

The Modified Lemaire Procedure

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Background: Anterolateral rotatory instability (ALRI) may be one reason why anterior cruciate ligament (ACL) reconstructions fail. An additional reconstruction of the anterolateral structures reduces the graft rupture rate by 50%. The modified Lemaire procedure is one of the lateral extra-articular tenodeses (LET) to restrain ALRI. The purpose of the present video is to describe this technique in detail.

Indications: According to the international anterolateral complex consensus group indications may include revision ACL reconstruction, high grade pivot shift, generalized ligamentous laxity, like genu recurvatum, and young patients returning to pivoting activities. However, clinical evidence to recommend specific indications is still missing.

Technique description: A 7 to 10 mm wide strip of the iliotibial tract, attached to Gerdy tubercle is shuttled deep to the lateral collateral ligament and is then attached proximal to the lateral femoral epicondyle. The biomechanical principle behind this is to place the graft posterior to the transverse axis of rotation through the entire range of motion. This posterior pull will restrain internal rotation and the anterior subluxation of the lateral tibial plateau.

Results: Newer comparative studies show a reduced graft rupture rate and higher rate of returning to preinjury level, when adding an anterolateral extra-articular reconstruction to the ACL reconstruction at 2 years follow-up. At long-term follow-up there was also a trend toward decreased graft rupture rate. However, one must be aware of the possible increased risk of lateral compartment osteoarthritis.

Conclusion: The modified Lemaire procedure is an easy-to-use add-on to the ACL reconstruction, which can effectively reduce graft failure rate.

Keywords: Lateral extra-articular reconstruction; lateral extra-articular tenodesis; anterolateral ligament; Lemaire reconstruction

TRANSCRIPT

The following video aims to demonstrate the modified Lemaire procedure, which reconstructs the lateral extra-articular structures. The principle behind this extra-articular tenodesis is to provide a lateral check-rein against anterior tibial subluxation of the lateral tibial plateau by pulling it posteriorly.

These are our disclosures.

According to the current literature approximately 5% to 25% of patients show unsatisfying results after anterior cruciate ligament (ACL) reconstruction with higher risks for the young population and patients returning to strenuous

sports. Combined anterolateral rotatory instability may be one reason for these poor results. This can be suspected, because a recent study by the stability group showed a 50% reduced graft rupture rate, when adding such a reconstruction. Furthermore, the Scientific ACL NeTwork International (SANTI) Study Group showed a 2.5 to 3.1 times reduced graft rupture rate, when performing an additional anterolateral ligament (ALL) reconstruction.

According to the international anterolateral complex consensus group indications may include revision ACL reconstruction, high-grade pivot shift, generalized ligamentous laxity, like genu recurvatum, and young patients returning to pivoting activities. However, the clinical evidence to recommend such specific indications is still missing.

In order to perform the modified Lemaire procedure, the patient is in supine position after the ACL reconstruction is finished. The left knee is approximately 90° knee flexed, and the foot is positioned on the left thigh of the surgeon in neutral rotation. Surgical landmarks, as you can see here, are Gerdy tubercle, the lateral epicondyle, the lateral collateral ligament, and the fibular head.

According to a recent biomechanical study by Eivind Inderhaug at Imperial College London, it has been shown that a strip of the iliotibial band (ITB) guided deep to the lateral collateral ligament (LCL) can restore internal rotational kinematics to normal.

A 5 to 7cm oblique incision is made over the lateral epicondyle toward Gerdy tubercle. Subtle hemostasis is

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Submitted July 26, 2021; accepted October 14, 2021.

The authors declared that they have no conflicts of interest in the authorship and publication of this contribution. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Video Journal of Sports Medicine (VJSM®), 2(1), 26350254211060354

DOI: 10.1177/26350254211060354

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performed using a standard electro cautery device. We then sharply dissect the subcutaneous tissue in order to expose the iliotibial tract using scissors. As you can see here, this can be simplified by stretching the subcutaneous tissue using 2 sharp hooks.

After finishing this preparation, again, the 2 landmarks, the lateral epicondyle and Gerdy tubercle are palpated and a small incision on the anterior edge of Gerdy tubercle, which can be marked by the surgeon's thumb, is performed. Scissors are then slid proximally through this incision in order to prepare the anterior edge of the ITB. Care should be taken not to damage the LCL, which is then be palpated and carefully exposed using a standard shaver. Small vessels indicate the right position around the lateral epicondyle.

An Overholt forceps is then used to carefully dissect the LCL and guide a shuttle suture deep to it. The suture loop should be directed toward Gerdy tubercle. We then dissect the posterior edge of the ITB strip by again sliding the scissors proximally and distally toward Gerdy tubercle. The desired width of the strip is 7 to 10 mm. The strip is then cut approximately 3 cm proximal to the lateral epicondyle in order to have a sufficient length for the lateral extra-articular tenodesis. These connecting fibers of the deep iliotibial tract should be carefully resected away from the ITB strip. The preparation of the strip of the ITB ends with whipstitching in a standard manner. The insertion on Gerdy tubercle is checked by pulling on the strip. Finally, the loop of the shuttle suture is used to shuttle the ITB strip deep to the LCL.

The graph on the left side shows the length change pattern of lateral extra-articular reconstructions from 0° to 90° knee flexion. The red lines show a course deep to the LCL and a tightening toward full extension, which present favorable results in order to restrain the pivot shift. The blue lines present a course superficial to the LCL, which are more variable compared with the red lines. That is why we shuttle the strip of the ITB deep to the LCL.

Also, a femoral insertion site proximal and posterior to the lateral epicondyle present favorable results in restraining the pivot-shift. Therefore, the interval between the lateral epicondyle and the gastroc tubercle is prepared and a guide wire is positioned. It is drilled in an 30° anterior and proximal angulation. The guide wire is then overdrilled by a suitable drill, normally 5 to 7 mm diameter. The graph on the right shows the safe area for positioning the lateral extraarticular tenodesis, when guiding the strip of the ITB deep to the LCL.

A potential tunnel conflict can be visualized by inserting the arthroscope though the anteromedial portal into the femoral tunnel. After drilling is finished, the strip is shuttled into the drillhole. According to recent biomechanical studies the graft should be fixed using approximately 20

N tension, neutral rotation of the foot, and 30 to 60° of knee flexion. For this we use an interference screw with the same diameter as the drill hole.

Potential complications of these technique are first, a short graft. As mentioned in the technique description, the graft length should be referenced to the lateral femoral epicondyle and should be approximately 3 cm longer than the distance to the epicondyle. If this still happens, an alternative fixation using staples or anchors should be considered. Second, one must be aware of possible over constraint of the lateral compartment. This risk can be minimized by fixating the graft with the foot in neutral rotation and the knee in 30° to 60° knee flexion. The postoperative management should be identical to the one used for isolated ACL reconstruction. Third, be aware of a potential tunnel conflict with the ACL tunnel. If in doubt, the ACL tunnel should be viewed arthroscopically through the anteromedial portal, while drilling the Lemaire tunnel.

The postoperative management is identical to the one used for an isolated ACL reconstruction.

In conclusion, this is an easy-to-use addon for an ACL reconstruction, which can effectively reduce graft rupture rate and has the same postoperative regime as an isolated ACL reconstruction. Thank you very much for watching and listening.

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