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The background of the cover features a blue-tinted photograph of a surgical team in an operating room. A circular inset on the left shows a close-up of a surgical incision. Large, semi-transparent yellow and blue circles are overlaid on the image. The title is centered in a large, bold, sans-serif font.

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REVISION MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION USING A QUADRICEPS TENDON GRAFT: A CASE REPORT

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Introduction: The medial patellofemoral ligament (MPFL) is the main soft tissue that prevents lateral patellar dislocation when the knee is almost fully extended. As these structures lose their ability to function properly, it can lead to more movement and finally displacement of the patella. The semitendinosus or gracilis graft remains the first-line choice in the MPFL reconstruction. However, the quadriceps tendon graft may also be a choice in MPFL reconstruction. However, there are few studies on MPFL reconstruction with a strip of the quadriceps tendon. This case presents the role of the quadriceps tendon graft in MPFL reconstruction.

Case Report: An 18-years-old male came to orthopaedic clinic with complaints of pain in his right knee and accompanied right patellar displacement, which has been suffered since one days ago. History trauma was found. The patient had a history of MPFL reconstruction using hamstring graft. Failure of MPFL reconstruction was occurred, hence the MPFL revision was performed using quadriceps graft. The Kujala score, range of motion, and recurrence were noted as the outcome. At 6 months follow up the patient showed a satisfactory outcome in terms of Kujala score and range of motion. There was no recurrence after the revision of MPFL surgery.

Conclusions: A revision of the MPFL reconstruction using quadriceps tendon provides an favorable outcome in terms of the Kujala score, range of motion, and recurrence.

Keywords: Medial patellofemoral ligament; MPFL reconstruction; magnetic resonance imaging; Post-operative knee.

INTRODUCTION

The medial patellofemoral ligament (MPFL) is the main soft tissue that prevents lateral patellar dislocation when the knee is almost fully extended. As these structures lose their ability to function properly, it can lead to more movement and finally displacement of the patella. Patellofemoral instability is a frequently suffer in active young individuals. The medial patellofemoral ligament (MPFL) is injured by patellar dislocation, which may result in repeated occurrences. Acute patellar dislocation has been associated with MPFL rupture in 95% to 100% of cases. Therefore, the recent reconstruction of the MPFL for treating patellar instability has garnered increased interest [1–4].

Recent biomechanical and anatomical investigation has demonstrated that the medial patellofemoral ligament (MPFL) is crucial for maintaining the patella's stability between full extension and 30° flexion [5–7]. The semitendinosus or gracilis graft remains the first-line choice in the MPFL reconstruction. However, the quadriceps tendon graft may also be a choice in MPFL reconstruction. However, there are few reports on MPFL reconstruction using a strip of the quadriceps tendon. This case presents the role of the quadriceps tendon graft in MPFL reconstruction.

CASE REPORT

An 18-years-old male came to orthopaedic clinic with complaints of pain in his right knee and accompanied right patellar displacement (Figure 1), which has been suffered since one days ago. History trauma was found. He fell in the bathroom with the mechanism he slipped to the right side, then his right knee hit the floor first, after the incident, he found it difficult to walk, and his patella was seen laterally displaced. He has a history of the same complaint and has undergone MPFL reconstruction surgery at a private hospital in Medan City in April 2021. Daily activities were still limited because he is still in the recovery stage after surgery. On the physical examination, tenderness was found on the right knee, accompanied by the knee joint's limited range of motion (ROM) due to pain and displacement of the patella. From the magnetic resonance imaging (MRI) examination revealed the medial patella femoral ligament has been rupture (Figure 2).



Figure 1. Clinical photo of the dislocated right knee.

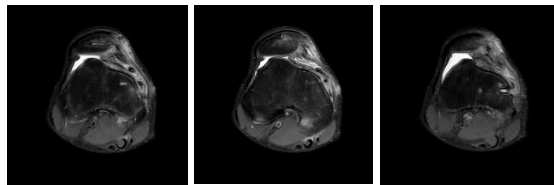


Figure 2. Knee MRI prior to MPFL revision surgery.

An orthopedic surgeon performed the MPFL reconstruction. The patient was in the supine position, and spinal anesthesia was performed. An anterior midline incision was used for the surgery. Harvesting the central 10-12mm of the Quadriceps Tendon superficial lamina (Figure 3), dissection of the superficial lamina of the QT is extended beneath the periosteum, particularly on the anterior side of the patella, and the periosteal hinge is used to fold the graft medially. The medial retinaculum and capsule are tunneled medially to accommodate the proximal free end of the graft, and to maintain the graft-patella anatomic attachment, an ethibond stay suture was positioned at the point where the graft and medial margin of the patella meet.



Figure 3. The quadriceps tendon graft harvesting.

Following surgery, a knee brace with ROM of 0-90 was used for 4 weeks. The patients were start mobilized with 20 kg of partial weight bearing for 4 weeks. Full weight bearing was initiated immediately afterwards. Passive ROM exercises up to a maximum of 90 degrees were started immediately after the surgery.

During six month follow-up, an MRI examination showed a single-bundle MPFL graft fixed with single femoral and patellar interference screws on the medial epicondyle femur bone and right patella bone (Figure 4), and the pre-operative Kujala score was 60 and significantly improved to 92 post-operative. Full ROM was achieved at 12 weeks after surgery.

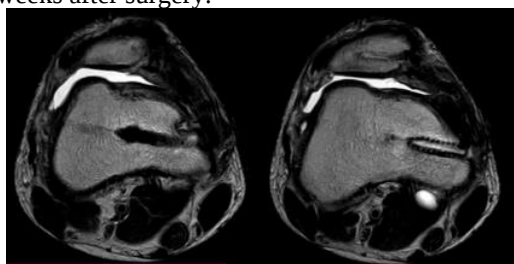


Figure 4. MRI of the right knee after revision of the MPFL reconstruction.

DISCUSSIONS

There are many techniques that are described

in the literatures for MPFL ligament reconstruction. Such techniques includes autografts with the hamstring, patellar, adductor, and finally the quadriceps tendon with no consensus on which techniques or graft is superior than the other.

Although the hamstring have the strength and property to replace MPFL ligament, but the downside is that the innate shape of hamstring tendon is different from that of MPFL. Hamstring tendons are generally more round, rather than thin and band-shaped like the MPFL which requires drilling of the patella and risking fracturing the patella [8-10].

Other common graft for MPFL is the adductor magnus tendon, where like the MPFL it is band-shaped and has the necessary strength to replace the MPFL. The problem with adductor magnus tendon as a graft for MPFL is that the adductor magnus muscle is in close proximity to the saphenous nerve and the saphenous branch of the descending genicular artery. The patellar tendon can also be used in MPFL reconstructions with reported good outcomes such as return to sport, quality of life, and long term pain. Although it has been reported to be associated with anterior knee pain due to the grafting procedure [8].

One of the reason that the authors decided to use quadriceps tendon graft to reconstruct the MPFL was because the quadriceps tendon, especially the superficial layer have similar morphology to MPFL. It is also relatively easir to harvest, with minimal damage to the patella.

Due to the band-like structure of the quadriceps tendon, bone tunnel is not needed to reconstruct the MPFL. Current evidence suggest that quadriceps tendon graft is associated with good short term result and cosmetic result.

The goal of the MPFL reconstruction is to mimic the anatomical and biomechanical function as close as possible to the normal MPFL. The normal MPFL is non-isometric where it is tense during extension and lax during flexion of the knee. An abnormal reconstruction of the MPFL such as malpositioning of the insertion of the ligament might lead to a loss of function such instability at extension due to lax MPFL, and tightness that causes a difficulty when trying to flex [3,8-15].

Several studies have shown that quadriceps femoris tendon is a viable option for MPFL reconstruction graft. Lubis et, al used a central quadriceps tendon harvesting and rerouting of the tendon below the vastus medialis muscle, fixated into the medial distal femur with a bio-absorbable screw and they reported a good outcome of quadriceps femoris tendon graft with good stability, even at 1 year follow-up. Two other studies by Rhatomy et al. and stensen et al. have also reported a similar outcome; having satisfying result up to 2 years of follow up with no recurrent dislocation and no disturbance in ROM reported [1,3,8,11].

One of the possible indication for quadriceps femoris graft for reconstruction of MPFL is a history of failed MPFL reconstruction by other methods. Commons reasons for failed reconstructions are

malpositioning of reconstructed ligament, lack of realignment procedures [2].

CONCLUSION

The myriad of graft option for MPFL repair, along with scarce evidence regarding the definitive graft option for reconstruction made the discussion regarding graft options for MPFL reconstruction an interesting subject. Quadriceps tendon graft is a viable option for the reconstruction of MPFL. Where it demonstrates good clinical outcomes in the short term evaluation of the repair. We suggest that future studies focuses on the long term effect of quadriceps effects be done in order to fully understand quadriceps tendon graft as a preferred method for MPFL reconstruction

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