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Case Series

Medial patellofemoral ligament reconstruction for patellofemoral instability: a new surgical technique

Shreekantha K. S., Mohammed Usman*, Deepak Malik, Mahammad Aseem, Mahammad Gous Mulla

Department of Orthopaedics, Sapthagiri Institute of Medical Sciences & Research Centre, Bangalore, Karnataka, India

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***Correspondence:**
Dr. Mohammed Usman,
E-mail: irfanusman10@gmail.com

ABSTRACT

The purpose of this study was to present new surgical technique for MPFL reconstruction. We also describe its functional outcome, complications, and the advantages of the procedure. This study is a prospective analysis of collected data during the period of august 2018 to January 2020. Ten cases of patients with recurrent symptomatic patellar instability and who underwent isolated MPFL reconstruction were included in the study. Kujala scoring and lysholm scoring was done to assess the functional outcome at follow-up. Post-operative dislocation and apprehension were recorded in each case along with any complication. Pre-operative Kujala score was 36.80 which improved to 89.80 postoperatively at the time follow-up. Pre-operative lysholm score was 36.80 which improved to 92.70 postoperatively at the time follow-up. The improvement in Kujala score and Lysholm score was found to be highly significant ($p<0.01$). We have done a simple technique where MPFL is reconstructed anatomically to restore kinematics and stability. Consistent good results with early rehabilitation can be obtained using the described technique.

Keywords: Medial patellofemoral ligament technique, Semitendinosis graft, MPFL reconstruction

INTRODUCTION

Patella dislocations are a common sports-related knee injury and represents 2% to 3% of all knee injuries. The current initial treatment for first time patella dislocation is often non-surgical.[1] MPFL is nearly always injured with patellar dislocation and is the main restraint to lateral patellar translation.[2] Recurrent patellar instability may occur in 15% to 40% of patients who have been treated non operatively for first-time patellar dislocations. Recurrent instability episodes may lead to further cartilage injury, debilitating pain, and limitation of activities of daily living, and may limit return to sport.[3]

Various techniques have been described using different grafts and fixation methods. In this study we have included patients with recurrent Patellofemoral dislocations and who underwent isolated MPFL reconstruction.

The purpose of this study was to present our modified technique for MPFL reconstruction. We also present its functional outcome, complications, and advantages from the procedure.

CASE SERIES

This study is a prospective analysis of collected data during the period of August 2018 to January 2020. Ten cases of patients with recurrent symptomatic patellar instability and who underwent isolated MPFL reconstruction were included in the study. The surgeries were performed by a single surgeon, following the same technique. Kujala scoring and Lysholm scoring was done to assess the functional outcome at follow-up. Post-operative dislocation and apprehension were recorded in each case along with any complication.

Patients with recurrent symptomatic patellar instability without a patellar fracture who underwent isolated MPFL reconstruction were included in the study. Clinically, patellar instability was assessed and confirmed based on the history of the patient and physical examination of the knee. Apprehension test, patellar tilt and patellar tracking were examined in every case.10 cases who underwent isolated MPFL reconstruction were selected.

Figure 1: Medial longitudinal incision for harvesting graft, midline incision over superior half of patella.

Figure 2: The two strands of prepared graft is pulled from medial to lateral side through each tunnel of patella for 15 mm.

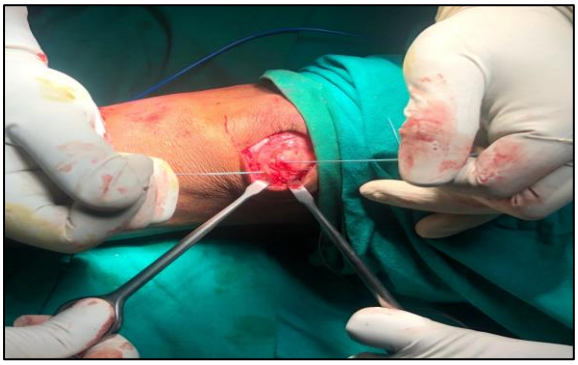

Figure 3: The ends of the sutures are tied on the lateral side of patella beneath lateral retinaculum.

Postoperatively, patients were followed up at 6 weeks, 3, 6, and 12 months. Clinical evaluation at follow- up was done by patellar tracking and apprehension test.

Figure 4: Range of motion recorded at 4 weeks post operatively.

Figure 5: Range of motion recorded at 6 months post operatively.

Post-operative dislocation and apprehension were recorded in each case along with any complication. Recurrence of patellar dislocation after surgery was considered as a failure.

Surgical technique used was as follows Patient is placed in the supine position on a radiolucent table. A tourniquet is placed around the thigh. Side support at level of tourniquet and foot bolster to rest knee at 60-degree flexion.

Evaluate patella instability while the patient is under anaesthesia. Patella glide is assessed for lateral tightness. Subluxation of patella in extension with subsequent reduction in further flexion angle noted.

A semitendinosis graft was harvested through a 3 cm medial longitudinal incision over the pes anserinus. The graft was whipstitched with number 2 Ethibond.

4 cm midline incision over superior half of patella is taken. Dissect subcutaneously to expose the proximal medial retinaculum at its insertion into the proximal portion of the patella. Make a 1.5-cm incision in the retinaculum.

Table 1: Patient details.

Patient S. no.	Age (in years)	Limb site	Mechanism of injury	Duration of symtptoms	Follow up (months)	Kujala score pre-op	Kujala Score post-op
1	23 M	Right	Contact sports injury	4	6	36	92
2	27 M	Left	Contact sports injury	2	6	41	88
3	33M	Left	Contact sports injury	10	6	38	89
4	21 F	Left	Contact sports injury	6	6	50	94
5	28 M	Right	Contact sports injury	9	6	45	89
6	32 F	Right	Contact sports injury	11	6	22	92
7	28 F	Left	Contact sports injury	6	6	36	94
8	35 F	Right	Contact sports injury	8	6	28	88
9	31 M	Left	Contact sports injury	10	6	34	92
10	44 M	Right	Contact sports injury	10	6	38	80

Use blunt dissection to spread between layers 2 and 3 (between the MPFL and the capsular layer) staying extrasynovial and developing the plane with a curved Kelly clamp directed toward the medial epicondyle and spreading between the layers to create a soft tissue tunnel.

Two patellar tunnels are created, both in proximal half of proximal patella using two beathed guide wires.

Table 2: Pre and post op comparison of range of motion.

Range of motion		
Pre-op (degrees)	3 months follow up (degrees)	6 months follow up (degrees)
130	110	130
134	115	128
136	115	130
135	100	130
136	110	132
132	100	130
134	115	130
135	110	132
140	110	136
136	100	130

Tunnel diameters are increased using appropriate size acornic reamer to 4 mm taking care not to breach articular or anterior surface of patella.

A 7 mm bony tunnel was then created over a guidewire at a point anterior to the midpoint between adductor tubercle and medial epicondyle, at the isometric point, using Schöttle technique under fluoroscopy. The isometric point was identified in a dead lateral plane.[4]

The two strands of prepared graft are pulled from medial to lateral side through each tunnel of patella for 15mm. The ends of the sutures are tied on the lateral side of patella beneath lateral retinaculum.

Under adequate tension, the graft was fixed with a 7 mm× 25 mm interference metal screw, with knee in 60 degree of flexion.

Repair the retinaculum over the reconstructed patellofemoral ligament. Close the subcutaneous tissues with 2-0 Vicryl and the skin with ethilon. Apply a postoperative dressing and a knee ROM brace.

Postoperative rehabilitation included mobilization with full weight-bearing in the first 2 weeks with an extension knee splint. 0°–60° range was allowed in the first 4 weeks and was progressively increased as tolerated by the patient. All the patients were able to achieve a full range of motion by the end of 12 weeks. All activities of daily living were allowed after 6 weeks. Any kind of high impact activity was allowed after 3 months. Competitive sports activities were allowed after 6 months.

Table 3: Comparative pre and post op scores.

	Age	Duration of symptom (in months)	Follow up (in months)	Kujala score pre-op	Kujala score post op	Lysholm score pre-op	Lysholm score post op	Return to sports activity (in months)	Range of motion pre-op	Range of motion three months	Range of motion six months
Mean	30.2	8.60	6.00	36.80	89.80	36.80	92.70	9.30	134.80	108.50	130.80
Std. Deviation	6.512	2.547	0.000	7.941	4.131	4.849	3.622	.823	2.658	6.258	2.150
Range	23	8	0	28	14	14	11	2	10	15	8
Minimum	21	4	6	22	80	30	85	8	130	100	128
Maximum	44	12	6	50	94	44	96	10	140	115	136

The statistical significance was set at $p<0.05$, with a confidence interval of 95%.

Depending on the nature of the criteria (quantitative, such as observed values, mean, and standard deviation; qualitative, such as number and percentages of patients per class), a descriptive data analysis was carried out. Pre- and post-surgery Kujala scores and lysholm scores were compared using the paired T- test.

DISCUSSION

Our study had a total of 10 cases. Three female and 7 were male patients. The average age was 30.20 years (range 21-44 years). The mean follow-up period was 12 months.

Mean pre-operative Kujala score was 36.80 which improved to 89.80 postoperatively at the time follow-up. Mean pre-operative Lysholm score was 36.80 which improved to 92.70 postoperatively at the time of 6 months of follow-up. The improvement in Kujala score and lysholm score was found to be significant ($p<0.01$).

None of the cases had any post-operative stiffness, hematoma, or sepsis. There was no failure (recurrent dislocations).

Superficial skin infection was recorded in one patient.

MPFL is condensation of tissue from medial border of patella to a point between adductor tubercle and medial epicondyle in the second layer of antero medial region of the knee. Average length of MPFL is 56.9±4.69 mm (range 46.0 to 75.0 mm). Patellar attachment is usually wider than the femoral attachment and is at the most prominent medial edge of the patella. Vastus medialis obliquus (VMO) is attached to proximal border of MPFL and provides medial stability tightening the ligament on contraction.[5]

The MPFL provides approximately 60% of the total medial restraining force against lateral patellar displacement, at 20 degree of knee flexion. MPFL experiences maximal loads at full knee extension or during early flexion. After 30 degree of knee flexion, the femoral trochlea contributes more to patellar stability.[6]

Predisposing factors of patella dislocation include genu valgum, patella alta, increased distance between the tibial tuberosity and the trochlear groove (TTTG distance), as well as increased internal rotation and anteversion of the femur.[7]

Either a complete or partial tear of the medial patellofemoral ligament is seen in about 98% of patients after an acute lateral patellar dislocation. The femoral origin was most frequently affected (50%), followed by the mid-substance (10%), and patellofemoral origin (10%).[8]

Alignment issues that are pathologic and that contribute to the instability should be addressed. They should be staged and/or concomitantly addressed with MPFL reconstruction. Other bony issues, including trochlear dysplasia, should be identified because they often contribute to recurrent patellofemoral instability. This is best graded from a true lateral radiograph. In cases of trochlear dysplasia, patients may be apprehensive with lateral translation of the patella at higher knee flexion angles (30° and beyond), because the patella is not secured in the trochlear groove.

The primary indication for MPFL reconstruction is recurrent lateral patella instability or dislocation. Isolated MPFL reconstruction may be contraindicated in cases of concomitant pathology, and should be considered in combination with other procedures such as a tibial tubercle osteotomy or lateral lengthening. Furthermore, MPFL reconstruction addresses instability symptoms and should not be expected to address patellofemoral pain.[9]

According to a study conducted in 2019 by Sappey-Marinier et al that evaluated 211 cases of isolated MPFL reconstruction. They had a minimum follow-up period of 3 years and were able to show an improvement in Kujala scores postoperatively (56.1 pre-operative to 88.8 post-operative).[10]

Schöttle et al in 2014 assessed both the clinical and radiological outcomes of linear MPFL reconstruction in 12 patients (15 knees) using semitendinosus graft after a follow-up of 4 years. Out of 15 knees (12 patients), 8

needed medializations of the tibial tuberosity. They also found their patients to have improved Kujala scores (53.3 points pre-operative to 85.7 post-operative).[11]

We did not encounter any case with a recurrence of patellofemoral dislocation, 1 patient in the study by Schöttle et al and 10 patients from the study by Sappey-Marinier et al were classified as failures. Mean pre-operative Kujala score was 36.80 which improved to 89.80 postoperatively at the time follow-up. Mean pre-operative Lysholm score was 36.80 which improved to 92.70 postoperatively at the time follow-up. In our case series, isolated MPFL reconstruction was only performed if the other structural parameters contributing to patellar instability were within normal limits. This might be the reason for the lack of failures.

The technique described is recommended for skeletally mature patients.

The greatest limitation was small number of patients and lack of a control group. The patients have been followed up for a short term of one year. In the future study, we will enrol more patients and compare different MPFL reconstruction methods to observe which method is associated with lower morbidity and more rapid rehabilitation.

CONCLUSION

We have done a simple technique where MPFL is reconstructed safely to avoid patella fracture, anatomically to restore physiological kinematics and stability, and economically to reduce the cost. Consistent good results with early rehabilitation can be obtained using sutures to fix the implant on patella and using the described technique.

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