

# Topography of the Femoral Attachment of the Posterior Cruciate Ligament

## Surgical Technique

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*The original scientific article in which the surgical technique was presented was published in JBJS Vol. 90-A, pp. 249-55, February 2008*

### ABSTRACT FROM THE ORIGINAL ARTICLE

**BACKGROUND:** The success of posterior cruciate ligament reconstruction has varied. The objective of this study was to determine quantitatively and qualitatively the topography and osseous landmarks of the femoral footprints of the anterolateral and posteromedial bundles of the posterior cruciate ligament, to improve surgical reconstruction.

**METHODS:** Twenty unpaired knees from twenty human cadavers were evaluated. The surface features of the femoral footprints of the anterolateral and posteromedial bundles of the posterior cruciate ligament were studied by means of macroscopic observation and three-dimensional laser photography.

**RESULTS:** We observed, both visually and with three-dimensional laser photography, an osseous prominence located proximal to the femoral footprint of the posterior cruciate ligament in eighteen of the twenty human knees. This osseous landmark, denominated the “medial intercondylar ridge,” determined the proximal border of the posterior cruciate ligament footprint. In eight of the twenty knees, we observed a small osseous prominence between the anterolateral and posteromedial bundles of the posterior cruciate ligament. A clear change in the slope of the femoral footprint of the posterior cruciate ligament was observed between the anterolateral and posteromedial bundles. The average area of the posterior cruciate ligament footprint (and standard deviation) was  $209 \pm 33.82$  mm<sup>2</sup>, the average area of the anterolateral bundle was  $118 \pm 23.95$  mm<sup>2</sup>, and the average area of the posteromedial bundle was  $90 \pm 16.13$  mm<sup>2</sup>.

**CONCLUSIONS:** The femoral footprint of the posterior cruciate ligament has a unique surface anatomy, consisting of a medial intercondylar ridge and a medial bifurcate ridge. The medial intercondylar ridge is observed more frequently.

**CLINICAL RELEVANCE:** These anatomical findings may assist surgeons in performing posterior cruciate ligament reconstruction in a more anatomical fashion.

ORIGINAL ABSTRACT CITATION: “Topography of the Femoral Attachment of the Posterior Cruciate Ligament” (2008;90:249-55).

### INTRODUCTION

Our approach to surgery for the reconstruction of the posterior cruciate ligament is governed by the anatomy of the insertion site. In this article, we describe the

concept of anatomical reconstruction of the posterior cruciate ligament, with a particular emphasis on the topography of the femoral insertion site of the ligament<sup>1</sup>. Studies suggest that

placement of the femoral tunnel(s) is paramount to restoring optimal tensioning of a posterior cruciate ligament graft<sup>2</sup>. Thus, accurate characterization of both the location and the size

**DISCLOSURE:** The authors did not receive any outside funding or grants in support of their research for or preparation of this work. Neither they nor a member of their immediate families received payments or other benefits or a commitment or agreement to provide such benefits from a commercial entity.

## CRITICAL CONCEPTS

### AUTHOR UPDATE:

In this paper, we have described the use of topographical osseous landmarks to more accurately position the femoral and tibial insertions of a double-bundle reconstruction of the posterior cruciate ligament. The femoral insertions of the posterior cruciate ligament are delineated by osseous landmarks—i.e., the medial intercondylar and bifurcate ridges. Recognition of these landmarks is critical to accurate placement of the femoral tunnels.

Our understanding of the orientation of the tibial insertions of the posterior cruciate ligament has evolved. The anterolateral insertion is actually located more proximally than the posteromedial insertion. Also, measurements from our previous study<sup>1</sup> suggest that the average areas of the distinctive anterolateral and posteromedial footprints, totaling 209 mm<sup>2</sup>, are larger than those reported in the literature<sup>13,14</sup>. Furthermore, our three-dimensional analysis utilizing a laser scan technique has more accurately captured the concave insertion-site topography of the posterior cruciate ligament (Figs. 3 and 20). We currently employ all of this information to guide an anatomical reconstruction of the injured posterior cruciate ligament.

Double-bundle anatomy can also be restored through augmentation procedures when only one of the two bundles is injured. In our experience, this has been the case in up to one-third of cases of acute and chronic posterior cruciate ligament injury. Typically, patients present with a torn anterolateral bundle. Augmentation techniques, with preservation of the posteromedial bundle and reconstruction of the anterolateral bundle, have been used with good results.

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