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Paper #27

The Effect of Anterolateral Procedures on Contact Pressures in the Lateral Compartment of the Knee

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Summary:

Our objective was therefore to compare lateral tibiofemoral joint contact pressures after the most commonly used anterolateral tenodeses.

Abstract:

Introduction

Given the common recurrence of residual laxity and re-injury post ACL reconstruction, additional anterolateral tenodesis procedures are increasingly used in combination with an anterior cruciate ligament reconstruction (ACLR) to improve control of anterolateral rotational instability. Despite the perception that there is a risk of overconstraining the lateral compartment, potentially leading to osteoarthritis, assessment on their effect on intraarticular compartment pressures is still lacking. Our objective was therefore to compare lateral tibiofemoral joint contact pressures after the most commonly used anterolateral tenodeses.

Methods

A controlled laboratory study was performed using 4 fresh-frozen cadaveric knees. Lateral tibiofemoral contact pressures were assessed with a Tekscan sensor, introduced and fixed arthroscopically, and located under the lateral meniscus on the lateral plateau. Contact pressure was recorded from 0 to 90° of knee flexion. Three conditions of rotation: neutral (NR), external (ER) and internal rotation (IR) were successively applied with a dynamometric torque rig. Knee flexion was monitored by a Motion Analysis® 3D optoelectronic system (Vicon, LA, USA). Joint centres and bone landmarks were calculated from 3D bone models obtained from CT scans. After an ACLR, defined as the reference baseline, several anterolateral procedures were compared: anterolateral ligament reconstruction (ALLR), modified Ellison, deep Lemaire (graft under the LCL), superficial Lemaire (graft over the LCL) and Modified Macintosh. The last 3 procedures were randomised. For each procedure, the graft was fixed at in NR at 30° of flexion and with a tension of 20N.



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Compared to ACLR, ALLR (+190 Pa, p=0.99) and Ellison procedure (+564 Pa, p=0.51) did not significantly increase lateral pressure for the IR condition. Conversely, deep Lemaire (+2390 Pa, p<0.001), superficial (+2383 Pa, p<0.001) Lemaire and Macintosh (+1729 Pa, p<0.001) did increase the lateral compartment pressure compared to ACLR in IR. No significant difference was observed in ER and NR conditions.

Conclusion

Compared to ACLR, the contact pressure of ALLR and modified Ellison did not change the pressure in the lateral tibiofemoral compartment, in contrast to the deep and superficial Lemaire, and Macintosh procedures significantly increased contact pressures when the knee was internally rotated. Therefore, whilst these lateral procedures most likely do improve rotational control and stability, there is a potential negative effect of increased lateral compartment pressures. Surgeons should take into account this potential effect when deciding on the addition of a lateral procedure, and which procedure they choose.