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

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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 patient 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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...
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 postoperative 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 Ilizarov 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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**References**


