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A case report on non-union of the inferior pole of the patella: A surgical dilemma

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Abstract

Introduction: Patellar non-union are rare orthopaedic cases. Treatment of these cases is a problem as no set protocol has been laid down to manage them.

Case report: We present a case of a 40-year-old man with a year-old inferior pole of patella non-union. Radiographs and clinical findings in the right knee helped us make the diagnosis. Once diagnosis was made the patient was managed with open reduction and internal fixation with a double tension band wiring. The fixation was supplemented with cortico cancellous graft obtained from the right iliac crest. Additional encirclage wiring was done and passed through the patellar tendon and tibial tuberosity to prevent flexion beyond the desired limit. Bony union was seen at 5 months and the circlage wire was removed at that point of time. Post operatively the patient underwent rigorous rehabilitation exercises to achieve a final range of motion from 0 to 110 degrees at the end of 7 months.

Conclusion: Double tension band wiring with quadriceps V-Y plasty and bone grafting is a good treatment modality for patellar non-unions.

Keywords: Patella non-union, tension band wiring, Quadriceps V-Y plasty, bone grafting

Introduction

Patellar fractures are devastating injuries with a variety of subtypes. These injuries account for around 1% of all skeletal injuries and are most common in people between the ages of 20 and 50^[1]. Men have twice the incidence of women, according to epidemiological studies^[2]. Stable restoration of patellar fractures remains a major surgical challenge due its subcutaneous anterior position, biomechanical function, and high level of force transmission during extension and flexion. The majority of instances are produced by a method of direct injury^[3]. Non-union of the patella is uncommon, with a prevalence of 2.4—12.5%. People with low functional demands on the knee may tolerate non-union or delayed union well. Surgical intervention, on the other hand, is required for symptomatic persons with painful non-union and active young people to successfully restore quadriceps power without sacrificing pre-existing knee mobility^[4].

The management of patellar non-union presents a number of specific issues. To begin with, patients may have few symptoms and be able to manage their everyday activities. If they try to return to intense physical employment, however, they become disabled. Clear treatment protocols for the management of these cases have not been established. Here we present to you a case of a patellar non-union managed at our institution.

Case report

A 40 year old Indian male came to our OPD with history of a road traffic accident a year previously. The patient was hit by a two-wheeler sustaining injury to the right knee. Patient had pain and swelling in the knee and the patient was unable to bear weight. Patient took treatment from a local quack and did not seek any formal medical treatment. Patient now complains of pain, swelling and stiffness in the right knee along with instability while walking. According to the patient the pain and swelling has significantly reduced since the time of injury. Symptoms were aggravated by walking and patient required to use a cane to support himself while walking. Local examination showed a defect in the patella and quadriceps atrophy (Fig:1). On examination we noted an extensor lag of around 30 degrees.

Flexion was present till 90 degrees and was painful in the terminal 20 degrees.



Fig 1: Local examination of the right knee showing a defect in the patella and quadriceps wasting

An X-ray of the right knee was ordered which showed a fracture non-union of the lower pole of the patella (Fig:2). The proximal patella fragment had retracted to a higher level than the normal side due quadriceps tendon insufficiency causing the main patella body to ride upwards thereby indicating a quadriceps contracture. The lower pole of the patella was fractured and seen just above the tibial tuberosity and the fracture was deemed to be extending into the intraarticular aspect of the patella femoral joint.



Fig 2: (A) Lateral Pre-operative Radiograph of Right knee. Arrow pointing towards inferior pole of patella. (B) Anteroposterior Pre-operative radiograph of Right knee.

It was decided to take the patient up for surgery. After performing all pre-operative investigations, the patient was deemed surgically fit. Consent was taken from the patient for the procedure and for bone grafting.

Surgery was performed under spinal anaesthesia with all aseptic precautions. 15 cm mid patellar incision was taken. Soft tissue dissection done and the fracture site was reached. Fracture site was freshened and fibrous tissue removed. Defect was identified in the quadriceps retinaculum. The right iliac crest was aseptically prepared and cortico cancellous graft was harvested from the crest. A v-y plasty was performed through the quadriceps mechanism to help in fracture reduction and approximation of both the fragments. The

fracture site was reduced with the help of reduction clamps (Fig:3). Cortico cancellous bone graft was filled in the fracture gap. Two K wires were passed from the inferior to the superior direction parallel to each other. Two Stainless Steel wires were passed around the K wires in a figure of eight fashion. In this way a double tension band wiring construct was prepared. One additional SS wire was passed around the patellar reticulum as an encirclage wire. The encirclage wire was passed through the Proximal patellar fragment and distally through the patellar tendon and tibial tuberosity so that flexion can be restricted beyond 70 degrees as the reduction became unstable beyond that range. The reduction was found to be satisfactory with maintenance of the patellofemoral joint congruity. The quadriceps retinaculum and mechanism were repaired with the help of Krakows sutures using Ethibond number two. Final reduction was found satisfactory on fluoroscopy and clinically. Quadriceps retinaculum repair was clinically strong. Wash was given and closure was attempted.

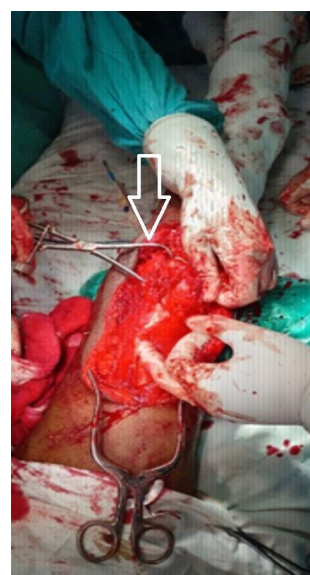


Fig 3: Reduction being held with reduction forceps

However, approximation of the skin edges was not possible while attempting closure. To get the skin closure V-Y flaps were raised on both sides. After raising the flaps closure was possible (Fig:4). Serial dressings were done to check for flap viability. But there was no flap necrosis and the flaps survived. Suture removal was done after 20 days of operation.



Fig 4: Skin closure with V-Y skin flaps

Post operatively the patient was kept in a long knee brace for 2 weeks. Partial weight bearing was started on post operative day 10. Full weight bearing was started after 6 weeks. Isometric hamstring and quadriceps exercises were started. After 2 weeks gradual knee range of motion was started along with continuous passive motion (CPM) therapy. By 12 weeks post operatively range of motion was between upto 70 degrees. There was no extensor lag which was noted. 5 months after the surgery good radiological union was seen (Fig: 5).



Fig 5: 6 months post operative radiographs (A) Anteroposterior radiograph (B) Lateral radiograph.

Patient was taken up for cerclage wire removal. Patient was started knee range of motion exercises immediately after the cerclage wire removal. Patient was given active and passive range of motion exercises and CPM therapy. 7 months post-surgery the patient had a knee range of motion from 0 to 110 degrees. Radiological union was seen by 6 months. Patient was satisfied and walking without a limp.

Discussions

Ignored patella fractures have a tendency to go into non-union. Non-union of the patella is uncommon, with a frequency of 2.4%, however it is more common in developing nations^[5]. There are few research on the gap non-union of the patella in the literature, and those that are there are limited in their scope^[6]. There is no set protocol for treating these fractures because they are so uncommon. The two patella fractures most infamous for leading to non-union are the transverse and inferior pole fractures^[7]. The literature defines both non-surgical and surgical therapy options. Patients who are morbidly ill and have low demands are treated non-surgically. It is not very beneficial for the union rate and functional return to regular activities. In most patients, surgical management is therefore preferred. Regarding the surgical treatment of a non-union patella, there is no agreement^[8].

In 2021 Bhushu Harna *et al.* published a case series and review of literature on surgical management of patellar non unions. 5 patellar non unions were included in their study. Two patients were treated with ORIF and k wiring while the other three had inferior pole non unions which were managed with open reduction and Krachow suture using fibre wire. Their study concluded that ORIF with TBW provided the best clinical results. V-Y Plasty may sometimes be required to get fracture reduction. Krachow suturing is a good technique for inferior pole fractures. Partial or total patellectomies are best

avoided^[9].

In a review study, Nathan *et al.* presented the protocol for treating patellar non-union patients. He concluded that patients with low functional demands may be managed without surgery, but those who engage in strenuous physical activity or play contact sports typically need open reduction and internal fixation. When a patient is a candidate for a reconstructive procedure, tension band wiring is the recommended course of action. Small distal fragments or the inability to successfully complete internal fixation are both situations when partial or total patellectomy may be an option^[7].

In order to safeguard the TBW, Satku *et al.* combined the standard anterior tension band wiring with a tension loop between the proximal fragment and the tibia. They published their results for 3 patients who were operated with this technique. We used a similar technique in our study^[8].

In two patients, Klassen and Trousdale described the use of bone grafting. During surgery, the need for bone grafting should be determined on a case-by-case basis^[10]. Uvaraj *et al.* published a study involving 22 patients. 18 transverse, 2 comminuted, and 2 lower pole fractures made up this group, the majority of which had previously been treated using conventional techniques. They used, tension band wiring was used in 16 cases, tension band wiring with cerclage in 3 cases, and patellectomy in 3 cases as a form of treatment. In 5 cases, excellent outcomes were obtained, and in 15 cases, satisfactory outcomes. Infection and implant failure were to blame for the bad outcomes in two cases. They concluded that surgical management of such cases resulted in good outcomes^[4].

Garg *et al.* published a study in which 35 cases of patellar non union were divided into 3 groups depending upon the type of surgical management. 10 patients were managed with V-Y plasty along with tension band wiring. 15 cases were managed with patellar traction followed by tension band wiring without V-Y plasty. The remaining 10 patients underwent either a partial or total patellectomy. In terms of the Knee Society Score (KSS), Melbourne Patella Score, time of union, discomfort, range of motion, quadriceps power, capacity to do daily activities, and problems experienced, they compared the treatment's outcomes. They concluded that contrary to patellectomy or V-Y plasty, preoperative patellar traction followed by tension band wiring is a favourable technique^[11]. Singhal *et al.* published a case report of a patellar non union which was managed in 2 stages. In the 1st stage, using an adjustable external fixator system, two 2mm K wires were transversely passed through each section and coupled with compressive rod assembly. Stage II was completed after complete approximation of the bone ends: the wires were cut, and tension band wiring with circular wiring was completed. They concluded that the two-staged surgical approach appeared to be successful in treating long-ignored patellar fractures^[6].

Bhimani *et al.* presented a case study of a 40-year-old male with a non-union patella and consequent quadriceps contracture. They performed a similar procedure of double tension band wiring with an extension block cerclage wiring after performing a quadriceps plasty. They came to the conclusion that quadricepsplasty with neutralising wire and tension band wiring is one of the effective treatment techniques for a nonunion patella associated with quadriceps contracture^[12].

Lachiewiz *et al.* published a case report of a 67-year-old woman with a neglected transverse fracture of the patella.

They managed the case with a 2-stage technique which included mobilization of the proximal fracture fragment, fixation with two cannulated screws, and repair of the medial retinaculum. The lateral retinaculum was left open to provide for better motion. They obtained a good clinical result with this technique^[13]. Following patellectomy, Dhar *et al.* used an Ilizarov fixator to apply patellar traction and got excellent clinical results^[14].

This case study aims to highlight the utilisation of single-stage double tension wire management for an old, untreated nonunion patellar fracture. During the procedure, double-tension band wiring was performed and V-Y plasty was used to mobilise the proximal fragment and fix it to the lower fragment. The goal of the procedure was to accomplish fractional lengthening in patients with nonunion of patellar fractures with significant gaps between the fracture fragments in order to eliminate quadriceps lag. This was a single stage procedure where the bony contact between the two fragments was achieved by a V-Y quadriceps plasty and fixation was done with double tension band wiring. In addition to serving as an internal brace during the early phase of rehabilitation, the neutralising wire fixation in the vicinity of the patellar tendon also compressed an already contracted patellar tendon. Additionally, it aids in securing the decrease by reducing the tensile stresses generated during knee flexion by the quadriceps muscle. Patella baja might occur if the neutralisation wire is overtightened during this surgery. An image intensifier should be employed intraoperatively to measure and compare the distance between the contralateral knee's distal pole of the patella and the tibial tuberosity in order to guarantee the proper length of the neutralisation.

Conclusion

There isn't a perfect management protocol for non-union patellar fractures, and the outcomes of various strategies aren't well-documented. We conclude that quadriceps V-Y plasty with double-tension band wire management is a good surgical measure in treatment of a patellar non-union. Combining it with bone grafting all but ensures satisfactory bony union in such cases. Rehabilitation protocols must be emphasised upon after successful fixation to achieve the best clinical results.

References

- Gwinner C, Märdian S, Schwabe P, Schaser KD, Krapohl BD, Jung TM. Current concepts review: Fractures of the patella. *GMS Interdiscip Plast Reconstr Surg DGPW*. 2016;5:Doc01.
- Boström A. Fracture of the patella. A study of 422 patellar fractures. *Acta Orthop Scand Suppl*. 1972;143:1-80.
- Nummi J. Fracture of the patella. A clinical study of 707 patellar fractures. *Ann Chir Gynaecol Fenn Suppl*. 1971;179:1-85.
- Uvaraj NR, Mayil Vahanan N, Sivaseelam A, Mohd Sameer M, Basha IM. Surgical management of neglected fractures of the patella. *Injury*. 2007;38(8):979-83.
- Kaufer H. Mechanical function of the patella. *J Bone Joint Surg Am*. 1971;53(8):1551-60.
- Singhal V, Mittal D, Lal H, Khare R, Sharma S, Resident S, *et al.* Gap Non-union of Patella: A Treatment Dilemma; c2022.
- Nathan ST, Fisher BE, Roberts CS, Giannoudis PV. The management of nonunion and delayed union of patella fractures: A systematic review of the literature. *Int Orthop*. 2011;35(6):791-5.
- Satku K, Kumar VP. Surgical management of non-union of neglected fractures of the patella. *Injury*. 1991;22(2):108-10.
- Harna B, Gupta P, Singh J, Rousa S, Gupta A. Surgical Management of Non-Union Patella Fracture: A Case Series and Review of the Literature. *Arch Bone Jt Surg*. 2021;9(5):554-558.
- Klassen JF, Trousdale RT. Treatment of delayed and nonunion of the patella. *J Orthop Trauma*. 1997;11(3):188-194.
- Garg P, Sahoo S, Satyakam K, Biswas D, Garg A, Mitra S. Patellar nonunions: Comparison of various surgical methods of treatment. *Indian J Orthop*. 2012;46(3):304-311.
- Bhimani R, Singh P, Bhimani F. Double-Tension Wire Management of Nonunion Patella with Severe Quadriceps Contracture. *Case Rep Orthop*. 2018;2018:1364129.
- Lachiewicz PF. Treatment of a neglected displaced transverse patella fracture. *J Knee Surg*. 2008;21(1):58-61.
- Dhar SA, Mir MR. Use of the Ilizarov method to reduce quadriceps lag in the management of neglected non union of a patellar fracture. *J Orthop*. 2007;4(1):12.

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