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Original article

Complications and revision surgeries in two extra-articular tenodesis techniques associated to anterior cruciate ligament reconstruction. A case-control study

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ABSTRACT

Introduction: Numerous techniques of anterior cruciate ligament (ACL) reconstruction associated to extra-articular tenodesis (EAT) have been described, but there have been few comparative studies, especially in terms of complications and revision procedures. The present study sought to compare two ACL reconstruction techniques using the patellar tendon (KJ): associating EAT by fascia lata (KJL2) or by gracilis (KJG). The study hypothesis was that the KJL2 technique incurs no extra risk of complications or surgical revision compared to the KJG technique.
Method: A prospective case-control study compared 41 patients undergoing KJL2 and 41 controls undergoing KJG. Complications, reconstruction failure and revision procedures were assessed at a mean 13 months follow-up (range, 6–20 months).
Results: The KJL2 group showed no extra risk of postoperative complications or reconstruction failure compared to the KJG group: 1 versus 2 re-tears, respectively, not requiring revision. Revision surgery was significantly more frequent in the KJG group (31.7% vs. 7.3%), notably for arthrolysis and meniscectomy.
Discussion: The KJL2 technique is reliable, without greater risk of complications or early revision surgery than the KJG technique.
Level of evidence: III – Case-control study.

1. Introduction

Extra-articular tenodesis (EAT) is associated to reconstruction of the anterior cruciate ligament (ACL) to improve control of rotational laxity. Many EAT techniques have been described, but there have been few comparative studies. Most have compared functional results and residual laxity after ACL reconstruction with or without EAT [1–3]. Complications have also been little studied.

Several EAT variants associated to bone-patellar tendon-bone ACL reconstruction (Kenneth Jones: KJ) have been developed, including the so-called KJG technique, where the hamstring tendon (gracilis) is connected to the tibial bone block of the bone-tendon-bone graft [4]. This technique is standardly used in our department, but can entail certain complications: tibial bone block fracture, pain at the hamstring harvesting site, hamstring weakening, stiffness, etc. The KJL2 technique consists in KJ reconstruction associated to EAT using a short strip of fascia. It has several advantages: hamstring sparing and respecting the tibial bone block, EAT with conserved insertion on Gerdy's tubercle without fixation by exogenous material, etc. It could thus reduce harvesting-related comorbidity and certain complications of the KJG technique, although other complications may arise: EAT too tight, with risk of pain and postoperative stiffness, and femoral fixation of the EAT, which is more fragile, with risk of reconstruction failure and ACL re-tear. A few studies described EAT using short fascia lata strips, but none assessed complications precisely [5–9].

The main objective of the present study was to compare the rate of short-term complications between the KJL2 and KJG techniques. The study hypothesis was that the KJL2 technique incurs no extra risk of complications or surgical revision compared to the KJG technique.

2. Material and methods

2.1. Patients

The study did not require review board approval, as the department's standard practices were unaffected.

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Two single-center non-randomized consecutive series of patients undergoing ACL reconstruction with EAT were compared in a case-control study. The case series included all patients receiving associated KJL2, between July 2014 and July 2015. Exclusion criteria comprised associated bone surgery (osteotomy, osteochondral graft), fracture or posterior cruciate ligament lesion. The control series included patients receiving associated KJG, in the same department, between July 2013 and July 2014. The exclusion criteria were the same as in the case series. Data were collected retrospectively from clinical files and follow-up reports. Several surgeons were involved (5 for KJG and 6 for KJL2), including some in only 1 series.

In-hospital management and rehabilitation were the same in both series. The main indications comprised: iterative reconstruction, previous medial meniscectomy, side-to-side anterior translation > 10 mm on dynamic radiographs, explosive pivot-shift test, and intensive at-risk sports activity associating pivot and contact. Both techniques (KJG and KJL2) were performed in the same indications, depending purely on date: the KJL2 technique progressively came to be systematic, due to its theoretic advantages, which we wished to assess in the present study: hamstring sparing, conserved tibial bone block, and no exogenous material on Gerdy's tubercle.

2.2. Surgical techniques

KJG [4] is an out-in bone-patellar tendon-bone ligament reconstruction technique associated to EAT using hamstring tendon (gracilis) in continuity with the intra-articular reconstruction (Fig. 1). The tibial bone block of the patellar tendon is cut to a champagne cork shape; a 4.5 mm diameter hole is drilled in the middle part, through which the harvested hamstring is passed. Impacting the bone block in the femoral tunnel blocks the hamstring, enabling femoral fixation. The two tendinous ends of the hamstring are then passed under the lateral collateral ligament (LCL) and fixed on Gerdy's tubercle. Tensioning is performed with the knee in 30° flexion and neutral rotation, after fixing the intra-articular transplant.

For KJL2, patellar tendon preparation is as in an out-in bone-patellar tendon-bone technique. The harvested fascia lata strip is 1 cm wide, with a length 30 mm more than the distance between Gerdy's tubercle and the lateral condyle. The strip remains inserted on Gerdy's tubercle, and the free end is passed under the LCL and into the femoral tunnel of the intra-articular plasty before the tibial bone block is impacted (Fig. 2). The EAT is fixed proximally by impacting the tibial bone block, which blocks the fascia lata strip in a press-fit, with the knee in 30° flexion and neutral rotation. Tibial fixation of the intra-articular reconstruction uses an interference screw.

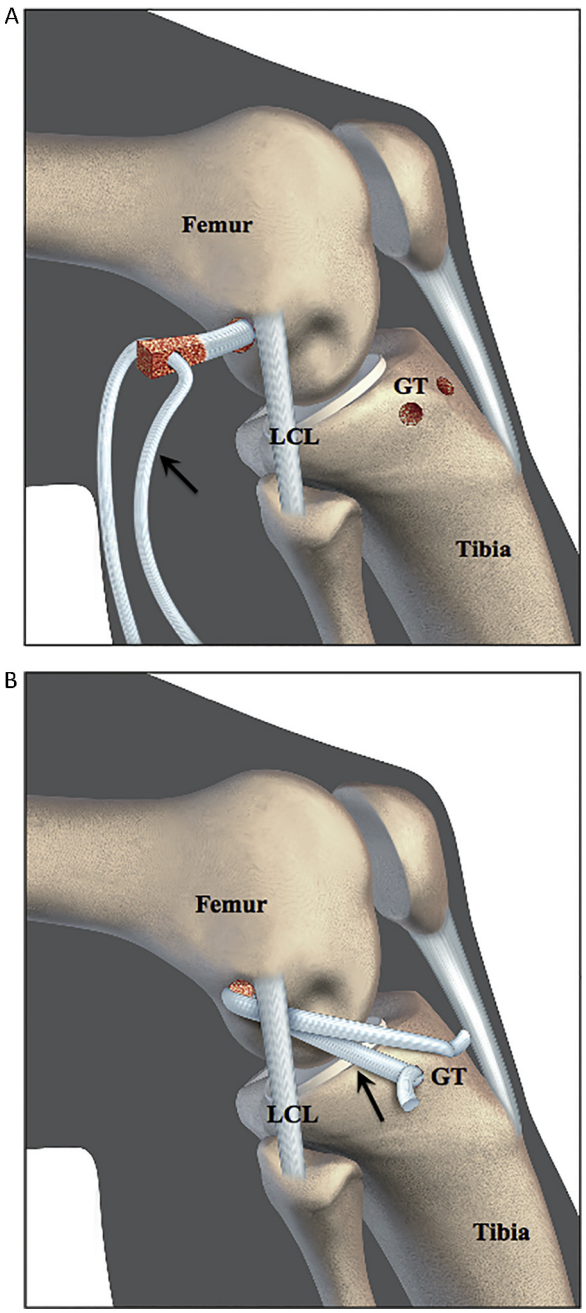

Fig. 1. Diagrams of extra-articular tenodesis by gracilis (KJG) procedure on right knee (LCL: lateral collateral ligament; GT: Gerdy's tubercle). A. Hamstring tendon (black arrow) passed through the impacted tibial bone block with press-fit in the femoral tunnel. B. The two strands are then fixed in a tunnel in Gerdy's tubercle, after passing under the LCL.

2.3. Assessment

Clinical follow-up was systematically performed at day 45, 6 months and 1 year. IKDC score was collected at last follow-up. Complications were noted at each follow-up, and classified as major if life-threatening or jeopardizing functional prognosis. Any secondary meniscal lesions were confirmed on MRI. Flexion contracture was defined as > 5° extension deficit. Pain and hematoma were considered as complications when leading to unscheduled consultation. Reconstruction failure was defined by clinical anterior laxity (soft endpoint on Lachman–Trillat test) and/or instability reported by the patient. All revision procedures were inventoried from clinical files and interview.

2.4. Statistical analysis

Continuous variables were presented as means and standard deviations, and compared on non-parametric Wilcoxon test. Categoric variables were compared on Fisher exact test. The significance threshold was set at $p < 0.05$. Analyses used XLstat software (2015; Addinsoft).

3. Results

During the study period (July 2014 to July 2015), 228 ACL reconstructions were performed, with 53 associating EAT. Forty-one of these patients were included in the KJL2 series. The control series

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