Lateral Patellofemoral Ligament Reconstruction Using a Free Gracilis Autograft

PAUL BORBAS, MD; PETER P. KOCH, MD; SANDRO F. FUCENTESE, MD

**abstract**

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Medial patellofemoral instability is a rare, disabling condition that is often associated with the wrong indication for lateral retinacular release or overcorrection with medializing tibial tubercle osteotomy. It is an even less common complication after total knee arthroplasty (TKA). The lateral patellofemoral ligament is an important lateral stabilizer of the patella against medial subluxation or dislocation. Until now, no report in the literature has described lateral patellofemoral ligament reconstruction with a free gracilis tendon autograft. Furthermore, there has not been a single case report of lateral patellofemoral ligament reconstruction after TKA. The authors describe a novel technique for reconstruction of the lateral patellofemoral ligament in a symptomatic medial subluxated patella resulting from TKA and extended lateral release in a 62-year-old patient. The result 1 year postoperatively was deemed successful. Clinically, the patella was stable, with correct tracking, and radiographically the patella was correctly positioned. With a technique similar to that used for the medial patellofemoral ligament, the lateral patellofemoral ligament can be reconstructed with a gracilis tendon autograft to permit stabilization independent of resting scar tissue of the lateral retinaculum. This operation can be performed in a minimally invasive way, without opening the joint, therefore decreasing the risk of joint infection. The authors showed a successful clinical and radiologic outcome 1 year after lateral patellofemoral ligament reconstruction in a patient with medial patellar instability after TKA and lateral release.
Medial subluxation or dislocation of the patella is a rare, disabling condition. Most frequently, it is associated with anterior knee pain after previous lateral retinacular release. In the literature, medial patellar instability is sometimes neglected because patellar instability generally signifies lateral subluxation or dislocation of the patella. Therefore, the possibility of medial patellar instability often is not mentioned. Nevertheless, painful medial subluxation has been found in up to 50% of patients with failure to improve after lateral release procedures. High failure rates of lateral retinaculotomy are well documented when the indication was wrong, especially in patients with anterior knee pain without demonstrable lateral instability. Conservative treatment options include stretching the medial retinaculum and muscle strength training of the quadriceps muscle, especially the vastus lateralis. Because of symptoms that persist after nonoperative treatment, in most cases surgical treatment is required. This includes lateral retinacular repair or reconstruction and medial retinacular release. As shown by anatomic studies, the lateral patellofemoral ligament is a passive lateral stabilizer of the patella. A gait analysis study of patients with medial patellar instability after lateral release supported the thesis that well-balanced passive structures, such as the lateral patellofemoral ligament, are more important than muscle balance. To date, no technique for anatomic lateral patellofemoral ligament reconstruction using a gracilis tendon autograft has been reported. In addition, lateral patellofemoral ligament reconstruction has never been performed after implantation of total knee arthroplasty (TKA). The authors present a case of medial patellar subluxation after lateral retinacular release in a patient with TKA and describe a novel technique for lateral patellofemoral ligament reconstruction.

**Case Report**

A 62-year-old woman presented with right anterior knee pain in the outpatient clinic. She underwent bilateral TKA without patellar resurfacing in a peripheral hospital 3 years ago. Tibial tubercle osteotomy and lateral retinacular release had been performed on the right knee 29 years ago because of lateral patellar instability. Rehabilitation of the left knee proceeded more easily than rehabilitation of the right knee. Because of residual pain in the right knee, patellar resurfacing of the right side was performed after 2 years. However, the symptoms did not improve afterward. The patient still had anterior knee pain on rising from a sitting position and ascending or descending stairs. Radiograph of the right knee showed correct localization of the patella and no signs of prosthetic loosening 27 months after surgery.

When seen in the authors’ clinic 3 years postoperatively, the patient still reported swelling of the right knee after slight physical stress. There was no pain at rest.

Clinical examination showed effusion and overheating. Ligament balancing in extension was correct, with slightly more opening on the lateral side. The patient had no pain on compression of the patella and no lateral apprehension. However, surprisingly, examination showed considerable medial subluxation of the right patella with slight medial apprehension. Infection was excluded with aspiration and blood tests.

Stress radiographs were performed and showed a slightly increased lateral opening of 3° in extension. Computed tomography scans excluded loosening and showed correct placement of the prosthesis, with a femoral external component rotation of 3° and a tibial internal component rotation of 21°, according to Berger et al. However, medial subluxation of the patella was confirmed. Analysis of the findings showed medial patellar instability caused by insufficient lateral structures, leading to the patient’s discomfort (Figure 1). Therefore, reconstruction of the lateral patellofemoral ligament was indicated.

Surgery was performed under spinal anesthesia. Preoperative antibiotic prophylaxis was administered. A tourniquet was applied to the thigh. Harvest of the gracilis tendon was performed through a 3-cm incision at the distal part of the old scar. The pes anserinus was visualized. The gracilis tendon was harvested with a tendon stripper and prepared in the same fashion as for reconstruction of the medial patellofemoral ligament. At both ends, a No. 2 absorbable braided suture was placed over a length of 2 cm with baseball stitches (Vicryl; Ethicon, Norderstedt, Germany). To prepare the pa-
tellar insertion site, a 3-cm skin incision was made, using the old scar, anterolateral to the patella. The bony insertion of the lateral patellofemoral ligament at the lateral margin of the patella was prepared by detaching the lateral retinaculum and exposing the bony rim. Using a special drilling guide (Storz, Tuttlingen, Germany) 2 convergent drill holes were placed at a 45° angle, 1 in the proximal part and 1 in the distal part of the lateral rim (Figure 2). The created tunnel was loaded with a suture loop, and the graft was pulled through it. Afterward, a 2-cm longitudinal skin incision was made over the lateral femoral epicondyle. From the lateral patellar rim, the layer between the lateral retinaculum and the joint capsule along to the lateral epicondyle was prepared. In the area of the lateral epicondyle, the fascia lata was split and a suture loop was passed through the dissected layers to pull the marked free ends of the graft. A guidewire with an eyelet was temporarily placed 0.5 cm proximal and posterior to the lateral femoral epicondyle, directed toward the medial epicondyle. Afterward, the tension of the 2 bundles was checked for isometry throughout the full range of motion. The guidewire was drilled through the medial cortex and skin and was subsequently overdrilled with a cannulated 6-mm drill to a depth of 32 mm (Figure 3A). The 2 free graft ends were pulled through the drilled hole fixed at the eyelet of the guidewire (Figure 3B) and were consequently fixed into the femoral hole (Figure 3C), using an absorbable 7×28-mm interference screw (Megafix, Storz). Postoperatively, the authors allowed partial weight bearing with 15 kg for 6 weeks. There were no restrictions for active or passive range of motion.

The patient was free of pain and very satisfied with the result 1 year postoperatively. Clinically, the patella was stable, with correct tracking and free range of motion. Radiologically, the patella was correctly positioned (Figure 4).

**DISCUSSION**

Medial patellar instability is a serious complication that can occur after open or arthroscopic lateral release, sometimes in association with a tibial tubercle transfer or a medial soft tissue procedure because of lateral patellar instability. Of the 163 cases of medial patellar subluxation reported in the literature, 149 (91%) had a previous lateral retinacular release.

Because lateral patellar instability is a considerably more common condition than medial patellar instability, frequently...
performed medial patellofemoral ligament reconstructions should be discussed. Medial patellofemoral ligament reconstructions are considered highly successful when correctly indicated. Many techniques for fixation and graft selection have been described, and the use of gracilis tendon autograft is well established. In the authors’ clinic, a technique for medial patellofemoral ligament reconstruction similar to that described earlier for lateral patellofemoral ligament reconstruction is performed routinely.

The anatomy of the lateral retinaculum of the knee is complex and remains controversial because of different anatomic descriptions. Some authors describe the lateral patellofemoral ligament as a palpable thickening of the joint capsule between the patella and femoral epicondyle. Others describe it as an extracapsular structure. The authors’ reconstruction was extra-articular so that it would be equal to the medial patellofemoral ligament reconstruction and avoid arthroto-my, which is associated with a higher risk of periprosthetic infection.

Several case reports of lateral patellar instability after TKA or patellofemoral joint arthroplasty treated with medial patellofemoral ligament reconstruction showed successful results. In 1 case, medial patellofemoral ligament reconstruction was combined with TKA in the same procedure and showed a good result at 2-year follow-up. The current case report clearly shows that medial patellar instability also may occur in patients with TKA. In the current case, a successful clinical outcome was seen 1 year after lateral patellofemoral ligament reconstruction in a patient with medial patellar instability after TKA and lateral release. With a technique similar to that used for the medial patellofemoral ligament, the lateral patellofemoral ligament can be recon-stucted with a gracilis tendon autograft, permitting stabilization independent of resting scar tissue of the lateral retinaculum. This procedure can be performed in a minimally invasive fashion without opening the joint, therefore decreasing the risk of joint infection. The main pitfall remains, as for the medial patellofemoral ligament, correct isometry of the transplant.

REFERENCES