MPFL: Medial PatelloFemoral Ligament
Anatomy and Biomechanics

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Quadriceps complex: Dynamic stabilizer of the patella

- Rectus femoris, vastus lateralis, vastus intermedius, vastus medialis.

- Vastus medialis oblique (VMO) = distinct part of the vastus medialis. Insertion on the patella at high angle, up to 65°.
Soft tissue static stabilizers of the patella

- Patellofemoral, patellotibial and patellomeniscal ligaments

- **Medial patellofemoral ligament (MPFL):** primary passive soft tissue restraint on the medial side of the patella. 50 to 60%.

- 4.5 to 6.4 cm long. 1.9 cm wide.

Nomura et al.
Gross Anatomy

• First described by Warren and Marshall in 1979.

• MPFL present in 88% to 100% of knees (predispositional factors?).
Layers (Warren and Marshall)

- Layer 1: Deep Fascia
- Layer 2: MCL. **MPFL**
- Layer 3: The capsule of the knee joint
Femoral origin

- Anatomic studies report differing origins:
  - Medial femoral epicondyle
  - Anterior to the medial femoral epicondyle
  - Superoposterior to the medial femoral epicondyle
  - Adductor tubercle
Femoral origin

- Baldwin (50 knees): two femoral origins of MPFL

  1. A 10.6 mm transverse origin in the groove between the medial epicondyle and adductor tubercle.

  2. An oblique origin from the proximal 30 mm of the leading edge of the superficial MCL.
Femoral origin

- Nomura
Femoral insertion:
Between the medial epicondyle and the adductor tubercle
Patella insertion

- **Superomedial two-thirds** of the patella.

- Span: around **3 cm**. 28.2 ± 5.6 mm (Baldwin); 16 to 38.8 mm, with a mean of 27.9 mm (Aragao).

- **Ventral edge** of the patella adjacent to the articular cartilage.
Patella insertion

• Nomura

• 2 of 30 knees: inserted not directly into the medial border of the patella, but into the *medial aspect of the quadriceps* tendon immediately proximal to its insertion at the patella.
Relationship of the MPFL to the VMO tendon

• “palpable band running along undersurface of the distal vastus medialis obliquus (VMO), attaching to both the medial femoral epicondyle and the proximal two-thirds of the patella.” (Hautamaa)
Relationship of the MPFL to the VMO tendon

- The VMO overlies the distal one-third of the MPFL. The angle of pull relative to the MPFL fibers changes as the knee is flexed.

Nomura et al.
Size and robustness

• Conlan found it to be variable, representing a distinct structure in 29 of 33 fresh frozen cadaver knees.

• Desio et al. reported that the MPFL was identified in all specimens, though its size was variable.

• Amis et al. report the tensile strength of the MPFL to be 208 N, with a standard deviation of 90N.
Isometric or Anisometric?

• “Not a settled issue”

• Nomura: Anisometric as it is slightly relaxed at 15–30° of knee flexion and tight at other angles.

• Steensen: Isometric during knee flexion from 0° to 90°, demonstrating an average change in length of 1.1 mm.
Isometric or Anisometric?

Nomura et al.
Fig. 28.2 Anatomic dissection of the medial side of the right knee. Macrophotography. (1) Medial retinacular nerve and branches. (2) Superior medial genicular artery. (3) Patella (superior medial angle of the patella). (4) Vastus medialis. (5) Quadriceps femoralis tendon. (6) Medial patellofemoral ligament. (7) Fascia (rejected). (8) Medial epicondyle
Conclusion

- Landmarks for MPFL reconstruction
- Knee position during fixation and tension
  - 30° ? 60° ?
  - Avoid over tension

“It appears prudent to tension your graft with the knee contained in the groove at the ROM where your graft length is the longest.” E. Arendt.