



Technical Note

Reconstruction of anterior cruciate ligament and anterolateral ligament using interlinked hamstrings – technical note[☆]



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ARTICLE INFO

Article history:

Received 19 August 2015

Accepted 25 August 2015

Available online 4 July 2016

Keywords:

Anterior cruciate ligament reconstruction

Anterolateral ligament

Orthopedic procedures

Palavras-chave:

Reconstrução do ligamento cruzado anterior

Ligamento anterolateral

Procedimentos ortopédicos

ABSTRACT

Recent anatomical and biomechanical studies on the anterolateral ligament (ALL) of the knee have shown that this structure has an important function in relation to joint stability, especially when associated with anterior cruciate ligament (ACL) injury. However, the criteria for its reconstruction have not yet been fully established and the surgical techniques that have been described present variations regarding anatomical points and fixation materials. This study presents a reproducible technique for ALL and ACL reconstruction using hamstring tendons, in which three interference screws are used for fixation.

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Reconstrução dos ligamentos cruzado anterior e anterolateral com flexores enlaçados – Nota técnica

RESUMO

Os recentes estudos anatômicos e biomecânicos sobre o ligamento anterolateral (LAL) do joelho evidenciam que essa estrutura apresenta função relevante para a estabilidade articular principalmente quando associada à lesão do ligamento cruzado anterior (LCA). No entanto, os critérios para sua reconstrução ainda não estão totalmente estabelecidos, assim como as técnicas cirúrgicas descritas apresentam variações sobre os pontos

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<http://dx.doi.org/10.1016/j.rboe.2015.08.021>

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anatômicos e materiais de fixação. O estudo apresenta uma técnica reprodutível para a reconstrução do LAL e LCA com os tendões flexores que usa três parafusos de interferência para as fixações.

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Introduction

The treatment of anterior knee instability through reconstruction of the anterior cruciate ligament (ACL) presents good clinical results. However, the failure rate for this operation is estimated to range from 1.8% to 14%.^{1,2} The persistence of anterolateral instability assessed by the pivot-shift test postoperatively is described as one of those factors.^{2,3}

After the anatomical “rediscovery” and biomechanical studies of the anterolateral ligament (ALL) demonstrated that this structure is important in anterolateral knee stability, it was observed that insufficiency of this ligament may contribute to the functional failure of isolated ACL reconstructions.⁴

This study aimed to present a reproducible technique of anatomical ACL and ALL reconstruction with the hamstring tendons, using three interference screws.

Surgical technique

Fifteen adult patients (19–38 years), 12 men and three women, underwent ACL and ALL reconstruction by the technique described below, with a mean follow-up of 10 months (6–15 months). All patients returned, without complaints, to activities of daily living and/or to sports and recreational activities that they practiced prior to injury.

Indication

After spinal anesthesia, a clinical examination was performed to estimate ALL sufficiency.

The anterior asymmetry of the lateral plateau with internal rotation of the tibia in flexion of 30–60°⁵ relative to the contralateral knee, and increased positivity of the pivot-shift maneuver can be a clinical sign of failure of the ALL.⁴

The study used the classification for the pivot-shift maneuver determined by the International Knee Documentation Committee⁶ (IKDC) 2000, which describes four grades: 0 – normal, 1 – glide, 2 – clunk, 3 – gross shift.

The criteria used for ALL reconstruction associated with ACL injuries were:

1. Injury in the ALL substance identified at a magnetic resonance imaging (MRI), termed Segond-like injury;
2. Segond fracture⁷;
3. Pivot-shift classified as grade II/III;

4. ACL reconstruction review in which patients had residual pivot-shift during the postoperative period and evolved with graft injury;
5. Asymmetrical anterior lateral plateau visible with knee internal rotation in flexion between 30° and 60°.
6. Lateral femoral notch sign.⁸

Graft preparation and surgical technique

The excision of the semitendinosus tendon (ST) and gracilis tendon (GR) is made through a 4-cm anteromedial incision in the tibia over the pes anserinus.

During the arthroscopic procedure for the anteromedial and anterolateral portals, the joint is assessed and the intercondyle is cleaned, while tendons are handled at the instrumentation table. All grafts are prepared with Ethibond^R n° 2 (Ethicon, Somerville, NJ).

The GR used to rebuild the ALL is prepared to form a double graft. Each end is sutured with Krackow stitches.

One end of the GR is passed as a “handle” during the preparation of the triple ST graft, which will be used for ACL reconstruction, so that the double GR graft has the same size in its two parts and the triple ST graft has a Krackow suture in one end and the other end is anchored in the GR (Fig. 1A–C).

After preparation and measurement of graft diameters (usually 8 mm for the triple ST graft and 5 mm for the double GR), the femoral and tibial tunnels are prepared.

The femoral tunnel, common to the ACL and ALL, is made using the outside-in technique. A tibial ACL guide is placed so that its joint position overlaps the footprint of the anatomical insertion of the ACL in the intercondylar wall. A 65° opening is applied to minimize the “killer turn” of the graft.

After the ACL guide is positioned and the site where the guide wire will be introduced is assessed, the guidewire is removed, and a 4-cm longitudinal incision in the skin and iliotibial tract is performed on the lateral side of the knee.

The lateral epicondyle is identified by palpation; the guidewire is introduced 8 mm (about one digital tip) posterosuperiorly^{9,10} in the lateral femoral cortex to mark the entry site.

The ACL guide is then reattached and coupled to the guidewire, followed by the drilling of the path for the ACL footprint. Sequentially, one drill of the same diameter as the graft is used to make the tunnel, which is generally 35-mm long.

The tibial tunnel is prepared with the same guide and similarly, but with an angle of 55° on the tibial ACL footprint.

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