



Case Report

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Double Tension Band Wire for Management of Non-Union Patella Fracture with Quadriceps Contracture in A Patient with Septic Sequelae

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Introduction

Fracture patella comprises of about 1% of all skeletal fractures.(1) Patella is prone to direct trauma as it is present subcutaneously over anterior aspect of the knee. Patella fractures are divided into various types depending on the fracture pattern, of which transverse fracture is a common type. At times patients present very late to the orthopaedic clinics with displaced patella fractures and most of the times, such fractures are associated with soft tissue contractures, knee joint stiffness and extensor lag.(2)

The extensor retinaculum if torn, leads to displacement of the superior fragment due to contraction of the quadriceps; making the fracture impossible to manage non- operatively.(3)The treatment of these fractures is extremely difficult as there is requirement of restoration of extensor mechanism to achieve desirable knee function.

The evidence to guide the management of such fractures is limited, which is evident from various techniques used by surgeons in different centres. (4)

These case series describe their experiences on patients with good bone stock and healthy soft tissues allowing for better implant purchase and fixation. This is a case of patella non union which was complicated by occurrence of septic arthritis seven months after the fracture rendering the soft tissue friable and bone osteoporotic.

Case Report

A 37 years old male presented with complaints of defect over the left knee since past one year associated with difficulty in walking and standing on the affected knee. Patient gave a history of trauma to the knee 1 year back for which he took emergency management and refused the surgery that was advised. Following a trivial trauma 5 months back patient developed pain, swelling and tenderness over left knee along with high grade fever for which arthrotomy with synovectomy was done but the fracture was not addressed. Patient was kept on antibiotics till the ESR and CRP values were in normal. Clinically, there was a defect over the anterior aspect of the left knee through which the distal femur and proximal tibia could be palpated. Swelling was appreciated over lower one third of anterior aspect of left distal thigh, which on palpation was hard in consistency and appeared to be retracted upper pole of patella, lower pole of patella was palpable just above the tibial tuberosity. Skin overlying the knee joint was not freely mobile. Midline vertical scar from previous surgery (arthrotomy) was also appreciable. His range of movement was 40 to 80 degrees of flexion actively with an extension lag of 40 degrees. Range of motion was 20 to 90 degrees of flexion on passive movement. Patient was unable to do active straight leg raising test.

The X-Ray of the left knee confirmed the position of superior pole of patella over distal one third of left femur and lower fragment close to tibial tuberosity with arthritic changes in the knee joint.



Figure 1. Pre-operative radiological images showing displaced patellar fracture fragments. AP view



Figure 2. Pre-operative radiological images showing displaced patellar fracture fragments. Lateral view

The patient was planned for a double stage procedure where quadriceps lengthening was planned using sustained skeletal traction. Two wires were passed through the superior fragment of patella and were tensioned over a half ilizarov ring. Sustained traction was applied in an inpatient setting with 3kg weight. The distance between the fragments was measured regularly. At 2 weeks the distance between the fragments reduced to less than one centimetre and patient was taken up for surgery. Intraoperatively, articular cartilage damage was appreciated and intraarticular adhesions were found. Arthrolysis was done, knee ROM was checked and was found to be zero to 120 degrees. Fracture ends were freshened, reduced and fixed using TBW principle. Unlike as quoted by Osama Al-Obaedi et al (5), This failed in immediate post of period with the proximal fragment slipping superiorly over the K wires.



Figure 3. Skeletal traction through superior pole of patella for gradual quadricep lengthening



Figure 4. Radiological image showing failure of tension band wiring

The patient was taken for a second surgery where tension band wiring for patella was performed after reducing the fragments. Additionally a second K wire was passed through a neutralisation hole made posterior to the tibial tuberosity, the retinaculum was repaired and the friable patellar tendon was strengthened using Ethibond(braided polyester) suture. The length of neutralisation wire was kept comparable to the patellar tendon of other knee to restore extensor mechanism and prevent complications like patella baja. A cylindrical slab was applied which was removed at the time of first dressing done at post op day 3 .



Figure 5. Intra-operative image showing articular cartilage damage and fibrosis.



Figure 6. Post-operative radiological images showing reduced patellar fracture through double tension band wire technique

Rehabilitation was started in the postoperative period from post op day 7, active straight leg raising exercises and static and dynamic quadriceps strengthening exercises were started. Suture removal was done at 14th postoperative day with addition of continuous knee passive motion to the regimen.

On discharge the range of motion of knee was 10 to 30 degrees of flexion with an extension lag of 10 degrees. At 4 weeks follow up patient had 5 to 60 degree of knee range of motion which subsequently improved to 5-70 degrees at 6 weeks follow up and 5-80 degrees at 3 months follow up.



Figure 7. Radiological images at three months follow up



Figure 8. Clinical image at three months follow up.

Discussion

Old neglected fracture patella are encountered seldom in orthopedic clinics. As certain fracture patterns are amenable to unite without operative interventions and a rate of non-union of about 2.7% is reported in patella fractures.(6) There is paucity of case reports describing the management for such patients. Most of these cases are a result of negligence of the patient in seeking medical care post traumatic injuries and repeated efforts to walk on limbs with patella fractures. The integrity of anterior fascia lata, Sharpey's fibres and medial and lateral extensions are the factors which allow active extension of knee even after patellar fractures. Unopposed passage of forces in patients while weight bearing over affected limbs leads to increase in displacement of the fracture fragments and soft tissue contractures.(7)

In a study conducted by Garg et al.[8] comparing the functional outcomes of various surgical modalities for treating non united patella fractures, namely V-Y quadricepsplasty and tension band wiring, tension band wiring after sustained patellar traction and patellectomy(6,9) they concluded that best functional outcomes were seen in patients managed by sustained traction and tension band wiring.

Patellectomy is only preferred when distal fragment is very small, since this leads to a number of complications like anterior knee pain, swelling and stiffness due to decreased lever arm of extensor apparatus mechanism causing increased stress on knee joint during extension(8,10). A double staged procedure can be considered in which gradual lengthening of quadriceps can be done using skeletal traction and once fragments are close to each other internal fixation can be done and are known to produce good results (5,11).

This patient shared the fracture morphology with those described in other studies, but the knee joint and surrounding soft tissues had extensive fibrosis and the bone was osteoporotic because of the septic sequelae. So we opted for progressive quadriceps lengthening and tension band wiring once fragments were close to each other with additional fixation using a neutralisation wire through the proximal tibia in region of patellar tendon. The neutralisation wire acted as an internal brace during the initial rehabilitation period and secured the reduction by decreasing tensile force exerted by quadriceps over the superior fracture fragment during knee flexion(7)

In such a complicated case described above, double tension wire management is advisable as it achieves good fractional lengthening and prevents quadriceps lag in patients with non-union of fracture patella and large gaps between the fracture fragments.

In a case reported by Rohan Bhimani et al,(7) it was concluded that quadricepsplasty with tension band wiring and a neutralisation wire is a good modality for treating a non union patella with quadriceps contracture. However it was done in a young patient with an otherwise normal knee joint.

On the other hand, in our patient the fracture was complicated by septic arthritis sequelae, the patellar fragments were osteoporotic and due to previous arthrotomy and synovectomy there was quadriceps

muscle scarring and fibrosis. A gradual muscle lengthening was chosen to prevent aggressive release of soft tissue as needed in quadricepsplasty. A double tension band wiring yielded good results even in absence of good bone stock.

Ideal management protocol for nonunited fracture patella is lacking and only a few studies comparing the treatment modalities for the said fracture are present, we believe that gradual quadricep lengthening and double tension band wiring is a superior method of treatment, as witnessed in our case. There is a scope for further research to validate these findings.

References

1. Eric EJ. Fraturas do joelho. Rockwood CAJ, Green DP, Bucholz RW. Fraturas em adultos. 3rd ed. Philadelphia: Lippincott. 1991:1729-44.
2. Singhal V, Mittal D, Lal H et al. Gap non-union of patella: A treatment dilemma. J Ort 2010;12:8-11
3. Carpenter JE, Kasman RA, Patel N, Lee ML, Goldstein SA. Biomechanical evaluation of current patella fracture fixation techniques. J Orthop Trauma. 1997;11:351-6.
4. Nathan ST, Fisher BE, Roberts CS, Giannoudis PV. The management of nonunion and delayed union of patella fractures:A systematic review of the literature. IntOrthop. 2011;35:791-5.
5. Al-Obaedi O, RThakrar R, Kundra R, Iqbal MJ. Gap Non-union Patella Fractures: Case Report and Review of the Literature. Journal of orthopaedic case reports. 2019;9(2):69.
6. Gwinner C, Märdian S, Schwabe P, Schaser KD, Krapohl BD, Jung TM. Current concepts review: Fractures of the patella. GMS Interdisciplinary plastic and reconstructive surgery DGPW. 2016;5.
7. Bhimani R, Singh P, Bhimani F. Double-Tension Wire Management of Nonunion Patella with Severe Quadriceps Contracture. Case reports in orthopedics. 2018 Sep 6;2018.
8. Garg P, Sahoo S, Satyakam K, Biswas D, Garg A, Mitra S. Patellar nonunions: Comparison of various surgical methods of treatment. Indian journal of orthopaedics. 2012 Jun;46:304-11.
9. Kfuri M, de Freitas RL, Batista BB, Salim R, Castiglia MT, Tavares RA, Araújo PH. Updates in biological therapies for knee injuries: bone. Current reviews in musculoskeletal medicine. 2014 Sep 1;7(3):220-7.
10. Asopa V, Willis-Owen C, Keene G. Patellectomy for osteoarthritis: a new tension preserving surgical technique to reconstruct the extensor mechanism with retrospective review of long-term follow-up. Journal of orthopaedic surgery and research. 2015 Dec;10(1):1-7.
11. Dhar SA, Mir MR. Use of the Ilizarov method to reduce quadriceps lag in the management of neglected non union of a patellar fracture. Journal of Orthopaedics. 2007;4:12.