Case Report

Horizontal Intra-articular dislocation of patella with intact periosteal sleeve in an adolescent: Case report and review of literature

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Abstract

Intra-articular patella dislocations are uncommon, but the majority of cases can be reduced by closed methods. We present a rare case that required open reduction and highlight the reasons and present a review of the same.

We describe a rare case of horizontal intra-articular patella dislocation associated with an intact periosteal sleeve and extensor retinaculum in a 13-year-old boy requiring open reduction.

Horizontal intra-articular patellar dislocation is an uncommon injury, especially in the adolescent age group. Open reduction should only be performed if closed reduction is unsuccessful.

Keywords: Horizontal intra-articular dislocation of patella; Intact periosteal sleeve; Open reduction.

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International Journal of Paediatric Orthopaedics | www.ijpoonline.com |
DOI- 10.13107/ijpo.2021.v07i01.097

Introduction

Patellar dislocation is an orthopaedic emergency. The commonest type of patellar dislocation is a lateral dislocation; frequently seen in the adolescent age group of 10-17 years [1]. Intra-articular dislocation of the patella is a rare entity in which the patella dislocates into the knee joint, either horizontally or vertically [1]. To the best of our knowledge, there exist only about sixty cases reported in the literature, the majority in adults [2, 3].

Intra-articular patellar dislocations can be horizontal or vertical depending on the axis of rotation. Horizontal intra-articular dislocation is commoner, more often seen in the adolescent and young adult age group and usually associated with injuries to the quadriceps, extensor apparatus or the femoral shaft and condyles [3, 4]. In a horizontal intra-articular dislocation, the patella rotates around its horizontal axis. Either the articular surface faces proximally towards the femur with the lower pole detached from the ligamentum patellae or it may face distally towards the tibia with the upper pole detached from the quadriceps tendon. In the vertical type of intra-articular patellar dislocation, the patella rotates around its vertical axis. In this case, the articular surface can either be facing medially or laterally. We report a rare case of horizontal intraarticular dislocation of patella with an intact periosteal sleeve in an adolescent 13-year-old boy, which was managed with open reduction.

Figure 1: Pre-op Xray showing left horizontal intra-articular patella dislocation

Figure 2: Pre-op MRI showing left horizontal intra-articular patella dislocation with an intact periosteal sleeve marked by the green arrow

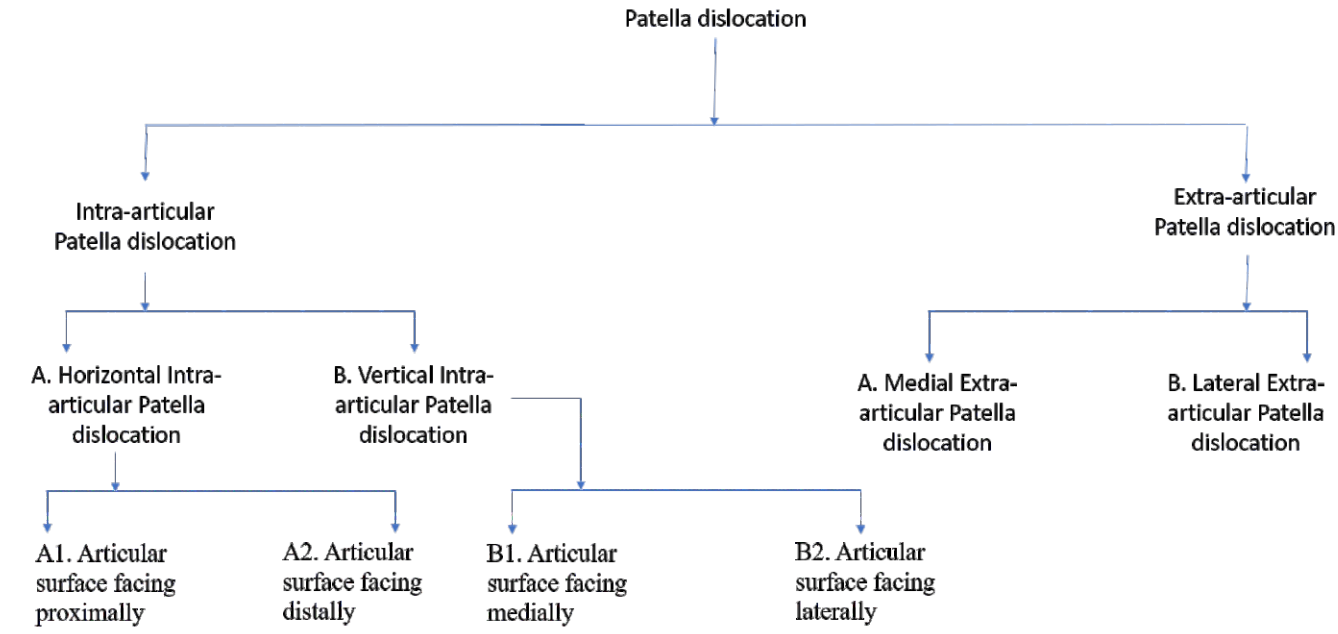

Table 1: Shafat's classification of Patellar dislocation

Case Report

A 13-year-old boy came to the ER with pain and swelling in the left knee around 2 hours following a dance injury where he experienced a "twist" of the knee. He was unable to stand or walk after the injury. On physical examination, his left knee was seen to be locked in flexion of 60 degrees. No further flexion was possible. There was moderate swelling in the left knee with the inferior pole of the patella and ligamentum patellae more prominent compared to the opposite side. The superior pole of the patella could not be palpated. There was diffuse tenderness. The radiographs showed horizontal intra-articular dislocation of the left patella with the articular surface of the patella facing distally (Shafat's classification type A2) with no other bony injury [4] (Figure 1) (Table 1).

MRI of the left knee confirmed the horizontal dislocation and showed that the quadriceps tendon, medial patello-femoral ligament and the ligamentum patellae were intact and in continuation with the periosteal sleeve of the patella [5, 6] (Figure 2).

Under general anaesthesia, closed reduction was attempted by trying to dis-impact the patella from within the knee joint. This was attempted by trying to pull the patella out of the joint with the knee flexed at 30 degree. This was unsuccessful and we therefore performed an open reduction. Under tourniquet control, the anterior periosteal sleeve of the patella was exposed through a

Figure 3: Intra-op image showing Periosteal sleeve cut to deliver the patella out of the knee joint

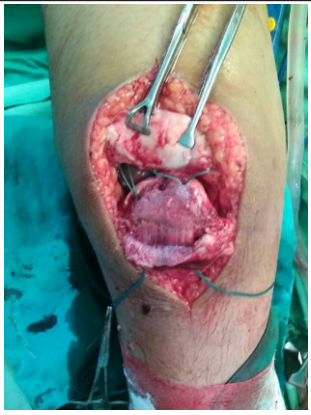

Figure 4: Intra-op image showing Periosteal sleeve repaired after multiple drill holes in patella to pass the Ethibond sutures

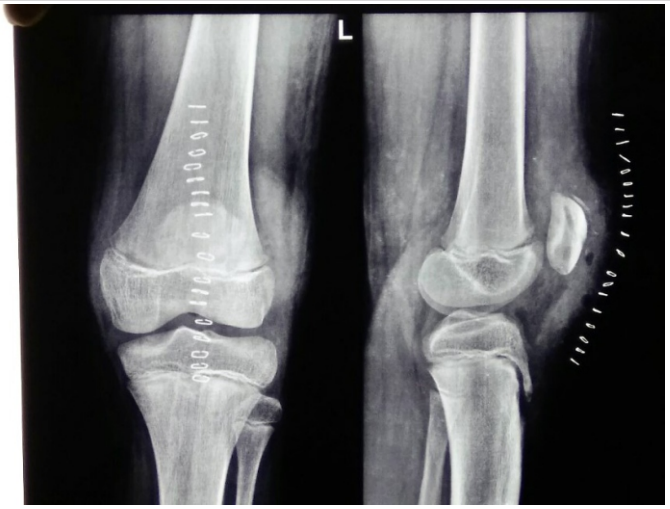

Figure 5: Immediate Post-op Xray showing patella reduced maintaining normal patella height as determined by the Insall-Salvati ratio

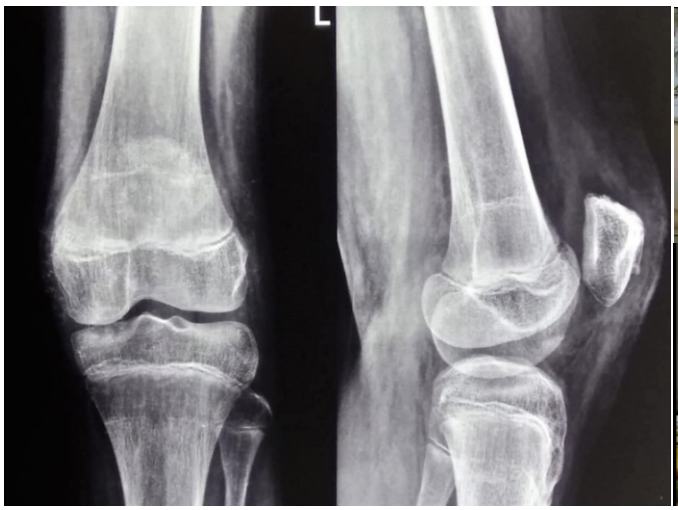

Figure 6: (6 a) One year follow up X-ray showing normal patella height as determined by the Insall-Salvati ratio and no degenerative changes in the knee joint; (6 b) One-year post up showing full extension with no extension lag; (6 c) One-year post up showing full flexion of the left knee,

midline longitudinal incision. It was found to be completely intact. An attempt to reduce the patella without incising the periosteal sleeve was unsuccessful. The sleeve was incised transversely, and the cut ends retracted proximally and distally. The patella was found to be locked between the femoral condyles. It was then gently delivered with a blunt periosteal elevator from within the knee joint. (Figure 3) The extensor retinaculum was inspected and it was found to be torn.

Once the patella was brought to its original position, attention was directed towards the reconstruction of the periosteal sleeve which had to be cut in order to reach the patella. Multiple vertical drill holes were made in the patella through which non-absorbable Ethibond sutures were passed and the patella sutured to the Quadriceps tendon maintaining the standard patellar height (Figure 4). The Periosteal sleeve and extensor retinaculum were repaired with Vicryl 2-0, and the wound was closed in layers under a negative suction drain. A cylinder cast was applied for 21 days in full extension of the knee and child allowed only partial weight-bearing till 3 weeks (Figure 5).

Gentle active and active assisted exercises were started after confirming active knee extension and integrity of the quadriceps mechanism. Attention was paid specifically to quadriceps strength and knee range of motion.

The child regained full range of motion with Grade 5 quadriceps power by around 8 weeks. At one-year follow-up, the child had a normal knee range of 0-140 degrees with full quadriceps power and no patellar instability (Figure 6a, b, c).

Discussion

Intra-articular dislocations of the patella are rare and are of two types, horizontal and vertical. The commonest type is the horizontal intra-articular dislocation of the patella [1]. When the knee is flexed, a direct or an oblique blow to the upper pole of patella pushes the patella into the joint causing the rupture of the quadriceps tendon and causing the articular surface of the patella to face inferiorly [7]. The second type of intra-articular dislocation is due to the detachment of the inferior pole of the patella from the patellar tendon leading to the articular surface of the patella facing proximally (Figure 7).

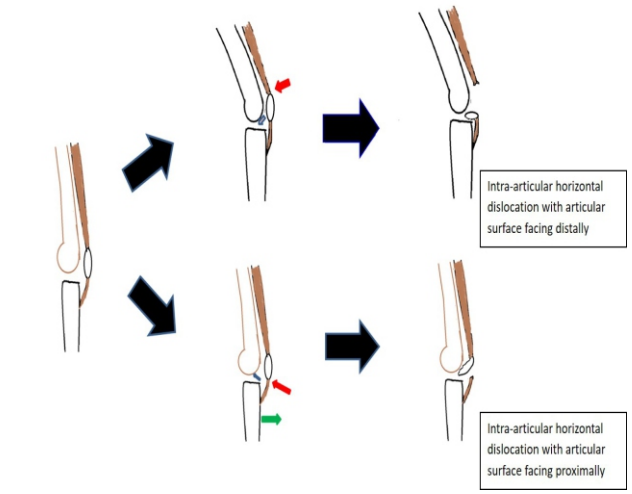

Figure 7: Diagrammatic representation of the mechanism of injury causing intra-articular dislocations of patella red arrow for the direction of force, blue arrow for the movement of patella and green arrow for the movement of distal limb.

This is a common injury in the adolescent age group after a fall during a dance or exertional sports [6]. Intraarticular patella dislocation, though being uncommon, is seen in the elderly age group too. Kramer et al has reported the youngest case yet of a 13-year-old boy [7]. It was a case of horizontal intra-articular dislocation with disrupted Quadriceps tendon and medial patellofemoral ligament injury. In this case, the dislocation was reduced after open reduction. The Quadriceps tendon and the torn medial patellofemoral ligament required repair. Most of these dislocations reduce by closed methods and rarely require open reduction [8, 9] McHugh et al reported impediments to reduction including the Quadriceps tendon and superior pole patellar osteophytes that become incarcerated in the intercondylar notch [10]. Khalifa et al reported spontaneous reduction of a horizontal intra-articular dislocation of the patella [11]. This was postulated to be due to quadriceps fatigue in a 66-year-old lady who had already undergone two failed attempts at closed reduction.

We postulate that, in our case, the intact periosteal sleeve was an impediment to possible closed reduction as there was no control over the patellar movements and the patella devoid of its sleeve was lying loose in the intra-articular space of the knee joint.

Table 2: mentioning articles in literature describing intra-articular dislocation in children

Author/ Year	Age of child	Diagnosis	Management	Complications
Broek et al/1985 [12]	14 years	Horizontal intraarticular dislocation of patella	Closed reduction and aspiration of hemarthrosis	None
Shaw et al/1995 [4]	14 years	Horizontal intraarticular dislocation of patella with osteochondral fracture of the proximal pole of patella	Closed reduction of the dislocation followed by joint exploration and reduction of the osteochondral fracture and fixation with sutures	None
Kramer et al/2013 [7]	13 years	Horizontal intraarticular dislocation of patella with Quadriceps tear and medial patella-femoral ligament tear	Open reduction and repair of both the structures	None
Berenger et al/2013 [13]	16 years	Horizontal intraarticular dislocation of patella with Quadriceps tendon avulsion from superior pole of patella	Closed reduction failed. Open reduction done followed by repair of Quadriceps tendon	Asymptomatic Ossification of quadriceps tendon
Potini et al/2015 [14]	14 years	Horizontal intraarticular dislocation of patella with Hoffa fracture	Closed reduction of the dislocation followed by open reduction and internal fixation of the Hoffa fragment	Restricted ROM 5-110 degrees
Gupta et al/2018 [9]	14 years	Horizontal intraarticular dislocation of patella with partial Quadriceps tendon tear	Closed reduction with repair of the tendon as the tear > 40%	None

Opening the periosteal sleeve to enter the joint cavity was necessary to achieve reduction and adequate tensioning of the sutures was vital to restore patella height.

Conclusion

Horizontal Intra-articular dislocation of the patella is an uncommon orthopaedic emergency occurring in adolescents following a sports or dance injury. This report highlights the rare case of intraarticular dislocation in a 13-year-old boy where the intact periosteal sleeve did not allow closed reduction and required an open reduction.

Clinical Relevance

Horizontal intra-articular dislocation of the patella is a rare orthopaedic emergency which can be treated by closed reduction. Very rarely if it fails, open reduction is indicated.

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Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Shah M, Shah A, Agashe M | Horizontal Intra-articular dislocation of patella with intact periosteal sleeve in an adolescent: Case report and review of literature | January-April 2021; 7(1): 22-26.