

Non-union Patella Fracture – Extensor Mechanism Repair with Quadriceps Release: A Case Report

Sushil Mankar¹, Rohan Jogewar¹, Pallav Agrawal¹

Learning Point of the Article:

Good functional outcome and early return to activities of daily living is possible in case of old, non-united patella fractures, which are difficult to treat with proper planning and meticulous surgical procedure.

Abstract

Introduction: Non-union patella is rarely seen in everyday outpatient department. Displaced patella fractures usually require surgical treatment for optimum results. The proximal fragment is retracted by the pool of quadriceps muscle. Conservatively managed displaced patella fractures lead to nonunion and impaired knee function.

Case Report: In our study, a 10-month-old neglected displaced patella fracture with impaired knee function was treated with extensor mechanism repair augmented with bone graft. A good functional outcome was observed at the end of 12 months. A good knee range of motion from full extension to 110° was observed.

Conclusion: We conclude that a stable fixation augmented with bone grafting and quadriceps release which augments bone healing gives good functional outcomes.

Keywords: Non-union, extensor lag, gap non-union, bone grafting, extensor repair.

Introduction

Patellar fractures account for about 1% of all skeletal fractures [1]. Surgical fixation is the most commonly used method of treating patella fractures. Various surgical techniques include open reduction internal fixation with Tension Band Wiring, cancellous screw fixation, or cerclage wiring [2]. Early intervention usually leads to a union of patella fractures as it is a sesamoid bone [3]. Non-union is usually rare with an incidence of around 2.4–12.5%. It is more common in developing countries like India where traditional practices and native treatment prevails [4]. Conservative treatments and traditional practices cause non-union in displaced patella fractures. The proximal fragment is pulled by the pull of the strong quadriceps muscle, leading to a gap at the fracture site [5]. If not reduced and

immobilized can cause non-union. This results in extension lag and hampered knee function. This complication may be tolerated by less demanding patients but requires surgical management in active patients [6]. Gap non-union of patella serves as a great challenge to orthopedic surgeons. The main aim of treatment is to restore the quadriceps mechanism. This will restore knee extension without compromising knee mobility. There are numerous surgical options for managing these cases without one procedure being regarded as the gold standard [7]. The particular challenges relate to quadriceps contractures causing proximal migration of the proximal bony fragment. In this case, we have used a novel single-step procedure of open reduction internal fixation with tension band wiring with bone grafting with quadriceps release augmenting with patellar

Author's Photo Gallery



Dr. Sushil Mankar



Dr. Rohan Jogewar



Dr. Pallav Agrawal

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¹Department of Orthopaedic Surgery, NKP Salve Institute of Medical Sciences and Research Centre and Lata Mangeshkar Hospital, Nagpur, Maharashtra, India.

Address of Correspondence:

Dr. Pallav Agrawal,
Department of Orthopaedic Surgery, NKP Salve Institute of Medical Sciences and Research Centre and Lata Mangeshkar Hospital, Nagpur, Maharashtra, India.
E-mail: pallav2005agrawal@gmail.com

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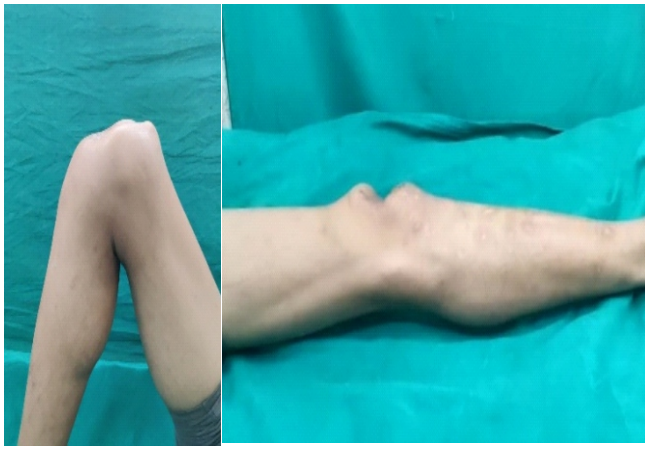


Figure 1: Clinical picture of right knee joint showing a visible gap on the patella.



Figure 2: Anteroposterior and lateral radiographs of the right knee joint showing a large gap between the fracture ends of the patella non-union.

tendon repair. Not much literature is available on this method. We obtained a stable fixation and an excellent post-operative outcome with the patient returning to activities of daily living.

Patient Information

A 23-year-old male came to our outpatient department complaining of an inability to actively extend the right knee joint. He reported a road traffic accident 10 months back. He was managed with traditional treatment consisting of multiple episodes of massages, native local application of undocumented medications, and about 3 weeks of immobilization with locally made splints. No improvement was observed despite local treatment. There was a gradual deterioration of knee function over time. The patients then came to our hospital after a period of 10 months post-injury. The primary concern of the patient was to achieve a normal range of motion of the affected knee with no extensor lag.

Clinical Findings

On examination, the patient was unable to actively extend the right knee joint. There was a visible gap in the patella (Fig. 1). There was no tenderness. There was a significant wasting of the anterior thigh as compared to the opposite side. He had painless movements of the right knee joint with significant extensor lag. Skin condition over the right knee was normal. His passive range of movement of the right knee joint was from full extension to 120° flexion. Active knee movement was only full flexion, and there was no active extension, hence the extensor lag. His activities of daily living such as walking and climbing stairs were significantly affected. The patient was admitted, and radiological investigations were done. Radiographs of the right knee joint revealed a large gap between both the proximal and the distal fragments of the patella. There was sclerosis and smoothing of the fracture ends (Fig. 2).



Figure 3: Longitudinal mid-patellar incision spanning both proximal and distal fragments.



Figure 4: Reduction of the fracture ends using patellar reduction forceps.



Figure 5: Reduction fixed and augmented with tension band wiring and Ethibond no 5.

Therapeutic Intervention

The patient was admitted to the orthopedic ward of our hospital for further management; after all necessary hemato-radiological investigations, patient was planned for surgery. The necessary informed and written consent was taken preoperatively. Under spinal anesthesia, using a tourniquet, a longitudinal mid-axial incision spanning both the proximal and the distal fragment of the patella was taken (Fig. 3). Full-thickness flaps were developed both medially and laterally and were elevated to avoid damage to the skin blood supply. After dissecting the superficial facial and the deep fascia, the extent of the non-union of both the fracture ends was identified. There was sclerosis and the formation of fibrous tissue over the fracture surfaces. The fracture ends were freshened using a curette till active bleeding was seen. There was difficulty in approximating the fracture ends; hence, a superficial partial release of the quadriceps was done. Which helped in approximating the fracture ends. Two straight and parallel k



Figure 6: Post-operative radiographs showing good placement of implants and good bony contact.

wires were passed across the distal and proximal ends, and reduction was achieved using patella reduction forceps (Fig. 4). The reduction was checked and confirmed under Figure intensification. Autologous cancellous bone grafts from the ipsilateral ischial spine were put between the fracture ends to augment fracture healing. Tension Band Wiring was done in a Figure of 8 pattern to achieve compression at the fracture site. To further enhance fixation, the distal fragment along with the patellar tendon was sutured with the proximal fragment using non-absorbable sutures (Ethibond no. 5) (Fig. 5). The strength and stability of fixation were assessed intraoperatively by achieving a knee flexion up to 90°. Medial and lateral patellar retinaculum were repaired using absorbable sutures. A thorough wash was given, skin was closed in layers, and above knee slab was given in knee extension. Post-operative radiographs of the knee were taken which showed well-reduced fracture and well-placed implants with good bony contact (Fig. 6).



Figure 7: Radiographs at 6 months showing good union at the non-union site with well-placed implants.

Post-Operative Protocol

The affected limb was immobilized for a period of 2 weeks in extension. Analgesics and antibiotics were given as per protocol. Regular dressings were done. The patient was discharged on post-operative day 7.

Follow-up and Outcomes

Knee movements, both active and passive, were started after 2 weeks. Initially, there was some pain and difficulty in knee movements which gradually improved after a period of 4 weeks. The patient was regularly followed up at 4, 8 weeks, 6 and 12 months. At each follow-up, clinical and radiological evaluation was done to do the functional assessment and monitor radiological signs of bony union. The functional outcome was



Figure 8: Clinical picture at the end of 6 months showing full knee extension and full flexion.

assessed using the Knee Injury and Osteoarthritis Score (KOOS) [8]. At the end of 4 weeks, the KOOS score was 60% (Good). Knee radiographs revealed well-reduced fracture and well-placed implants with no loosening or back out of any wires (Fig. 7). There was a gradual improving trend in the knee movement and functional outcomes on successive follow-ups (Fig. 8). The functional outcomes at the end of 4 weeks, 6 months, and 12 months were found to be 60% (Good), 86% (Excellent), and 92% (Excellent), respectively, according to Knee Injury and Osteoarthritis Knee score. The radiological findings showed good signs of bony union on radiographs taken at 6 months and 12 months.

Discussion

The primary aim of reporting this case is to emphasize that surgical management in patella non-union is necessary to restore knee range of motion and an acceptable functional outcome. The objective of our surgery was to pull the proximally retracted fragment and reduce the large gap between the fragments. Few cases and studies have been reported for such fractures. Few studies have described two-staged procedures that include Ilizarov or skeletal traction to reduce the non-union gap [9]. Although good results have been discussed, these procedures are associated with complications, such as pin-tract infections, pin loosening, prolonged duration of surgery, and increased costs. Other studies have advised a VY plasty of the quadriceps to pull the proximally retracted fragment to reduce the non-union gap [10]. However, it is associated with weakness of the quadriceps in turn leading to prolonged rehabilitation and residual extension lag. A single-staged procedure with stable fixation with tension band wiring, augmenting with bone grafts, and reinforcing the fixation with non-absorbable sutures (Ethibond no. 5) gave us good results. Patellectomy is also suggested in a few studies but leads to extensive duration of rehabilitation and residual extensor lag

[11]. There is no gold standard treatment of long-standing patella non-union with huge gaps and there are very few documented studies. In our case, the retraction of the proximal fragment of the patella was achieved by superficial partial release of the quadriceps to achieve functional lengthening. The need for VY plasty of the quadriceps was not needed in our case to pull the proximal fragment and restore the extensor mechanism. There was an excellent functional outcome after 1 year of follow-up. From our observation, we conclude that in nonunion patella with huge gaps, a good bony contact of opposing fragments with adequate fixation, augmented with cancellous bone grafting leads to an excellent functional outcome with a good range of knee movements without any extensor lag. Rehabilitation should be taken into consideration to restore the long-standing quadriceps weakness and to achieve good movements of the affected knee joint. Prospective and multicentric studies are required to contribute additional evidence on the management of nonunion patella, given the limited existing data.

Conclusion

In the end, we would like to conclude that with serial follow-ups we were able to obtain a stable construct that held its place in the follow-ups. We met with the clinical expectations of the patient. The patient was able to do his activities of daily living, especially straight leg raise. Augmenting the procedure with a bone graft expedited the bone healing.

Clinical Message

Old Gap Non-united Patella fracture can be managed with a single-staged definitive procedure with tension band wiring and bone grafting and good knee function in terms of extension mechanism and knee range of movement can be achieved with an aggressive rehabilitation program.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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