

KNEE

BIOMECHANICS

Medial fem condyle larger & extends more distally

Tibia Medial concave, lateral convex.

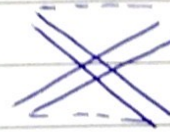
Menisci make tibial plateaus more congruent to fem condyles

Coronal Varus centre of knee lateral to Mechanical axis

Sag Centre of knee posterior to Mechanical axis = extension force

Flexion - Extension

4 bar linkage Zippinger 1917



Pinskerova & Williams 2003 MRI studies of cadaveric living knees
& Freeman

Lateral femoral condyle rolls back ~15mm with flexion

= internal rotation of tibia (or ER of femur)

2 functions 1. ↑ lever arm of quads

2. Allows clearance of femur from tibia

Axial rotation of 30° of lateral compartment about medial

Why 4 bar linkage disputed: Ligaments are not rigid & do not have a single isometric point at all positions of flexion.

Variable tension in different bundles at different degrees flex.

Screw home Mechanism

In extension tibia ER in terminal extension this results in tightening of both CR ligaments & locking of knee.

Popliteus unlocks knee by causing tibial IR to allow flexion

KNEE STABILITY

1°

2°

Ant translation

ACL

ITB

MCL & med capsule
LCL & lat capsule
Menisci

Dynamic hamstrings

Post translation

PCL

LCL

Dynamic quads

Internal rotation

ACL

Basis of pivot shift

Popliteal oblique lig

Posterior medial complex

External rotation

Popliteofibular ligament

LCL

Posterior lateral corner @ 30° flexion

Valgus

Superficial MCL

ACL

VARUS

LCL

ACL

Posterior lateral corner