

IMPLANTLESS PRESS FIT GRAFT FIXATION AT PATELLA FOR MPFL RECONSTRUCTION FOR RECURRENT PATELLOFEMORAL INSTABILITY



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Abstract:

Patellofemoral instability is one of the most prevalent knee disorder in adolescents. It is often multifactorial and complex. Often accompanied by insufficiency or tear of MPFL ligament. MPFL is primary soft tissue stabiliser of patella and acts as checkrein of lateral patella dislocation. There have been variations in surgical techniques including different choices of surgical techniques, graft material and fixation methods, despite these there is no conclusive evidence that a particular surgical option is superior to another. Recurrent Patella instability requires individualised surgical planning .

In this article we present a surgical technique which is implantless socket type of press-fit fixation at patella .

Introduction:

Recurrent Patellar Instability is the most common cause of anterior knee pain in skeletally immature and 2nd most frequent cause of traumatic haemarthrosis of the knee after ACL injury (1). This also accounts for 3% of all knee injuries(2) . Incidence of primary dislocation is 29/100000 in children and recurrent dislocation is 15-44% (3) whereas in 60% recurrence is seen in less than 14 yr old age group as compared to 33 % in older than 15 yrs. Incidence increases in 2nd decade and decreases by 4th decade and It is twice more common in females than males in general population where as in athletic population more male prevalence than female in both acute and recurrent patella dislocation (4). H De jour and the school of Lyon (5) classified patients having PatelloFemoral pathology associated with instability in 3 groups such as objective patellar instability, potential patellar instability and painful patella syndrome.

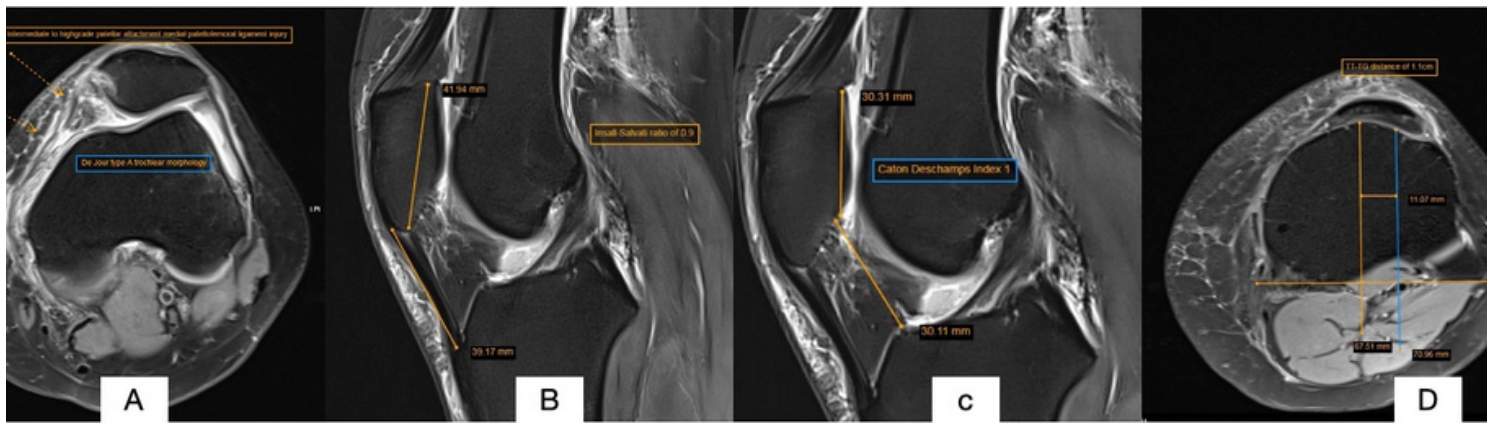


Fig 1 : MRI scan. A: Axial cuts showing high grade MPFL tear at Patella attachment with Dejour type A trochlear dysplasia, B: Sagittal section showing normal Insall Salvati ratio 0.9, C: Caton Deschamps index 1 & D:TT-TG distance 11mm

Patellofemoral instability is multifactorial and complex as it involves several abnormal anatomical factors such as trochlear dysplasia, patella Alta, patella dysplasia, rotational limb deformities, hypoplasia of vastus medialis obliquus, patella femoral and patellotibial ligament issues, extensors muscle dysplasia, generalized laxity (6). MPFL is a Primary static stabiliser of the patella providing 50-60% of restraint to lateral displacement in 0-30 degree flexion and with MPTL, MPML and vastus medialis obliquus confer PF stability. MPFL is damaged in 96% of patients with lateral patella dislocation(7,8). MPFL reconstruction has become the cornerstone among those warranting surgery. Surgery has shown superior results as compared to conservative treatment in RPI. Isolated MPFL reconstruction is indicated in recurrent patella dislocation with a mild degree of pathology. Or as an adjunct with lateral release TTO or Trochleoplasty(9).

Case:

23yr male student reported with right knee pain and feeling of giving away .With a history of right knee lateral patella dislocation 17 months ago during a football tackle . Last dislocation was 3 months ago . On examination J sign ,patella apprehension, quadrant test positive. No restriction in range of motion movement, normal Q angle and no generalized ligament laxity.

On investigation no X-ray abnormality in AP standing, lateral in 30 flexion and skyline views. MRI showing high-grade MPFL tear De Jour Type A Trochlear dysplasia, Insall Salvati was 0.9, Caton Deschamps index was 1 and Tibial Tuberosity - Trochlear Groove (TT-TG) distance 11 mm all within normal(Fig 1). As abnormalities in this case were MPFL tear and mild trochlear dysplasia we went ahead with isolated MPFL reconstruction.

Surgical technique:

- After Spinal anaesthesia, Patient in supine position and non-sterile tourniquet was used. Marked affected limb is prepared and draping was done as per protocol
- Physical examination was performed to asses for medio- lateral displacement of patella and retinacular tightness and then tourniquet was inflated
- Diagnostic knee arthroscopy is performed to inspect for any intra articular pathology (cartilage / loose bodies/ ligaments).
- Using oblique anteromedial incision,at level of tibial tuberosity, the gracilis tendon is harvested. The two ends of the graft are each sutured with No: 2 FiberWire using a whipstitch technique

- Patella preparation-A longitudinal skin incision is made on the medial aspect of middle-third of patella and deeper dissection done exposing medial margin of patella and retinacular tissue is removed with a nibbler to create a crater for the graft to lie on medial margin of patella.
- 2 parallel tunnels are made with 2.5 mm wire and is drilled from medial to lateral direction. 1st proximal wire which is placed around 5 mm distal to attachment of Vastus Medialis with 15mm between the 2 wires (Fig 2A,2B).
- A cannulated 4.5 mm drill with depth of 15mm is drilled over the 2.5mm wire containing a small eyelet (Fig 2C,2D)
- Ethilon No: 1 suture is looped on its length to form a loop and the free end is kept ready
- 1st proximal beath pin is loaded with loop end and retrieved through the tunnel laterally (PS). A second distal end beath pin loaded with a free end and retrieved laterally(DS) through the skin incision of the previously used anterolateral arthroscopy portal or simply pierced through the skin.
- Next the Ethilon with a free end on the lateral side (DS)is loaded onto the loop end of ethilon on the lateral side (PS) and then the free end of ethilon on the medial (Proximal medial suture) is pulled so that by the end of this step there is a U shape single ethilon with one side loop on the medial distal tunnel and free end on the other medial proximal (Fig 2E).
- Next 2 opposed double different colour fibre wire is passed through the loop of U shaped ethilon which is pulled around the lateral bone bridge medially through the drill holes (Fig 2F,2G)

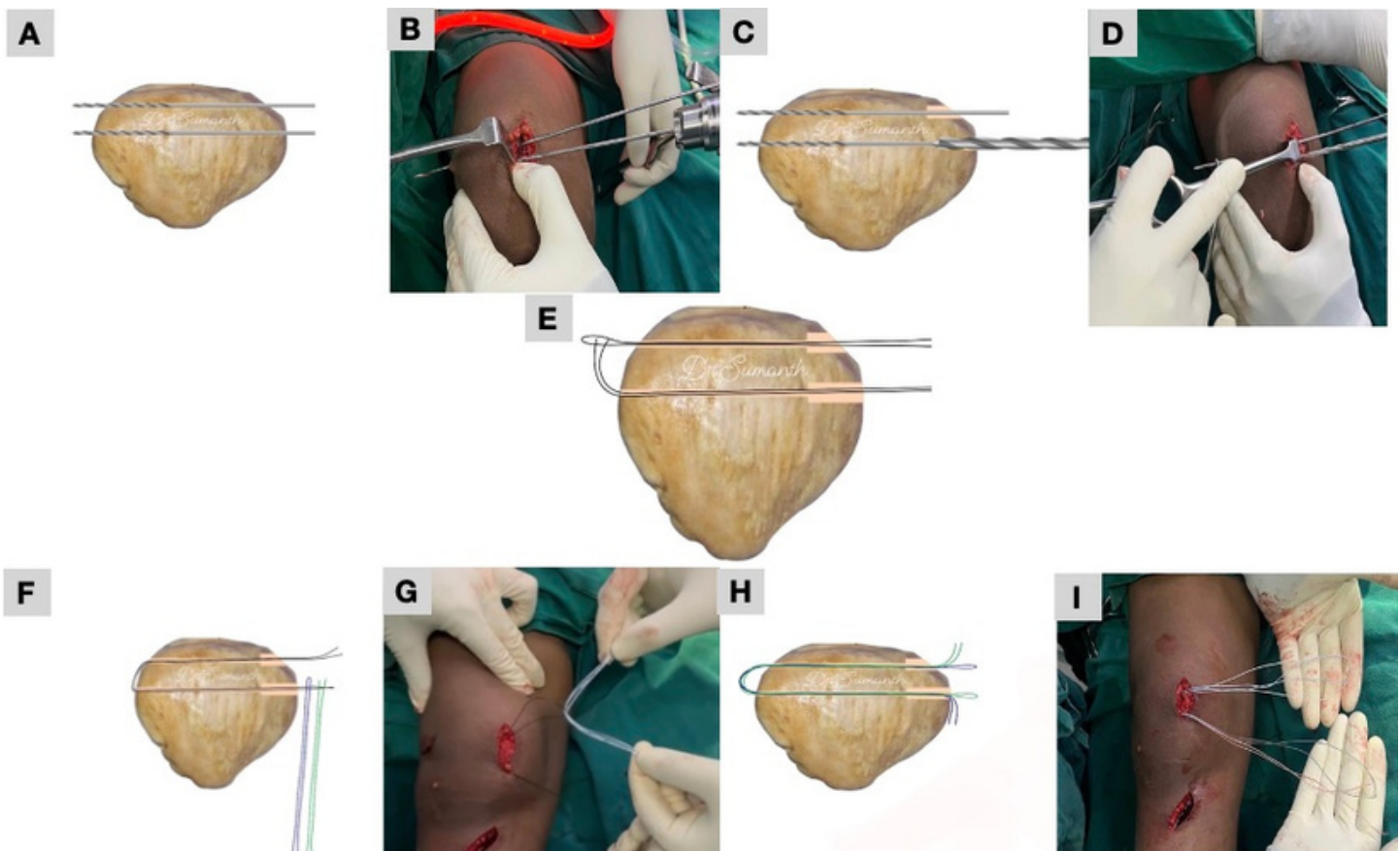


Fig 2 : Surgical Technique. A, B: parallel 2.5 mm wire from medial to lateral 1st proximal wire placed around 5 mm distal to attachment of vastus medialis with 15mm gap between the 2 wires, C, D: A 4.5 mm cannulated drill is drilled both in proximal and distal with depth of 15mm over the 2.5mm wire containing a small eyelet, E: Ethilon no 1 with free end on lateral side in distal tunnel being loaded on to loop end of 2nd ethilon on lateral side in proximal tunnel, F,G: Two different coloured opposed fiber wire is passed the loop, H,I: Two free ends of one Fiber Wire and the loop of other fibre wire at proximal tunnel and 2 free ends of one Fiber Wire and the loop of the other fibre wire at the distal on the medial side

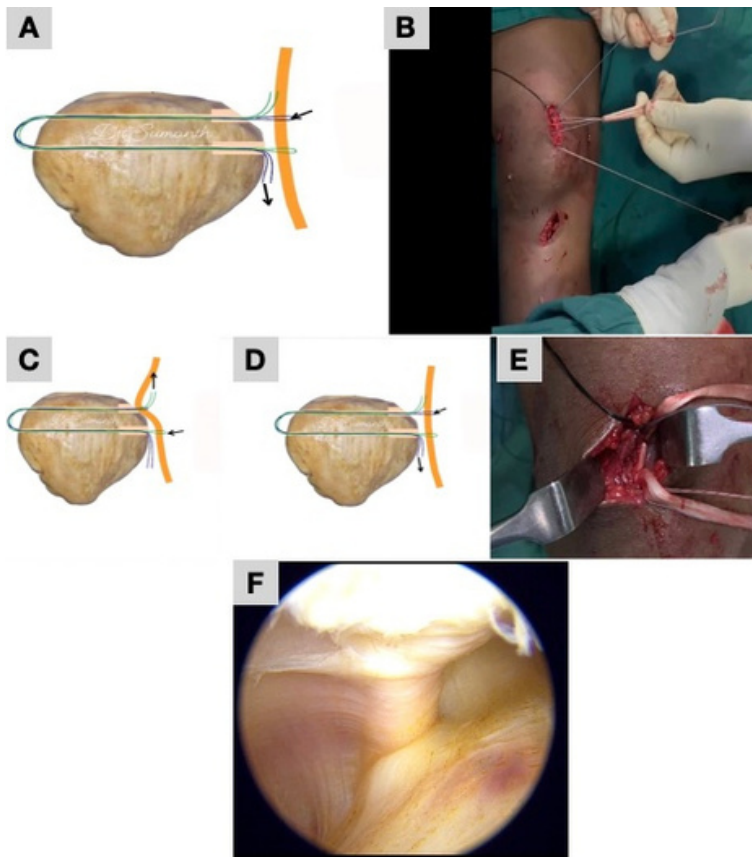


Fig 3. Surgical Technique. A, B: The central part of the graft is loaded into the suture loop of both firewire, C,D, E: Graft is placed within the socket by pulling on the free ends of both sutures. F: Arthroscopic image of reconstructed Medial Patello femoral ligament

- On medial there should be 2 free ends of 1 FiberWire suture and the loop of the other fiberwire should be at the proximal medial drill holes . The 2 free ends of 1 FiberWire and the loop of the other Fiberwire at the distal (Fig 2H,2I)
- The central part of the graft is loaded into the suture loop of both fiber wire and placed on the medial groove (Fig 3A,3B)
- By pulling on the free ends of both sutures (proximal and distal), the graft is pulled press-fit into the 1-cm bone socket. Simple knots are applied over the free ends of the suture to secure the graft onto the medial patellar facet (Fig 3C, 3D, 3E)
- Femoral preparation palpate the medial epicondyle and adductor tubercle prior to making the incision.
- A 2 cm vertical skin incision is made between the two points.
- The Schottle's point, which is confirmed under fluoroscopic guidance.
- A 2.5 mm beath pin is drilled from the Schottle's point, with the beath pin directed proximally and anteriorly.
- By use of a 6-mm cannulated drill, a bone tunnel is made at the medial tubercle. Another suture is passed through the eyelet at the end of the wire and pulled through the bone. Both free ends of the graft, already armed with sutures, are passed between the second and third capsular layers and through the femoral shuttling suture. Both ends of the graft are pulled into the bone and fixed with a 7-mm interference screw at 30-40 degrees of knee flexion. Attention is paid not to over-tighten the graft.
- Extra-articular graft placement is confirmed under arthroscopy. Arthroscopic intraoperative image post-MPFL reconstruction as illustrated to confirm extra-articular graft placement (Fig 3F). The wounds are thoroughly irrigated and subcutaneous tissue is closed with No: 2 Vicryl and skin with skin staples. The advantages & possible complications of the technique have been summarized in Table 1.

Table 1: Advantages & Possible complications of the technique	
Advantages	Possible complications
<ul style="list-style-type: none"> • Anatomical double bundle fixation • Implant less fixation at patella - avoid related complication • Press fit socket type fixation • Tendon to bone healing over the medial patella border • Decreases chances of patella fracture 	<ul style="list-style-type: none"> • Suture loosening • Irritation on lateral side of the patella • Improper tunneling

Table 1: Advantages and possible complications of the technique.

Rehabilitation:

- Extension Long Knee Brace - 3 weeks
- Non-weight bearing for 2 Weeks
- Knee Flexion - 0-30- 2 Weeks, 0-60 3rd Week, Full Range from 4th Week
- Quadriceps Exercise from post-op day 1
- Muscle Strengthening Exercises From 7-8 Weeks
- Return To Sports From 5 Months

Conclusion:

- Preoperative - Meticulous Clinical And Radiological Assessment for an individualised approach.
- Key to good reconstruction is to restore anatomy , maintain isometry and avoid over tightening of the graft .
- No conclusive evidence of superior of one surgical technique over others .
- Milder degree of associated pathologies can be addressed by Isolated MPFL reconstruction.

References:

1. Fithian DC, Paxton EW, Stone ML, Silva P, Davis DK, Elias DA, White LM. Epidemiology and natural history of acute patellar dislocation. *Am J Sports Med.* 2004 Jul-Aug;32(5):1114-21. doi: 10.1177/0363546503260788. Epub 2004 May 18. PMID: 15262631.
2. Redziniak DE, Diduch DR, Mihalko WM, Fulkerson JP, Novicoff WM, Sheibani-Rad S, Saleh KJ. Patellar instability. *J Bone Joint Surg Am.* 2009 Sep;91(9):2264-75. PMID: 19724006.
3. Hawkins RJ, Bell RH, Anisette G. Acute patellar dislocations. The natural history. *Am J Sports Med.* 1986 Mar-Apr;14(2):117-20. doi: 10.1177/036354658601400204. PMID: 3717480.
4. Cash JD, Hughston JC. Treatment of acute patellar dislocation. *Am J Sports Med.* 1988 May-Jun;16(3):244-9. doi: 10.1177/036354658801600308. PMID: 3381981.
5. Dejour H, Walch G, Nove-Josserand L, Guier C. Factors of patellar instability: an anatomic radiographic study. *Knee Surg Sports Traumatol Arthrosc.* 1994;2(1):19-26. doi: 10.1007/BF01552649. PMID: 7584171.
6. Dierks TA, Manal KT, Hamill J, Davis IS. Proximal and distal influences on hip and knee kinematics in runners with patellofemoral pain during a prolonged run. *J Orthop Sports Phys Ther.* 2008 Aug;38(8):448-56. doi: 10.2519/jospt.2008.2490. Epub 2008 Aug 1. PMID: 18678957.
7. Warren LA, Marshall JL, Girgis F. The prime static stabilizer of the medial side of the knee. *J Bone Joint Surg Am.* 1974 Jun;56(4):665-74. PMID: 4835814.
8. LaPrade RF, Engebretsen AH, Ly TV, Johansen S, Wentorf FA, Engebretsen L. The anatomy of the medial part of the knee. *J Bone Joint Surg Am.* 2007 Sep;89(9):2000-10. doi: 10.2106/JBJS.F.01176. PMID: 17768198.
9. Dejour DH, Mesnard G, Giovannetti de Sanctis E. Updated treatment guidelines for patellar instability: "un menu à la carte". *J Exp Orthop.* 2021 Nov 26;8(1):109. doi: 10.1186/s40634-021-00430-2. PMID: 34837157; PMCID: PMC8626553.

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