



A Case Report of Comminuted Patella Fracture with Open Reduction

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Introduction: Patellar injuries are usually caused while a person slips or falls on a flexed knee and when the forces from the extensors surpass the inherent strength of patella. As the bony failure advances, it concurs or follows injury to medial and lateral extensions of quadriceps mechanism. This happens by pulling mechanism of the muscles. The patient is unable to extend the affected knee actively. This is indicative of disruption of the extensor mechanism and a torn retinaculum. This requires repair or reconstruction through operative means.

Case Presentation: To find out complications of comminuted fracture of patella and open reduction after 15 years of surgery. Case Report: A 32-year-old man had a history of fall on ground due to slipping of the wheelchair over wet floor while taking a patient on wheelchair which led to comminuted fracture of left patella with shift knee and had undergone Open reduction and Tension band Osteosynthesis. After this surgical intervention, the patient presented with knee stiffness and pain (rated 6 on numerical pain rating scale) and was referred to physiotherapy.

Conclusion: This case study concluded that there is evident stiffness and muscle wasting observed after 15 years of post-fracture surgery of patella, which was managed with the physiotherapeutic rehabilitations.

Keywords: Comminuted fracture of patella; open reduction; tension band osteosynthesis; fall; knee.

1. INTRODUCTION

There is a massive prototype of changes in treatment of fractures of patella [1]. This ranges from ancient medicine to the present developing surgical methods [2]. After patellectomy in a rabbit model, deteriorating changes were noted on the femoral articular surface as described by Cohn and Kelly et al in 2000. After patellar fractures, much better outcomes are obtained by proper reduction and stable fixation, usually after using tension band wiring method [3]. Combining the circulate wiring and screw fixation are the most accepted methods for stabilization of transverse and less comminuted fractures. This method is also adapted for marginal patella fractures. Partial or total patellectomy is indicated only in the conditions where the patella is so severely comminuted that precise reduction and reconstruction of the retro patellar joint surface is not able to execute [4]. Non-Operative treatment is followed if the extensor processing is functioning like in some non-displaced fractures, fractures in which the articular gaps are lesser than 2 mm and fractures in which displaced fragments are not more than 3 mm. When these conditions cannot be fulfilled, the surgical treatment should be taken into action [5].

2. CASE REPORT

A 32-year-old male, a resident from sawangi, Wardha working as an attendant in nursing college presented with chief complaints of left knee pain (graded 10 on numerical pain rating

scale) and swelling over left knee (Fig. 2). The patient had a history of fall on ground due to slipping of the wheelchair over wet floor while taking a patient on wheelchair. The complaints were sudden in onset and progressive with duration. The patient had no past history of any surgery or medications. The patient's family history was also irrelevant. The patient's sleep-wake cycle was disturbed due to diurnal variation of pain.

On general examination, the vital signs were stable, lungs and heart sounds were normal. On inspection, adherent scar mark of 2 & ½ cm in width and 4cm in length was seen over left knee. Upper 2/3rd swelling of calves was seen on left side. On palpation, Tenderness (grade 1) was present at anterior part of the knee. Active Knee flexion was restricted on left side (50 degrees) due to pain (Fig. 1). Crepitus was present. Muscle girth on below patellar level on calf level was increased due to presence of swelling. As a primary treatment, patient was advised to use axillary crutches or walker. X-Ray confirmed comminuted fracture of left patella. MRI confirmed fluid in patellofemoral joint, hypertrophy of quadriceps and patellar tendon, hyper intense signal was noted in both tibial condyles and articular surfaces. So, the patient underwent Open reduction and Tension band Osteosynthesis. After 1month, he was advised for static quads, knee and patellar mobilization exercises. After Open reduction and Tension Band Osteosynthesis, the patient presented with pain (6 on numerical pain rating scale) and left knee stiffness.



Fig. 1. Shows restricted ROM



Fig. 2. Shows swelling and malalignment

3. DIAGNOSTIC ASSESMENT

Typically, fracture classification and treatment decisions are based on quality Antero-Posterior and lateral radiographs of the knee, which help to clarify the type of fracture and exclude other associated lesions. The anteroposterior view may be difficult to interpret due to the overlay of the patella on the femoral condyles. In transverse fractures, lateral radiographs are useful in assessing displacement and articular congruity. The axial view of the patella at 30° of flexion is difficult to obtain because of the pain and can cause secondary displacement in cases of transverse or comminuted fracture. It is mostly useful to visualize sagittal fracture patterns, significant osteochondral lesions or retinacula avulsions. The AO/OTA (AO Foundation / Orthopaedic Trauma Association) patellar fracture classification distinguishes three groups: extra-articular or avulsion fractures, partial articular (sagittal) and complete articular (either coronal or multi-fragmentary). The patellar bone is coded with the number 34, and a letter describes the type of fracture: A for extra-articular, B for partially articular, and C for completely articular. The next number describes the subtype and the second next one the precise localization. For example, 34-C1.3 stands for a complete articular, transverse fracture through the distal third of the patella. Due to the complexity of this classification though, its interest remains uncertain in the daily practice. Computed tomography (CT) with three-dimensional reconstructions is known to be very useful for quantifying precisely the number of fragments, the articular displacement or to detect

small osteochondral fractures. A recent study by Lazaro et al. in 2013 demonstrated that with a CT scan, there was a change in the AO/OTA classification in 66% of the cases and a modification of the surgical strategy for 49% of the patients where it was extremely difficult to classify patellar fractures properly based on standard X-rays [6]. In particular, severely comminuted distal pole fractures were missed on nearly half of the standard images.

4. THERAPEUTIC INTERVENTIONS

Physiotherapy intervention starts immediately after the surgery when plaster immobilization has been done. During the period of the plaster immobilization movement of the remaining joint has to be started as early as possible. These include: active movements of the ankle; active movements of fingers and toe.; straight leg rise with little assistance; knee press exercise (static quadriceps exercise) [6].

During this period, one also has to start non-weight bearing crutch gait. It means walking with the help of crutches but without bearing the weight on the affected leg.

After the removal of plaster cast:

After the long-term immobilization of knee when plaster is removed the most common complication and complain is knee joint stiffness and weak thigh muscle. There is also a problem with walking. So immediately after removal of knee plaster, careful knee movement had to be started.

Other Physiotherapy Modalities:

1. Knee flexion extension on CPM exerciser (Continuous Passive Motion exerciser): CPM machine is used to gain knee range of motion (knee movement) where machine moves the knee joint passively. It has a graduated angle control from which angle of movement can be controlled and is increased as the movement increases. It is all done under the supervision of a qualified physiotherapist.
2. Active knee flexion-extension: Active knee flexion and extension are done within the pain-free range. Gradually range has to be increased.
3. Strengthening exercises: Knee press using pillow or bedroll and straight leg rise.
4. Partial weight-bearing gait using crutch or cane. By now one can start walking using a cane and bearing partial weight on the affected leg.

Other Physiotherapy modalities include:

- Prevention of re-dislocation: Kinesiology Taping: Lateral reinforcement will reduce the movement of the patella (to prevent dislocation);
 - Bracing; Reassurance and behavioural modification.
 - Improve range of motion: Manual therapy knee; Knee mobilizations.
 - Combination therapy
 - Strengthening exercises: Quadriceps, hamstrings, adductors, hip and lower abdomen and Closed kinetic chain exercises are recommended.
 - Stretching;
 - Improve flexibility of hamstrings and quadriceps
 - Proprioception: Improve stability of the knee
5. After six weeks independent walking with full weight bearing on the affected leg has to be started.

5. DISCUSSION

With the new advances in the method of internal fixation and advancement in the quality of metals, the present scenario's approach is more towards internal fixation. One must attempt to

preserve the patella and the surrounding structures as much as possible [7]. The chances of postoperative infection are much lower for patella fractures in terms of clinical series. Though infection is a constant risk following any open surgery, the factors can help in minimizing the chances of infection, good skin condition in operative area,; judicious use of antibiotics; optimal operation room condition; good adequate debridement (in open wounds); meticulous surgical intervention [8].

Tension band technique can be used in most of the patellar fracture patterns. One major and common disadvantage of this technique is impingement of hardware. This problem is related to irritation of the capsule and tendons from the implants [9]. Although, results of final outcome following patellar fractures may be different from patients' condition to condition. There is no generally accepted outcome assessment system for patellar fractures. Most author's base outcome on subjective details complaints of pain, limitations in ADL, and change in the job post due to decrease in working efficiency. The lack of uniform assessment scale allows only broad generalizations to be made about results of these injuries [10]. Objective points such as quadriceps wasting, knee ROM, knee pain, extensor lag, quadriceps power and function are seen. Results of open reduction and internal fixation are much better when compared to patellectomy. This suggests that one should definitely go for open reduction and internal fixation for preserving the patella as much as possible. Patellectomy should be reserved for those patients where reconstruction and osteosynthesis is not possible. The late sequelae of patella fracture can be the development of Patellofemoral Pain or other osteoarthritic symptoms [11].

6. CONCLUSION

This case study concluded that there is evident reduce in stiffness and muscle wasting observed after 15 years of post-fracture surgery of patella, when started with rehabilitation.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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