International Journal of Orthopaedics and Traumatology

ISSN Print: 2664-8318
ISSN Online: 2664-8326
Impact Factor: RJIF 5.42
IJOT 2023; 5(1): 29-33
www.orthopedicsjournal.in
Received: 20-02-2023
Accepted: 22-03-2023

Faisal MA
Associate Professor, Department of Orthopaedic Surgery, Arthroscopy & Arthroplasty Unit, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Chowdhury AZ
Professor, Department of Orthopaedic Surgery, Arthroscopy & Arthroplasty Unit, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Kundu IK
Associate Professor, Department of Orthopaedic Surgery, Arthroscopy and Arthroplasty Unit, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Mahmud CI
Associate Professor, Department of Orthopaedic Surgery, Arthroscopy & Arthroplasty Unit, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Ali MY
Associate Professor, Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Runa SP
Department of Pedodontics, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Parajuli S
Resident, Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Amin MR
Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Dey D
Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Rasul A
Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Das CP
Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Corresponding Author:
Faisal MA
Associate Professor, Department of Orthopaedic Surgery, Arthroscopy & Arthroplasty Unit, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Functional outcome of isolated medial patellofemoral ligament reconstruction for recurrent patellar dislocation

Faisal MA, Chowdhury AZ, Kundu IK, Mahmud CI, Ali MY, Runa SP, Parajuli S, Amin MR, Dey D, Rasul A and Das CP

DOI: https://doi.org/10.33545/26648318.2023.v5.i1a.25

Abstract
Background: In young, active patients, a patellar dislocation is a frequent knee injury. Long-term non operative treatment is reportedly becoming less popular in recent years, and patients who fail initial non operative management for recurring patellar dislocations are more frequently advised to undergo surgery. More frequently used in this context is medial patellofemoral ligament (MPFL) repair.
The Medial Patellofemoral Ligament, which is usually damaged by an acute lateral patellar dislocation, serves as the main barrier against excessive lateral displacement. Patients who experience frequent episodes of lateral patellar instability and fail a thorough non operative therapy are candidates for surgery.
Objectives: The objectives of this study was to evaluate the clinical, functional, and radiological results of isolated MPFL reconstruction for recurrent lateral patellar dislocation.
Methods: In the Department of Orthopaedics at Bangabandhu Sheikh Mujib Medical University, a prospective study was carried out between January 2020 and December 2021 with a 1-year follow-up. The study comprised 34 individuals with repeated unilateral patellar dislocation and persistent patellar instability without any anatomical predisposing factors. The modified Cincinnati and Kujala scores and anthropometry were used in the evaluation.
Results: Prior to surgery, the mean modified Cincinnati score was 50; after surgery, it was 85 (P =.001). Preoperatively, the mean Kujala scores were 43; postoperatively, they were 80 (P =.03). With time, the muscle volume of the operated limb's thigh rise, but it didn't develop as well as the unoperated limb (P =.04). Preoperatively, the mean Insall-Salvati index was 1.1 (range, 0.9-1.2), and at the most recent follow-up, it was still within the normal range (1.1 [range, 0.9 to 1.2]) (P =.07). The anthropometric measurement of muscle volume of the thigh of the operated limb increased with time (2.95±0.50 L preoperatively to3.75±0.7 L at follow-up; *P* = .03).
Conclusion: The safe, effective treatment option for recurrent patellar dislocation in individuals without any predisposed anatomic features is medial patellofemoral ligament restoration utilizing hamstring tendon.

Keywords: Patella, recurrent dislocation, medial patellofemoral ligament (MPFL), reconstruction

Introduction
A patellar dislocation is when the patella is completely removed from the trochlear groove of the femur. It frequently takes occurred during athletics and almost usually involves a lateral displacement [3, 16, 18]. Although children and teenagers between the ages of 10 and 19 have a significantly greater incidence, at 31 per 100,000, it is still only 6 per 100,000 overall [16, 18]. After a first-time patellar dislocation, patients are typically treated non-operatively even though the recurrence probability may be as high as 50%. [11, 18] Beginning with an open wedge osteotomy of the anteromedial femoral condyle, surgical therapy for patellar dislocation has been documented since the early 1900 s.
There have been a lot of surgical procedures documented in the literature throughout the last century [2, 14].
Anatomical abnormalities like trochlear dysplasia, patella alta, increased femoral ante torsion, increased external tibial torsion, increased Q angle, increased tibial tuberosity to trochlear groove distance, and valgus alignment of the lower limb have been the focus of surgical treatment for recurrent dislocations until recently [6, 12].

A new biomechanical study has revealed that if the patella dislocates laterally, the medial patellofemoral ligament (MPFL), which serves as the main soft tissue constraint, will rupture [7, 13]. Acute repair and reconstruction of this ligament are becoming more common as our understanding of the MPFL's role in biomechanics has improved.

According to research using cadaveric sections, the MPFL and medial patellomeniscal ligament together account for 50% to 60% of the soft tissue constraint to lateral translation [20]. Up to 100% of patients with acute patellar dislocation in the knees who underwent rapid surgical exploration and magnetic resonance imaging tests had an MPFL damage [3, 22]. And various treatment plans [10]. Although there is growing interest in MPFL reconstruction for primary patellar dislocation, MPFL reconstruction has traditionally been performed most frequently for recurrent patellar dislocation [16].

MPFL reconstruction can be done in a variety of ways employing various graft types and treatment regimens [10]. There have been several MPFL reconstruction techniques using semitendinosus, gracilis, quadriceps tendon, and synthetic grafts documented [1, 8, 9, 10, 19, 21]. There is no one surgical approach that clearly improves the others. In this prospective study, patients who underwent isolated anatomic MPFL reconstruction with autologous hamstring grafts for persistent patellar dislocation were assessed clinically and functionally.

Objectives of study

The objectives of this study was to evaluate the clinical, functional, and radiological results of isolated MPFL reconstruction for recurrent lateral patellar dislocation.

Materials and Methods

In the Department of Orthopaedics at Bangabandhu Sheikh Mujib Medical University, a prospective study was carried out between January 2020 and December 2021 with a 1-year follow-up. The study comprised 34 individuals with repeated unilateral patellar dislocation and persistent patellar instability without any anatomical predisposing factors. The modified Cincinnati and Kujala scores, anthropometry and plain radiography were all used in the evaluation. Following surgery, the patients were routinely checked on at 2, 4, 8, 12, and 24 weeks as well as once a year after that. The modified Cincinnati rating system [20], which has been validated in our study and the Kujala score were used to conduct the clinical and functional evaluations. To make the radiographic measurements mentioned above, lateral, and anterior radiographs were collected at 4, 12, and 24 weeks, as well as yearly after that. The same operator carried out each measurement.

Inclusion criteria

1. Adult patients with recurrent unilateral patellar dislocation
2. Failed Conservative management

Exclusion criteria

1. Q angle greater than 20°,
2. Genu valgus greater than 7°,
3. Trochlear angle greater than 145° on the skyline view,
4. Patellar dysplasia grade IV and V
5. Patella alta (Insall- Salvati index greater than 1.2) and
6. Meniscal or anterior or posterior cruciate ligament tears requiring repair or reconstruction.

Pictures

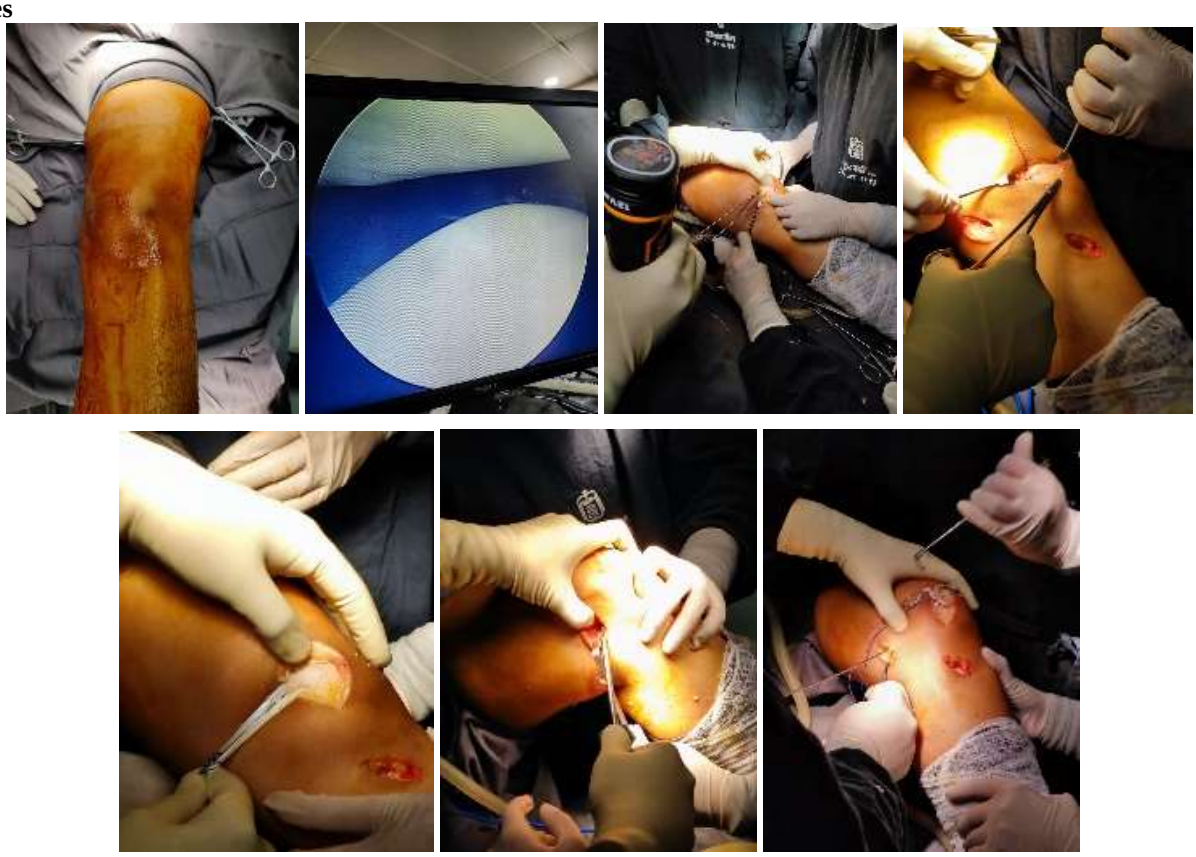

Fig 1: Per-operative Image

Fig 2: Post-operative Image (After 3 months)

Anthropometry
According to Jones and Pearson, thigh volume and cross-sectional area of the thigh (Muscle and bone) were measured bilaterally at the level of the second segment of the thigh before the operation and at the most recent follow-up [15]. From these anthropometric values, the thigh's muscle and bone cross-sectional area was determined [4, 15]. The same operator carried out all the measurements.

Surgical Technique
The senior surgeon performed each procedure as previously said [5]. In order to address any intra-articular derangement of the knee, a diagnostic arthroscopy was quickly carried out with the patient supine and a tourniquet on the thigh. Then, an autogenous hamstring tendon transplant was taken out and processed as usual [17]. To repair the MPFL, the semitendinosus tendon was taken and used. A 4 cm longitudinal medial Parapatellar incision was made to access the patella. The graft was inserted through two transverse parallel tunnels, separated by a 1 cm bone bridge that crossed the entire width of the upper third of the patella, forming a loop of tissue from the medial aspect. A 1.5 cm longitudinal incision was made above the medial epicondyle, and the graft was then passed between the deep fascia and the knee capsule. With the use of a Tran's femoral Beath pin, the two ends of the graft were inserted into a 7-mm tunnel that was roughly 3 cm long and located on the medial epicondylar posterior side, close to the medial collateral ligament and 1 cm distal to the adductor tubercle. The graft was kept under stress as the knee was repeatedly cycled between full flexion and full extension. The strain in the graft was relieved in this way. With the knee flexed to 60°, the graft was then fixed inside the medial epicondyle tunnel using a 7-mm-diameter and 30-mm-long biodegradable interference screw. The wound was closed in layers and routine dressings, bandages, and a straight knee splint were applied.

Post-operative Rehabilitation
0 POD: Analgesic, Antibiotics, jones bandage
1st POD: Remove Jones
2nd POD: Dressing, Quadriceps Strange thing Exercise
14 POD: Stitch off
After 2 weeks: Progressive Knee ROM and Partial Weight bearing
After 4 weeks: Full weight Bearing
After 6th weeks: Full ROM
After 3 months: Start Functional Activities
After 6 months: All activities

Statistics
Descriptive statistics were calculated. Changes in the variables under study were tested using the Mann-Whitney test, as there was some evidence of non-normality. Comparison of pre-treatment scores with post-treatment scores was undertaken using Wilcoxon (within-subjects) tests. Significance was set at $p<.05$.

Result
This prospective study included 34 patients. There were 25 male and 9 female patients with a mean age of 32.5±11.4 years (Range, 20-40 years) (Table 1). During examination under anesthesia, the surgeon was able to completely dislocate the patella in 5 patients with manual pressure directed in a medial-to-lateral direction. When divided in 4 quadrants, 29 the lateral patella motion was greater than 2 quadrants in all patients on application of medial-to lateral digital pressure at examination under anesthesia. At arthroscopy, there was an osteochondral lesion less than 15 mm in diameter in 11 patients. The osteochondral defects were in the medial patellar facet (n = 5), on the lateral femoral trochlea (n = 3), and on both the medial patellar facet and the lateral femoral trochlea in 3 patients. In all cases, the osteochondral defect was grade IV according to the ICRS classification [26]. Of the 34 patients, 7 had grade III degenerative joint disease of the patellofemoral joint at the index procedure, and 3 had grade IV degenerative joint disease of the patellofemoral joint at the index procedure. The mean modified Cincinnati score increased from 50±15 (range, 35-65) preoperatively to 85±15 (range, 75-100; P = .001). The mean Kujala scores increased from 43±15 (range, 28-58) preoperatively to 80±14 (range, 66-94; P = .03). There were no significant differences in all the above variables between patients with and without osteochondral lesions ($p \geq .07$), and between male and female patients ($p \geq .08$). The Insall-Salvati index was 1.1 (range, 0.9-1.2) preoperatively and remained within normal range (1.1; range, 0.9-1.2; P = .07) at latest follow-up (Table 2). The anthropometric measurement of muscle volume of the thigh of the operated limb increased with time (2.95±0.50 L preoperatively to 3.75±0.7 L at follow-up; P = .03).

Table 1: Characteristics of the Patients **(**Demographic Data)

N	**34**
Females	9
Males	25
Mean Age (Range 20 years to 40 years)	32.5±11.4

Table 2: Outcome after Treatment

Measure	**Preoperative**	**Latest Follow-up**
Modified Cincinnati[a]	50±15	85±15
Kujala score[a]	43±15	80±14
Install-Salvati index (Weight bearing)	1.1±0.2	1.1±0.2

[a] Significant differences between preoperative and latest follow-up; $p< .05$.

Anthropometry
The muscle volume of the thigh of the operated limb increased with time (2.95±0.50 L preoperatively to 3.75±0.7 L at follow-up; P = .03).

Discussion

In our study there were 34 patients out of which 25 male and 9 female patients with a mean age of 32.5±11.4 years (range, 20-40 years). Male majority which is similar to Ronga *et al.* [24].

We found the mean modified Cincinnati score increased from 50±15 (range, 35-65) preoperatively to 85±15 (range, 70-100; *P* = .001) similar to Ronga *et al.* [24] (52 to 89 scores). In our study the mean Kujala scores increased from 43 preoperatively to 80 which is similar Kujala scores improved from 46 to 84 points on average with previous study Christiansen *et al.* [25].

The Insall-Salvati index was 1.1 (range, 0.9-1.2) preoperatively and remained within normal range (1.1; range, 0.9-1.2; *P* = .07) at latest follow-up (Table 2) which is similar with previous study Ronga *et al.* [24] i.e. 1.1 (range, 0.9-1.2) preoperatively and remained within normal range (1.1; range, 0.9-1.2; *P* = .07) at latest follow-up.

The anthropometric measurement of muscle volume of the thigh of the operated limb increased with time (2.95±0.50 L preoperatively to 3.75±0.7 L at follow-up; *P* = .03) with is similar with previous study (3.22±0.65 L preoperatively to 3.52±0.7 L at follow-up; *P* = .03) [24].

Conclusions

The safe, effective treatment demonstrates that both subjective and clinical outcomes are excellent after isolated MPFL reconstruction, as proven by this study. The option for recurrent patellar dislocation in individuals without any predisposed anatomic features is medial patellofemoral ligament restoration utilizing hamstring tendon.

Conflict of Interest

Not available

Financial Support

Not available

Reference

1. Aarimaa V, Ranne J, Mattila K, Rahi K, Virolainen P, Hiltunen A, *et al*. Patellar tendon shortening after treatment of patellar instability with a patellar tendon medialization procedure. Scand J Med Sci. Sports. 2008;18:442-446.
2. Aglietti P, Buzzi R, De Biase P, Giron F. Surgical treatment of recurrent dislocation of the patella. Clin Orthop Relat Res. 1994;308:8-17.
3. Ahmad CS, Stein BE, Matuz D, Henry JH. Immediate surgical repair of the medial patellar stabilizers for acute patellar dislocation: A review of eight cases. Am J Sports Med. 2000;28:804-810.
4. Buckley DC, Kudsk KA, Rose BS, Fatzinger P, Koetting CA, Schlatter M. Anthropometric and computerized tomographic measurements of lower extremity lean body mass. J Am Diet Assoc. 1987;87:196-199.
5. Carmont MR, Maffulli N. Medial patellofemoral ligament reconstruction: A new technique. BMC Musculoskelet Disord. 2007;8:22.
6. Carney JR, Mologne TS, Muldoon M, Cox JS. Long-term evaluation of the Roux-Elmslie-Trillat procedure for patellar instability: A 26-year follow-up. Am J Sports Med. 2005;33:1220-1223.
7. Christiansen SE, Jacobsen BW, Lund B, Lind M. Reconstruction of the medial patellofemoral ligament with gracilis tendon autograft in transverse patellar drill holes. Arthroscopy. 2008;24:82-87.
8. Deie M, Ochi M, Sumen Y, Yasumoto M, Kobayashi K, Kimura H. Reconstruction of the medial patellofemoral ligament for the treatment of habitual or recurrent dislocation of the patella in children. J Bone Joint Surg Br. 2003;85:887-890.
9. Drez D, Jr, Edwards TB, Williams CS. Results of medial patellofemoral ligament reconstruction in the treatment of patellar dislocation Arthroscopy. 2001;17:298-306.
10. Ellera Gomes JL, Stigler Marczyk LR, Cesar de Cesar P, Jungblut CF. Medial patellofemoral ligament reconstruction with semitendinosus autograft for chronic patellar instability: A follow-up study. Arthroscopy. 2004;20:147-151.
11. Fernandez E, Sala D, Castejon M. Reconstruction of the medial patellofemoral ligament for patellar instability using a semitendinosus autograft. Acta Orthop Belg. 2005;71:303-308.
12. Harilainen A, Sandelin J. Prospective long-term results of operative treatment in primary dislocation of the patella. Knee Surg Sports Traumatol Arthrosc. 1993;1:100-103.
13. Hawkins RJ, Bell RH, Anisette G. Acute patellar dislocations. The natural history. Am J Sports Med. 1986;14:117-120.
14. Insall J, Salvati E. Patella position in the normal knee joint. Radiology. 1971;101:101-104.
15. Jones PR, Pearson J. Anthropometric determination of leg fat and muscle plus bone volumes in young male and female adults. J Physiol. 1969;204:63P-66P.
16. Kujala UM, Jaakkola LH, Koskinen SK, Taimela S, Hurme M, Nelimarkka O. Scoring of patellofemoral disorders. Arthroscopy. 1993;9:159-163.
17. Maffulli N, Leadbetter WB. Free gracilis tendon graft in neglected tears of the Achilles tendon. Clin J Sport Med. 2005;15:56-61.
18. Nakagawa K, Wada Y, Minamide M, Tsuchiya A, Moriya H. Deterioration of long-term clinical results after the Elmslie-Trillat procedure for dislocation of the patella. J Bone Joint Surg Br. 2002;84:861-864.
19. Nomura E, Inoue M, Sugiura H. Ultrastructural study of the extra-articular Leeds-Keio ligament prosthesis. J Clin Pathol. 2005;58:665-666.
20. Noyes FR, McGinniss GH, Mooar LA. Functional disability in the anterior cruciate insufficient knee syndrome: Review of knee rating systems and projected risk factors in determining treatment. Sports Med. 1984;1:278-302.
21. Panagiotopoulos E, Strzelczyk P, Herrmann M, Scuderi G. Cadaveric study on static medial patellar stabilizers: the dynamizing role of the vastus medialis obliquus on medial patellofemoral ligament. Knee Surg Sports Traumatol Arthrosc. 2006;14:7-12.
22. Schottle PB, Fucentese SF, Romero J. Clinical and radiological outcome of medial patellofemoral ligament reconstruction with a semitendinosus autograft for patella instability. Knee Surg Sports Traumatol Arthrosc. 2005;13:516-521.
23. Spritzer CE, Courneya DL, Burk DL Jr, Garrett WE, Strong JA. Medial retinacular complex injury in acute

patellar dislocation: MR findings and surgical implications. AJR Am J Roentgenol. 1997;168:117-122.
24. Ronga, *et al*. Isolated Medial Patellofemoral Ligament Reconstruction for Recurrent Patellar Dislocation. Am J Sports Med. 2009 May 26;37:1735-1742.
25. Christiansen SE, Jacobsen BW, Lund B, Lind M. Reconstruction of the medial patellofemoral ligament with gracilis tendon autograft in transverse patellar drill holes. Arthroscopy. 2008;24(1):82-87.

How to Cite This Article
Faisal MA, Chowdhury AZ, Kundu IK, Mahmud CI, Ali MY, Runa SP, *et al*. Functional outcome of isolated medial patellofemoral ligament reconstruction for recurrent patellar dislocation. International Journal of Orthopaedics and Traumatology 2023; 5(1): xx-xx.