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TECHNICAL NOTE

Arthroscopic tightening of the anterior cruciate ligament

Retente du ligament croisé antérieur : une technique originale sous contrôle arthroscopique

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Summary We present here the preliminary results obtained with arthroscopic tightening of the anterior cruciate ligament (ACL). Six patients underwent the technique. Four had had prior ACL reconstruction, two had sequelae of tibial spine fractures. Laxity persisted in all cases. The transplant or the ligament were continuous and insertion points were well positioned. The procedure consisted in using a trephine to bore the tibial bone at the foot of the ligament or transplant in order to tighten the ligament. There was no evidence of instability after the arthroscopic tightening procedure. Mean pre- and postoperative differential anterior drawer values were 9.2 and 3.9 mm, respectively. For native or reconstructed anterior cruciate ligaments, which are continuous and well positioned but not loose, arthroscopic tightening obviates the need for ligament transplant and appears to be free of specific morbidity.

Résumé Nous rapportons ici les résultats préliminaires d'une technique arthroscopique de retente du ligament croisé antérieur. Six patients ont été opérés selon cette technique. Quatre avaient déjà eu une ligamentoplastie, deux des séquelles de fracture du massif des épines tibiales. Dans tous les cas, une laxité persistait, le transplant ou le ligament étaient continus et leurs points d'insertions étaient en bonne place. Le principe de l'intervention a été de prélever, à l'aide d'une tréphine, une carotte osseuse tibiale située en continuité avec le « pied » du ligament ou du transplant afin de le retendre. Aucune complication n'a été constatée.

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Aucun patient n'a signalé d'instabilité au décours de la retente du ligament. Les valeurs pré- et postopératoires moyennes du tiroir antérieur différentiel étaient successivement de 9,2 et de 3,9 mm. Dans le cas de ligaments croisés, natifs ou reconstruits, continus, bien positionnés mais détendus, cette technique permet de faire l'économie d'un transplant ligamentaire et semble être dépourvue de morbidité spécifique.

Introduction

Anterior cruciate ligament (ACL) reconstruction using autologous transplants is an effective and long-lasting solution to anterior instability of the knee. Although the efficacy of this intervention on stability has been demonstrated over the short and long terms in most cases [1—4], functional failure is possible. Most often, it results from transplant malposition but can also be the consequence of its distension, by slippage or lengthening, even though it is properly positioned. This situation can be likened to the case of native cruciate ligaments that have not been ruptured but have been distended as a result of tear or detachment from the tibial spines. With these continuous ligaments, which are well positioned but nonfunctional, the classical therapy suggested remains a new ACL reconstruction [5—8]. This technique requires a new ligament harvest and sacrifices a transplant whose macroscopic aspect is sometimes satisfactory.

This study presents an original arthroscopic technique that tightens a ligament transplant or a native cruciate ligament that is well inserted but distended, as well as the functional results of the first six interventions performed using this technique.

Material and methods

Between October 2001 and July 2004, six patients were operated using this technique (Table 1):

- three of these patients had had an ACL reconstruction;
- one had had two ACL reconstructions;
- one had had a tibial spine fracture associated with unreduced elevation of the tibial spine;
- the last patient had had epiphyseal detachment of the cruciate ligament insertion during childhood.

Five patients felt instability in the knee, four had just had a meniscus accident (Table 1). In the patient who did not suffer from perceived instability, the association of a meniscus caught in the notch and the anterior laxity observed motivated her to revise her ACL reconstruction.

In ACL reconstruction revision, tibial and femoral insertion positions were verified on plain X-rays and MRI. In one case of early failure, the tibial bone plug of the transplant was extruded (Fig. 1). It was impossible to know whether it was a poorly positioned initial fixation or a secondary displacement.

During the same operation, a meniscus lesion was resected and three longitudinal disinsertions were repaired. The patient who had sequelae of a tibial spine fracture treated using an arthroscopic method also required a valgization osteotomy with external closing, which allowed us to correct a 10° residual varus and an arthroscopic arthrolysis warranted by limited joint range of motion (from a 20° flessum to an 80° flexion). Stiffness was secondary, in extension, to the anterior conflict between the notch and the tibial spine and, in flexion, to retraction from scarring.

The pre- and postoperative laxities were measured on lateral X-rays of the knee flexed at 20° on a Telos stress device (500 N) for anterior drawer stress. The preoperative anterior drawer differential values were not measured in the patient with fracture sequelae nor in a patient operated on for meniscus blockage.

Given the small number of patients, neither comparison nor statistical analysis was done.

Surgical technique

In this series, the material and installation were the same as those used for classical arthroscopic ACL reconstruction. In this indication, in addition to the usual ancillary guiding system, pins and reamers, to prepare the tibial tunnel we used a surgical trephine of a diameter adapted to the diameter of the transplant and Kirschner wires for centering. The patient was installed in the dorsal decubitus position on an ordinary table, with a tourniquet at the thigh root, with the limb free from the 120° extension to the flexion of the knee.

After testing the ligament, we used arthroscopy through two anteroinferior approaches to check the continuity of the ACL, its distension (Fig. 2), and the positions of the tibial and femoral insertions.

Using a motorized shaver, the foot of the ligament was freed of scar tissue along its entire periphery and was peeled from its synovial to its distal extremity. The transplant or the ACL was then separated along the fibers using a probe, so as to position the ACL reconstruction aimer at the center of its

Figure 1 Extruded bone plug of the tibial tunnel (fixation in an improper position secondary displacement?).