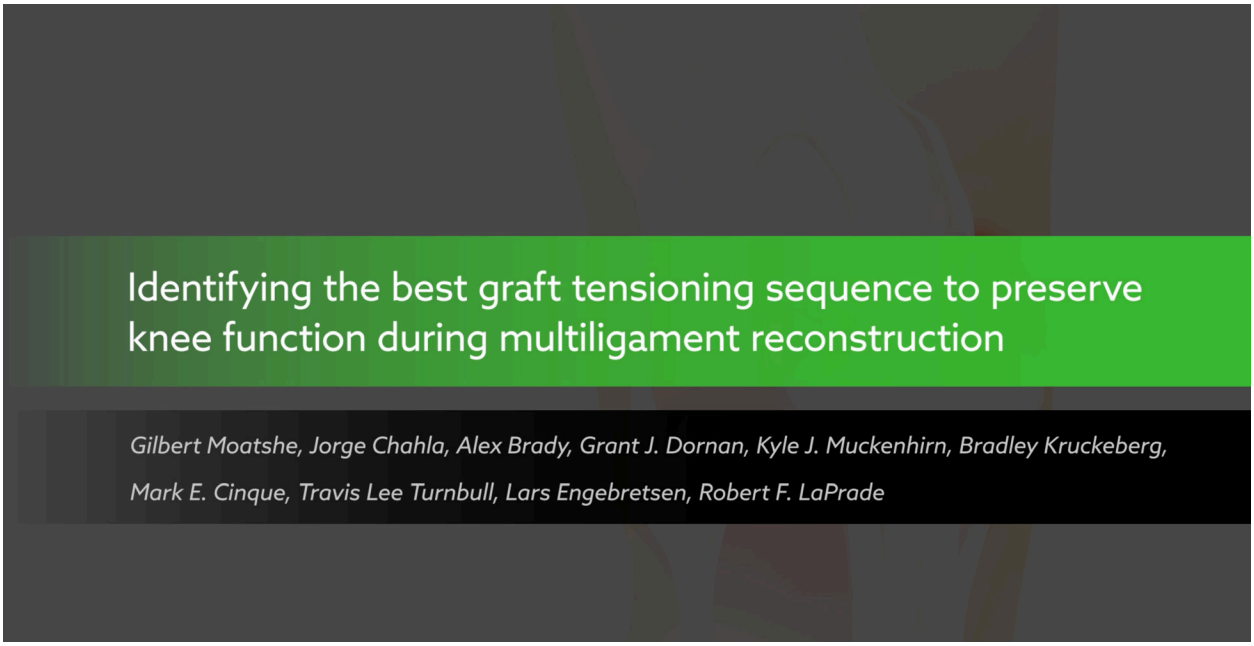
Client: *Dr. Robert LaPrade*

Study: *Identifying the best graft tensioning sequence to preserve knee function during multiligament reconstruction*

Research Square

Video Abstract Report



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Your unique video tags are as follows:

- graft tensioning,
- knee ligaments,
- multiligament injury,
- tensioning order,
- knee dislocation,
- ligament biomechanics,
- ligament reconstruction,
- tibiofemoral orientation,
- knee kinematics,
- knee instability,
- joint loading,
- graft failure,
- ACL,
- PCL,
- PLC,
- anterior cruciate ligament,
- posterior cruciate ligament,
- posterolateral corner,
- The American Journal of Sports Medicine,
- Steadman Philippon Research Institute

Video script

Knee dislocations often involve injury to multiple major knee ligaments, necessitating concurrent multiligament reconstruction to restore native joint stability. One of the most important variables in this procedure is successful graft tensioning, but there's been little consensus as to which tensioning sequence best achieves an anatomic tibiofemoral orientation. To guide surgical decision making, a team based at the Steadman Philippon Research Institute in Colorado biomechanically tested different graft tensioning sequences on a human model of knee dislocation. Their results revealed one sequence that may improve outcomes from multiligament reconstruction.

The testing was performed on ten cadaveric knee specimens. The team mimicked the injuries sustained during a dislocation by subjecting each knee to sectioning of the anterior cruciate ligament, the posterior cruciate ligament, and the static stabilizers of the posterolateral corner. The sectioned knee was then placed in a custom-made robotic fixture for ligament reconstruction. Using reconstruction grafts, the team performed a double-bundle PCL reconstruction, an ACL reconstruction, and a double-graft reconstruction of the three main static stabilizing structures in the posterolateral corner of the knee. During the procedure, each graft was tightened in one of four separate tensioning sequences.

Kinematic testing was performed after each sequence. This involved placing the knee at 0, 30, 60, and 90 degrees of flexion to assess the newly obtained tibiofemoral orientation after reconstruction. The orientation was identified using predefined landmarks, which were also obtained in the intact state.

The results showed that none of the sequences restored native tibiofemoral orientation. But one sequence did appear to outperform the others. The team found that first tightening the grafts for the double-bundle posterior cruciate ligament reconstruction, followed by the anterior cruciate ligament reconstruction graft and then the posterolateral corner reconstruction grafts gave the best chance at avoiding abnormal kinematics and positioning of the knee.

Although the researchers didn't test all possible tensioning orders, these findings provide the first empirically tested answer regarding which grafts to tension first during a multiligament reconstruction of a dislocated knee. By identifying the sequence most likely to produce a favorable orientation, they've taken the field one step closer to preserving joint function.