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Arciero vs. LaPrade: A Biomechanical Comparison of Two Techniques for Knee Posterolateral Corner Reconstruction

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INTRODUCTION

- The Posterolateral Corner (PLC) is an area of the knee that does not receive adequate research recognition despite its contribution to overall knee stability. (Figure 1) This has lead to the creation of multiple surgical reconstruction techniques. Two very commonly used techniques are the Arciero and LaPrade reconstructions.

Figure 1: A. Anatomy of the posterolateral corner (PLC) highlighting the Fibular Collateral Ligament (FCL), Popliteus Tendon (PLT), Popliteofibular ligament (PFL) and Lateral Gastrocnemius Tendon. B. Anatomy of the PLC showing origin and insertion points of the FCL, PLT, and PFL.

PURPOSE

- The objective of this study was to identify which reconstruction technique best restores stability to a deficient PLC with the addition of an injury to the Tibiofibular (Tib-Fib) ligament or anterior cruciate ligament (ACL).

METHODS

- Ten matched-paired, fresh-frozen cadaveric specimens from mid-femur to foot were used. The skin and subcutaneous fat was removed from all specimens and the foot was disarticulated at the tibiotaral joint.
  - One leg from each matched pair was randomized to receive the Arciero reconstruction while the contralateral leg received the LaPrade reconstruction
  - Post-reconstruction, five of the ten matched pairs underwent sectioning of the Tib-Fib ligament while the other five matched pairs had their ACL’s sectioned

- The Arciero technique: a 22cm graft is fixed into the popliteus sulcus and run through a tibial tunnel. The second 22cm graft is anchored at the FCL femoral attachment, runs through a fibular tunnel, and is passed through the tibial tunnel. Both grafts are tensioned, interference screws are placed in the tunnels, and grafts are secured in the tibia. This technique attempts to reconstruct the FCL, PFL, and PFL (Figure 2A).³⁴

- The LaPrade technique: one end of a 22cm graft is fixed into the popliteus sulcus and run through a tibial tunnel. The second 22cm graft is anchored at the FCL femoral attachment, runs through a fibular tunnel, and is passed through the tibial tunnel. Both grafts are tensioned, interference screws are placed in the tunnels, and grafts are secured in the tibia. This technique attempts to reconstruct the FCL and PFL only (Figure 2B).³⁴

- Prior to testing, a trained orthopaedic surgeon harvested the Semitendinosus, Gracilis, and Achilles tendons from each specimen to use as allografts for the corresponding reconstructions.

- A torque/force rod was fixed in the distal end of the tibial canal so that varus angulation (VA) and external rotation (ER) could be measured through the testing fixture. (Figure 3)

- A custom-made testing fixture was created to isolate and apply 10 Nm VA and 5 Nm ER at 0°, 20°, 30°, 60°, and 90° of flexion. (Figure 4)

RESULTS

- For intact PLC testing, we found the ER and VA profiles of the Arciero and LaPrade groups to be statistically similar.
- A significant difference was found between intact and post-sectioning ER and VA profiles (P=0.0001 and P=0.0165, respectively; Figure 5)
- There was no significant difference between the Arciero and LaPrade groups post-reconstruction in ER or VA (P=0.4842 and P=0.8509, respectively)
- There was no significant difference post Tib-Fib sectioning in ER or VA (P=0.2293 and P=0.1778, respectively)
- There was no significant difference post ACL sectioning in ER or VA (P=0.8496 and P=0.1962, respectively)

CLINICAL RELEVANCE

- A comparison of Arciero and LaPrade reconstructions allows for surgeons to select the technique they prefer based on their preference and training without concern for surgical outcomes affecting knee stability.

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