

Medial Patellofemoral Ligament Reconstruction Using the Medial Third of the Patellar Tendon: Camanho's Technique



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Abstract: The reconstruction of the medial patellofemoral ligament (MPFL) is an essential procedure in the surgical treatment of patellar instability. The medial third of the patellar tendon is a good graft option for this reconstruction, maintaining the insertion of the graft in the patella, with no need for hardware for patellar fixation. The objective of this article is to describe the MPFL reconstruction technique with the patellar tendon graft.

The incidence of patellar dislocations has increased over the past 2 decades, in both young men and women.¹ In primary dislocation, management is generally conservative, with surgical indication for patients with loose bodies or osteochondral lesions. For individuals stratified at high risk of recurrence, operative treatment may also be considered in a first episode of dislocation.² For nonsurgically treated patients, approximately 35% may develop recurrent dislocation³ and will require surgical intervention.

The reconstruction of the medial patellofemoral ligament (MPFL) is an essential procedure in surgical treatment^{4,5} and may be combined with realignment procedures, depending on anatomic alterations and risk factors.^{5,6} Several techniques and types of graft have been described for MPFL reconstruction, including the use of the quadriceps tendon,⁷ the gracilis tendon,⁸ the semitendinosus tendon,⁹ the patellar tendon,¹⁰

the peroneus longus tendon,¹¹ the adductor magnus tendon,¹² allografts,¹³ and synthetic grafts.¹⁴ No graft source seems to be superior to the others so far in the literature.¹⁵⁻¹⁸

The MPFL reconstruction using the medial third of the patellar tendon, maintaining the insertion of the graft in the patella, is a viable and reproducible technique, with good results reported.^{19,20} Especially when associated with a tibial tubercle osteotomy, where an anterior access is already obligatorily performed, this technique becomes even simpler. The purpose of this article is to describe the step-by-step procedure of this technique (Video 1).

Surgical Technique

Patient Preparation

The patient is placed in the supine position on the operating table, with a pneumatic tourniquet set proximally in the injured limb. After performing an anti-sepsis and positioning the sterile drapes, the pneumatic tourniquet is inflated.

Graft Harvesting and Preparation

A longitudinal incision is made over the medial margin of the patellar tendon, from the inferior pole of the patella toward the anterior tibial tuberosity (ATT). Dissection is carried through the subcutaneous tissue, and the peritenon is incised vertically, exposing the patellar tendon. The width of the patellar tendon is measured and its medial third is longitudinally dissected, in the direction of its fibers (Fig 1). If the

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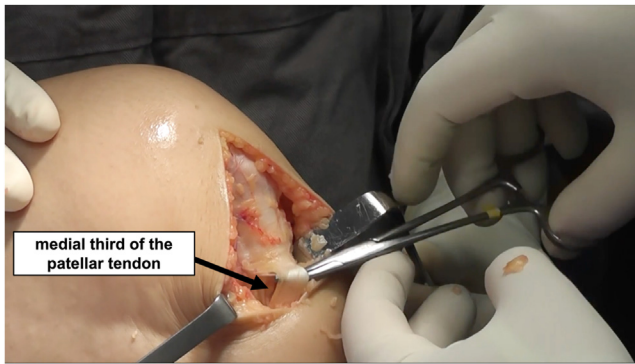


Fig 1. Anteromedial view of the left knee. After opening the peritendon, a 10- to 12-mm strip of the medial third of the patellar tendon is blutely dissected with Kelly forceps.

tendon is very wide or narrower, around 10 to 12 mm in width is enough for the procedure. After that, the medial third of the patellar tendon is disinserted from its attachment on the ATT with the scalpel blade (Fig 2). The medial third of the patellar tendon is separated from the rest of the tendon with blunt dissection until the patella (Fig 3), and a No. 11 scalpel blade is used to carefully detach the patellar tendon from the patella up to the transition between the proximal and middle thirds of the patella.

The graft is then rotated approximately 90 degrees toward the femoral insertion of the MPFL (Fig 4). For the graft to curve properly, the most proximal lateral part of the tendon must be released approximately 5 mm more than the medial part. Sutures with a Vicryl 1-0 thread are placed between the periosteum and the graft to prevent its detachment from the patella (Fig 5). The extremity of the graft is prepared with a 1-0 Vicryl suture.

MPFL Femoral Point

With the graft prepared, a 2-cm incision is made posterior and proximal to the medial epicondyle of the femur. The MPFL insertion point is located between the

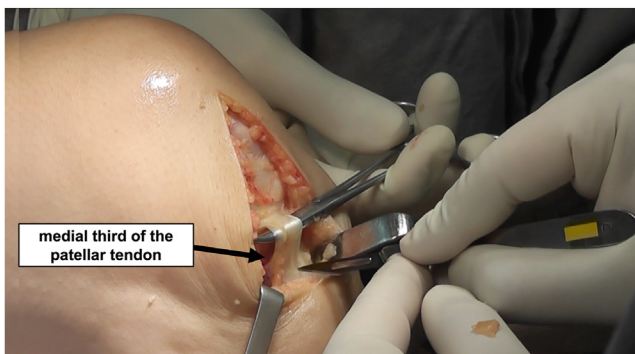


Fig 2. Anteromedial view of the left knee. With the medial third of the patellar tendon properly dissected, it is carefully detached from the anterior tuberosity of the tibia with a No. 11 scalpel blade.

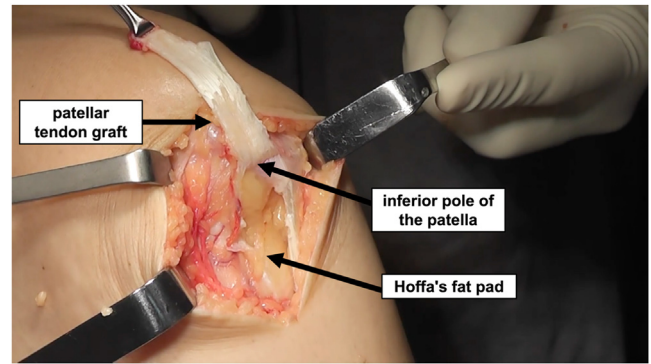


Fig 3. Anteromedial view of the left knee. After its detachment from the tibial tubercle, the medial third of the patellar tendon is dissected in the direction of its fibers toward the inferior pole of the patella.

adductor tubercle and the medial epicondyle, and its bony surface is properly exposed for placing the suture anchor. The guide pin of the anchor is positioned on the femoral insertion of the MPFL and checked with fluoroscopy, according to Schöttle et al.²¹ If the position is suitable, the guide pin is removed, and the suture anchor is impacted into the MPFL anatomic point on the femur.

Graft Passage and Fixation

The interval between layers 2 and 3 of the medial retinaculum is identified and the graft is passed from the patella toward the femur through this plane. Finally, the graft is fixed in the suture anchor with the knee in 30 degrees of flexion, with the patella engaged to the trochlea.

After fixation, proper tensioning of the graft is verified, which must translate approximately 1 quadrant with the knee in full extension. The peritendon of the

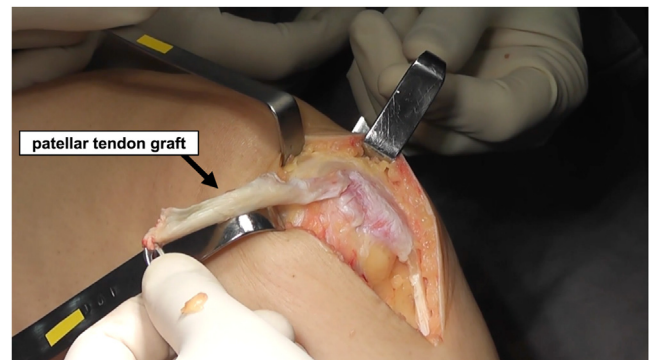


Fig 4. Anteromedial view of the left knee. The patellar tendon is carefully disinserted until the transition between the middle and upper thirds of the patella and then the graft is rotated approximately 90 degrees toward the femoral insertion of the medial patellofemoral ligament. In the proximal region, the lateral part of the tendon is released approximately 5 mm more than the medial part, allowing the graft to rotate properly.

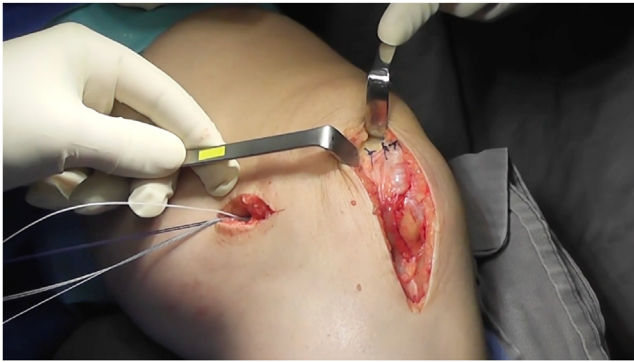


Fig 5. Anteromedial view of the left knee. After rotating the graft toward the femur, sutures with a 1-0 Vicryl thread are placed between the periosteum and the graft, close to its insertion in the patella, to prevent its detachment from the patella.

patellar tendon is closed with a No. 3 Vicryl suture and the wounds are sutured by layers.

Rehabilitation

In the immediate postoperative period, ice, compression, and limb elevation are recommended to control swelling and pain. Isometric exercises are encouraged. Patients can perform partial weightbearing with crutches and progress as tolerated. They are kept with a knee brace for about 3 weeks, until satisfactory quadriceps activation is achieved. Free range of motion (ROM) of the knee is allowed. With the knee immobilizer discontinued, the focus is on restoring full ROM and muscle control, with initial proprioception exercises and closed kinetic chain exercises, gradually evolving to open chain exercises. The return to sports activity happens around week 12.

Discussion

Patellar tendon graft is widely used for anterior cruciate ligament reconstructions with good outcomes, with appropriate biomechanical characteristics for ligament reconstructions (Table 1). The mean ultimate load to failure of a 10-mm-wide patellar tendon graft is $2,977 \pm 516$ N, and the 7-mm-wide composite is $2,238 \pm 316$ N.²² The mean ultimate load to failure of the MPFL in cadaveric studies was 178 ± 46 N.²³ Regarding graft length, patella baja would be a concern, but it is not a condition associated with patellar instability. Quite the opposite, patella alta is a risk factor and a frequently associated condition, present in 24% of patients with patellar instability but in only 3% of normal controls.²⁴ Aframian et al.²⁵ performed a meta-analysis on MPFL anatomy, including 19 studies, and found an average length of 56 mm, with the longest and shortest reported lengths of 74 mm and 45 mm, respectively. Neyret et al.²⁶ evaluated the patellar tendon length in 42 knees with patellofemoral instability and found a mean of 53 mm, ranging from 44 to 68 mm. In our technique,

Table 1. Pearls and Pitfalls of Medial Patellofemoral Ligament Reconstruction Using the Medial Third of the Patellar Tendon

Pearls	Pitfalls
- For proper rotation of the graft, the lateral portion of the tendon must be detached from the patella approximately 5 mm more than the medial part.	- Dissection of the tendon and its disinsertion from the patella must be carefully performed to avoid complete detachment of the graft.
- Reinforcement sutures can be placed between the periosteum of the patella and the graft to avoid the complete detachment of the graft from the patella.	- Overtightening the graft increases pressure on the patellofemoral joint, which can lead to anterior knee pain and degeneration.

the patellar tendon graft is detached from the patella with careful dissection, from distal to proximal, up to the transition between the proximal and middle thirds of the patella, which increases the length of the graft by approximately 2 to 3 cm. Therefore, the patellar tendon graft has appropriate biomechanical characteristics and enough length for this reconstruction.

For MPFL reconstruction, the patellar tendon graft can be used with¹⁰ or without the ATT bone plug.²⁰ When it is used with a bone plug, it is necessary to make a femoral tunnel, and the fixation can be performed with an interference screw or with a suspensory cortical button. When the graft is prepared without a bone plug, fixation can also be performed with suture anchors. Although the use of interference screws was associated with a greater load to failure compared with the use of suture anchors in MPFL femoral fixation in biomechanical studies,²⁷ a systematic review²⁸ that evaluated the clinical outcomes of interference screws versus suture anchors for femoral fixation with a mean follow-up of 40 months concluded that there was no clinical difference regarding Kujala,²⁹ Lysholm,³⁰ and Tegner³¹ scales. Therefore, the implant can be chosen according to the availability and surgeon's preference. For patellar fixation, unlike the use of free grafts, such as the gracilis tendon, the use of patellar or quadriceps tendons grafts does not require implants for graft

Table 2. Advantages and Disadvantages of Medial Patellofemoral Ligament Reconstruction Using the Medial Third of the Patellar Tendon

Advantages	Disadvantages
- No need for fixation device on the patella, minimizing costs and the risk of a patellar fracture.	- Risk of injury to the infrapatellar branch of the saphenous nerve in the anterior incision, leading to paresthesia.
- When associated with tibial tubercle osteotomy, the same incision is used to harvest the graft.	- Need for a larger and less cosmetic incision for patellar tendon graft harvesting.

fixation, which has the advantage of reducing costs and minimizing the risk of patellar fractures (Table 2).³²

Regarding the functional results, the reported outcomes of our series show a mean postoperative Kujala score of 88.9, including 21 patients, with a minimum follow-up of 2 years.³³ Witoński et al.²⁰ reported the outcomes of 10 patients who underwent MPFL reconstruction with a patellar tendon graft, with a mean follow-up of 3 years and 7 months (minimum 2 years), and described a mean postoperative Kujala score of 84.4, with a mean increase of 24.7 points when comparing pre- and postoperative values. These results are comparable to those in the literature. Schneider et al.,³⁴ in a meta-analysis including 7 studies, reported the pooled mean postoperative Kujala score of 85.8, and Cohen et al.,³⁵ in a meta-analysis including 3 studies and a total of 54 patients, reported the pooled mean postoperative Kujala score of 87.

The possible complications of this procedure are the same as those described for MPFL reconstruction, such as overtightening of the graft, leading to persistent anterior knee pain or knee stiffness, patellar fractures, failure,³² and patellofemoral arthritis.³⁶ In our series,¹⁹ we have the reported outcomes of 50 patients with a mean follow-up of 8.9 years (minimum 6 years), with a recurrence rate of dislocation of 12% and subjective instability complaint without dislocation in 6% of patients. No patient had loss of ROM. Witoński et al.²⁰ reported no recurrent dislocation and no other complications in their study. In the literature, Aliberti et al.,¹⁸ in a systematic review including 150 patients who underwent MPFL reconstruction with autografts, reported a failure rate of 8.7%.

The MPFL reconstruction technique using the medial third of the patellar tendon is simple and reproducible and does not require special instruments to be performed, making it an excellent option for orthopaedic surgeons in the treatment of patellar instability.

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](#).

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