


Medial Patellofemoral Ligament Reconstruction

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Background: Patellar instability is a relatively common condition in the young, active population and causes disruption of the medial patellofemoral ligament (MPFL). MPFL reconstruction is often performed to restore this medial stabilizer and reduce the risk of recurrent instability.

Indications: Isolated MPFL reconstruction has been shown to reduce the risk of recurrent patellar dislocation. It is indicated in our patients who have had more than 1 dislocation in the absence of other significant bony malalignment or cartilage defects that require concurrent surgery.

Technique Description: Diagnostic arthroscopy is first performed to evaluate the patellar and trochlear cartilage surfaces. A medial approach to the patella is then performed and the 2 free limbs of the allograft are secured to the patella at the 9 to 11 (or 1 to 3) o'clock position. A small approach to the femoral insertion site of the MPFL is performed and confirmed with fluoroscopy, and the graft is secured to the femur with a biotenesis screw. Postoperative examination confirms improved stability of the patella, and the patient performs a gradual return to play protocol.

Results: Recent studies have demonstrated overall good clinical outcomes after MPFL reconstruction, with improved patellar stability and high patient satisfaction. One systematic review found an 85% rate of return to sport with a low risk (7%) of recurrent subluxation or dislocation.

Discussion/Conclusion: MPFL reconstruction is a reliable option for improving patellar stability in patients with recurrent dislocations. We believe our technique, which optimizes the fixation and footprint of the graft on the patella and allows for easy visualization of femoral anatomy on fluoroscopy, can improve the reproducibility of the procedure and provide optimal clinical outcomes.

Keywords: MPFL reconstruction; medial patellofemoral ligament; patellar instability; patellar dislocation; operative technique; allograft

VIDEO TRANSCRIPT

In this video, we will demonstrate a technique for medial patellofemoral ligament (MPFL) reconstruction with allograft tendon.

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Here we will review the pertinent history, physical examination, and imaging findings for our patient, as well as the preoperative planning pearls and the surgical technique for this case. We will then discuss the postoperative management and rehabilitation protocol, followed by a brief discussion of postoperative outcomes and complications from the literature.

The patient is a 30-year-old woman presenting with a history of recurrent left patellar instability that had failed non-operative treatment. Her physical examination demonstrated nearly full range of motion and was significant for increased lateral translation of the patella compared with the contralateral knee as well as patellar apprehension.

Her x-rays showed no bony fracture or significant patella alta, and her magnetic resonance imaging (MRI) demonstrates an attenuated and non-functional MPFL with increased lateral translation of the patella and no significant patellar cartilage lesions, as well as a normal tibial tuberosity-trochlear groove (TT-TG). Given her history of recurrent instability and failed non-operative treatment



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in the setting of normal bony anatomy, the plan was for MPFL reconstruction with allograft tendon.

Preoperative planning considerations for this case include evaluation of the cartilage for injury or loose bodies that may need to be addressed or removed at the time of surgery, depending on the size and other characteristics of the defect. As mentioned above, it is important to consider the bony anatomy, as well as coronal and rotational lower extremity alignment, that could affect the risk of re-dislocation postoperatively, such as the TT-TG example shown here. In younger patients, an open physis may also influence operative decision making, such as tunnel location or concurrent procedures.

There are many options for both patellar and femoral fixation of the MPFL graft, and a backup option or plan should be available in the event that primary fixation fails or is inadequate intraoperatively. Graft type should be chosen preoperatively, and in this case, semitendinosis allograft was chosen. Prior studies have shown equivalent clinical outcomes with allograft and autograft as the reconstruction is extra-articular, so allograft is preferred in most cases. A graft at least 24 to 27 cm long with a doubled diameter of about 6 mm should be used. Any excess graft can be trimmed when prepared on the femoral side. Fixation options for a loose or unstable cartilage lesion should also be available if it is identified on preoperative imaging. Finally, fluoroscopy should be available for the evaluation of tunnel placement, and the patient should be positioned at the end of the table so that appropriate anteroposterior and lateral imaging of the knee can easily be obtained.

Preoperative examination demonstrates increased lateral patellar translation with near dislocation throughout range of motion.

The patient is first set up for a standard knee arthroscopy to evaluate the patellar and trochlear cartilage surfaces. Arthroscopy demonstrated softening and fissures of her medial patellar facet with significant lateral patellar translation, but no unstable or loose cartilage lesions requiring further treatment.

During the arthroscopy, an assistant can prepare the MPFL allograft by whipstitching about 2 cm at each end of the graft, leaving 2 long suture tails on each end. The tails on each end can then be loaded through a 2.4 mm pushlock and secured with a hemostat clamp.

When the arthroscopy is complete, the foot of the bed is flattened and the patient is positioned in a standard sliding knee positioner at 30° to 45° of flexion.

The 2 incisions are then marked over the medial border of the patella and over the MPFL origin on the femur near the medial epicondyle.

The patellar incision is made first and dissection is carried down to the vastus medialis oblique muscle fascia and medial retinaculum, where the medial border of the patella can be palpated.

A 15 blade is used to make an incision along the medial border of the patella, dissecting through the first 2 layers and leaving the capsule deep to these layers intact. A small cuff of tissue should be left on the patella to close at the end of the case.

A kelly clamp is then used to open the space just superficial to the capsule in order to create a plane for the MPFL graft.

Once the patella is exposed under the medial sleeve of tissue, fluoroscopy can be used to confirm the position of the pushlocks. The graft should ideally be anchored at the 9 and 11 o'clock position on a left knee or the 1 and 3 o'clock position on a right knee.

Using the drill guide, each of the 2 pushlock sites can then be drilled, taking care to make sure that the drill does not penetrate into the articular cartilage. The bovie can be used to ensure that the site for each pushlock is easily visible and that the trajectory is clear.

The 2 pushlocks loaded with the sutures from the graft are brought to the table. The first pushlock is placed in the inferior drill hole, with the graft held superficially to the pushlock and the sutures positioned deeply.

The sutures should be tensioned before and during placement so that the graft is secure against the patella.

The assistant holds the graft in a loop and the second pushlock is placed in the superior hole in the same manner, with the graft superior to the pushlock and the sutures deep.

A free needle is then used to pass each of the 2 sutures through the strand of graft from deep to superficial, about 3 mm from where the graft contacts the bone. The sutures are then tied together, which secures a slightly larger footprint of the graft to the medial patella.

The same steps are repeated with the superior strand of graft, again bringing each suture from deep to superficial and tying them on the superficial surface of the graft.

The graft is then wrapped in a wet sponge and attention is turned to the femoral insertion of the MPFL.

The knee is positioned to obtain a perfect lateral view on fluoroscopy. After superficial dissection, the medial epicondyle and adductor tubercle are palpated, and then fluoroscopy is used to confirm the position of the pin at Schottle point.

Once it is positioned, it is advanced about 5 to 6 cm. Additional x-rays can be obtained to confirm the position of the pin.

Schottle point can be found by drawing a line along the posterior femoral cortex and then 2 perpendicular lines at the level of the origin of the femoral condyle and the posterior aspect of Blumensaat line.

If desired, prior to drilling the tunnel, the isometry of the graft can be confirmed by passing the graft into the medial incision and marking the point on the graft where it contacts the passing pin. The knee can then be ranged, and if the marked point of the graft moves relative to the pin during motion, then the pin can be adjusted to a more isometric point. Typically, if the pin is too proximal, then the graft will be too tight as the knee moves into deeper flexion, and it can be adjusted more distally until the isometry is appropriate.

Similarly, the graft will loosen with flexion if the pin is placed too distally.

The soft tissue around the pin is cleared and then a steri-strip is placed to mark 30 mm on the appropriately sized reamer.

A tunnel is drilled to at least that depth to ensure that the graft will not bottom out in the tunnel. The pin and the reamer are removed, and a beath pin is placed through the tunnel and drilled out of the lateral side of the knee, aiming slightly anteriorly and proximally if possible.

If it has not already been done, a Kelly clamp is passed from the femoral incision to the patellar incision, confirming that it is between layer 2 and layer 3, which is deep to the vastus medialis oblique muscle and medial retinaculum and superficial to the joint capsule. The graft is then passed with a suture loop into the femoral incision.

The graft is wrapped around the beath pin and marked where it will enter the tunnel.

A second mark is made 25 mm distal to this point, and then a whipstitch is placed up the graft and back down for this length, leaving 2 long suture tails at the end of the graft.

The remaining graft is then cut in order to avoid the graft bottoming out in the femoral tunnel.

A shuttle suture is then looped through the beath pin, with the loop side remaining in the incision and the free ends passed out of the lateral femur.

The sutures from the graft are then passed out of the lateral side of the femur. They are pulled slowly so that the graft can be positioned to easily pull into the femoral tunnel. The end of the graft should be seen entering the tunnel and the graft should be seated almost all of the way to the first mark.

The knee is cycled with tension on the graft and placed back at 45°. A nitinol wire is placed posterior to the graft in the tunnel, and an interference screw is placed over it while tension is maintained on the graft sutures laterally. The screw should be fully seated and not remain proud.

Final tension is confirmed in the patellar incision, and postoperative examination should confirm appropriate patellar tracking and knee range of motion.

The patella should have improved stability from preoperatively but still have 1 to 2 quadrants of lateral translation.

The superficial retinacular layers should be closed over the graft to reinforce the reconstruction. The soft tissue and skin are closed and dressed in a standard fashion.

Postoperatively, the patient may be weightbearing as tolerated in a hinged knee brace that is locked in extension for ambulating. Range of motion during therapy is limited to 40° for the first 2 weeks and then advanced to full motion after that.

The patient is weaned out of the brace starting at 6 weeks postoperatively. They should focus on maintaining their full extension while progressing to full knee flexion. At this point, they will also begin to progress through more closed chain strengthening and balance exercises.


At 3 months, the patient may begin jogging and continues to progress through strengthening and proprioception activities. At 4 months, they can begin a plyometric program and sport specific exercises as able, with the goal of returning to full sports by 6 months postoperatively.

A recent meta-analysis found that the majority of patients return to play at an average of 7 months postoperatively, and most return to the same level of play.^{2,4} One of the more significant complications after MPFL reconstruction is redislocation, and recent systematic reviews have noted that about 2% of patients sustain a recurrent dislocation, with a larger number experiencing possible subluxation events.^{1,6,7}

Finally, other complications are also relatively uncommon but can include arthrofibrosis requiring manipulation, superficial wound problems, and patella fracture.⁵

Our references can be found here. Thank you.

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