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KEY PROCEDURES

Anatomic Double-Bundle Posterior Cruciate Ligament Reconstruction

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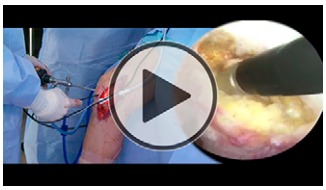
Published outcomes of this procedure can be found at: J Bone Joint Surg Am. 2012 Nov 7;94(21):1936-45; Am J Sports Med. 2014 Oct;42(10):2346-55; and J Bone Joint Surg Am. 2011 Oct 5;93(19):1773-80.



Click the arrow above or go to surgicaltechniques.jbjs.org to view the video article described in this summary.

Abstract

The posterior cruciate ligament (PCL) is the main posterior stabilizer of the knee. It is composed of 2 bundles, the larger anterolateral bundle (ALB) and the smaller posteromedial bundle (PMB). The 2 bundles were historically believed to function independently, with the ALB predominantly being an important stabilizer in flexion and the PMB being a stabilizer mainly in extension. However, a recent biomechanical study[1] noted a codominant relationship between these 2 bundles. The anatomic single-bundle PCL reconstruction, focusing on reconstruction of the larger ALB, is the most commonly performed procedure. Because of the residual posterior and rotational tibial instability after a single-bundle reconstruction and the inability to restore the normal knee kinematics, an anatomic double-bundle PCL reconstruction has been proposed in an effort to recreate both bundles using the native footprint, thereby restoring the normal knee kinematics. The anatomic double-bundle PCL reconstruction has demonstrated improved subjective and objective patient outcomes with a low complication rate. Indications for PCL reconstruction are isolated symptomatic acute grade-III PCL tears, combined multiligament lesions, or acute grade-III PCL tears combined with repairable meniscal body or root tears. For chronic PCL tears, indications include functional limitations due to the PCL tear (e.g., difficulty with deceleration, incline descent, or stairs) and comparative PCL stress radiographic laxity of >8 mm in a symptomatic patient.

The steps of this procedure include (1) correct patient positioning to allow for good accessibility of both sides of the joint; (2) graft preparation (Achilles tendon [ALB] and tibialis anterior [PMB] allografts are used); (3) creation of femoral tunnels (11 mm for the ALB adjacent to the cartilage and 7 mm for the PMB with a 2-mm bone bridge); (4) tibial tunnel creation (12-mm diameter, 7 mm anterior to the so-called champagne-glass drop-off); (5) graft fixation and tibial graft passage (a metal screw for the ALB and a bioabsorbable screw for the PMB, with the screws away from the bone bridge to

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avoid bone bridge breakage); and (6) tibial fixation (the grafts are independently fixed with the knee at 90° of flexion (ALB) and extension (PMB) with screws and washers on the medial side of the tibia.

Three prospective randomized studies[18,19,23] suggested that, while clinical outcomes are similar between both isolated transtibial reconstruction techniques, the objective measures of postoperative side-to-side posterior translation and objective International Knee Documentation Committee scores were significantly improved with double-bundle compared with single-bundle PCL reconstructions.

Acknowledgment

NOTE: The illustrations in videos 2 and 3 are reproduced from: Anderson CJ, Ziegler CG, Wijdicks CA, Engebretsen L, LaPrade RF. Arthroscopically pertinent anatomy of the anterolateral and posteromedial bundles of the posterior cruciate ligament. J Bone Joint Surg Am. 2012;94(21):1936-45.

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