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## Arthroscopy assisted MPFL reconstruction by anatomic inverted 'V' tunnels placement technique

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### Abstract

**Background:** The medial patellofemoral complex, consisting of the medial patellofemoral ligament (MPFL) and the medial patellotibial ligament, is the main passive stabilizer of the patellofemoral joint. Since it has been shown that rupture of the MPFL is the main pathological consequence of patellar dislocation and biomechanical studies have demonstrated that the MPFL is the main passive restraint against patellofemoral instability (PFI) and lateral patellar displacement.

**Materials and methods:** In 13 patients of post traumatic recurrent dislocation of patella, arthroscopy assisted minimally invasive MPFL reconstruction was done between March 2011 and July 2014, reconstruction was done with the hamstring tendon graft.

**Results:** All the patients were treated successfully, on 1 and 2 year follow up they were able to walk and run well without the apprehension of dislocation of patella, Range of movement improved to complete flexion in 11 patients. 1 patient c/o stiffness of knee, 1 patient had minimal infection. No other significant post operative complications were seen.

**Conclusion:** Since the recurrent dislocation of patella is a bothersome condition and most of the cases are associated with MPFL tear. Reconstruction of the MPFL has become a widely accepted for restoration of patellofemoral stability and it can be treated well with the minimally invasive arthroscopy assisted MPFL reconstruction technique. Results are encouraging and rehabilitation of the patient is early. Satisfaction level of the patient as well as the Surgeon is pretty good.

**Keywords:** Patello-femoral ligament, instability, dislocation, arthroscopy, reconstruction

### Introduction

Patellar instability is a common clinical problem affecting a young, active population. A large number of procedures have been described to treat patellar instability with varying clinical results [1, 2] including fully arthroscopic procedures [3]. Reconstruction of the medial patellofemoral ligament (MPFL) has become popular in the treatment of chronic patellar instability. It has been shown that the MPFL is the primary medial restraining structure to lateral displacement of the patella and contributes up to 80% of the medial restraining forces to the patella [4, 5]. In cases of full patellar dislocation biomechanical studies have shown the MPFL has limited ability to lengthen [6]. The capacity of the MPFL to heal is also limited, which results in increased medial laxity of the patellar retinacular structures [7, 8].

The MPFL is a condensation of the medial retinaculum, which originates from the medial aspect of the patella and inserts into the adductor tubercle of the medial femoral condyle. The numerous described reconstructive techniques have the aim to restore this medial tether of the patella. Various tendon sources have been described including gracilis [9, 12], hamstring [10, 14], semitendinous [11, 13], partial patellar tendon [15] and allografts or artificial tendons [16]. In addition, grafts have been fixed using a variety of techniques including patellar drill holes, sutures, suture anchors and interference screws at the femoral condyle. Generally, the clinical results of MPFL reconstruction have been reported as successful. Redislocation rates of 0–10% have been reported (Table 1). For techniques involving transverse patellae drill holes, a small incidence of patellar fracture has been reported [12, 17].

### Material and methods

This study included 13 post-traumatic patellar instability patients. The diagnosis of MPFL ligament tear was confirmed by MRI. Patients underwent surgery from March 2011 to July 2014 at NIMS medical college, Jaipur.

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All patients who underwent a primary MPFL reconstruction in this period were included in the study. Any revision procedures or patients who had undergone previous surgery except diagnostic arthroscopy were excluded. The mean follow up was 24 months (range: 12-38 months). Patients mean age was 20 years (range: 14–30 years). There were 8 male and 5 female patients. All patients had chronic patellar instability. Exclusion criteria for this operation were:

1. Significant patellofemoral degenerative changes (grade III–IV)
2. Significant patellar malalignment with an increased Q angle [tibial tubercle to trochlear groove distance (TTTG) greater than 15 mm]
3. Severe trochlear dysplasia (Dejour type B or C)

Patients were evaluated by preoperative and follow-up Tegner activity scores. At follow-up a subjective Kujala score was obtained. Clinical data included incidence of recurrent subluxation or dislocations. Any complications and re-operations were noted.

Anatomic inverted 'V' dual tunnel placement with three incision technique was employed. Firstly, the gracilis or semitendinosus tendon was harvested through a 2- to 3-cm incision over the pes anserinus using a tendon stripper. A second incision was made over the medial border of the patella along the proximal two thirds and third incision over lateral border of patella.

#### Surgical technique and post-operative protocol

Initially diagnostic arthroscopy of the affected knee was performed to identify the MPFL tear and to rule out any other associated pathology or other ligament tear. The reconstruction was done with the use of hamstring autograft. 2-3 cm longitudinal incision was taken over 1 cm medial and parallel to the tibial tuberosity, this provided the access to the pes anserinus region, we identified the insertion of gracilis or semi-tendinosus and used tendon stripper to harvest the graft. Once the autograft was harvested, the origin and insertion of the MPFL were identified on the patella and femur. On the patellar side, two drill holes in inverted 'V' shape were made through which the ends of the autograft tendon were passed. The ends were then secured either with tenodesis screws or by tying them over one another on the lateral side of the patella. The autograft tendon was then directed through a drill hole in the femur, tensioned, and secured with an interference screw on the medial aspect of the femur, at the isometric point [18].



[Intra-op picture showing graft placement through patellar tunnels.]

#### Postoperative protocol

All patients were given the same general rehabilitation protocol. All patients were made weight-bearing as tolerated with a knee brace in extension for weight-bearing. For the first six weeks postoperatively, patients primarily worked on range of motion exercises with full range of motion allowed as tolerated, when the patient was not weight-bearing. From six weeks to three months, closed chain strengthening was initiated at three months postoperatively. Finally patients were allowed to return to routine and sports activity at five to six months postoperatively, once they had passed a functional assessment.

#### Results

All patients were treated successfully and had a mean follow up of 24 months (range: 12-38 months). All patients were followed up at 6 weeks, 3months, 6 months and then yearly for regular check up. At 1 and 2 year follow up they were able to walk and run well without the apprehension of dislocation of patella, Range of movement improved to complete flexion in 11 patients. One patient complained of stiffness of knee, another patient underwent an arthroscopic washout for infection. No other significant post operative complications were seen.

9 patients had no or occasional slight pain with a mean post-operative Kujala score of 85 points (range: 55–100 points) at one year and 92 at two years follow-up. The Tegner activity score improved overall from 3 points (range: 0–5 points) to 5 points (range: 1–7 points).

#### Discussion

This study shows that arthroscopy assisted MPFL reconstruction technique is very useful in treatment of recurrent patellar instability. Patients resumed their normal routine life style about 6 months after surgery. Patients were evaluated with the help of Kujala and Tegner subjective scores [19, 20]. There are several studies to evaluate the results of MPFL reconstruction, which showed results in favour of reconstruction as well as other studies which quote post surgical complications.

A study by Arendt *et al.* has reported a redislocation rate of nearly 46% [21]. Camp *et al.* found a redislocation rate of 28% [22]. In the study of Arendt *et al.*, there were greater numbers of patients with patella alta and trochlear dysplasia. In the Camp *et al.* study, half of the redislocation patients had nonanatomic placement of femoral anchors. When comparing subjective outcomes, the Kujala and tegner scores are comparable to other studies.

Most of the studies demonstrates lower redislocation rates, anywhere from 0–11% [23, 24, 25, 26]. Commonly reported outcome is the Kujala score.

Lateral patellar dislocation following a medial patellofemoral ligament (MPFL) reconstruction has been reported as another complication. There was a traumatic episode resulting in a transverse avulsion fracture at the medial rim of the patella. Presence of original underlying pathology such as dysplastic trochlea, abnormal TT–TG, patella alta and hyperlaxity, results in a greater reliance upon the reconstructed MPFL for patellar stability. Due to a severe stress, the graft, which is stiffer than the original ligament, causes a fracture of the medial edge of the patella.

Overtight MPFL ligament is also a complication, which can be avoided by thorough arthroscopic examination of knee, we evaluated the correct patellar tracking and functioning of

patello-femoral joint by arthroscopic visualization of the patella and trochlear groove while knee in motion. Still post operative over-tightening can be treated by a percutaneous release of the graft. Thus proper graft tensioning as well as its femoral positioning is important.

### Conclusion

Arthroscopy assisted MPFL reconstruction with transverse patella drill holes and hamstring tendon graft provides good postoperative patellar stability, it is a procedure with good success rates for patients with recurrent patellar dislocation.

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