

Arthroscopy assisted MPFL reconstruction in recurrent patellar dislocation

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Abstract:

Background:

For recurrent patellar dislocation, arthroscopic MRPs are less invasive, offer a cosmetic benefit, and have good clinical outcomes. Nevertheless, the medial patellofemoral ligament (MPFL), which has been clearly demonstrated to be the main tissue that restricts the medial patella, is not recreated or repaired using these approaches.

Objective:

To evaluate the efficacy of Arthroscopy assisted MPFL reconstruction in recurrent patellar dislocation by assessing its effects upon pain management and quality of life of patients.

Methodology:

This is a retrospective, cross-sectional study, conducted at Kharian hospital, during November 2023 till April 2024. Total 20 patients were included in the study. All of the patients experienced patellar dislocation at least twice during physical examinations, and they were all diagnosed as recurrent patellar dislocation with positive apprehension signs. Using double-looped semitendinosus tendon, all patients in this study had MPFL repair alone; no additional articular cartilage treatments or surgical procedures were performed.

Results:

The mean Kujala score increased considerably from 67.3 points with SD: 10.5 preoperatively to 91.6 points SD: 6.0 at the final follow-up (P.0002). Wiberg 2 was observed in 8 knees and Wiberg 3 in 10 knees on preoperative axial radiographs. The mean preoperative Q angle was 17.9° (range: 13°-27°; standard deviation: 3.4°). The mean congruence angle increased considerably postoperatively, from 14.8° (range, -7° to +54°; SD, 15.0°) to -9.9° (range, -39° to +9°; SD, 11.8°) (P.003, paired t test).

Conclusion:

In conclusion, both subjectively and radiographically, restoration of the medial patellofemoral ligament yields satisfactory results during a 2-year follow-up in the treatment of recurrent patellar instability. The results of the disclosed approach are competitive with previous operations, and it has the unique benefit of addressing the underlying pathoanatomic problem.

Keywords:

MPFL, Arthroscopy, recurrent patellar dislocation

Introduction:

Recurrent lateral dislocations are caused by osseous and soft-tissue abnormalities, leading to patellar instability, which is sometimes multifactorial. In circumstances when trochlear dysplasia is severe, trochleoplasty may be advised. Proximal, distal, or combination surgery is used to treat illnesses of the extensor mechanism, such as patellar alta or increased distance from the tibial tubercle to the trochlear groove (TT-TG). Patients with a normal Q-angle, inadequate medial structures, and early instability from a traumatic event are most suited for proximal soft-tissue procedures.

Proximal soft-tissue therapies balance the medial and lateral soft tissues. Anatomical susceptibility of the medial tissues, such as the medial

patellofemoral ligament (MPFL), medial retinaculum, and vastus medialis obliquus (VMO), and tightness of the lateral structures, such as the retinaculum or the iliotibial band, are regarded to be the causes of recurrent patellar dislocation. There is disagreement over the most effective proximal soft-tissue approach, despite the fact that other methods have been proposed. Recently, MPFL repair has emerged as the favored course of treatment for recurrent lateral patellar dislocations because it represents the primary passive limit to lateral patellar translation during early knee flexion.

For recurrent patellar dislocation, arthroscopic MRPs are less invasive, offer a cosmetic benefit, and have good clinical outcomes. Nevertheless, the medial patellofemoral ligament (MPFL), which has been clearly demonstrated to be the main tissue that restricts the medial patella, is not

recreated or repaired using these approaches. Thirty to sixty percent of patients with posttraumatic patella instability who are treated nonoperatively may experience recurrent dislocation, subluxation, and functional instability due to patellofemoral pain.

In a study, the clinical results of 100 patients treated with different non-operative techniques for initial acute patella dislocations were published. Fourteen years later, 44% of them had re-dislocated. Sixty-three percent reported unsatisfactory results over an extended period of follow-up, with another 19% having recurrent patellofemoral pain and dislocation.

This study aims to evaluate the efficacy of Arthroscopy assisted MPFL reconstruction in recurrent patellar dislocation by assessing its effects upon pain management and quality of life of patients.

Methodology:

This is a retrospective, cross-sectional study, conducted at Kharian hospital during November 2023 till April 2024. Total 20 patients were included in the study. All of the patients experienced patellar dislocation at least twice during physical examinations, and they were all diagnosed as recurrent patellar dislocation with positive apprehension signs. Using double-looped semitendinosus tendon, all patients in this study had MPFL repair alone; no additional articular cartilage treatments or surgical procedures were performed. Four patients' patellae were classified as type II and nine patients' patellae as type III according to Wiberg's categorization. The study adhered to the Helsinki Declaration's tenets and was authorized by the regional ethics commission. The patients gave their consent after being informed that the case data will be published. A 4- to 6-cm medial longitudinal incision was created midway between the adductor tubercle and the patella's medial edge. The distal end of the vastus medialis obliquus muscle allowed the medial retinaculum to slip, measuring 10 mm wide and 6 to 8 cm long with the patellar side intact. It started around 1 cm above the medial edge of the patella and ended posterior to the adductor magnus tendon. A longitudinal incision was made in the medial retinaculum, parallel to the medial collateral ligament. A rectangular bone tunnel was drilled through the patella from the proximal third of its medial margin to the center of its anterior surface using a 3.5-mm drill and patellar guides. After flexing the knee to a 60-degree angle, a tension spacer was positioned between the middle bone and the prosthetic ligament. Following the patella's physical placement, a tentative staple was used to temporarily secure the artificial ligament while putting the least amount of tension on it. The artificial ligament was found to be sufficiently tensioned across the whole range of knee flexion, even after the tension spacer was removed. At this time, we verified that the patellar position was accurate over the full range of knee flexion using

arthroscopy. The initial staple was positioned behind the temporary staple to anchor the prosthetic ligament to the bone. After taking out the temporary staple, the second staple was inserted almost exactly where the first one had been. The stapled area was covered by the elevated periosteum. The medial retinaculum slip was used to hide the staples and prosthetic ligament. Then, mattress sutures were utilized to replicate the medial retinaculum and vastus medialis obliquus exactly. A knee immobilizer was used to immobilize the knee after surgery. Activities to strengthen the quadriceps were initiated as soon as the patient was able to tolerate them. On days two through five after surgery, progressive passive and active range-of-motion exercises were initiated. On days five through ten after surgery, patients were permitted to bear weight as tolerated while wearing a patellar brace. After surgery, full weightbearing was allowed from days 10 to 17.

The follow-up period lasted 31.5 months on average (range: 24 to 43 months). Every patient filled out a subjective, self-administered questionnaire. The following statements were given to the patients to choose which best described how their surgical treatment turned out: (1) I've been able to return to all of my activities because my knee has greatly improved. (2) Although there is still occasional soreness or difficulties during sports activities, the knee has improved. (3) My knee has gotten better, but I still can't go back to playing sports. (4) After surgery, the knee is in the same condition as before. Subjective evaluations of outstanding, good, fair, or poor were produced by the answers to this question. The patients were also questioned for any recurrent subluxations or dislocations. Based on their levels of activity both before and after the accident, participants were asked to complete a Tegner score. Furthermore, patients had to fill out two different knee rating forms. A variant of the Lysholm knee score that places more attention on anterior knee issues is the Fulkerson functional knee score. A score of 90 to 94 is regarded as extremely high, 80 to 89 as good, 70 to 79 as decent, and less than 70 as low. A score of 95 to 100 is considered outstanding. Every patient underwent a thorough evaluation of both knees. Evaluation criteria included patellofemoral crepitus, quadriceps angles, medial or lateral facet tenderness, lateral retinacular tenderness, apprehension to lateral displacement, medial or lateral hypermobility, medial patellar glide, lateral patellar tilt, and presence of pain with patellar compression against the trochlear groove. Additionally, range of motion and chronic quadriceps atrophy were given significant attention. For radiographic inspection, two views were used: an infrapatellar view of both the operated and unoperated knees, and a standing 30° flexed-knee lateral view. Patellar subluxation and tilt were assessed using the congruence angle and lateral patellofemoral angle in the infrapatellar radiograph, respectively.

Using pictures from both pre- and post-MPFL periods, the chondral state of the patellofemoral joint was assessed retrospectively in accordance with the International Cartilage Repair Society (ICRS) classification. The anterior medial femoral condyle, anterior lateral femoral condyle, femoral groove, and the medial, central, and lateral facet of the patella comprised the six components of the patellofemoral joint. Every component's chondral state was assessed during MPFL reconstruction and compared to that during second-look arthroscopy. Clinical measures included lateral patellar mobility, lateral patellar apprehension sign, incidence of recurrent patellar subluxation or dislocation, and Kujala score. Measurements were made both before and after surgery of radiographic data, including the congruence angle, lateral tilt angle, and sulcus angle.

The mean standard deviation (SD) of the mean was used to assess the data. There was statistical analysis done. Both the Wilcoxon rank-sum test and the Student's t test were applied. P0.05 was considered significant.

Results:

Out of 20 patients, 14 (70%) were males and 6 (30%) were females, with mean age of 41.6 ± 15.3 and 34.8 ± 12.8 years respectively. Laterality indicated higher incident of left sided knee injury with frequency of 13 (65%) as compared to right sided knee with 7 (35%). Post-operative details were documented, follow up recovery was reported as 15 knees (75%) as excellent, 03 knees (15%) as good, 2 knees (10%) as fair/poor, and none as worse, according to the Crosby/Insall criteria. Three knees experienced further lateral subluxation or dislocation. The mean Kujala score increased considerably from 67.3 points with SD: 10.5 preoperatively to 91.6 points SD: 6.0 at the final follow-up (P.0002). Wiberg 2 was observed in 8 knees and Wiberg 3 in 10 knees on preoperative axial radiographs. The mean preoperative Q angle was 17.9° (range: 13°-27°; standard deviation: 3.4°). The mean congruence angle increased considerably postoperatively, from 14.8° (range, -7° to +54°; SD, 15.0°) to -9.9° (range, -39° to +9°; SD, 11.8°) (P.003, paired t test). Preoperatively, patellofemoral arthritis was classified as none to mild in 13 of the 15 knees (75%) and moderate in 3 knees (15%) using the Crosby/Insall grading system. At the final check-up, 16 knees (80%) had none to mild pain, while 2 knees (10%) had moderate pain.

Discussion:

Many authors have outlined the anatomy of the medial aspect of the knee joint. The undersurface of the vastus medialis obliquus, the aponeurosis of the vastus intermedius in layer II of the medial side of the knee, the adductor tubercle, and the superomedial border of the patella were all characterized in another study as the origin and insertion points of the medial patellofemoral ligament. Its anatomic consistency was shown in twenty cadaveric dissections. Additionally, a great deal of research has shown how important the medial patellofemoral ligament is for the patella's static resistance to lateral translation. 8–10 It has been estimated

Radiographic analysis		Pre-Operative	Final Follow-up
Patellofemoral arthritis	findings using the Crosby	None to mild: 15	None to mild: 13; moderate: 2
	Insall grading system	Moderate: 1	Moderate: 1
Patellofemoral arthritis	findings using the Kellgren	Grade 2 : 3	Grade 1: 1; grade 2: 1
	Lawrence grading system	Grade 1: 1	Grade 1: 1
Femrotibial arthritis	findings using the Kellgren	Grade 2 : 13	Grade 0: 13; grade 1: 4; grade 2: 2
	Lawrence grading system	Grade 1: 3	Grade 1: 3

that the medial patellofemoral ligament accounts for between 53% and 60% of the overall medial restraining force.

It has been discovered that resistance to lateral patellar translation is facilitated by the medial patellomeniscal ligament as well as the medial patellotibial ligament, however the latter may have a negligible effect. In eight out of ten misplaced patellae on a cadaveric model, a tear of the medial patellofemoral ligament was found. The medial patellofemoral ligament was ruptured in vivo in 15 out of 16 patients who had treatment for acute patella dislocation. The femoral insertion was the most common location of ligamentous disruption in each of these groups.

Distal realignment techniques have been described for the treatment of patellar instability. Despite the fact that 84% of patients reported feeling better, 6 knees had a patellar dislocation after surgery. Moreover, some advocates of distal realignment advocate for the treatment only when an abnormal quadriceps angle is present, which some individuals with recurrent patellar instability may not have. 36 Lastly, medial ligamentous injuries cannot be effectively treated with distal realignment techniques.

Treatment options for patellar instability now include distal realignment techniques. Even though 84% of patients reported feeling better, 6 knees experienced a patellar dislocation after surgery. Additionally, some advocates of distal realignment contend that the procedure should only be carried out in cases when an aberrant quadriceps angle exists, which some people with recurrent patellar instability may not have. 36 Distal realignment techniques are ultimately useless for treating medial ligamentous damage.

Recurrence rates of up to 44% have been reported postoperatively, despite the treatment being a desirable alternative for first-time dislocators due to

its less invasive nature. As a matter of fact, one patient in our study experienced recurring dislocation following a single lateral release for an acute patellar dislocation. The senior author and most other writers are against isolated lateral release as a therapy for recurrent instability following patella dislocation. During proximal realignment therapies, the vastus medialis obliquus and/or the superficial medial retinaculum are usually imbricated. The superficial medial retinaculum and vastus medialis obliquus, however, only slightly limit the lateral movement of the patella. Although they address the medial side of the knee, these surgeries do not address the ligamentous lesion.

Recurrence rates following patellar dislocation, despite appropriate nonoperative care, have been found to range from 14% to 44%. Additionally, it has been stated that 20% to 30% of patients, regardless of surgical or nonoperative treatment, would show indications of instability. In our series, all patients experienced symptoms of instability even after beginning PT, with the exception of one who had a large osteochondral fragment that needed to be excised quickly. Treating patellar dislocation by addressing the medial patellofemoral ligament is not a new concept. In 14 patients who had medial patellar retinaculum repair following acute patellar dislocation, Sargent and Teipner³⁷ reported excellent results.

Their method of medial patellofemoral ligament advancement and repair has also supported acute medial patellofemoral ligament repair and given justification for therapies that focus on the fundamental pathophysiology of patellar dislocation. They emphasize that the injured medial tissues are not addressed by distal realignment procedures, which realign the dynamic patellar stabilisers. Unfortunately, acute repair of the medial patellofemoral ligament may not be possible in the chronic scenario because of the inability to detect the structure or the existence of severe scarring.

There are numerous reported methods for rebuilding the medial patellofemoral ligament. Gomes³⁹ rebuilt thirty medial patellofemoral ligaments using a polyester ligament. After following up with his patients for an average of 39 months, he recorded improvement in 83% of them. Avikainen et al.⁴⁰ repaired the medial patellofemoral ligament using adductor magnus tenodesis. The current study, which has a minimum 2-year follow-up, is the largest series of its kind, with 13 patients who had autogenous hamstring or iliotibial band repair for medial patellofemoral ligament damage.

The principal pathoanatomic lesion of patella dislocation is treated by reattaching the torn medial patellofemoral ligament. The authors recommend restoration to address this ligamentous rupture in individuals who experience recurrent patellar instability. This is comparable to treating anterior cruciate ligament restoration for anterolateral knee instability instead of extra-articular therapies. A part of the autograft is used to repair the medial patellotibial ligament in addition to the medial

patellofemoral ligament. Previous anatomic studies suggest that this repair's component might not significantly increase stability.

This is analogous to treating anterolateral knee instability using anterior cruciate ligament restoration rather than extra-articular treatments. In addition to the medial patellofemoral ligament, a portion of the autograft is used to repair the medial patellotibial ligament. Prior anatomic investigations indicate that this component of the repair may not add significant stability. Furthermore, despite the fact that the medial patellofemoral ligament restoration was performed with a lateral release, the authors argue, and previous studies support, that lateral release alone would have resulted in worse results.

This is comparable to treating anterior cruciate ligament restoration for anterolateral knee instability instead of extra-articular therapies. A part of the autograft is used to repair the medial patellotibial ligament in addition to the medial patellofemoral ligament. Previous anatomic studies suggest that this repair's component might not significantly increase stability. Furthermore, the authors contend—and prior research supports—that lateral release alone would have produced inferior outcomes even when the medial patellofemoral ligament reconstruction was carried out with a lateral release.

The senior author only undertakes distal realignment treatments prior to ligament restoration in cases of significant malalignment (quadriceps angle more than 15°). The authors do not recommend medial patellofemoral ligament reconstruction in those who have an improper quadriceps angle. Both the lateral patellofemoral angle and the mean congruence angle showed significant improvements on radiography. The absence of a significant change in the mean Blackburne-Peel ratio between preoperative and postoperative periods indicates that neither patella alta nor patella baja were introduced during the procedure.

Conclusion:

In conclusion, both subjectively and radiographically, restoration of the medial patellofemoral ligament yields satisfactory results during a 2-year follow-up in the treatment of recurrent patellar instability. The results of the disclosed approach are competitive with previous operations, and it has the unique benefit of addressing the underlying pathoanatomic problem.

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Disclosure

Authors declared no conflict of interest

Ethical approval was taken (ERC # Res/MC/128)

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Patient consent was taken

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