

Synovial C-Shaped Tibial Footprint of the Anterior Cruciate Ligament.

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Abstract

BACKGROUND: Although numerous anatomic studies about the anterior cruciate ligament (ACL) structure and attachments have been performed, these studies have not reached consensus on the ACL footprint.

PURPOSE: To investigate the existing controversy regarding the morphology of the tibial ACL insertion (footprint) and confirm histologically that the tibial ACL footprint is not completely filled with ligament tissue.

STUDY DESIGN: Descriptive laboratory study.

METHODS: The tibial ACL footprint was dissected from 20 different fresh-frozen cadaveric knees (all males; mean age, 68.8 ± 5.4 years [range, 55-80 years]; mean weight, 78 ± 6.6 kg [range, 45-93 kg]). Two knees, 1 with severe osteoarthritis and 1 with previous knee surgery, were excluded. The tibial ACL insertion was observed, and this area was longitudinally divided into 4 parallel slices (0%-25%, 25-50%, 50%-75%, and 75%-100%), embedded in paraffin wax, and stained with hematoxylin-eosin, alcian blue, and picrosirius-polarization. The specimens were measured using a microscope to determine the distances from the anterior to the posterior border of the ACL ligament tibial insertion and the distance from the posterior border to the end of the ligament fibers of the ACL ligament tibial insertions.

RESULTS: The 18 evaluated knee specimens confirmed the finding of a C-shaped tibial insertion of the ACL. The measurements showed that the ligament (vertical parallel collagen fibers) occupied only 30.8% of the complete insertion. The remaining area was filled with synovial tissue, demonstrating histologically the "C" shape.

CONCLUSION: This study confirms macroscopically the C-shaped tibial insertion of the ACL and shows histologically that synovial tissue is an indirect insertion filling the major part of the footprint.

CLINICAL RELEVANCE: This anatomic study suggests a different shape of the ACL tibial footprint, which may be useful for new perspectives regarding ACL reconstruction surgery research.