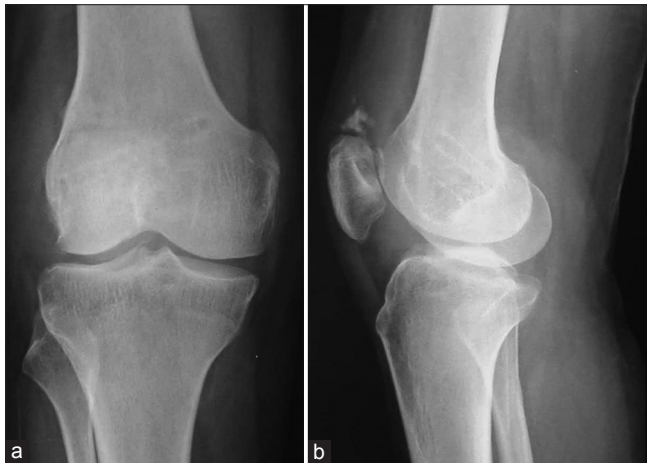


Figure 6: (a and b) 2 year followup anteroposterior and lateral radiograph after screw removal showing patella located at normal place and fracture united

in association with distal femoral fractures, femur shaft fractures and knee dislocations.³⁻⁵ Hoffa fracture occurring in association with rotational patellar dislocation have not been reported before though it has been described to occur with conventional patellar dislocations.¹

The exact mechanism of injury in vertical dislocation of the patella is not clear. From the available literature, it is evident that direct injury from medial or lateral side with the knee in the extended position can produce a vertical dislocation of the patella.^{2,6} Valgus strain on the knee and a continued pull of quadriceps causes the patella to ride against the femoral condyle resulting in rotation around its vertical axis.⁷ Isolated coronal femoral condyle fracture can occur as a result of direct trauma with an element of abduction or axial loading from the proximal tibia during knee flexion.^{1,3} Though it is difficult to ascertain the mechanism of injury in our patient it may be hypothesized that valgus force would have contributed for femoral condyle fracture and the patellar dislocation. Minimal chondral damage of patellar articular surface indicates that the fracture could be the result of vertically rotated patella forcing into femoral condyle fracture.

Vertical patellar dislocations even in isolation are difficult to reduce by closed maneuvers. Incarceration into a fracture makes closed reduction almost impossible and attempts at close reduction make the patella vulnerable for chondral injuries. Open reduction is hence favored to minimize cartilage damage and for optimal management of associated bone and soft tissue injuries.

The key in management of this injury pattern for satisfactory long term outcome is to achieve early atraumatic repositioning of the patella without further chondral damage and to achieve optimal stability at the patellofemoral joint by stable reconstruction of the injured medial soft tissues. Early surgical management can also help in direct repair of the medial soft tissue structures. The MPFL and medial retinacular disruption of varying degrees has been reported in acute traumatic patellar dislocation patients.⁸ In our patient, the MPFL was completely torn with minimal disruptions seen at the superomedial retinacula and the quadriceps tendon attachment. The lateral arthrotomy was opted in our patient since access and reduction of the posterolaterally incarcerated patella was deemed difficult through a medial arthrotomy and would have produced further chondral damage during manipulative maneuvers. This enabled easy repositioning of the patella and preserved the uninjured important medial retinacular structures.

To the best of our knowledge this is the first case report for this unique injury pattern. Identifying a vertical dislocation is paramount and a CT scan can help in visualizing the rotated articular surface and fracture pattern of femoral condyle which guides in management.⁹ Closed attempts at reduction are more likely to fail especially in the presence of a fracture as described and are not recommended for fear of inducing further chondral damage hence open reduction is preferred for reduction, management of associated soft tissue injuries and removal of loose cartilage fragments.¹⁰ Early planned surgical procedure aimed at gentle atraumatic reduction of the patella and achieving a strong repair of the medial

soft tissue restraints can help in early return to function and a good long term outcome.

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How to cite this article: Soraganvi PC, Narayan Gowda BS, Rajagopalakrishnan R, Gavaskar AS. Irreducible, incarcerated vertical dislocation of patella into a Hoffa fracture. *Indian J Orthop* 2014;48:525-8.

Source of Support: Nil, **Conflict of Interest:** None.