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Treatment of Patella fracture with predesigned locking plate: A case report

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Abstract
Patella, account for approximately 1% of skeletal fractures. Commonly used method for treatment of patella fractures still include tension band wiring/cerclage wiring. Here we present a case of Patella fracture treated by using a predesigned locking plate (Arthrex) for fixation. A 45year old female presented with a comminuted fracture of the right patella [AO – 34-C2] following a direct blow to the right knee. After achieving satisfactory reduction the appropriate star shaped plate was selected and fixed with 3.5mm locking screws. Knee movements were started after 4 weeks from the surgery. Patient was shifted to full weight bearing and achieved full range of motion over the next 8weeks with significant reduction in pain. Patient is currently walking full weight bearing without support and has full range of motion of the knee without any post-operative complications at 1year from the date of surgery. These newly designed plates have reduced the size of the metal also also increased the stability of fracture fixation. These plates can certainly provide us with the added benefits like lower chances of soft tissue irritation due to the anatomical structure, ability to fix comminuted fractures to achieve anatomical reduction and a higher mechanical stability.

Keywords: Patella, locking plate, stability, tension band wiring

Introduction
Patella, being the largest sesamoid bone with a very superficial and subcutaneous location is very prone for direct traumatic injuries.

Patella fractures account for approximately 1% of skeletal fractures in adults [1, 11]

Comminuted fractures result after a direct injury with the knee in flexion while indirect trauma i.e when the force exerted by the extensor mechanism exceeds the tensile strength of the patella results in a transverse type of fracture [10].

Undisplaced fractures are usually managed conservatively using knee braces or cast while surgery is indicated in cases of open fractures, intra articular fractures, displacement of more than 2-3mm of the articular surface [1, 3, 7, 9]

Even though medical research has made advancements in almost every kind of fracture in the skeleton, surprisingly very little growth has been observed in the management of patella fractures.

Despite the high complication rate, the most commonly used method for treating patella fractures still remain tension band wiring / cerclage wiring and cancellous screws [2, 11].

Even though this method provides a stable construct, complications like early fracture dislocations were noted in upto 30% cases [4, 8] Other more common complications which include migration of wires, chronic pain due to skin irritation due to K wires made revision surgery necessary in upto 65% cases [5, 14]

We face a shortage of options while treating comminuted fracture with either cerclage wiring or patellectomy in our arsenal.

Such a high rate of complication and lack of treatment options in comminuted fractures make further research in the management of patella fractures a necessity.

Here we present a case of Patella fracture treated by Open reduction and internal fixation using a predesigned locking plate (Arthrex) for fixation.

Case report

Written informed consent was obtained from the patient for publication of this case report, accompanying images and any additional related information.

A 45year old female presented to a tertiary care hospital with c/o pain and swelling over the right knee and inability to bear weight on the right leg following a direct blow to the knee as she slipped from the staircase.

On initial examination, the knee was grossly swollen with tenderness over the patella and knee movements were painful and restricted.

On primary evaluation, there was no evidence of any other injury.

The radiograph revealed a comminuted fracture of the right patella [AO – 34-C2] (Figure1).

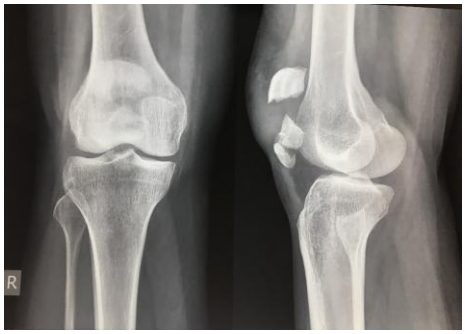

Fig 1

Patient was taken up for surgery the next day under Spinal Anaesthesia.

Patient was placed in supine position with a pneumatic tourniquet applied to the proximal thigh.

A midline incision was given and the retinacular damage was assessed. Fracture was reduced and held using patellar clamps and reduction clamps.

The articular surface and reduction was assessed with a C-arm machine.

After achieving satisfactory reduction (Figure 2),

Fig 2

Fig 3

The appropriate star shaped plate (Figure 3) was selected from the available options (Figure 4) and placed over the retinaculum.

The plate was temporarily fixed with K wires (Figure 5). 6 screws (3.5mm) were used to fix the plate (Figure 6).

Fig 4

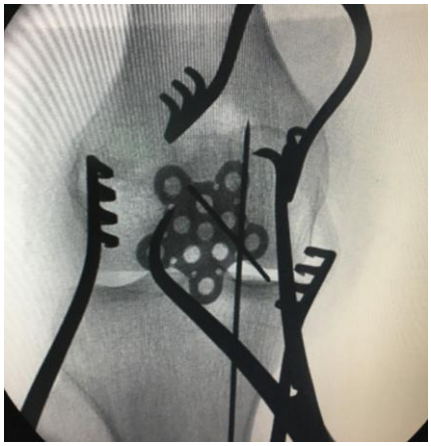

Fig 5

Fig 6

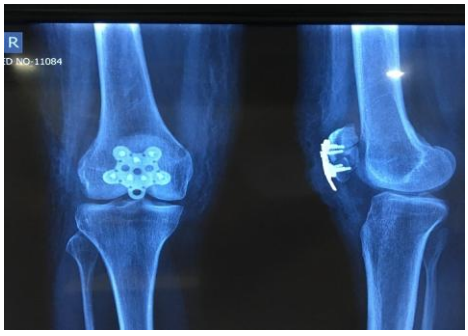

Fig 7: (Post-operative X-ray)

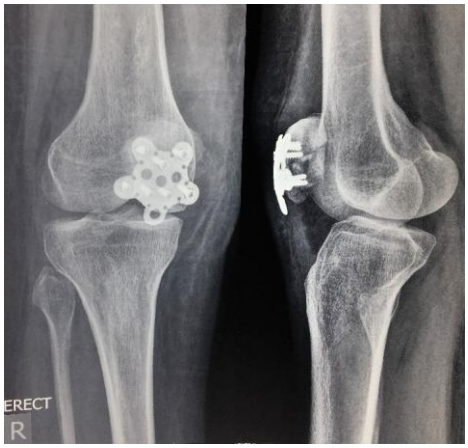

Fig 8: (4 weeks post op)

The wound was washed thoroughly using normal saline and closed in layers.

Patient was put in a knee brace following the surgery.

Suture removal was done at 2weeks from the date of surgery and patient was kept on partial weight bearing with walker and knee movements were not permitted for 4 weeks from the surgery.

Gradual knee range of motion exercises and quadriceps strengthening exercises were started after 4weeks from surgery once satisfactory fracture healing and reduction was confirmed on radiographs (Figure 8).

Patient was shifted to full weight bearing and achieved full range of motion (Figure 9, 10) over the next 8weeks with significant reduction in pain while walking and while climbing stairs. By the end of 12th week post op, patient was able to perform all her daily activities independently.

Fig 9

Fig 10

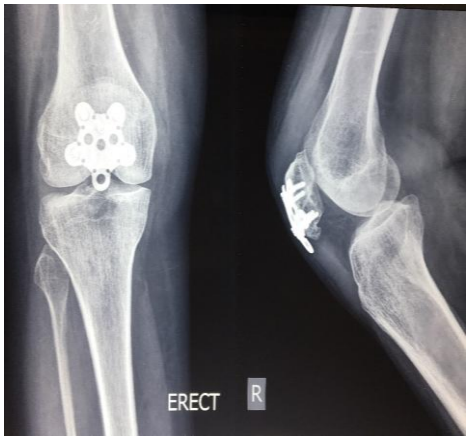

Fig 11: (10months post op)

The patient was closely followed up every month and patient is currently walking full weight bearing without support and has full range of motion of the knee without any post-operative complications at 1year from the date of surgery.

Discussion

Patella fractures have a potential to represent injuries from subtle non displaced fractures to open comminuted fractures.

The primary aim of surgical management is to obtain anatomical reduction and to use a fixation method which gives us the maximum stability with minimum complications.

Until early 19th century, conservative management was used which included splinting the knee in extension and rest.

Operative procedures were limited and included patellectomy (partial/total) or in some cases repair of extensor mechanism [11].

After a lot of research and modification in the technique of tension wiring initially described by Pauwels in 1966, a modified tension band wiring technique has been implemented and is currently the most commonly used technique in management of patella fractures.

Another technique commonly used is the cannulated lag screw along with tension band wiring which provides greater stability and usually indicated in simple transverse fractures.

Catalano *et al* and Gosal *et al* have reported that metal wire and implant removal was necessary in 65% and 38% cases respectively [6].

Even after technical modifications, cases of early fracture dislocations have been noted in 22-30% cases of tension band wiring [4, 8, 12].

These newly designed plates have not only reduced the size of the metal but have also increased the stability of fracture fixation.

This superior stability is a result of better anchorage of the plate in the bone.

The main objective of designing such an implant was to increase the stability and lower the chances of deformation under increasing load as compared to the methods available currently.

This design will also help reduce the complications of soft tissue irritation and subsequent removal.

A study by S. Wurm showed decreased displaced of fracture when subjected to maximum load when fixed with plate as compared to the traditional tension band wiring [15].

The study also showed that only 16% patients complained of stress related pain but without functional impairment.

Wild *et al* used peripheral patella plating as a low profile option in a synthetic patella model and found the fixation to be more rigid than tension band wiring [12].

Although more development is yet to be made even in the design of these plates, they can certainly provide us with the added benefits like lower chances of soft tissue irritation due to the anatomical structure, ability to fix multiple fragments together in comminuted fractures to achieve anatomical reduction and a higher mechanical stability.

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