Technical Note

All-Arthroscopic Management of Lateral Patellar Instability

Krzysztof Hermanowicz, M.D., Ph.D., Tomasz Mrozek, M.D., Piotr Jancewicz, M.D., Marcin Sar, M.D., Julia Hermanowicz, Laura Szajwa, and Adrian Góralczyk, M.D.

Abstract: Patellar dislocations are common injuries that can lead to recurrent dislocations and instability. Patellar instability is a complex problem and requires a multifactorial approach. Over the years, many different repair and reconstruction techniques has been developed. The variety of techniques proves that there is no best procedure, and different options must be taken into consideration in every case. Many of these techniques are complicated and require graft harvesting or drilling through the patella. We present a technique of arthroscopic patellar stabilization with a single suture anchor and lateral release that is easy to perform, cost-effective, and does not require drilling tunnels through patella or graft harvesting.

Patellar dislocations are common injuries, accounting for approximately 3% of all knee injuries. Nonoperative treatment in 50% of cases ends in failure, especially in the younger population, leading to recurrent dislocations and instability that require surgical management.[1] Patellar dislocations mostly occur in young patients, who have high expectations toward treatment and returning back to activity, thus creating a very challenging problem to address.[2] The medial patellofemoral ligament (MPFL), which is the main restraining force against lateral patellar displacement in 0° to 30° range of knee motion, is disrupted in 90% of lateral dislocations.[3] Various surgical treatments have been described to approach MPFL tears, including MPFL repairs, repairs with suture augmentations, and reconstructions with autografts or synthetic ligaments. Recently there has been trend toward MPFL reconstructions, implying a lower recurrent dislocation rate when using this technique.[4] However, patellar instability is a very complex problem that many other pathoanatomic lesions can lead to and should be treated using a multifactorial approach, which includes treating abnormalities such as trochlear dysplasia, lateral positioning of the tibial tubercule, femoral rotation, and limb malalignment. Addressing the MPFL tear alone may lead to failure and the need for revision surgeries independently of the method that has been used because of fact that patellar dislocation and MPFL tear are usually a result, not a cause, of patellar instability. If a multifactorial approach is considered, there are no statistical differences between repair and reconstructions of MPFL.[4] Patellar dislocations also can lead to many concomitant lesions, including cartilage damage, fractures, and loose bodies, which ought to be addressed during a single procedure. We present an arthroscopic MPFL repair using one suture anchor (CONMED Linvatec, Warsaw, Poland), with lateral release of the patella, that can be a part of multifactorial approach in treating patellar instability.

Diagnosis

The diagnosis of MPFL tear is made on the basis of clinical examination, history of dislocations, and magnetic resonance imaging of the knee. Magnetic resonance imaging is used to precisely evaluate the location of the MPFL tear, concomitant lesions, and pathoanatomic abnormalities to plan the surgical approach. Computed tomography scans can be

From the ORTIM Orthopaedic Clinic, Bialystok, Poland (K.H., P.J.); Department of Orthopedics and Traumatology, Hospital of Ministry of Internal Affairs and Administration, Białystok, Poland (T.M., M.S., A.G.); and Medical University of Białystok, Białystok, Poland (J.H., L.S.).

Received January 16, 2024; accepted April 11, 2024.

Address correspondence to Tomasz Mrozek, M.D., Department of Orthopedics and Traumatology, Hospital of Ministry of Internal Affairs and Administration, Fabryczna 27, 15-471 Białystok, Poland. E-mail: mrozekorto@gmail.com

2212-6287/2485
https://doi.org/10.1016/j.eats.2024.103055

valuable to assess bony deformations. Patellar tilt, trochlear dysplasia, femoral malrotation, or lateral positioning of tibial tubercule should be ruled out. If they are present, operative management should include treatment according to pathologies that has been found.

Surgical Technique

Indications and Contraindications

Indications include patellar instability with patellar-side MPFL tear. Contraindications include femoral-side MPFL tear, systemic or local infection, poor bone condition correlated with systematic diseases like rheumatoid arthritis, and femoral dysplasia with significant patellar deformation.

Patient Positioning

General or regional anesthesia can be used. The patient is placed in a supine position and a nonsterile thigh torniquet is applied. The leg is then placed in a leg holder and prepared in a sterile fashion.

Diagnostic Arthroscopy

Diagnostic arthroscopy is performed through standard anterolateral and anteromedial portals using a 30° arthroscope (Arthrex, Munich, Germany). At the beginning the diagnosis, the rupture site of MPFL also is confirmed. The MPFL can be either torn near its patellar or femoral attachment. This technique is suited only to repair parapatellar MPFL tears. Before addressing the MPFL tear, any concomitant lesions must be excluded. If found, they should be treated first. If preoperative evaluation presents pathoanatomic abnormalities, they ought to be addressed in following fashion—tibial tubercule osteotomy and lateral release should be performed after MPFL repair, as a single-step procedure.

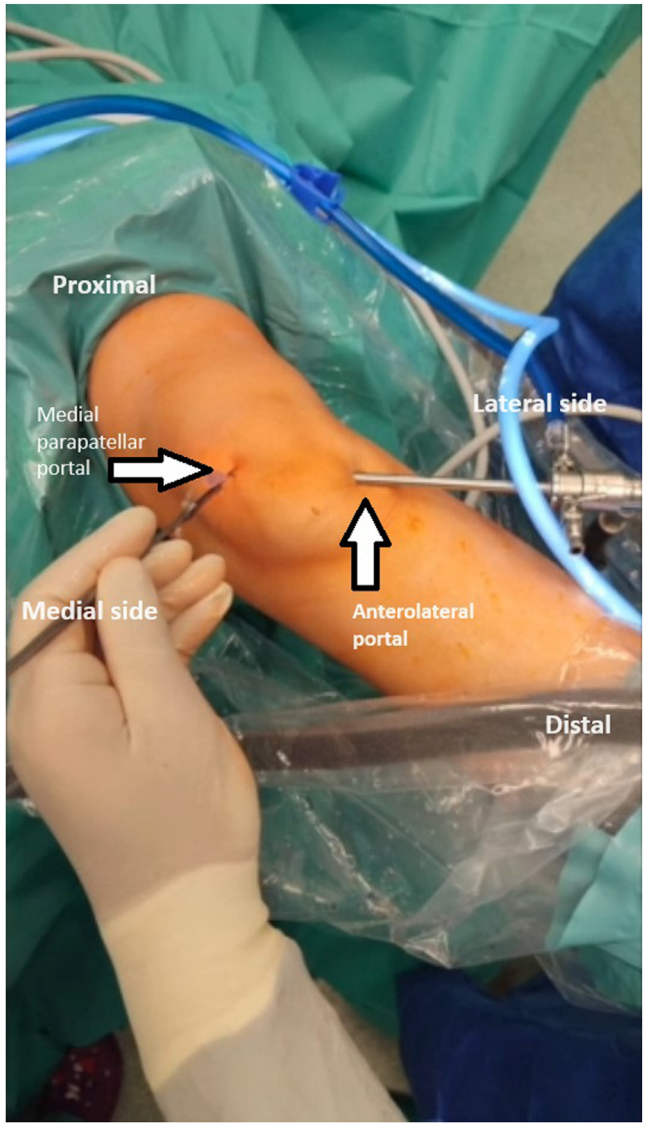

Fig 1. With visualization through the anterolateral portal, the medial parapatellar portal is created (left knee, outside view).

MPFL Repair

With visualization through the anterolateral portal, the medial parapatellar portal is created (Fig 1). This will be main portal to use the procedure. Through medial parapatellar portal, the middle third and superomedial margin of the patella are debrided using a shaver (Arthrex) to expose bone. (Fig 2, Video 1). Afterwards, the Y-Knot flex suture anchor (CONMED Linvatec) is introduced through an aiming guide into the debrided medial patellar margin (Fig 3). Anchor placement is a crucial moment of the procedure, because there is a possibility to position it in the wrong spot or not deep enough because of the mobility of patella. In contrast, there is a risk of cartilage penetration during drilling, when the direction of drilling is not adequate. The next step of procedure is tightening of the MPFL. Using the BirdBeak Suture Passer (Arthrex), the thread is passed to the proximal part of the MPFL in the direction of suprapatellar recess and is retrieved behind the ligament in its proximal bottom part (Fig 4, Video 1). This procedure is then repeated with remaining 3 threads, each time retrieving the thread in a point more distal to the previous one, which results in passing threads through almost entire width of MPFL (Fig 5). Before tightening knots, lateral retinaculum release is performed. The camera is switched to anteromedial portal, and lateral retinaculum is visualized. Using a radiofrequency probe, the lateral retinaculum is released starting from its superior margin, which is identified by vastus lateralis muscle fibers (Fig 6, Video 1). Afterwards, the knots are tied on both implant threads (Fig 7). Then, a control

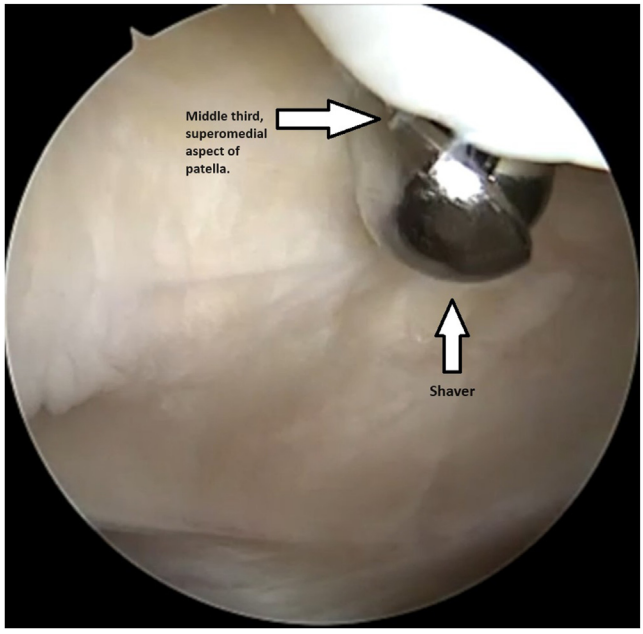

Fig 2. Arthroscopic view from the anterolateral viewing portal into the medial side of the left patella. Through the medial parapatellar portal, the middle third, superomedial aspect of the patella is debrided using a shaver until the bone is exposed.

check of patella tracking is performed (Fig 8, Video 1). The last step of the procedure is releasing the torniquet. The tissues around the area where lateral release was performed are cauterized to prevent heavy bleeding from superolateral genicular artery and hematoma in early postoperative period. After the procedure, the wounds are closed and sealed with sterile dressing.

Rehabilitation

After the first day after surgery, a continuous passive motion machine is introduced for 4 weeks with gradual flexion angle progression to 90°. Walking on crutches is recommended for 4 weeks, with 0° to 90° of flexion limitation for 6 weeks. Progressive weight bearing is allowed from the fourth week. Manual therapy starts after the third postoperative day.

Discussion

The presented technique allows one to address arthroscopically lateral patellar instability caused by a patellar-side MPFL tear. As patellar dislocations usually have multifactorial background, and every patient has to be treated individually, the presented technique may be applied as a single procedure or just a part of more complex surgeries involving bony procedures.[5,6] The procedure is fast, easy, and reproducible. Moreover, as an arthroscopic technique, it allows to address additional intraarticular pathologies at once.

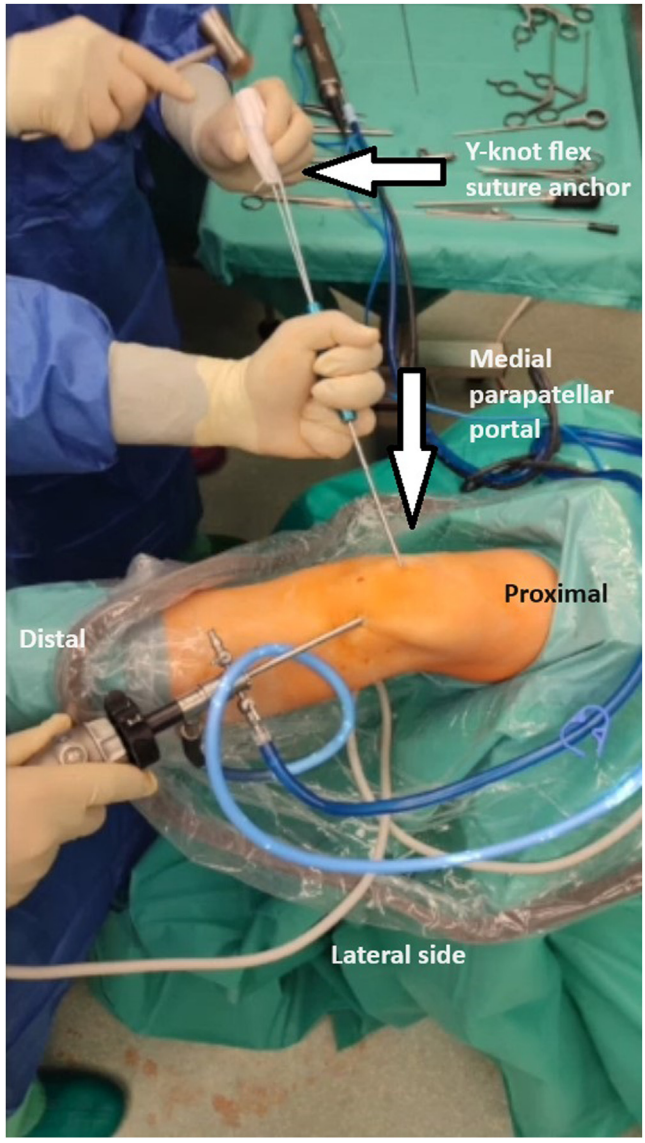

Fig 3. Outside view of the left knee. The Y-Knot flex suture anchor is placed into the middle third superomedial aspect of the patella.

The multifactorial origin of patellar instability has led to development of different techniques of treating MPFL injuries and recurrent patellar dislocations. Many current surgeries require advanced surgical skills because of their complexity.[7,8] Moreover, most of them involve drilling 1 to 3 tunnels throughout the patella, which increases risk of iatrogenic fractures of patella or cartilage damage.[8,9] In contrast, placing additional tunnels in the femur may increase the risk of tunnel convergence during multiligamentous reconstructions as well as impairment of a bone structure. Another risk of graft-based surgeries is tunnel malposition or overtension on the graft, which may restrict knee flexion, increase load in patellofemoral joint, and lead to an early osteoarthritis.[10]

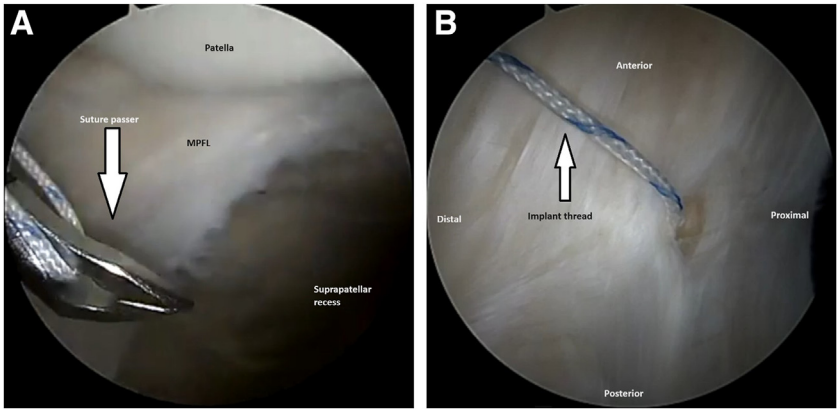

Fig 4. (A-B) Arthroscopic view from the anterolateral viewing portal into the medial side of the left patella. Reattaching the MPFL. Using suture passer, the thread is passed to the proximal part of the MPFL (A) in the direction of suprapatellar recess and is retrieved behind the ligament in its proximal bottom part (B). (MPFL, medial patellofemoral ligament.)

There has been a recent trend to perform MPFL procedures using suture anchors, which is followed in our technique.[9,11,12] Not drilling tunnels in the patella reduces the risk of iatrogenic injuries and allows us to perform that procedure in children. Using only one suture anchor proves this is a cost-saving procedure. It can be easily revised and does not exclude other, more complicated procedures, if failed during or after the surgery. Many of recently provided techniques in which suture anchors are used still require graft harvesting or an open surgical approach to medial side of the patella, risking donor-site morbidity and causing more trauma.[11,13-15] Our procedure, being an all-arthroscopic technique, without the necessity for graft harvesting, reduces this risk, simplifying whole procedure.

However, our presented technique has its limitations. In very complicated or severe instabilities, the outcome might not be satisfactory for the patient if only MPFL repair is performed; thus, additional procedures might be required. Despite not being complex, there are still risks related to positioning of the suture anchor, especially cartilage injury. A suture anchor cannot be used if there is poor bone

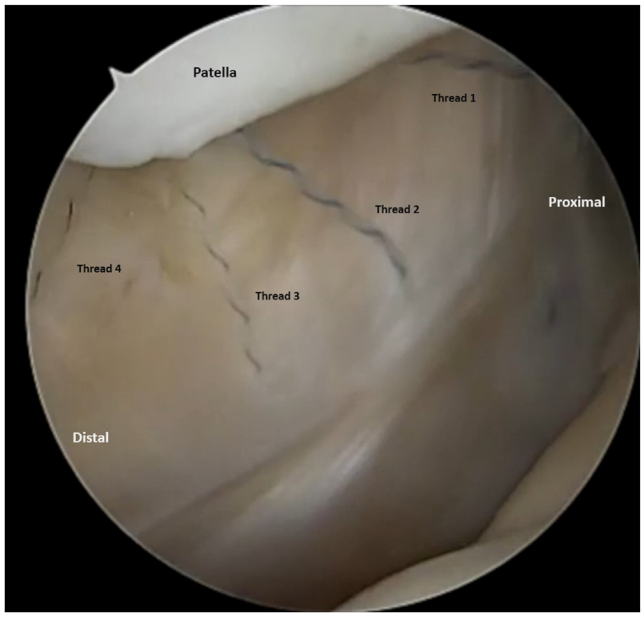

Fig 5. Arthroscopic view from the anterolateral viewing portal into the medial side of the left patella. Reattaching of the MPFL is performed with 4 threads of Y-Knot flex suture anchor, each time passing the thread in a point more distal to the previous one, which results in passing threads through almost entire width of MPFL. (MPFL, medial patellofemoral ligament.)

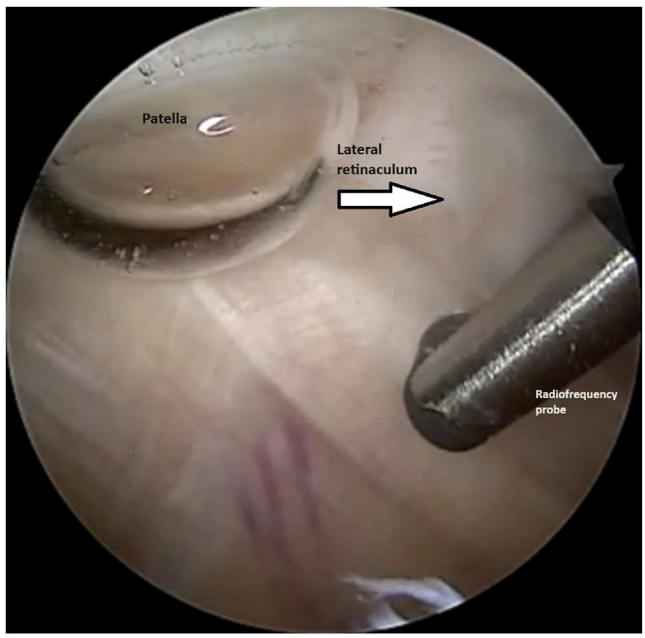

Fig 6. Arthroscopic view from the anteromedial viewing portal into the lateral side of the left knee patella. Release of the lateral retinaculum is shown.

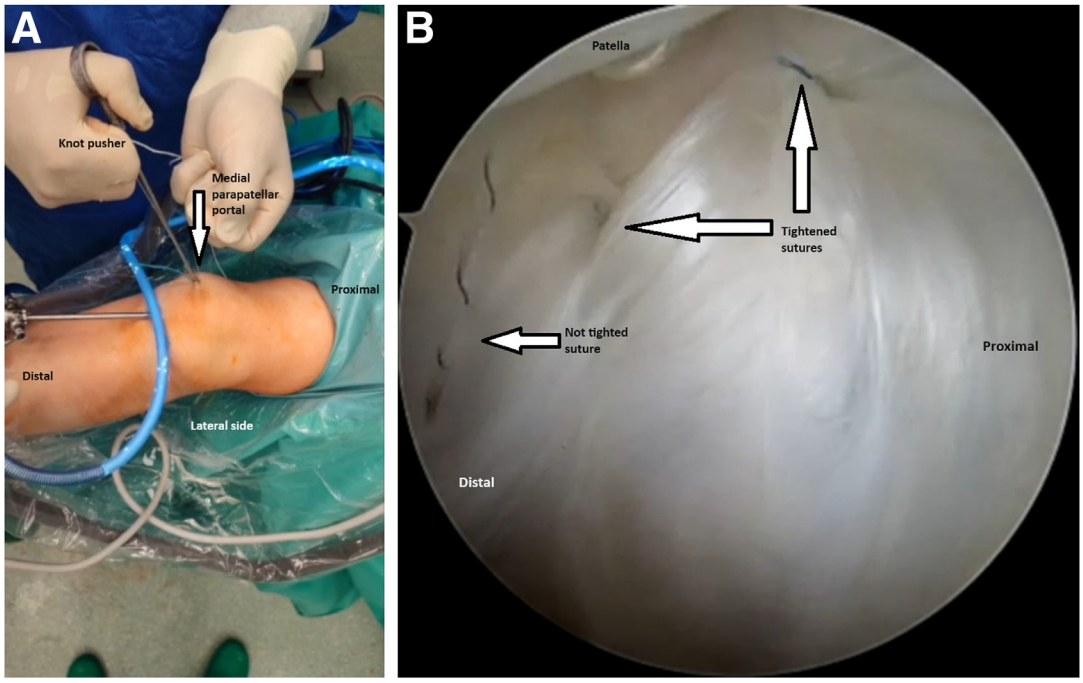

Fig 7. (A) After the MPFL is reattached, the knots are tied on both implant threads. (B) Arthroscopic view from the anterolateral viewing portal into the medial side of the left knee patella. (MPFL, medial patellofemoral ligament.)

condition. In that case, a titan anchor (Y-Knot RC; CONMED Linvatec) can be used instead of all-suture anchor. This procedure also is ineffective in femoral based ruptures of MPFL. The main advantages and disadvantages are summarized in Table 1.

Despite good short-term results, this technique needs to be further studied, focusing on long-term results. The presented technique, because it is easy to perform, cost-effective, and minimally invasive, can be a valuable asset in treating patellar instabilities.

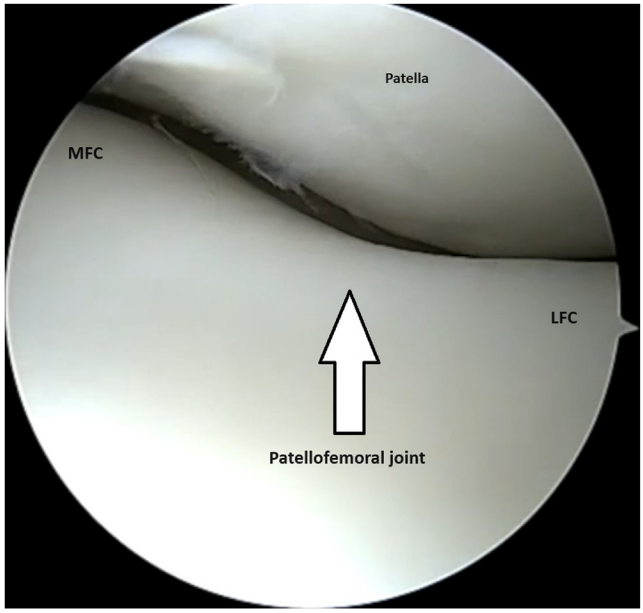

Fig 8. Arthroscopic view from the anterolateral viewing portal into the patellofemoral joint. After the MPFL is reattached, the control of patellar tracking should be performed. (LFC, lateral femoral condyle; MPFL, medial femoral condyle.)

Table 1. Advantages and Disadvantages of Arthroscopic Patellar Stabilization With a Single Suture Anchor and Lateral Release

Advantages	Disadvantages
No tunnels drilled throughout the patella; reduced risk of iatrogenic injuries.	Technique is effective only in patellar-sided ruptures of the MPFL.
Cost-effective technique because only one suture anchor is used.	Possibility of wrong placement or failure of the suture anchor placement.
No graft harvesting—no donor-site morbidity, less traumatizing procedure.	Despite good short-term outcome, the long-term results are still not known.
Can be performed in children.	Possibility of cartilage damage during suture anchor placement and tissue penetration with suture passer.
Easy to revise; other procedures can be performed, in case of failure through or after surgery.	
All-arthroscopic procedure reduces trauma and facilitates fast recovery.	

MPFL, medial patellofemoral ligament.

Disclosures

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

References

1. Cheng B, Wu X, Ge H, Qing Sun Y, Zhang Q. Operative versus conservative treatment for patellar dislocation: A meta-analysis of 7 randomized controlled trials. *Diagn Pathol* 2014;9:60.
2. Dragoo JL, Nguyen M, Gatewood CT, Taunton JD, Young S. Medial patellofemoral ligament repair versus reconstruction for recurrent patellar instability: Two-year results of an algorithm-based approach. *Orthop J Sports Med* 2017;5:2325967116689465.
3. Gravesen KS, Kallemose T, Blønd L, Troelsen A, Barfod KW. High incidence of acute and recurrent patellar dislocations: A retrospective nationwide epidemiological study involving 24.154 primary dislocations. *Knee Surg Sports Traumatol Arthrosc* 2018;26:1204-1209.
4. Petri M, Ettinger M, Stuebig T, et al. Current concepts for patellar dislocation. *Arch Trauma Res* 2015;4:e29301.
5. Weber AE, Nathani A, Dines JS, et al. An algorithmic approach to the management of recurrent lateral patellar dislocation. *J Bone Joint Surg Am* 2016:98417-98427.
6. Bulgheroni E, Vasso M, Losco M, et al. Management of the first patellar dislocation: A narrative review. *Joints* 2019;7:107-114.
7. Hinckel BB, Dean RS, Ahlgren CD, Cavinatto LM. Combined medial patellofemoral ligament, medial quadriceps tendon-femoral ligament, and medial patellotibial ligament reconstruction for patellar instability: A technical note. *Arthrosc Tech* 2023;12:e329-e335.
8. Floyd ER, Ebert NJ, Carlson GB, Monson JK, LaPrade RF. Medial patellofemoral reconstruction using quadriceps tendon autograft, tibial tubercle osteotomy, and sulcus-deepening trochleoplasty for patellar instability. *Arthrosc Tech* 2021;10:e1249-e1256.
9. Abdel-Aziz A, Sherif MM, Waly MR, Abdel-Aziz MA, Mostafa Zaky Abdelrazek BH. Simple cost-effective reinsertion of avulsed medial patellofemoral ligament in acute patellar dislocation. *Arthrosc Tech* 2021;10:e847-e853.
10. Elias JJ, Cosgarea A. Technical errors during medial patellofemoral ligament reconstruction could overload medial patellofemoral cartilage. *Am J Sports Med* 2006;34:1478-1485.
11. Tang J, Zhao J. Wide patellar insertion medial patellofemoral ligament reconstruction with internal bracing. *Arthrosc Tech* 2021;10:e2487-e2493.
12. Klumpp R, Mosca A, Gallinari G, Compagnoni R, Trevisan C. All-arthroscopic knee patellofemoral ligament repair. *Arthrosc Tech* 2022;11:e1661-e1666.
13. Makovicka JL, Hartigan DE, Patel KA, Tummala SV, Chhabra A. Medial patellofemoral ligament reconstruction using all-soft suture anchors for patellar fixation. *Arthrosc Tech* 2018;7:e231-e237.
14. Ishibashi Y, Kimura Y, Sasaki E, Sasaki S, Yamamoto Y, Tsuda E. Medial patellofemoral ligament reconstruction using FiberTape and knotless SwiveLock anchors. *Arthrosc Tech* 2020;9:e1197-e1202.
15. Su F, Hartwell MJ, Zhang AL. Minimally invasive medial patellofemoral ligament reconstruction with patellar-sided tensioning using all-suture anchors. *Arthrosc Tech* 2024;13:102875.