The Ribbon-Shaped Femoral Footprint Of The MPFL: Implications For Reconstruction

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Disclosures

• Miho J. Tanaka, MD
• I have no financial conflicts to disclose.
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The medial patellofemoral ligament (MPFL) has a narrow and elongated femoral footprint on the medial femur.

Many surgeons utilize a bone tunnel and inference screw for femoral fixation of the MPFL graft during reconstruction, which can eccentrically place the graft.
Study Aims

• 1) Describe the ribbon shaped footprint of the MPFL on the femur with regard to anatomic landmarks

• 2) Describe the difference between native MPFL anatomy and optimal femoral tunnel placement to recreate the elongated femoral footprint during MPFL reconstruction
Methods

- 20 paired fresh frozen cadaveric knees
- Dissected to expose MPFL femoral footprint
- Digital images of the medial femur analyzed using Image J software
- Anatomy of the MPFL footprint was described
  - Size: Length and width
  - Position: Most proximal (P1) and most distal point (D1)
  - Angle relative to the axis of the femoral shaft
Methods

• Reference line between the adductor tubercle (AT) and the medial epicondyle (ME) (AT-ME line) was created

• Midpoint (M1 – native MPFL midpoint) was categorized based on its position relative to this line
  – Zone 1 (anterior half, and proximal to AT line)
  – Zone 2 (posterior half, and proximal to AT line), Zone 3 (anterior half, distal to AT-ME line), or Zone 4 (posterior half, distal to AT-ME line).
Methods

- Simulated 8mm bone tunnel with screw was placed to match the native femoral footprint
- Midpoint of corresponding tunnel (M2) was described using the same measurements.
- M1 and M2 were compared using paired t tests
Results

• 17 knees from 10 cadavers (7M, 3F)
• Mean cadaveric age 73.1
• All knees had visible MPFL fibers
  – Femoral origin was clearly identified
• Length: 11.7+/-1.8mm (Range 9.6,15.7)
• Width: 1.7mm+/-0.4mm (Range, 0.9, 2.2)
Results

- Footprint angle 14.6+/-16.6 anterior to the axis of the femoral shaft

- D1: 10.9mm distal and 2.6mm more posterior than P1
Results

- M1 was found to be 6.2+/-3.9mm anterior and 7.6+/-4.5mm distal to the AT.
- M2 was 2.5mm posterior and 0.8mm proximal to M1 [p<0.001, p=0.011].
Midpoint relative to AT-ME and bisecting line

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*AT-ME: Anterior Tibial Margin to Medial Epicondyle*
Summary

• The femoral footprint of the MPFL is ribbon shaped and elongated
  – Angle of 14.6 degrees relative to femoral shaft axis
  – Distal margin is 10.9mm distal and 2.6mm more posterior than proximal margin

• An eccentrically placed graft and screw within a tunnel can mimic this footprint
  – The center of this corresponding tunnel (M2) was 2.5mm posterior to the native midpoint (M1)
  – The majority (70.6%) were found distal to AT-ME line, in posterior half
Conclusion

• The femoral footprint of the MPFL is elongated, and the function of its most proximal and distal fibers may vary

• Further biomechanical studies and radiographic correlations are needed to understand the relationship between tunnel position and native MPFL function

• The AT-ME line may serve as an anatomic reference with regard to the femoral footprint of the MPFL