

TRANSVERSE PATELLA FRACTURE IN A TEN YEAR OLD BOY: CASE REPORT

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ABSTRACT

Patella fractures are rare in children. Transverse fractures in particular are an uncommon pattern. We report a case of a transverse patella fracture in a ten year old boy. He presented with inability to actively extend his left knee, two months after a fall. On evaluation he was found to have a transverse fracture of his left patella. This was treated by tension band wiring.

INTRODUCTION

The function of the patella is to increase the mechanical advantage of the quadriceps by increasing the angle at which the quadriceps acts. In children a larger part of the patella is cartilaginous compared to adults. It is also a lot more mobile and therefore less predisposed to fracturing (1,2). As more and more of the patella ossifies, the incidence of fractures of the patella increases. The pattern too changes. While the sleeve fracture is the commonest pattern seen in young children, adolescents will have other patterns including transverse and comminuted fractures just as in the adults (1, 2). We are not aware of any reported case(s) of patella fracture(s) in children in local literature.

CASE REPORT

A ten year old boy presented at the Rift Valley Provincial General Hospital, Nakuru two months after he fell on his left knee. He presented with inability to actively extend his left knee. Immediately after the fall, he reported that he had pain and swelling which resolved after about two weeks. However the inability to extend his knee had persisted. On examination, there was wasting of the quadriceps muscles and a palpable gap within the patella. The patient could not extend the affected knee actively. The rest of the knee examination was normal. Radiographs revealed a transverse fracture of the patella as shown in Figure 1. Figure 2 shows the radiographs of the patient's right (normal) knee.

Figure 1

AP and lateral view radiographs of the patient's left knee



Figure 2

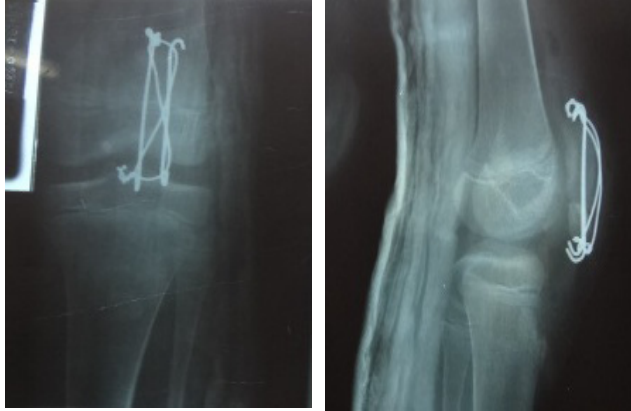
AP and lateral view radiographs of the patient's right (normal) knee



The patient was treated by open reduction and internal fixation of the patella fracture with a tension band wire using 1.6mm k-wires and gauge 18 cerclage wire and the limb splinted in a back slab.

Figures 3 and 4

The patient's post-operative check radiographs



DISCUSSION

Patella fractures are rare in children. Schmal *et al* (1) reported an incidence of 0.44% amongst children and adolescents. Most of the fractures were in older children with none seen before the age of 8 years. Of these fractures, sleeve fractures are the commonest accounting for about 60% of all paediatric patella fractures (2). They were first reported by Houghton and Ackroyd in 1979 (3). Transverse fractures, fractures of the poles and comminuted fractures of the patella are less common in children (1, 2, 4, 5). These patterns are commoner in adolescents in whom a greater part of the patella has ossified. Overall, boys have a higher incidence of patella fractures than girls (1, 2).

Causes of patella fractures in children include direct force onto the patella with the patella being crushed against the distal femur. Most of these injuries occur during sporting activities (6). Another cause of patella fractures is indirect forces such as forceful contraction of the quadriceps while the knee is flexed. This results in avulsion fractures of the patella (6, 7). Stress fractures have also been reported as a result of repetitive forces (8, 9).

Whatever the cause, patients complain of a variable degree of pain and swelling. They may also complain of inability to extend their knee actively. On examination, there may be a variable degree of swelling and tenderness. The proximal portion of the patella may be high-riding (patella alta) in patients in whom the extensor mechanism has been completely disrupted.

The patient may be unable to actively extend the knee as a result of disruption of the extensor mechanism or on account of pain. However, even with a fracture, active range of motion may be maintained as long as the retinaculum is not disrupted. This is usually painful in the acute phase (5). Therefore, presence of active extension should not be misconstrued to preclude a

patella fracture.

When a patella fracture is suspected, plain radiography is the mainstay of investigation. Anteroposterior and lateral view radiographs are the standard. The knee should be flexed to 30 degrees when taking the lateral view to best demonstrate any displacement (7, 10). For displaced fractures through the substance of a fully ossified patella, the diagnosis is usually obvious on good radiographs. For transverse fractures, as the one we are reporting, a gap is most obvious on the lateral view. Scrutiny of the anteroposterior view too reveals a gap though the superimposed distal femur may make it harder to appreciate the fracture. Longitudinally oriented fractures are best seen on the skyline view (10).

Non-displaced patellar fractures are easily missed on plain radiographs. For such, an MRI is the investigation of choice (5, 11, 12). MRI is also the only way in which the size of the chondral fragment in the sleeve fractures can be determined pre-operatively. It should therefore be considered for all patients in whom the doctor highly suspects a fracture but has normal plain radiographs and in all paediatric patients with an avulsion fractures of the lower pole of the patella to check for a sleeve fracture.

Knowledge of the ossification pattern around the knee as well as normal variants is essential so as to distinguish fractures from other anomalies such as bipartite patella and Sinding-Larsen-Johanssen disease (13).

Patella fractures are considered to be displaced if the articular step off or separation of the fragments is greater than 3mm (5). Non-displaced fractures of the patella can be treated non-operatively with a splint/brace for two to four weeks depending on the age of the patient. Displaced fractures are treated operatively. The aims are to restore continuity of the extensor mechanism, restore joint congruency and maintain patella height (1, 2, 6).

Open reduction is done and the reduction held with either Tension Band Wire (TBW), modified tension band wire or a circumferential cable for comminuted fractures. Osteosynthesis with lag screws has also been described. For sleeve fractures and other avulsion fractures in which one of the fragments is too small, transosseous sutures may be used (1, 10). For polar fractures, all effort should be made to conserve all but the smallest of polar fragments as it has been shown that long term outcome is superior where the polar fragments are retained as compared to when they are resected (14).

After the period of immobilization for non-displaced fractures and once pain allows for fractures treated operatively, the patient should undergo physiotherapy just as is recommended for adults (15). This includes knee range of motion exercises and quadriceps strengthening exercises. The goal is to regain the pre-injury level of function.

REFERENCES

1. Schmal, H., Strohm, P. C., Neimeyer, P. *et al* Fractures of the patella in children and adolescents. *Acta Orthop. Belg.* 2010; **76**(5):644-650.
2. Dai, L.Y. and Zhang, W. M . Fractures of the patella in children. *Knee Surg, Sports Traumatol. Arthrosc.* 1999; **7**: 243-245.
3. Houghton, G.R. and Ackroyd, C.E. Sleeve fractures of the patella in children: a report of three cases. *J. Bone Joint Surg. Brit.* 1979; **61-B**(2):165-168.
4. Makhdoomi, K.R., Doyle, J. and Moloney, M. Transverse fracture of the patella in children. *Arch. Orthop. Trauma Surg.* 1993; **112**(6):302-303.
5. Ismail, A., Mahmut, N. A. and Mehmet, K. Non displaced transverse patella fracture in a child: A case report. *Sci. Intern.* 2013; **1**:183-185.
6. Ray, J.M. and Hendrix, J. Incidence, mechanism of injury, and treatment of fractures of the patella in children. *J. Trauma-Injury Infec. Critical Care.* 1992; **32**(4):464-467.
7. Grogan, D.P., Carey, T. P., Leffers, D. and Ogden, J.A. Avulsion fractures of the patella. *J. Paediat. Orthop.* 1990; **10**:721-730.
8. Hensal, F., Nelson, T., Pavlov, H. and Torg, J. S. Bilateral patellar fractures from indirect trauma: A case report. *Clin. Orthop.* 1983; **178**:207-209.
9. Iwaya, T. and Takatori, Y. Lateral longitudinal stress fracture of the patella: Report of three cases. *J. Pediat. Orthop.* 1985; **5**:73-75.
10. Beaty, J. H. and Kumar, A. Fractures about the knee in children. *J. Bone Joint Surg. Am.* 1994; **76**(12):1870-1880.
11. Bates, D. G., Hresko, M. T. and Jaramillo, D. Patella sleeve fracture: Demonstration with MR imaging. *Radiology.* 1994; **193**:825-827.
12. Shands, P. A. and McQueen, D. A. Demonstration of avulsion fracture of the inferior pole of the patella by magnetic resonance imaging: A case report. *J. Bone Joint Surg. Am.* 1995; **77**: 1721-1723.
13. Medlar, R. C. and Lyne, E. D. Sinding-Larsen-Johansson disease. Its etiology and natural history. *J. Bone Joint Surg. Am.* 1978; **60**:1113-1116.
14. Veselko, M. and Kastelec, M. Inferior patella pole avulsion fractures: Osteosynthesis compared with pole resection. *J Bone Joint Surg. Am.* 2004; **86**(4):696-701.
15. Mehdi, M., Husson, J. L., Polard, J. L. *et al*. Treatment results of fractures of the patella using pre-patellar tension wiring. Analysis of a series of 203 cases. *Acta. Orthop. Belg.* 1999; **65**(2):188-196.