

Multi-Fragment Patellar Non-Union in a Young Patient Due to Failed Fixation and its Management - A Rare Case Report

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Abstract

Introduction: Multi-fragmentary patellar non-union is rare and it causes functional disability in patients. The purpose of studying this case is to present an unusual patella multi-fragmentary non-union and discuss its management.

Case presentation: We present a case of a 25-year-old male patient presented with pain and instability and decreased movements of the right knee since last 1 year. The patient had a history of trauma for which he was operated at the local hospital. X-ray and CT scan of the right knee was suggestive of the non-union of the right patella with three main fragments. We managed with open reduction and internal fixation using CC screw, cerclage and tension band wiring. At one-year follow up, the patient is having a clinical and radiological union of non-union with good functional outcome.

Conclusion: Combination of cannulated cancellous screw, cerclage and tension band wiring provides stable fixation in the multi-fragmentary patellar non-union, helps in early mobilisation which in turn helps in getting good functional outcome and prevents implant-related complications.

Keywords: Non-union; Multi-fragmentary patella; Internal fixation; Fixation failure.

Introduction

Patella fractures contribute to 1% of all skeletal injuries [1]. The anterior subcutaneous location of the patella makes it more vulnerable to direct trauma and Transverse fracture pattern are commonly observed. The incidence of nonunion or delayed union of patella fractures is rare and it ranges from 2.7-12.5% [2]. Conservative management of the displaced fractures, inadequate fixation, and implant failure lead to non-union of patella fractures. The management of these non-unions depends on the functional demands of the patient, the reason for the development of the nonunion and the presence of an intact extensor mechanism of the knee for a later reconstructive procedure. Many patients have a functional knee joint and only those with a wide gap and failed extensor mechanism require surgical intervention. We present a case of the non-union patella due to failed fixation in a previously operated patient.

Case Report

A 25-year-old male presented with complaints of pain in the right knee for one year, difficulty in walking for eight months and had a history of clicking sound while doing knee movements for 8 months. The patient was apparently alright one year back when he had fallen from the bike and sustained trauma to the right knee, the patella

fracture was diagnosed and was treated at a local hospital with tension band wiring. The patient was discharged on day 3 and was advised to walk with a brace. Two months after the surgery patient started having pain in the right knee and difficulty in weight-bearing along with the click sound in the knee while walking. The patient took analgesic medication for the same and avoided walking for a few months but with an increase in the pain and inability to extend the knee completely.

On examination, previously operated linear scar was seen over right knee, there was tenderness over the patella and no local rise of temperature, visible swelling was present. A palpable gap between the fracture fragments was noticed along with palpable hardware. No scar tenderness or wound was present, knee flexion was limited to 90° and extension lag of 15°.

X-ray right knee anteroposterior and lateral view showed non-union patella with sclerosed fracture ends with previously operated tension band wiring (Fig. 1). CT scan of the right knee with 3-D reconstruction revealed non-union of the patella with three main primary fragments such as medial, superolateral and inferolateral fragment (Fig. 2). As the patient was having chronic pain, instability, and knee movement restriction, we planned for open reduction and internal fixation surgery.

The patient was operated under spinal anaesthesia with all the aseptic precautions in the supine position using a tourniquet. Midline knee incision was taken over the previously operated scar and soft tissue flaps raised on both sides. Previously operated tension band wire was removed first, and fracture fragments were identified. Fibrous tissue between the fracture fragments was removed and edges were freshened till we get fresh bleeding (Fig. 3). Initially, the superolateral fragment was fixed with medial fragment using Partially threaded 4 mm CC screw to convert the three-part into two

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Figure 1: X-ray right knee AP and lateral view showing nonunion patella with failed previously operated SS wires

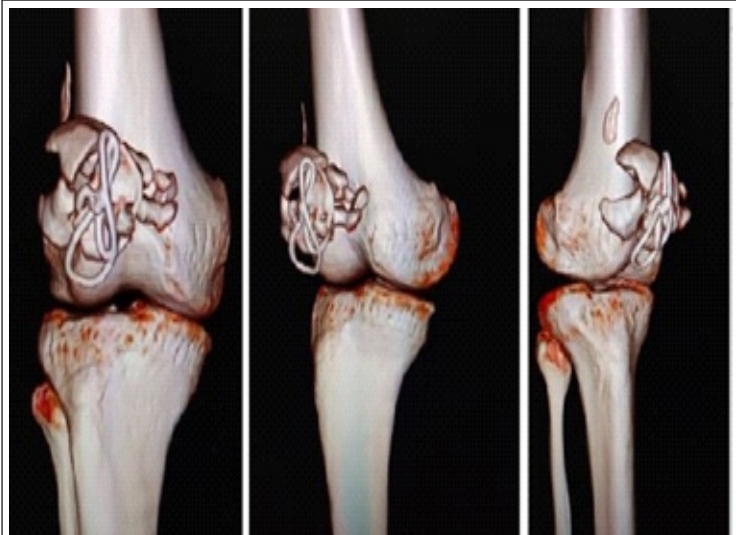


Figure 2: Preoperative 3D CT scan showing the nonunion patella with previous SS wires.



Figure 3: Intraoperative images showing fibrous tissue at the nonunion site



Figure 4: Immediate post-operative X-ray showing good compression and articular continuity using CC screw, cerclage and tension band wire



Figure 5: Follow up x ray at 6 months showing good nonunion healing



Figure 6: Follow up X-ray at 1 year showing union with no implant failure



Figure 7: Functional outcome at 1 year

fragments. Then the remaining fragment was held together using cerclage wire and then figure of eight tension band wiring (TBW) was done using AO SS wire. Stability of the fixation was checked intraoperatively, and the fixation was stable during the knee flexion and extension. Intraoperative fluoroscopy images were taken to confirm the intra-articular reduction and wound was closed in layers. The immediate post operative x-ray showed a good reduction of the articular surface with compression at the non-union site (Fig. 4). Postoperatively long knee brace was given till the suture removal and full weight-bearing started from the second postoperative day. Knee range of movements was started after 4 weeks. Six months and the one-year post-operative x-ray showed healing of the non-union site without implant failure (Fig. 5, 6). At present patient is having complete knee flexion and extension with no lag, instability and pain (Fig. 7).

Discussion

Patella non-unions are rare. The main reason for this condition is early mobilisation in patients who were managed with conservative management, improper fixation of fracture fragments, infections and compound fractures. There is no exact management option available for these non-unions in the literature. The described management options are single-stage procedures like V-Y quadricepsplasty and osteosynthesis or patellectomy if the gap is more. If there is no significant gap between the fragments, primary approximation and internal fixation can be done as done in our case [3, 4]. The staged procedure has also been described using Illizarov or JESS fixator for quadriceps lengthening [5]. The generated patellofemoral compressive forces are three times greater than that of the body weight during routine daily activities and may exceed seven times the body weight while climbing stairs and squatting. The main described reason for non-union includes conservative management of displaced fracture, very loose hardware which causes fragment to displace or very tight fixation which causes the implant to break after load bearing. The inadequate fixation using

cerclage wire shows the highest rate of non-union as compared to Tension band wiring. The systematic review showed surgical management in the form of tension band wiring is the best management in high demand patients [6].

Traction using steinman pin or VY quadricepsplasty helps to approximate the two ends in cases of large gaps, latter fixation can be done using cerclage and tension band wiring [7]. In cases of lower pole non-union, which is not amenable to fixation can be excised but knee weakness can be a problem [8].

Patellectomy decreases the lever arm length of the quadriceps mechanism, leading to undue stress on the knee joint during extension, this leads to early degenerative changes and is a relative contraindication in young patients [8, 9]. In our case cerclage, tension band wiring and CC screw fixation were used. CC screw was used to convert multifragments into two-part, which gives stability and also helps to prevent slippage of the fragments while tightening of cerclage and tension band wiring and prevents implant failure. The combination of these has given good stable fixation in our case which in turn helps in getting good functional outcome. It is always important to check the stability intraoperatively before the wound closure as unstable fixation can lead to fixation failure and non-union as observed in primary surgery in our case.

Under tightening of wire leads to loosening, then non-union and over-tightening leads to implant failure and slippage of fracture fragments out of the cerclage wire and can go for non-union again. So Proper placement and tightening of cerclage or tension band wire in relation to the patella is very important to get stable and better compression at the fracture site, to prevent implant-related complications and to start early mobilisation.

Conclusion

Combination of cannulated cancellous screw, cerclage and tension band wiring provides stable fixation in the multi-fragmentary patellar non-union, helps in early mobilisation which in turn helps in getting good functional outcome and prevents implant-related complications.

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