

To repair or not to repair: A biomechanics study of meniscal ramp lesions

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Video Abstract

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Abstract

Recent studies have shown that all-inside repair of meniscal ramp lesions can restore normal knee motion. But it has remained unclear how ramp lesion repairs affect ACL in situ forces and bony contact forces. To remedy that, researchers from the University of Pittsburgh recently used a robotic system to examine these forces in intact knees, knees with ramp lesions, and knees with ramp lesion repairs. Their findings, reported in the November issue of the American Journal of Sports Medicine, suggest that the indications for ramp lesion repair may be limited. The team looked at nine knees from human cadavers, each tested using a six-degree-of-freedom robotic system. The knees were continuously flexed from full extension to 90° under five different loads: an anterior load, an external-rotation torque, a combined anterior and compression load, and a combination of external- or internal-rotation torque and compression. The loads were applied to intact knees, knees with a surgically induced ramp lesion measuring 25 millimeters, and knees with ramp lesions repaired by the all-inside approach. All specimens had native, intact ACL. Using the robotic testing system, the team measured the in situ forces in the ACL and bony contact forces in the medial and lateral compartments. Results showed that ramp lesions did not significantly affect knee biomechanics. In response to all loading conditions, intact knees and knees with ramp lesions showed no differences with respect to kinematics, in situ forces in the ACL, or bony contact forces. However, compared with intact knees, knees with ramp lesion repair did show significantly reduced anterior translation at flexion angles ranging from full extension to 40° in response to the all-anterior load. Additionally, repaired knees showed significantly reduced in situ forces in the ACL at high flexion angles under the torque-plus-compression loading conditions. Altogether, these findings appear to challenge the benefit of all-inside repair of ramp lesions. But, to be sure, more work is needed. Studying real knees under more practical conditions could help researchers better understand how ramp lesions truly affect the biomechanics of the knee.