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Neglected segmental patella fracture: A case report and review of literature

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Abstract

Introduction: Fractures of patella constitute only 1% of all skeletal injuries. Mechanism of injury can be either by a direct impact or by indirect eccentric extensor contraction. Management depends on the personality of fracture, displacement, articular surface involvement, and the status of the patient's extensor mechanism. Several techniques have been described for patellar fracture fixation.

Case Report: We present a case of a 35 year old male who had a 3 months old segmental fracture of the patella. After dissecting all the fibrous tissue in-between the fracture fragments, the 3-piece patella was fixed using principle of tension band construct.

Discussion: There have been several techniques described in literature for the treatment of patella fractures depending upon the personality of fracture like tension band wiring, cerclage wiring, cannulated screw fixation, trans-osseous suture, partial patellectomy, etc.

Conclusion: This stable fixation allowed us to start immediate physiotherapy program and has resulted in a good functional result at one-year follow-up.

Keywords: Case report, segmental patella fracture, techniques, extensor mechanism

Introduction

Although patellar fractures account for meagre 1% of all fractures, but it is important for the weight bearing extensor apparatus of the lower limb. Fractures of the patella result from either a direct impact or an indirect eccentric contraction of the extensor mechanism. Treatment is dependent on the personality of fracture, displacement, articular surface involvement, and the status of the patient's extensor mechanism. Several techniques have been described for patellar fracture fixation. They include tension band fixation, cannulated screws, plating, encirclage, non-absorbable suture repair etc. In severely comminuted fractures, partial patellectomy with restoration of the extensor mechanism may be the only treatment option. However, partial patellectomy is associated with several complication such as shortening of the extensor mechanism, increased Patellofemoral joint forces, and subsequent Patellofemoral arthritis. So every attempt should be made to preserve patella wherever possible.

Case Report

A 35 year old male presented to our institution with a complaint of difficulty in walking following a fall from motor-bike and injuring his right knee 3 months back after which he took local bone setter treatment. A palpable gap was evident at the time of examination and knee range of motion was severely restricted to 0-20 degrees of flexion. Radiographs revealed a segmental patellar fracture as shown in Figure 1. A midline incision was made centred over the patella. After dissecting all the fibrous tissue in-between the fracture fragments, the patella was found to have a large proximal fragment and an equal sized middle and distal fragments (Figure 2). Inspection of the fracture ends revealed sclerosis and smoothening. Sclerosed edges were cleared. Initially proximal and middle fragment were reduced using reduction clamp and two 2.5 mm K wires were passed from distal to proximal direction to make it a single piece. Now both the K wires were retrieved from the opposite side and then after reducing the distal fragment with this pair of proximal and middle fragment, both the K wires were passed making it a stable construct. Position of the K wires and articular congruity was confirmed in AP and lateral views of fluoroscopy. Then applying the tension band principle, stainless steel wire of 18 gauge was used in a figure of 8 fashion to complete the construct (Figure 3). Stability of the construct was checked by flexing and extending the knee. The medial and lateral patellar retinacula were repaired using No 1 vicryl suture.



Fig 1: showing pre-operative and immediate postoperative radiographs



Fig 2: showing removal of fibrous tissue in-between the fracture fragments prior to fixation

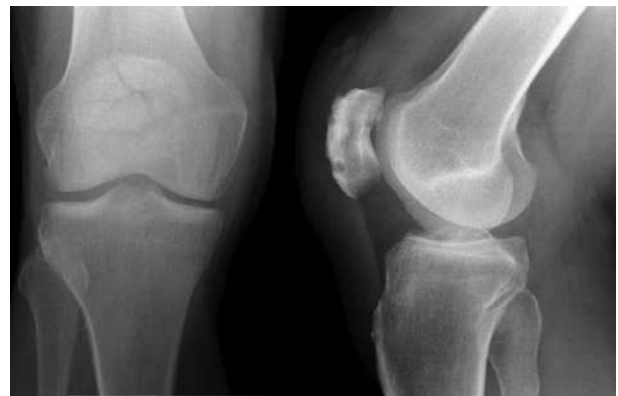


Fig 4: showing healed fracture with no visible fracture lines at 1-year follow-up post-implant removal

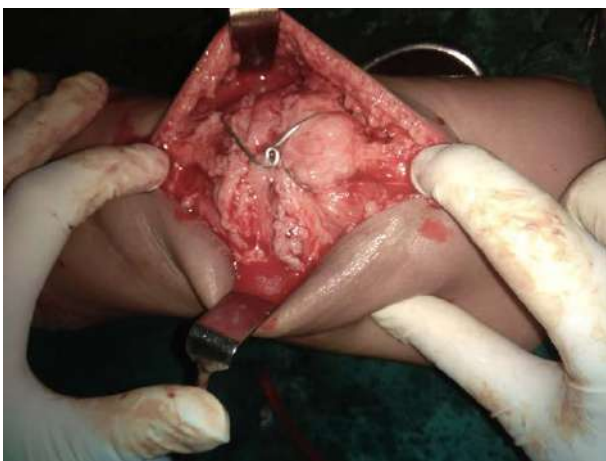


Fig 3: showing osteosynthesis using 2.5 mm K wires and 18-G SS wire.



Fig 5: showing active knee range of motion and SLR (straight leg raise)

Active range of motion (ROM) exercises were started immediately after surgery on post-op day 1. The patient was made partial weight bearing in a knee immobiliser as tolerated using a walker after 2 weeks following suture removal. This was followed by aggressive physiotherapy involving active as well as active-assisted knee ROM and quadriceps strengthening exercises at our physiotherapy centre. At her 1-year follow-up, post-implant removal, the patient has painless knee flexion up to 110 degrees. Radiographs at final follow-up show a healed patella with no visible fracture lines (Figure 4). Clinical photo of the patient's range of motion is shown in Figure 5.

Discussion

There have been several techniques described for the treatment of patella fractures. In comminuted fractures, management with inferior pole resection can result in patella baja and shortening of the extensor mechanism. Patella baja can lead to an increase in the compressive forces across the Patellofemoral joint, potentially increasing cartilage wear within the Patellofemoral joint, leading to early arthritis [1, 2]. Advances in suture material strength and bone anchor techniques have provided sufficient strength for early mobilization after patellar tendon repair [3, 4]. However, in patella fractures with distal comminution or avulsion fractures, bone anchors are not recommended because the purchase of the bone anchor depends on having an intact cortex.⁴ In cases where there is no intact cortex or insufficient bone stock is present, excising the bone fragments with attachment of the patellar tendon by trans osseous pull out suture also requires a considerable period of immobilization of the knee in order for healing to occur due to the weakness of synthetic non-absorbable sutures [5]. The tendon-to-bone junction requires at least six weeks to heal after a partial patellectomy [6]. This immobilization of the knee in extension delays rehabilitation, can result in weakness of the quadriceps muscle, and decreased functional restoration of knee range of motion [7].

In order to avoid delays in rehabilitation, techniques such as figure-of-eight wiring and patellotibial tubercle cerclage reinforcement have been described. The use of wiring may lead to implant failure, implant irritation, and the need for a secondary procedure. These techniques also make adjusting the length of the patellar tendon difficult, potentially leading to patella baja and increased Patellofemoral joint wear [5-8]. In order to promote early knee mobilization, Hung et al. [6] reinforced their patellar tendon-to-bone repair with a figure-of-eight tension band wire loop from the patella down to the tibial tubercle. The majority of the patients in their series were mobilized after one week. Though none of the patients had disruption of the repair, a high percentage did have radiographic arthritis at final follow-up likely due to the partial patellectomy. Breakage of the tension band wire is also a concern. Retaining the inferior patellar pole preserves the functional length of the extensor mechanism resulting in better functional outcomes regardless of fixation method [7, 9].

Conclusion

With our technique, we were able to provide the patient with a stable construct, early range of motion, and good long-term results. To our knowledge, this method of osteosynthesis was best suited for such neglected segmental fracture pattern and provided the desired stable bony construct.

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