

**Case Report**

# Patellar fractures in children

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## Summary

We describe a rare case of patellar fracture in a seven year old girl. The case was reviewed for various aspects such as clinical diagnosis, imaging tests and most suitable treatment.

## Introduction

Pediatric patellar fractures are relatively uncommon. However, when reported, they involve patients younger than 16 years [1]. The peak incidence is between 8-12 years of age [2]. The reason for this is the relative flexibility of the patella in childhood which is less affected by impact and tension forces during quadriceps contraction [3]. The mechanism of such fractures is either due to direct trauma and/or excessive contraction of the extensor mechanism. Houghton and Ackroyd [4], elucidated an avulsion-type fracture of the lower end of the patella; in such fractures a significant chunk of cartilage is avulsed from the patella affixed to a discrete bone fragment. Such fractures may not be commonly diagnosed, especially if there is a large hemarthrosis or if X-ray studies aren't clear about the fracture line [4,5]. In such cases, MRI of the knee is the diagnostic modality of choice [6,7], in the detection of this condition in order to avoid later damage to knee extension or the formation of megapatellas with irregular joint surface [8-10].

## Case Report

A seven year old Ghanaian girl was running at school and she collided with another girl and her right knee hit a concrete pillar. When she presented to emergency department she had complaints of pain and swelling right knee and inability to bear weight on right lower limb. On examination, there was moderate swelling and tenderness over right patella. The patient could not perform an active extension of the knee. Xrays revealed a patellar fracture.

Patient was admitted to the hospital and was given analgesics and knee immobiliser. She was treated by Open reduction and Internal Fixation using K wires and Tension Band Wiring in the following day. A cylinder slab was advised for 3 weeks post operatively. Immobilisation with plaster

## More Information

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was discontinued after 3weeks and X-ray showed fracture was uniting well. She was referred to physiotherapy and was advised knee mobilisation exercises and partial weight bearing.

Radiograph before surgery (Figure 1A,B)

She was followed up regularly and at 6 weeks clinically there was no tenderness at the fracture site.

Her knee ROM was full with full active flexion and extension and she was bearing full weight. Check X-rays showed complete union of fracture at 6 weeks.

At the last follow up at 6 months, the child was asymptomatic and was advised implant removal.

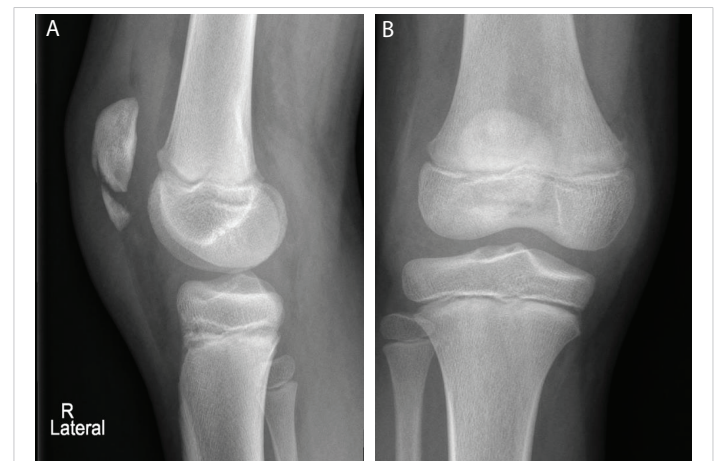


Figure 1AB: Radiograph before surgery.

Radiograph after six weeks (Figure 2A,B)

Radiograph After 6 Months (Figure 3A,B)

## Discussion

The girl in our case report had an age less than the usually reported age group of patellar fractures in children which is 8-12 years [1]. This may be due to a combination of direct and indirect trauma that is the peculiar mechanism of injury which occurred in our patient.

The predominant quandary regarding pediatric patellar fractures is the diagnosis. Often, congenital anomalies may mimic fractures [11,12]. Another issue in such cases is difficulty in gauging the size of the fracture fragments, more so in sleeve-type fractures due to the cartilaginous nature of the patella [13]. Belman and Neviasser [1] reported that missed or delayed diagnoses are common for patellar fractures in children. Sleeve-type patellar fractures often occur in children who take part in activities requiring knee extension force with quadriceps contraction against resistance, with injury occurring on the supportive leg. Hence, this form of injury is unlike those due to direct knee trauma [4]. Grogan, et al. [14] gave his classification of pediatric patellar fractures based on their anatomic location. The proximal avulsion fracture, which

is the commonest, involves the patellar upper pole while as the distal end avulsion is commonly traumatic, just like our case. Medial avulsion injury can be seen after a lateral patellar dislocation. The avulsion of the superolateral corner of the patella may be mistaken for a bipartite patella or may be stress induced due to repeated traction of the vastus lateralis muscle [12]. A similar stress induced injury is the Sinding-Larsen-Johansson disease, due to repeated stress of the distal patellar end causing an incomplete avulsion of the patellar ligament fibers and subsequent necrosis and calcification [15].

To be aware of the possibility of such an injury, a good history along with characteristic radiological features should lead to the diagnosis. The avulsed patellar fragment invariably includes a sizable sleeve of cartilage; it is imperative that this fragment must be accurately reduced to re-establish the articular surface of patella [4].

The treatment of paediatric patellar fractures with splints in lower limb extension can result in a reconstruction of the extensor apparatus, but a patellar deformity can remain (megapatella) with motion restraint, especially in extension [16,17]. Extensor mechanism reconstruction surgery with absorbable sutures has not shown good results [4,17,18]. The most ideal treatment method seems to be the rigid internal fixation of the fracture with emphasis on anatomical reduction and the realignment of the joint cartilage [4]. When bone fragments are small, internal fixation must be performed by a tension band [4,19]. The stability of internal fixation can be augmented by suturing medial and lateral retinacula which is very important. With rigid fixation, active flexion and extension exercises of the knee are initiated as early as possible as soon as the wound has healed and a normal range of movements of knee was achieved within a few weeks as we observed in our case.

Tsubosaka et al. [18] has reported a case of fracture patella in a 12 year old boy following a skateboard injury. As tension band wiring was unsuccessful it was treated with transosseous tunnelling and suturing with ethibond 5 and cerclage wiring of patella.

Ndeleva et al. [20] has reported a case of transverse fracture patella in a 10 year old boy 2 months after a fall. He was treated with tension band wiring.

Johan Kirkegaard, et al. [21] has reported a case of fracture patella in a 11 year old boy which was missed initially and later diagnosed after 6 weeks with MRI scan. He was treated with open reduction and fixation of patella using cerclage and fiber wire sutures.

## Conclusion

Although fractures of the patella in children are uncommon, we should think of it as one of differential diagnoses in cases of acute knee injuries especially when the injury was caused

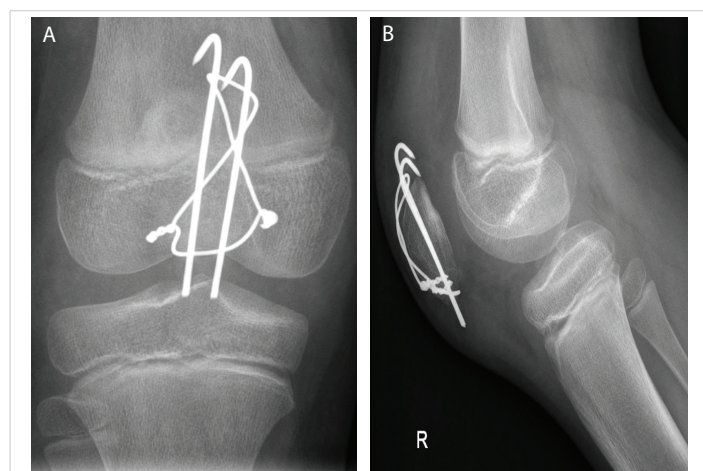


Figure 2AB: Radiograph after six weeks.

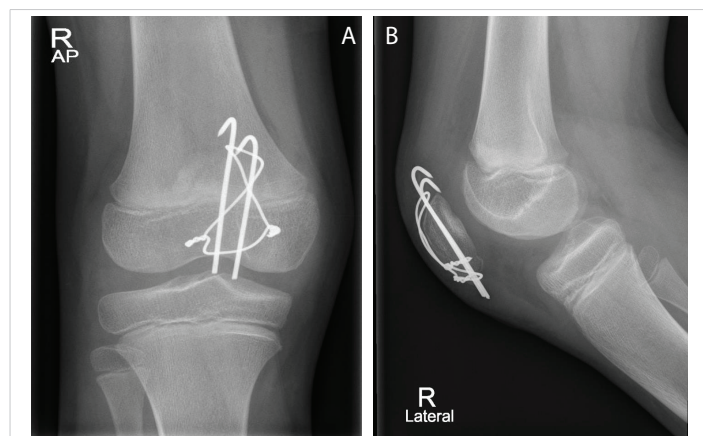


Figure 3AB: Radiograph after 6 months.

by excessive force such as jumping or sports injuries. The diagnosis can often be missed in fractures with a very small avulsed bony fragment. We suggest MRI scan in doubtful cases for early diagnosis and early surgical intervention and internal fixation with mobilization can achieve excellent results for displaced fractures of the patella.

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