International Journal of Research in Medical Sciences
Laksana KM et al. Int J Res Med Sci. 2018 Aug;6(8):2831-2835
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20183279

Case Report

Medial patellofemoral ligament reconstruction with gracilis autograft for recurrent patellar instability: a case report

Komang Mahendra Laksana*, I. G. N. Wien Aryana

Department of Orthopaedic and Traumatology, Sanglah General Hospital, Udayana University, Bali, Indonesia

Received: 21 May 2018
Accepted: 27 June 2018

***Correspondence:**
Dr. Komang Mahendra Laksana,
E-mail: mahendralaksanabali@gmail.com

ABSTRACT

The medial patellofemoral ligament (MPFL) is the primary passive restraint in pathologic lateral translation of the patella. Recurrent patellar instability is common, and multiple procedures have been described for its treatment. Chronic instability of the patellofemoral joint and recurrent dislocation may lead to progressive cartilage damage and severe arthritis if not treated adequately. A 17-years-old female presented with a one-year history of knee pain in his left knee. The apprehension test is positive; there is pain and muscle defensive contraction of lateral patellar dislocation with 20°-30° of knee flexion. MRI revealed flattened trochlear joint surface proximally and the concavity is less pronounced distally. The inclination angle is less than 11 degrees and trochlear facet asymmetry can be seen on axial view. Patient undergone medial patellofemoral ligament reconstruction with gracilis autograft and six months postoperatively, the patient was followed up using WOMAC score and showed good result. WOMAC score was 96.2% indicating no significant pain, joint stiffness, or any difficulty on physical activity. After the operation, the patient is able to perform regular daily activities without any complaints. This study has shown that treatment of recurrent patellar instability with medial patellofemoral ligament reconstruction using gracilis autograft resulted in satisfactory functional outcome based on WOMAC score.

Keywords: Gracilis tendon, Medial patellofemoral ligament reconstruction, Patellar instability

INTRODUCTION

The medial patellofemoral ligament (MPFL) is the primary passive restraint in pathologic lateral translation of the patella.[1-4] Consequently, it tears when the patella dislocates laterally.[1,5] The efficacy of MPFL reconstruction in the control of lateral patellar instability has already been demonstrated, and therefore, its reconstruction is currently one of the most widely used surgical approach.[1] Recurrent patellar instability is common, and multiple procedures have been described for its treatment. Medial patellofemoral ligament reconstruction can be successful in patients who have an incompetent medial patellofemoral ligament or who have failed medial patellofemoral ligament repair and present with recurrent patellar instability. In the general population, the overall incidence of acute patellar dislocation is 5.8 per 100,000 people in the United States.[6,7] The rate of patellar dislocation is estimated to be highest in the age group of ten to seventeen years, with reported rates of 29% to 43%.[6,8] Women have a 33% increased prevalence of acute patellar dislocation compared with men.[6] Most patients with patellar dislocation are young and active individuals, with women in the 2nd decade of life having a higher risk. The prevalence of acute patellar dislocation is 6-77 per 100,000 population. Nearly half of all patients with a first-time dislocation will sustain further dislocations after initial conservative management.

During the recovery period, most patients have restricted mobility, and two-thirds of them reported limitations with strenuous activities. Chronic instability of the patellofemoral joint and recurrent dislocation may lead to progressive cartilage damage and severe arthritis if not treated adequately.[9] This case describes a medial patellofemoral ligament reconstruction using gracilis tendon autograft with an anchor and bio-interference screw fixation. The principal advantage of this construct is the ability to definitively fix the medial patellofemoral ligament soft-tissue graft on the femur and provisionally fix the graft to the patella while assessing for reasonable medial patellofemoral ligament isometry throughout the arc of knee motion.[10]

In the past, risk of recurrent patellar dislocation was mostly attributed to anatomic factors including trochlear dysplasia, patella alta, excessive lateral patellar tilt, and excessive tibial tubercle-trochlear groove (TT-TG) distance. However, recent studies reveal the critical role of retinacular restraints, i.e., the medial patellofemoral ligament (MPFL), in patellofemoral stability. MPFL injury is reportedly identified in most patients with recurrent patellar dislocation.

However, in many cases, primary repair of the MPFL is insufficient to recover appropriate tensile strength. Therefore, in the past few years, the important role of MPFL reconstruction is emphasized with development of many diverse techniques for securing stability of the patellofemoral joint. Remarkable developments have been made especially in graft choice and fixation methods, but determining the best method remains controversial. Many graft materials for MPFL reconstruction have been introduced, including autologous semitendinosus tendon, gracilis, quadriceps tendon, patellar tendon.[11]

Anatomically, the medial patellofemoral ligament extends between the superomedial pole of the patella to the anterior aspect of the medial epicondyle in layer 2 of the medial soft-tissue structures. Normal function of the patellofemoral joint is ensured by passive stabilizers (bones and ligaments) and active stabilizers (extensor muscles). Joint geometry is crucial for stabilization during movement. The femoral sulcus must be deep enough and the lateral trochlea high enough to ensure safe tracking throughout the range of patellofemoral flexion. The medial ligamentous stabilizers prevent lateral displacement of the patella during movement. The most important ligamentous stabilizers are the medial patellar retinaculum and the medial patellofemoral ligament (MPFL) (Figure 1).[9] The patellar insertion is wider than the femoral origin. The vertical distance from the superior pole of the patella to the top of the medial patellofemoral ligament averages about 6.1mm. The inferior edge of the medial patellofemoral ligament is located near the midpoint of the patella. On the femoral side, the medial patellofemoral ligament inserts on the entire height of the medial epicondyle. Biomechanically, the medial patellofemoral ligament is considered the primary passive restraint to patellar lateral displacement, with a mean tensile strength.[12]

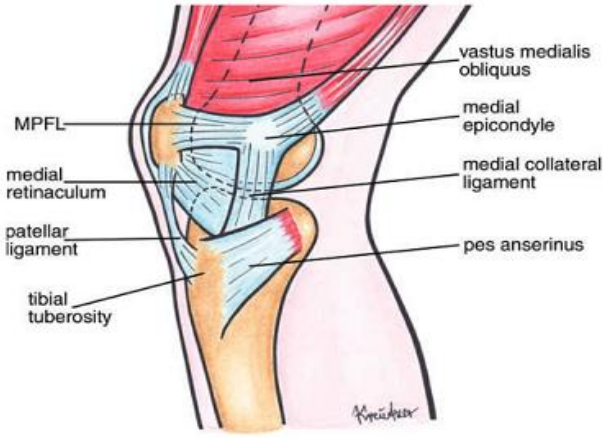

Figure 1: Anatomic structure of the knee (medial side).

CASE REPORT

A 17 years old female presented with a one-year history of knee pain in her left knee. She had a history of trauma several years ago with recurrent patellar dislocation occuring while playing basketball. The pain was aggravated by long-distance walking, walking on stairs or bending of the knee. Knee examination showed no deformity but a limited range of motion of flexion. The patient had lateral joint line tenderness.

Radiograph AP view revealed the presence of "crossing sign" and "double contour sign". “Crossing sign” is a line represented by the deepest part of the trochlear groove crossing the anterior aspect of the condyles, assessed from lateral radiographs. The “double contour sign” is a double line at the anterior aspect of the condyles (Figure 2). MRI found trochlear joint surface is flattened proximally, and the concavity is less pronounced distally, with inclination angle of less than 11° and we can see trochlear facet asymmetry on the axial view (Figure 3).

Figure 2: Radiograph knee AP view.

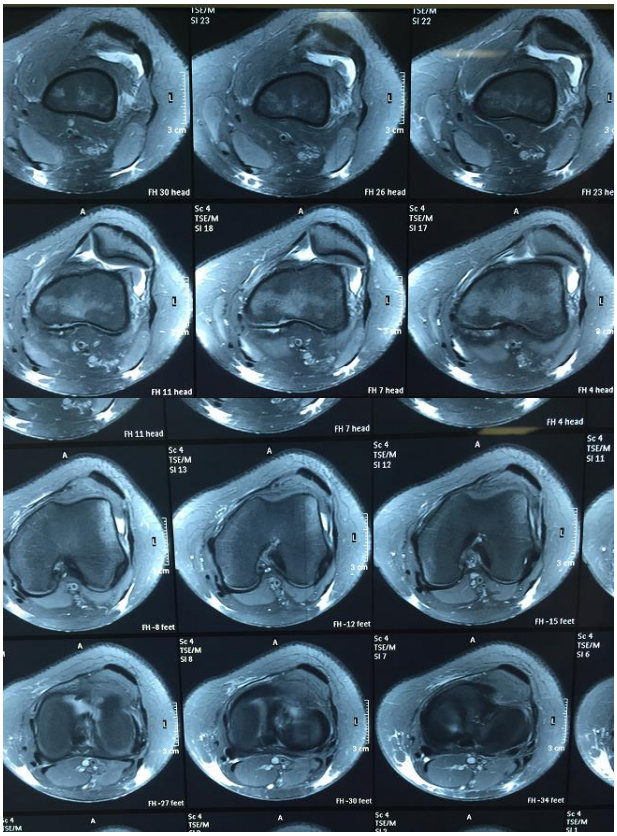

Figure 3: Knee MRI axial view.

First and foremost, determination of the sliding and tilting of the patella, cartilage state, and occurrence of any sign of a loose body was done using arthroscopy and the patient was treated for any identified lesion before surgery. Approximately 3cm longitudinal incision was made 2cm medial to the tibial tubercle, and the gracilis tendon was identified at the deep portion of the sartorius fascia. The fascia was then incised to detach the gracilis tendon using a tendon stripper. (Figure 4A) Muscle tissues were removed from the collected tendon, and a whip stitch was placed at each end.[11]

Next, an approximately 2cm longitudinal incision was made at the upper medial two-thirds of the patella; and the medial retinaculum was examined by detaching subcutaneous tissue and fat. After making a submuscular tunnel at the lower portion of vastus medialis obliquus for penetration of the graft tendon, approximately 2cm longitudinal incision was made to expose the distal portion of the adductor tubercle. (Figure 4B) By fluoroscopy, the isometric point was marked slightly anterior to an elongation of the posterior femoral cortex in between the proximal origin of the medial condyle and the most posterior point of Blumensaat's line (Figure 5).

This was followed by suture anchor fixation. The graft tendon was passed through the patella tunnel after fixing an end of the graft tendon with the thread attached to the suture anchor, and the graft end was sutured using No. 2 Ethibond (Ethicon, Somerville, NJ, USA) while keeping the knee joint bent in a 45° angle. (Figure 4C) Subsequently, the lateral retinacular release was carried out in 4 cases in which the tightness of the lateral retinaculum was maintained after MPFL reconstruction.[11]

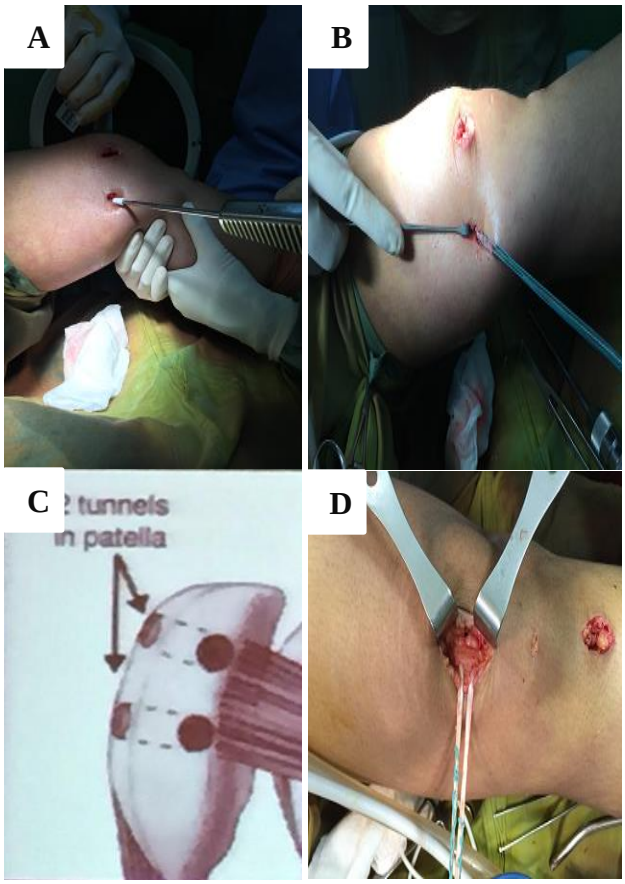

Figure 4: Approach of MPFL Reconstruction using autograft gracilis tendon. (A) Detach the gracilis tendon using a tendon stripper, (B) Lon-gitudinal incision was made to expose the distal portion of the adductor tubercle, (C) Keeping the knee joint bent in a 45° angle, (D) Tightness of the lateral retinaculum was maintained after MPFL reconstruction.

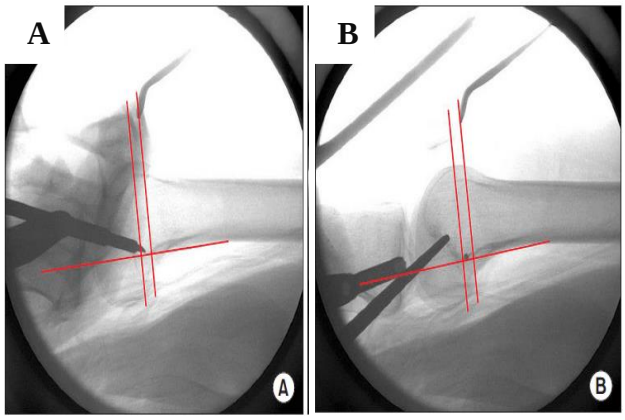

Figure 5: Femoral attachment site. (A) Under fluoroscopy, marked the isometric point (B) This was followed by suture anchor fixation.

Postoperatively, patients are allowed full weight bearing with the leg locked in extension. The brace is locked for ambulation and is removed at night. The brace also is removed to start active and passive range of motion exercises, gentle isometric quadriceps strengthening, and stationary bicycling. The brace is unlocked when quadriceps strength is regained. At six weeks postoperatively, patients should achieve full range of motion and be able to perform straight-leg raises without difficulty. At that point, the brace is discarded, and closed chain quadriceps exercises are started. At 12 weeks, patients are allowed to start jogging. Return to sports is delayed for approximately four months. At six months post-operative follow up, the patient had no symptoms and showed good result (Figure 6).

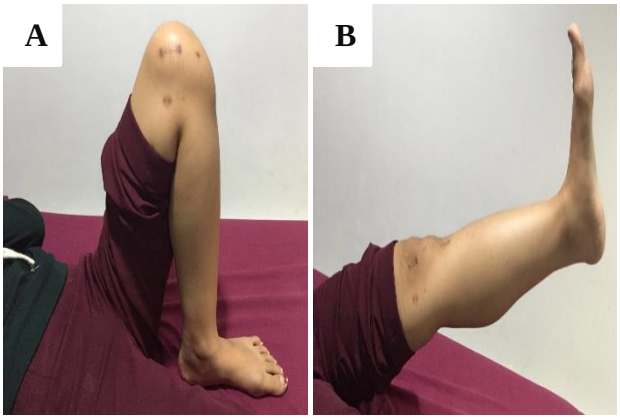

Figure 6: Result post-operative after six months to follow up. (A) Postoperatively, patient was not able to achieve full range of motion. (B) At six weeks postoperatively, patients should achieve full range of motion.

DISCUSSION

Atraumatic injury or abnormal twisting moment to the knee with or without predisposing bony abnormalities can result in dislocation and associated rupture of the medial patellofemoral ligament (MPFL)-the primary soft-tissue restraint to lateral patellar dislocation.[2,4,13-15]

The medial patellofemoral ligament is the major restraint to lateral dislocation of the patella. Treatment for recurrent patella instability in children and adolescents with open growth plates after patella dislocation is less well established. Conservative treatment after primary patella dislocation in patients <18 years results in recurrent instability in 40% of cases. Patients below 14 have an even higher 60% risk of recurrent instability.[7,16] Trochlea dysplasia and open physes at the time of first dislocation are risk factors for redislocations.[17] Historically, proximal realignment procedures have generally been advocated for paediatric patella instability patients, which fail conservative treatment.

Traditional management of a first-time dislocation in the absence of significant osseous abnormalities has involved nonoperative management with bracing and rehabilitation. Failure of conservative measures and resultant recurrent patellar instability is a recognized indication for operative intervention to prevent further instability episodes, patellofemoral osteoarthritis, and associated loss of function.[1,8,18] Treatment of recurrent patellar instability with MPFL reconstruction is a hot topic in the orthopaedic literature, with more than 200 peer reviewed publications since 2014. Interest in anatomical insertions, restoration of optimal biomechanics, operative techniques, and associated clinical and radiographic outcomes dominates this research. As anatomic knowledge and radiographic capabilities have improved, criteria have been developed to aid in the operative decision-making process and identify patients who may be candidates for an isolated MPFL reconstruction.[19] Multiple procedures have been proposed to treat patellar instability including lateral release, medial imbrication, medial patellofemoral ligament repair, and a number of distal realignment procedures. Reconstruction of the medial patellofemoral ligament can be used as a successful primary procedure or as a salvage procedure.[12]

Several methods of MPFL reconstruction have been described. They vary in terms of graft choice, patellar and femoral fixation and graft tension at the time of fixation. In general, it is thought that a non-anatomical graft tends to over-constrain the patellofemoral (PF) joint.[1,20-22] Theoretically, this pressure results in the loss of knee motion and increases PF osteoarthritis (OA).[1,20]

Conversely, in a biomechanical laboratory study using cadaver knees, a non-anatomical femoral attachment point in the adductor tubercle did not alter the pressures on the PF joint in comparison with an anatomical attachment.[21] Then again, controversy persists relative to defining the optimal attachment points for the MPFL graft.

We used WOMAC index to evaluate the functional outcome of the patient after the operation. WOMAC index consists of three item points: pain, joint stiffness, difficulty in physical activity. After the medial patellofemoral ligament reconstruction patient was followed up and examined using WOMAC Score.

The patient was able to perform regular daily activity without pain and limitation of movement on her left knee. Patient was able to flex and extend her knee fully without pain. WOMAC Score after medial patellofemoral ligament reconstruction was 96,2 %. The score indicates there is no significant pain, joint stiffness, and difficulty on physical activity. Medial patellofemoral ligament reconstruction showed excellent outcome in our case without the presence of any harmful condition.

CONCLUSION

This study has shown that treatment of recurrent patellar instability with medial patellofemoral ligament reconstruction is considered to produce satisfactory results with good functional outcome based on WOMAC score.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Monllau JC, Masferrer-Pino À, Ginovart G, Pérez-Prieto D, Gelber PE, Sanchis-Alfonso V. Clinical and radiological outcomes after a quasi-anatomical reconstruction of medial patellofemoral ligament with gracilis tendon autograft. Knee Surgery, Sport Traumatol Arthrosc. 2015;1-7.
2. Conlan T, Garth WP, Lemons JE. Evaluation of the medial soft-tissue restraints of the extensor mechanism of the knee. J Bone Jt Surg-Ser A. 1993;75(5):682-93.
3. Desio SM, Burks RT, Bachus KN. Soft tissue restraints to lateral patellar translation in the human knee. Am J Sports Med. 1998;26(1):59-65.
4. Hautamaa PV, Fithian DC, Kaufman KR, Daniel DM, Pohlmeyer AM. Medial soft tissue restraints in lateral patellar instability and repair. Clin Orthop Relat Res. 1998;349(349):174-82.
5. Stephen JM, Kaider D, Lumpaopong P, Deehan DJ, Amis AA. The effect of femoral tunnel position and graft tension on patellar contact mechanics and kinematics after medial patellofemoral ligament reconstruction. Am J Sports Med. 2014;42(2):364-72.
6. Amin NH, Sean Lynch T, Patel RM, Patel N, Saluan P. Medial patellofemoral ligament reconstruction. JBJS Reviews. 2015;3.
7. Fithian DC, Paxton EW, Stone ML, Silva P, Davis DK, Elias DA, et al. Epidemiology and natural history of acute patellar dislocation. The American J sports medicine. 2004;32(5):1114-21.
8. Atkin DM, Fithian DC, Marangi KS, Stone M Lou, Dobson BE, Mendelsohn C. Characteristics of patients with primary acute lateral patellar dislocation and their recovery within the first 6 months of injury. Am J Sports Med. 2000;28(4):472-9.
9. Diederichs G, Issever AS, Scheffler S. MR imaging of patellar instability: injury patterns and assessment of risk factors. Radiographics. 2010;30(4):961-81.
10. Anbari A, Cole BJ. Medial Patellofemoral Ligament Reconstruction A Novel Approach. J Knee Surg. 2008;21(3):241-5.
11. Kim TS, Kim HJ, Ra IH, Kyung HS. Medial patellofemoral ligament reconstruction for recurrent patellar instability using a gracilis autograft without bone tunnel. Clin Orthop Surg. 2015;7(4):457-64.
12. Lind M, Jakobsen BW, Lund B, Christiansen SE. Reconstruction of the medial patellofemoral ligament for treatment of patellar instability. Acta Orthopaedica. 2008;79:354-60.
13. Nomura E. Medial patellofemoral ligament reconstruction. Tec Chir Ortop e Traumatol. 2007;5(3):109-14.
14. Sallay PI, Poggi J, Speer KP, Garrett WE. Acute dislocation of the patella: A correlative pathoanatomic study. Am J Sports Med. 1996;24(1):52-60.
15. Sillanpaa P, Mattila VM, Iivonen T, Visuri T, Pihlajamaki H. Incidence and risk factors of acute traumatic primary patellar dislocation. Med Sci Sports Exer. 2008;40(4):606-11.
16. Cash JD, Hughston JC. Treatment of acute patellar dislocation. Am J Sports Med. 1988;16(3):244-9.
17. Lewallen LW, McIntosh AL, Dahm DL. Predictors of recurrent instability after acute patellofemoral dislocation in pediatric and adolescent patients. Am J Sports Med. 2013;41(3):575-81.
18. Mäenpää H, Lehto MU. Patellofemoral osteoarthritis after patellar dislocation. Clin Orthop Relat Res. 1997;(339):156-62.
19. Weber AE, Nathani A, Dines JS, Allen AA, Shubin-Stein BE, Arendt EA, et al. An algorithmic approach to the management of recurrent lateral patellar dislocation. J Bone Jt Surg. 2016;98(5):417-27.
20. Elias JJ, Cosgarea AJ. Technical errors during medial patellofemoral ligament reconstruction could overload medial patellofemoral cartilage: A computational analysis. Am J Sports Med. 2006;34(9):1478-85.
21. Melegari TM, Parks BG, Matthews LS. Patellofemoral contact area and pressure after medial patellofemoral ligament reconstruction. Am J Sports Med. 2008;36(4):747-52.
22. Tateishi T, Tsuchiya M, Motosugi N, Asahina S, Ikeda H, Cho S, et al. Graft length change and radiographic assessment of femoral drill hole position for medial patellofemoral ligament reconstruction. Knee Surgery, Sport Traumatol Arthro. 2011;19(3):400-7.

Cite this article as: Laksana KM, Wien Aryana IGN. Medial patellofemoral ligament reconstruction with gracilis autograft for recurrent patellar instability: a case report. Int J Res Med Sci 2018;6:2831-5.