



Original Article

The femoral tunnel view test during ACL reconstruction can ensure tunnel integrity[☆]

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ABSTRACT

Objective: Violation of the posterior femoral cortex commonly referred to as posterior wall blowout, can be a devastating intraoperative complication in anterior cruciate ligament reconstruction (ACLR) and can lead to loss of graft fixation or early graft failure. This study describes and analyzes whether the femoral tunnel view test can ensure the integrity of the femoral tunnel during ACLR.

Methods: Intraoperative femoral tunnel integrity using the 360° arthroscopic view test was performed in 584 ACLR patients between 2014 and 2016. Posterior wall blowouts were described by their location along the femoral tunnel (i.e., near the aperture or more proximal) and by the depth of the tunnel blowout (<3 mm, 3–5 mm, >5 mm), corresponding to the length of the posterior cortical wall of the violated femoral tunnel. The time spent for the test was measured during ACLR. Complications related to the femoral tunnel view test were also evaluated.

Results: The femoral tunnel view test was performed in all 584 patients. In 12 patients (1%), the femoral tunnel presented a posterior cortical blowout that did not extend beyond 3 mm. Only four patients (0.6%) presented posterior wall blowout that extended beyond 5 mm. The time for the test was 40 s (±20 s). No complications related to the test were reported.

Conclusion: The femoral tunnel view test is effective for ensuring the integrity of the femoral tunnel during ACL reconstruction, without increasing the surgical time and without an increase in the complications rate.

Clinical relevance: The femoral tunnel view test is a quick and straightforward test able to provide an adequate view of the patient's anatomy to ensure tunnel integrity during ACLR.

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O teste de visualização artroscópica do túnel femoral durante a reconstrução do LCA garante a integridade do túnel

R E S U M O

Palavras-chave:

Ligamento cruzado anterior

Túnel femoral

Artroscopia

Objetivos: A violação da cortical femoral posterior pode ser complicação intraoperatória devastadora na reconstrução do ligamento cruzado anterior (RLCA), pode levar à perda de fixação ou à falha precoce do enxerto. Este estudo descreve e analisa a capacidade do teste de visualização artroscópica do túnel femoral em evidenciar a integridade de suas paredes durante a RLCA.

Métodos: Foram prospectivamente avaliados 584 pacientes elegíveis à RLCA entre 2014 e 2016 quanto à integridade do túnel femoral com o uso do teste de visualização artroscópica. A localização ao longo do túnel femoral e a profundidade da violação no túnel (<3 mm, 3-5 mm, >5 mm) foram avaliadas. O tempo para o teste foi medido e a ocorrência de complicações relacionadas ao mesmo também foi analisada.

Resultados: Todos os 584 pacientes elegíveis foram submetidos ao teste de visualização do túnel femoral durante a cirurgia artroscópica para RLCA. Em 12 (1%) pacientes, o túnel femoral apresentou perda de integridade da cortical posterior, que não ultrapassou 3 mm. Apenas quatro (0,6%) pacientes apresentaram violação da cortical posterior, que se estendeu para além de 5 mm. O tempo médio dispendido no teste foi de 40 segundos (± 20). Nenhuma complicação realização foi relatada.

Conclusão: O teste de visualização do túnel femoral é eficaz para avaliar a integridade desse túnel durante a RLCA, sem aumentar o tempo cirúrgico e sem provocar aumento na taxa de complicações relativas ao procedimento.

Relevância clínica: O teste de visualização artroscópica do túnel femoral é uma técnica simples e rápida, capaz de obter visão adequada da anatomia do paciente, garante a integridade do túnel durante a RLCA.

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Introduction

Several parameters are important for the successful anterior cruciate ligament reconstruction (ACLR).¹⁻⁶ An adequate positioning of the femoral and tibial tunnels is one of the main determinants of the clinical outcome,⁷⁻¹¹ as the final position of both tunnels determines the kinematics of the ACL graft after surgery.^{1,3,4,12}

ACLR failure usually results from the use of an inadequate surgical technique, failure of the healing process, or post-operative trauma.^{11,13} The most frequent technical error observed in ACLR is the inadequate positioning of the femoral tunnel.^{13,14} An overly anterior position may result in rotational laxity or even graft clamping; in turn, an overly posterior position may cause posterior or lateral cortex fracture, which may lead to loss of graft restraint and fixation failure. Thus, if this complication is not readily recognized in the intraoperative period and optional fixation or salvage strategies are not employed, the risk of early graft failure is considerably increased.^{11,13,14} It is difficult to determine the true incidence of posterior wall blowout in ACLR since its description in the literature has not been well described.

The present study is aimed at analyzing the ability of the femoral tunnel arthroscopic visualization test to evidence the integrity of the femoral tunnel walls during ACLR. The hypothesis is that direct vision of the tunnel in its entirety is ensured

with the use of the arthroscopic visualization test, which could secondarily minimize the complications related to a tunnel fracture during ACLR.

Methods

Between January 1, 2015 and May 31, 2016, 640 patients with ACL injury underwent ACLR and their data were prospectively collected. All patients with ACL injury, with injury time of less than 12 months were included, without any gender, age, or trauma mechanism distinction. Patients with multiligament lesions, associated degenerative conditions in the knee, incomplete physeal closure, arthroscopic procedures prior to surgery at knee level, or those who underwent other concomitant major procedures (e.g., high tibial osteotomy) were excluded. The study was approved by the Ethics Committee of the institution (CAAE No. 61368116.3.0000.5127).

The 584 (91.3%) patients included in the final study group underwent ACLR using the inside-out technique described below (quadruple hamstring technique)^{15,16}; the procedures were performed by the Knee Group of this institution.

ACLR – inside-out technique

The technique used is a previously published modification, which is briefly described herein.^{8,14,15,17} The grafts are removed with an open stripper, preserving the tibial insertion,

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