Poster #38

Biomechanical Evaluation of Medial Patellofemoral Ligament Reconstruction Grafts Fixed at Non-Anatomic Femoral Insertion Points: Avoid Proximal and Anterior Positioning

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I have no disclosures to report.

SKA is a paid consultant of Stryker Corporation

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BACKGROUND

- Optimal MPFL graft placement is important to prevent graft over- and undertensioning throughout knee ROM
- Graft over-tightening with knee flexion can potentially lead to graft stretching/failure.
- Inappropriate graft tensioning may also result in reduced knee range of motion and recurrent patellar instability.

BACKGROUND

- Previous studies have evaluated graft isometry at various distances from the **anatomic** attachment site as found on dissection.

- Schottle's point is commonly used intraoperatively as a landmark for placement of the MPFL femoral attachment

- Studies evaluating non-optimal placement with respect to this radiographic point have not yet been conducted.

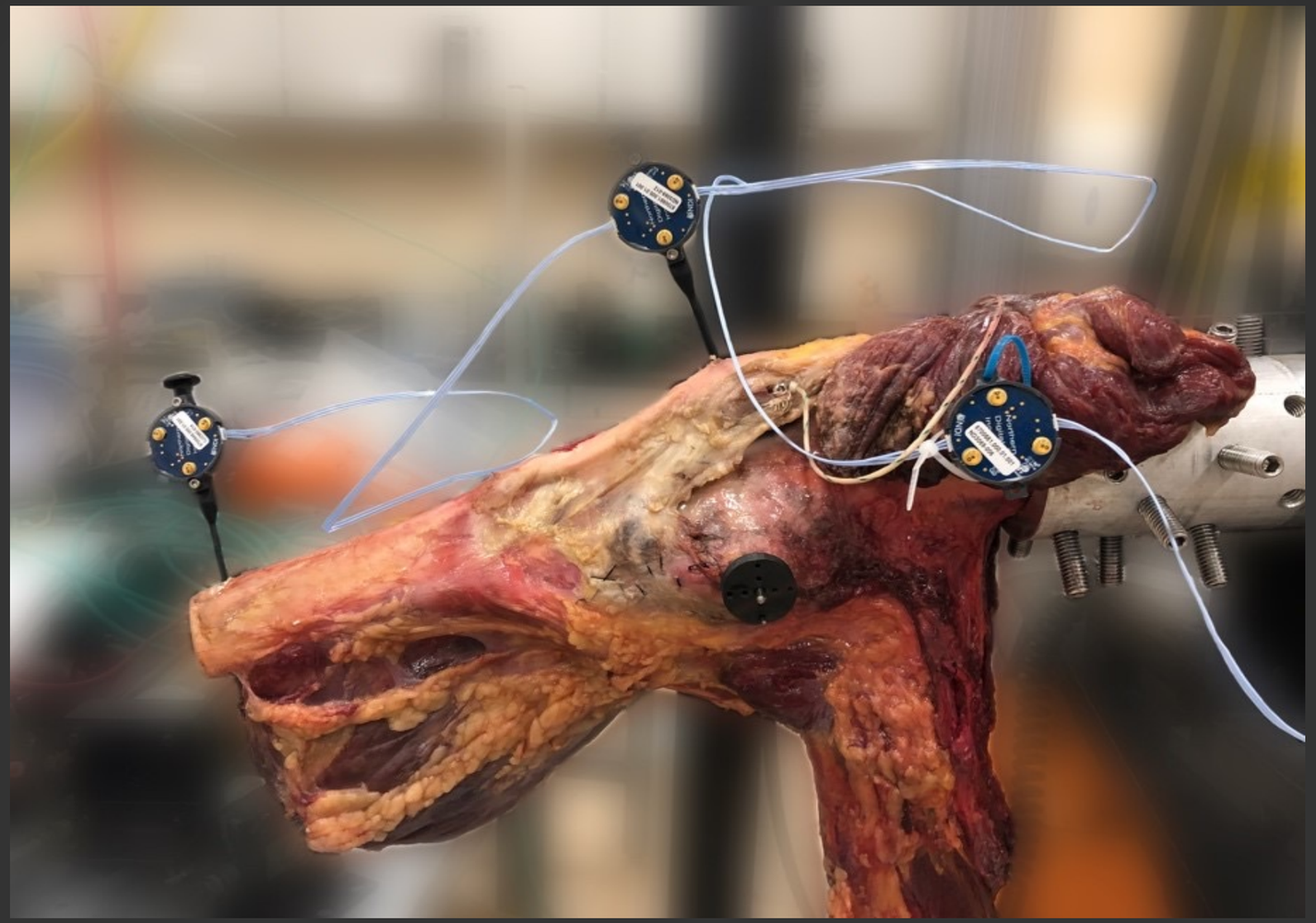
PURPOSE

The purpose of this study was to identify differences in MPFL reconstruction graft isometry with femoral tunnel malpositioning compared to Schottle's Point

METHODS

- Cadaveric Biomechanical Study with 11 fresh specimens.
- Anchored Ethibond suture simulating MPFL graft placed at standardized patellar attachment site.
- 3D-Printed template centered at Schottle's point on fluoroscopy and MPFL graft attached to K-wire placed 5 or 10 mm anterior, posterior, distal, or proximal to Schottle's point using the template. K-wire also placed at Schottle's point as a control.
- Optitrak motion capture system used to track knee flexion angles and draw wire length sensor used to evaluate graft isometry.

Experimental Set-Up



- Millimetric excursion and the ratio of graft length compared to baseline excursion at 30º, defined as a normalized length (NL), was calculated at 0º, 60º, 90º, and 120º of flexion.

RESULTS

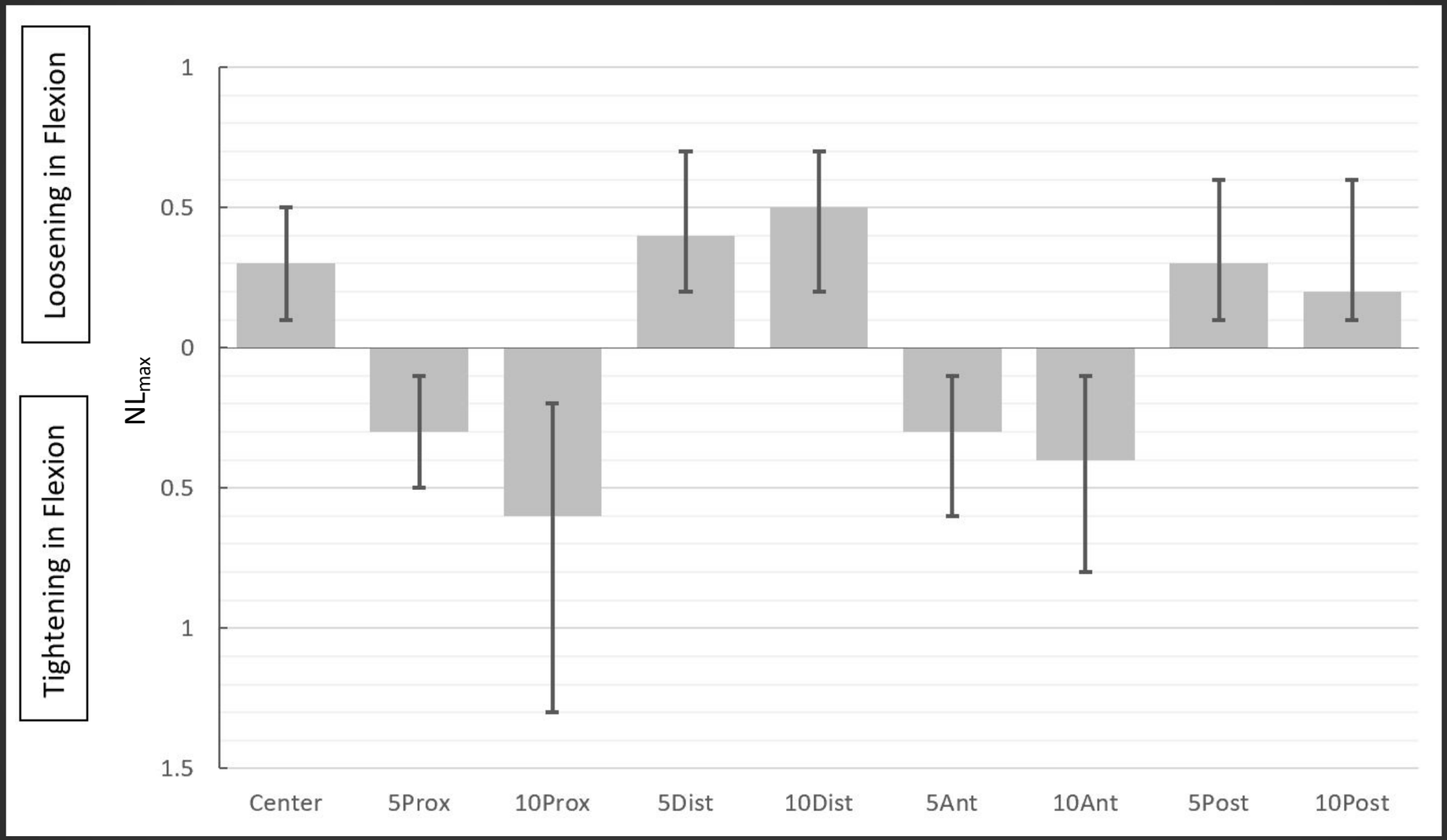


Figure 1. Mean and range of graft NL across 9 experimental femoral insertion points. Values below 0 indicate undesirable flexion angle-tension relationships with tightening during flexion.

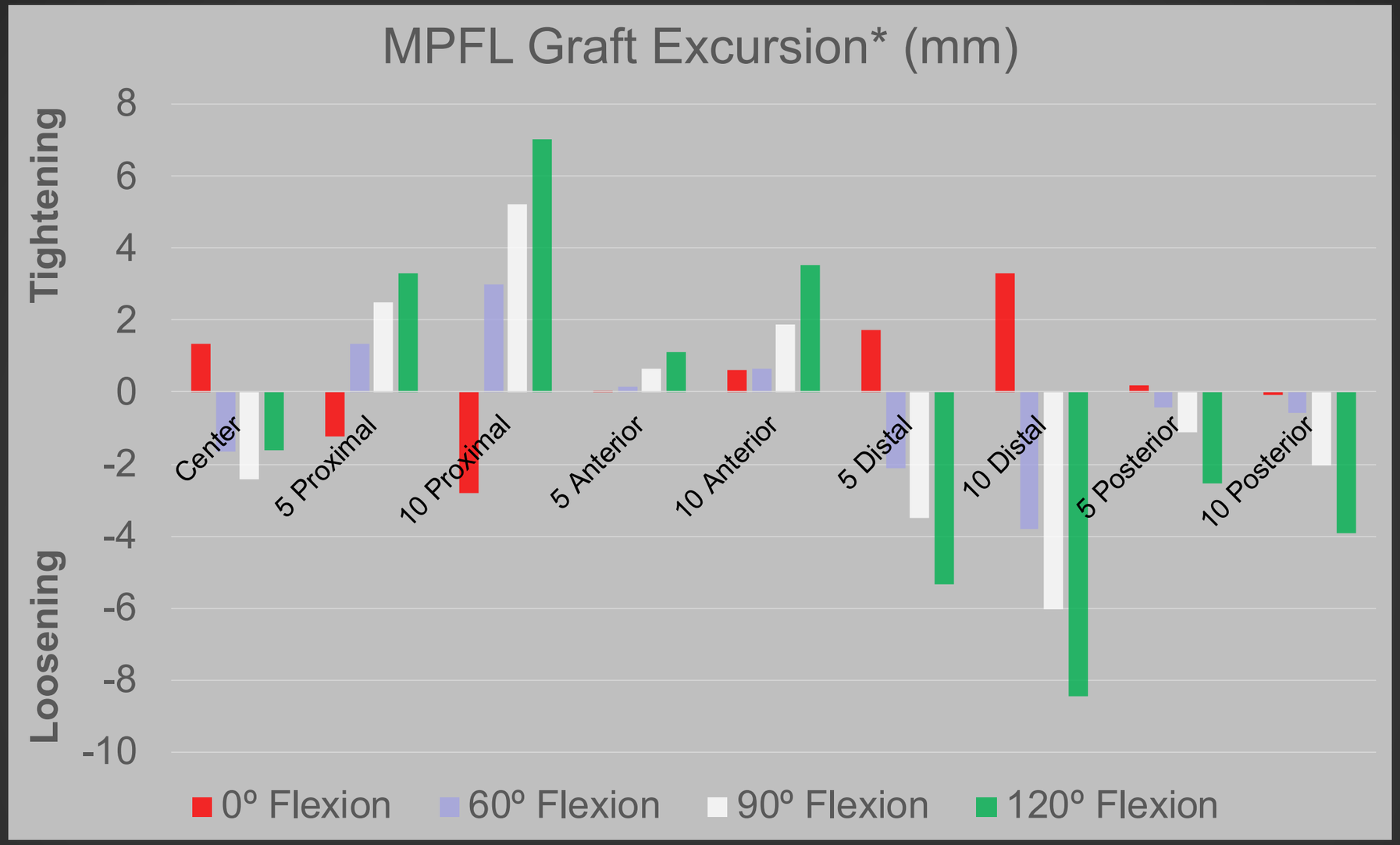


Figure 2. Millimetric excursion of experimental femoral insertion points at various flexion angles compared to draw wire length at 30º flexion. Grafts placed anterior or proximal tighten at increasing flexion and loosen at lower flexion angles whereas grafts placed distally and posterior tighten at low flexion angles and loosen as the knee flexes.

DISCUSSION

- Anterior and proximal placement of the MPFL graft leads to loosening during extension, where tightening is most desired to prevent patellar dislocation, and tightening during flexion, where overconstraint is possible.

- Distal and posterior placement leads to tightening during extension and loosening during flexion, which is desirable and is similar to tensioning biomechanics of a graft placed at Schottle's point.

CONCLUSION

In order to minimize the risk of MPFL graft tightening during knee flexion, if deviating from Schottle's point, it is safest to err posterior or distal in femoral tunnel position.

Thank You

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