

# Knee arthroplasty Planning

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Knee and Hip arthroplasty fellow

# Summary



Knee Imaging basic principles

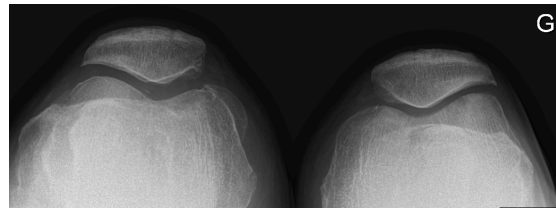
Knee arthroplasty planning

A blue ribbon graphic with a 3D effect, featuring a darker blue shadow on the left side. The ribbon is horizontal and contains white text.

# Knee Basic Imaging principles

# Must-Have X-ray

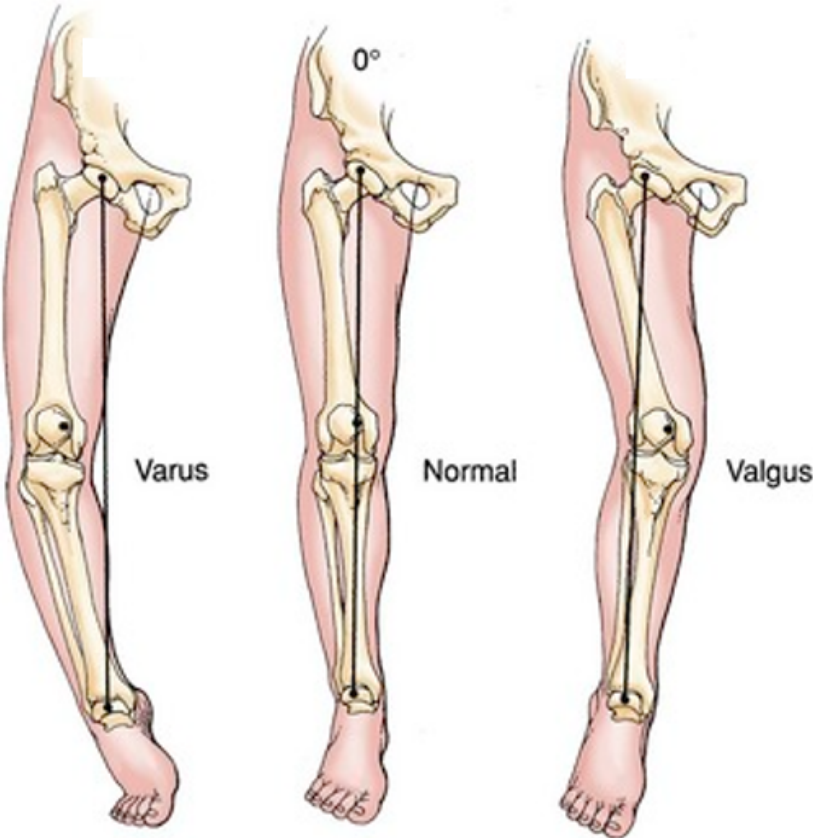
- Goniometrie
- Schuss
- Profil
- Axial Rotule 30°



# Coronal Plane



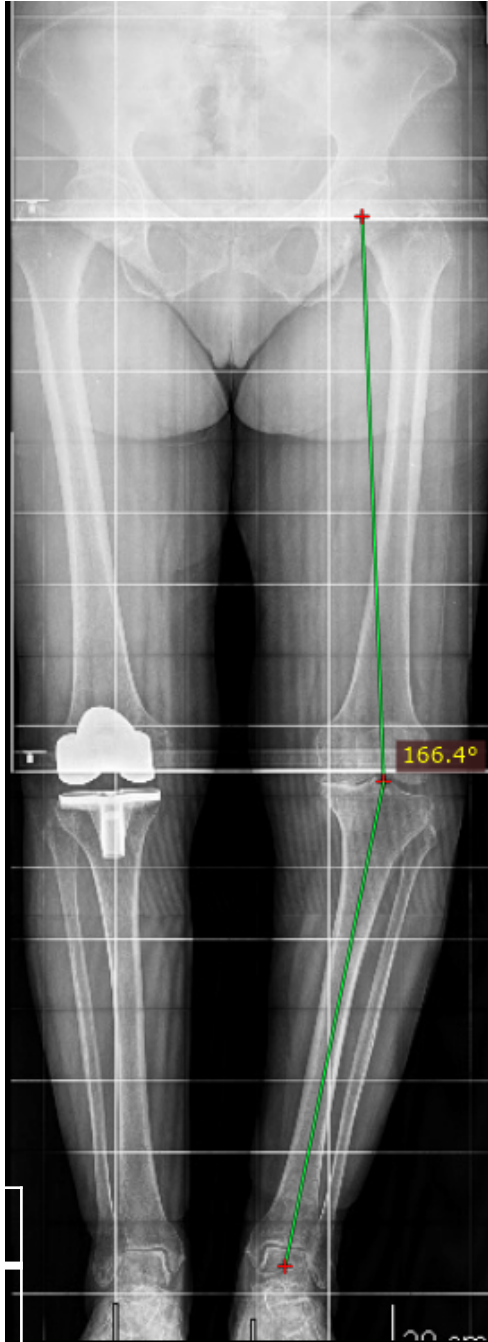
HKA <177°

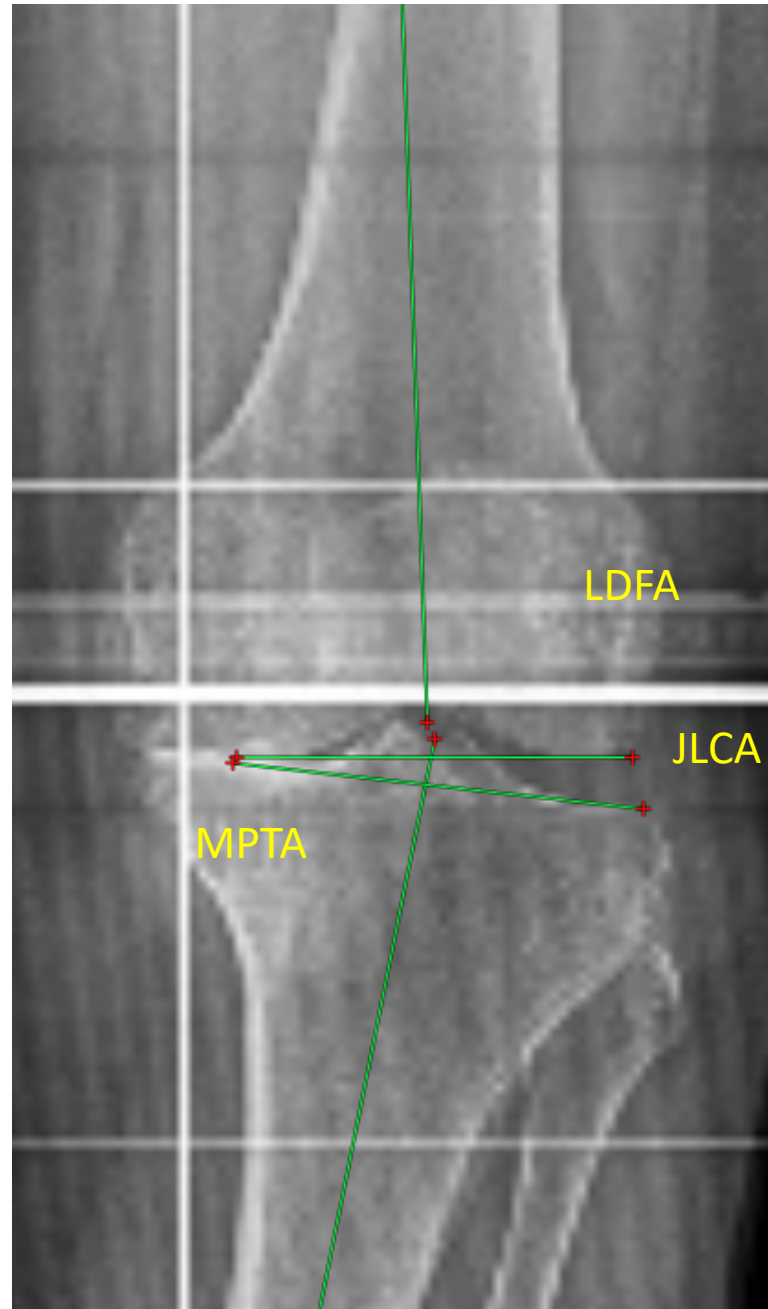
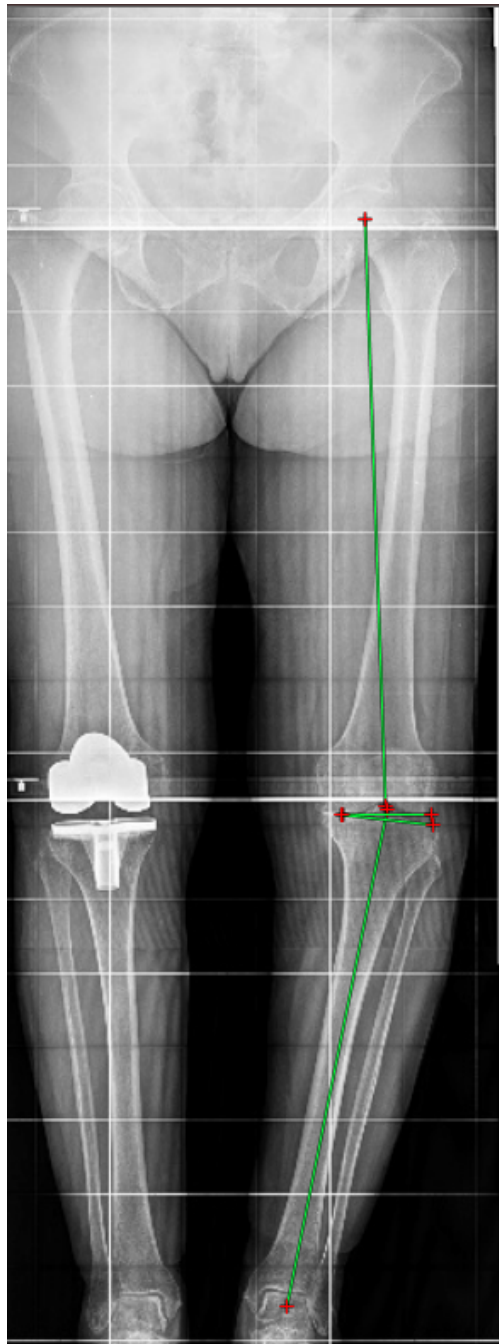


Hip Knee Ankle (HKA)

177°<HKA<180°

HKA > 180°





HKA depends on:

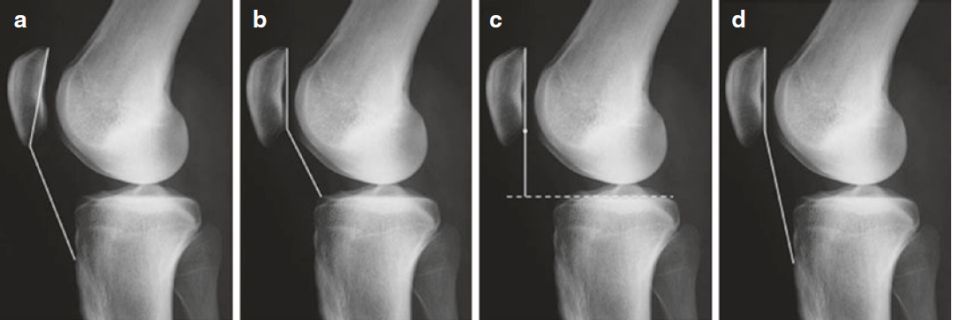
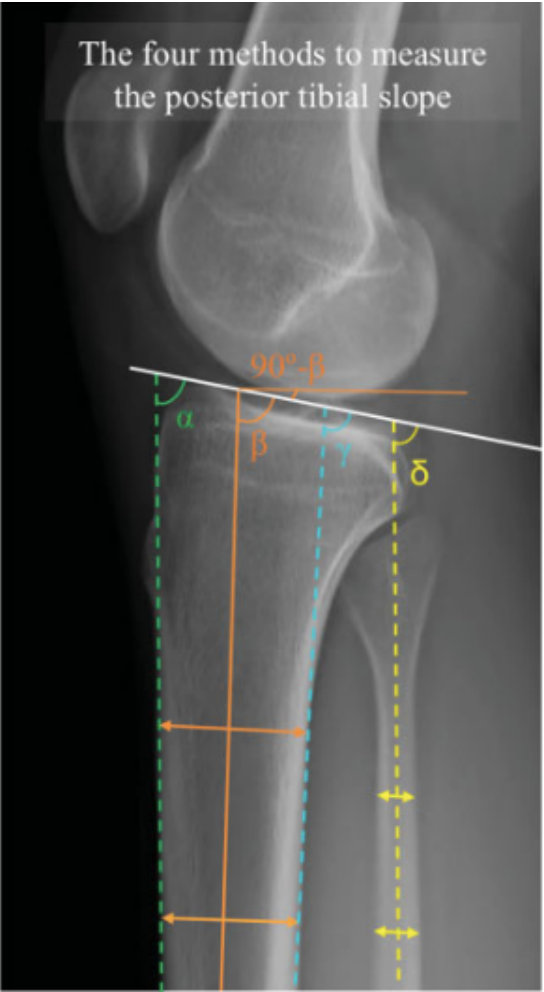
- Distal femur anatomy (LDFA)
- Proximal tibial anatomy (MPTA)
- Soft tissue competency (JLCA)
- Cartilage wearing

LDFA  $87^{\circ} \pm 3^{\circ}$

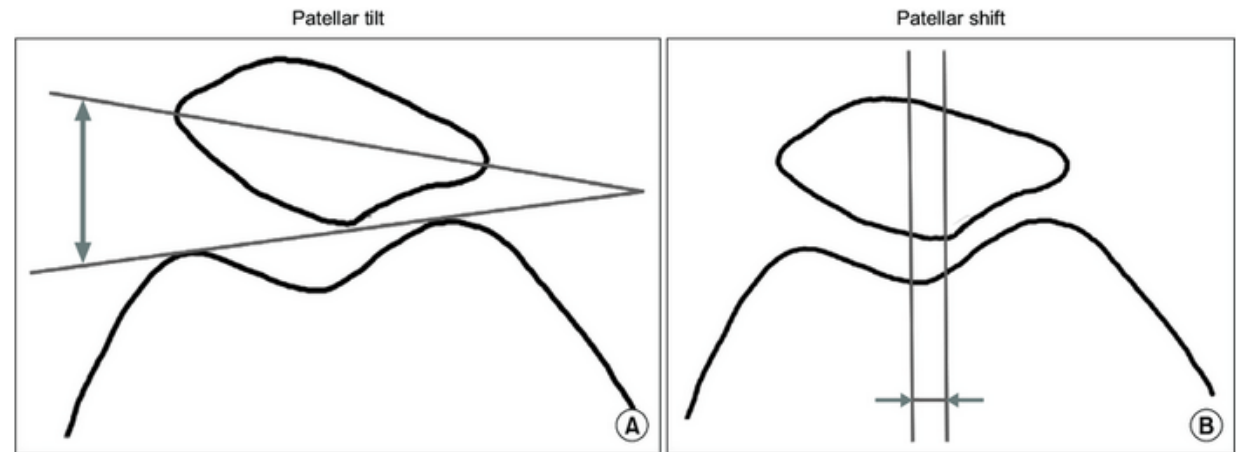
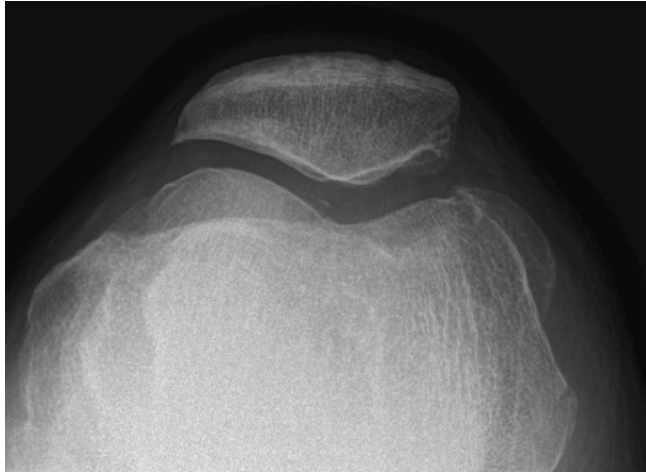
MPTA  $87^{\circ} \pm 3^{\circ}$

JLCA  $0^{\circ} \pm 2^{\circ}$

# Sagittal plane



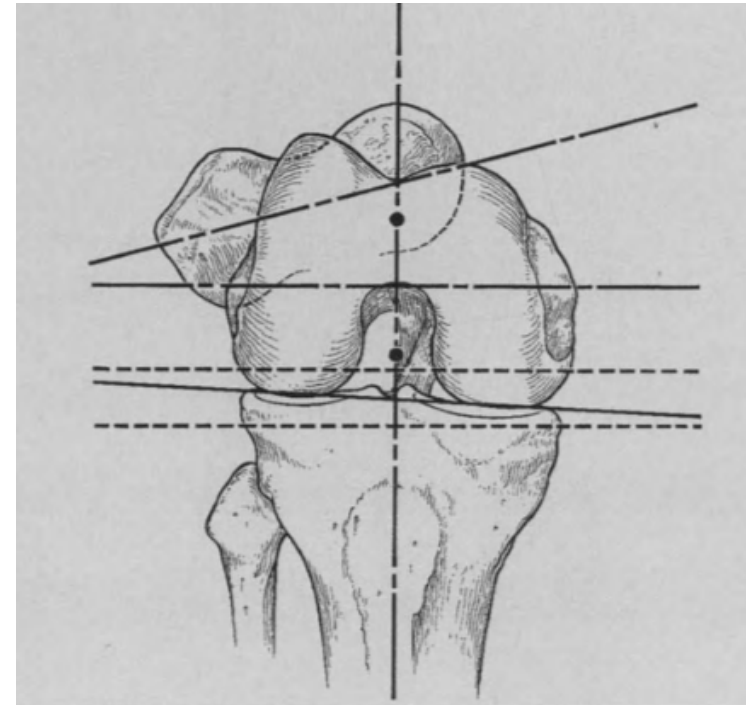
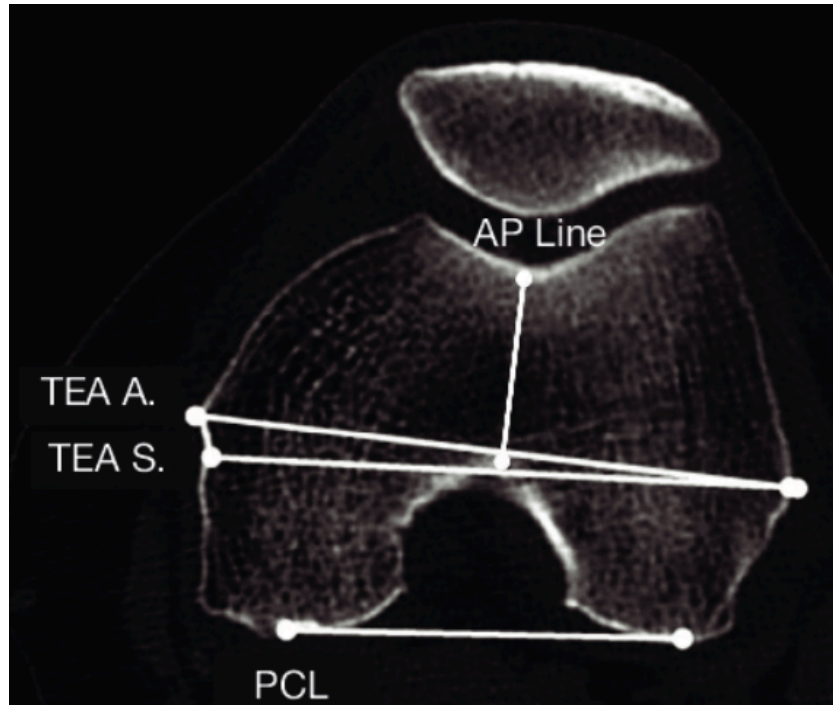
# Axial Plane



- PFJ Osteoarthritis
- Patellar thickness
- Patellar tilt and shift



# Axial Plane



Knee  
arthroplasty  
planning

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PTG vs PUC

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Soft Tissue status

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Surgical approach

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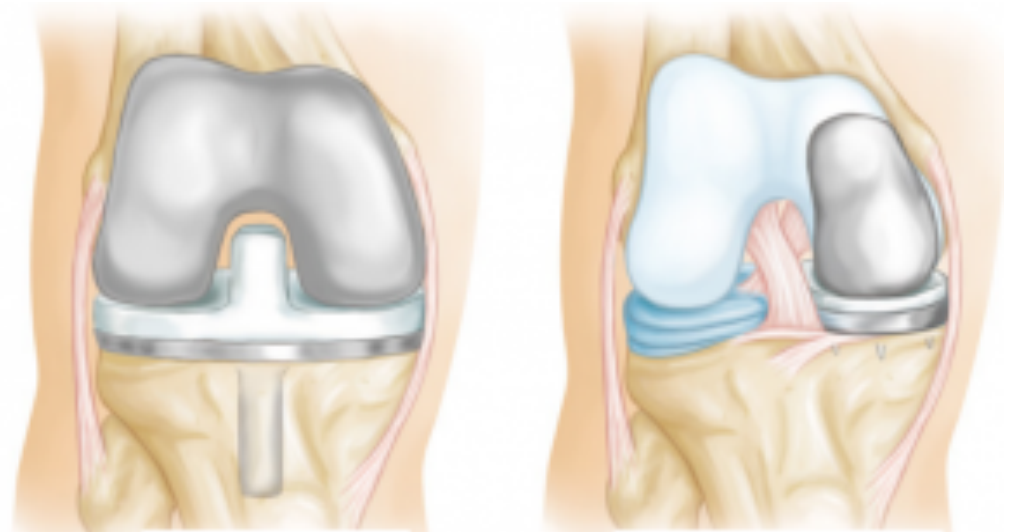
Alignment

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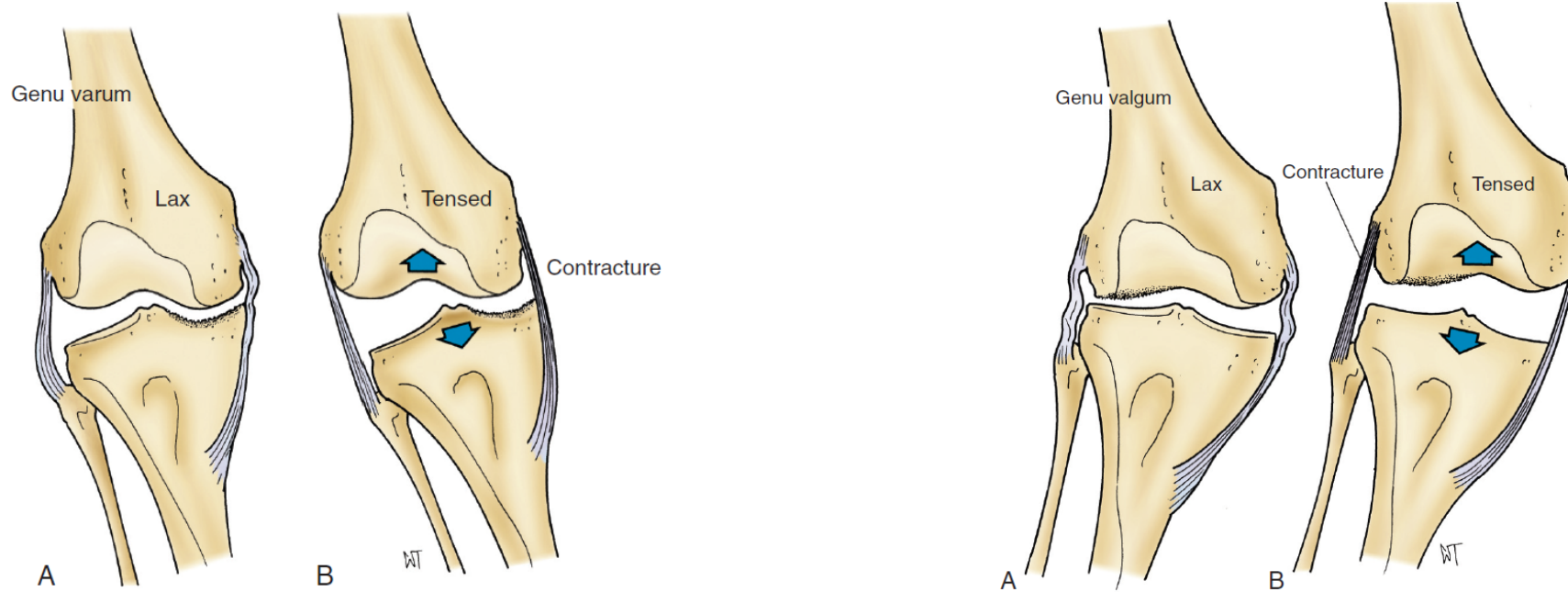
Patella

# Why not a Uni?

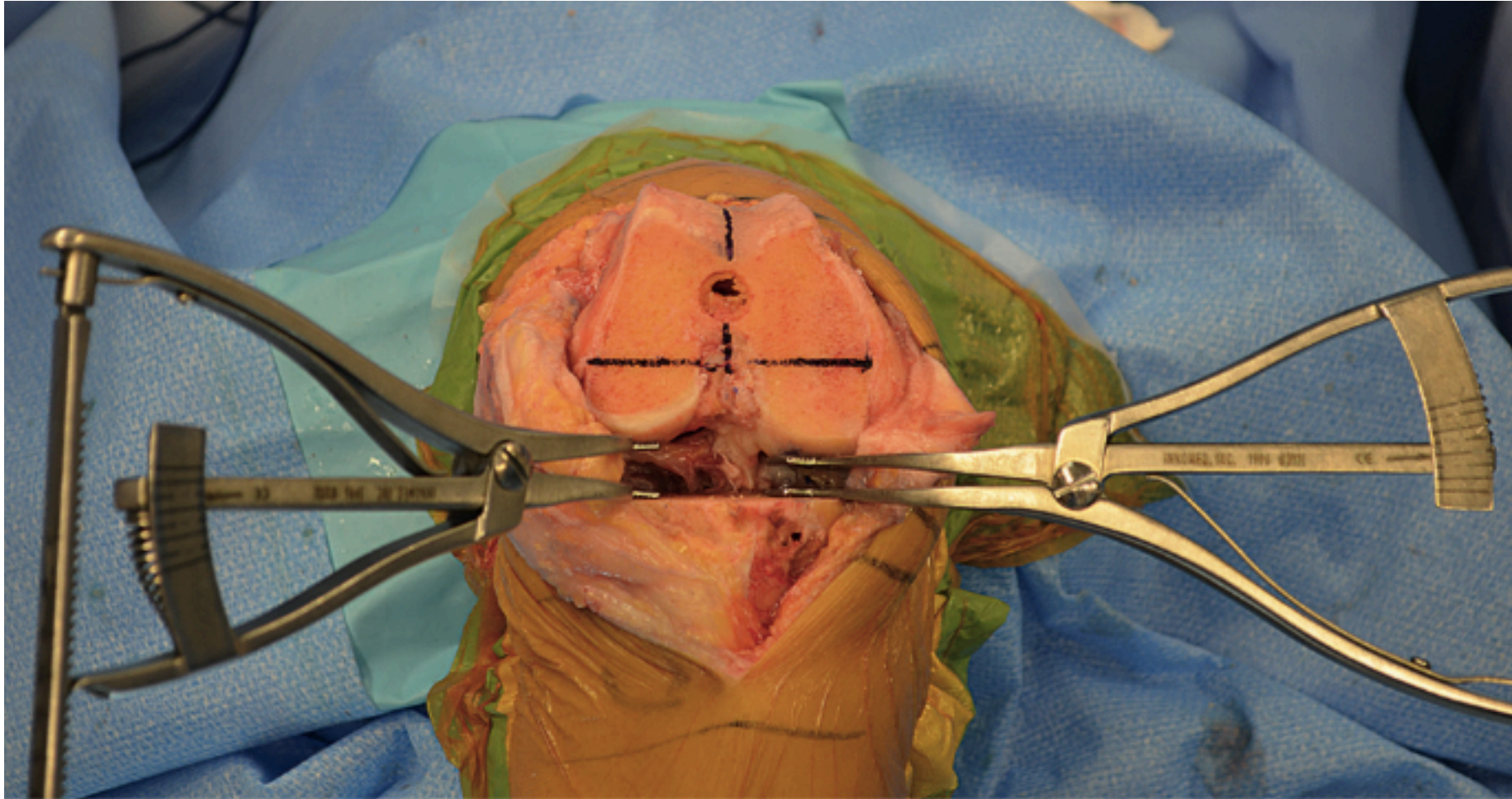
- Multicompartment disease
- Inflammatory disease
- Flexion contracture (10°-15°?)
- Fixed coronal deformity
- LCA instability



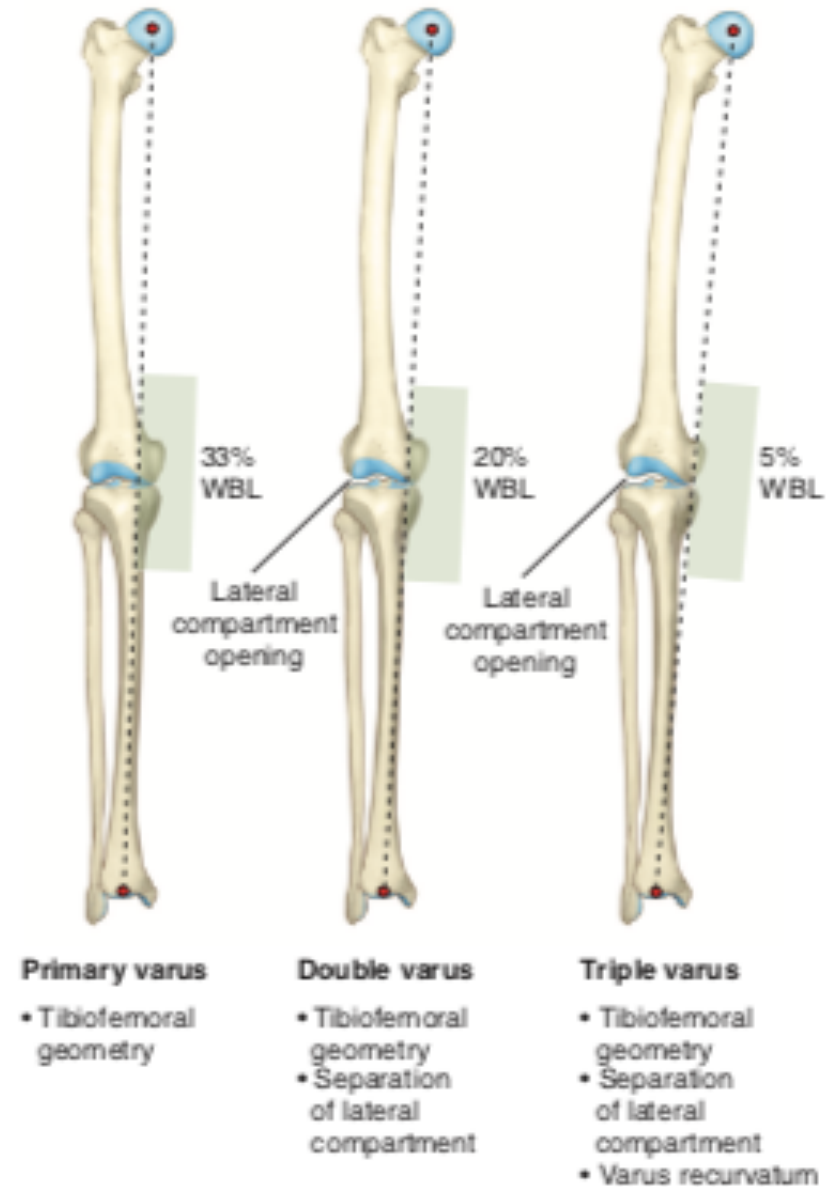
# Soft tissue status Assessment

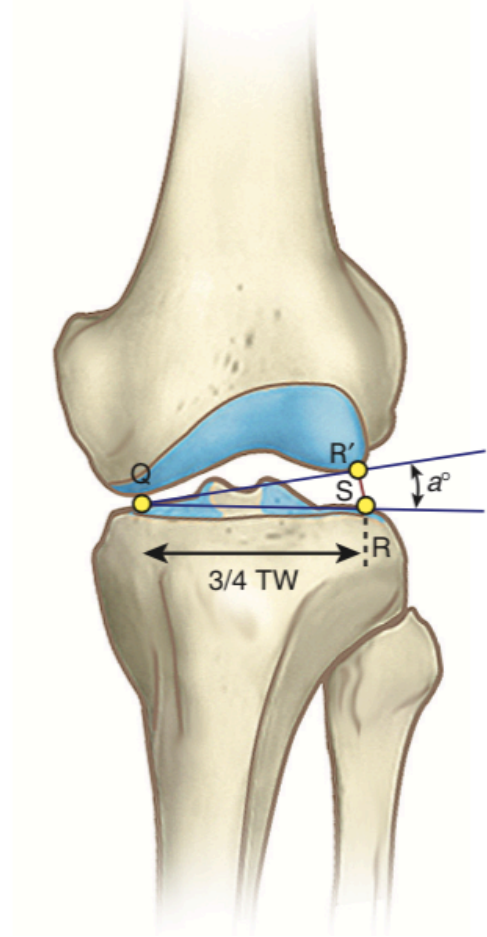
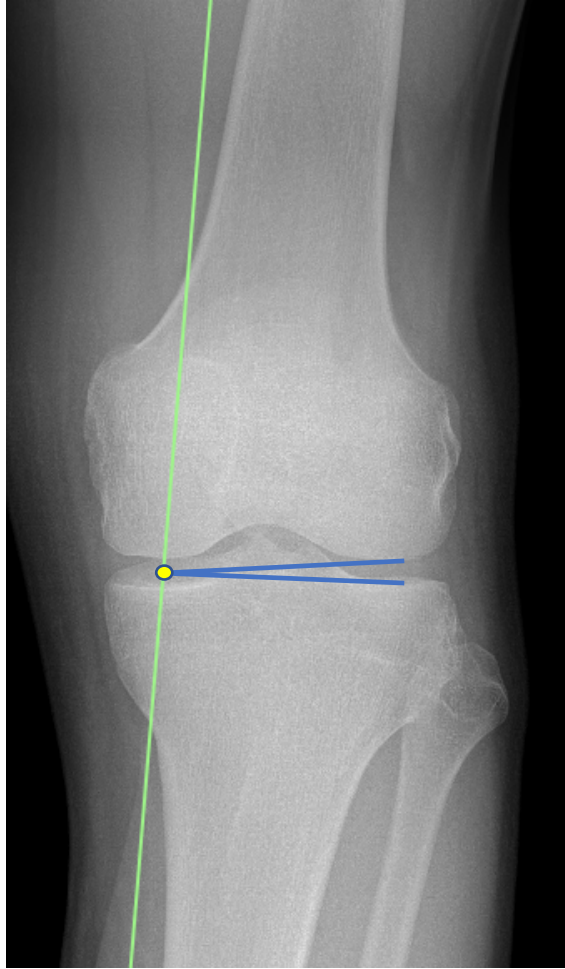


# Gap balancing

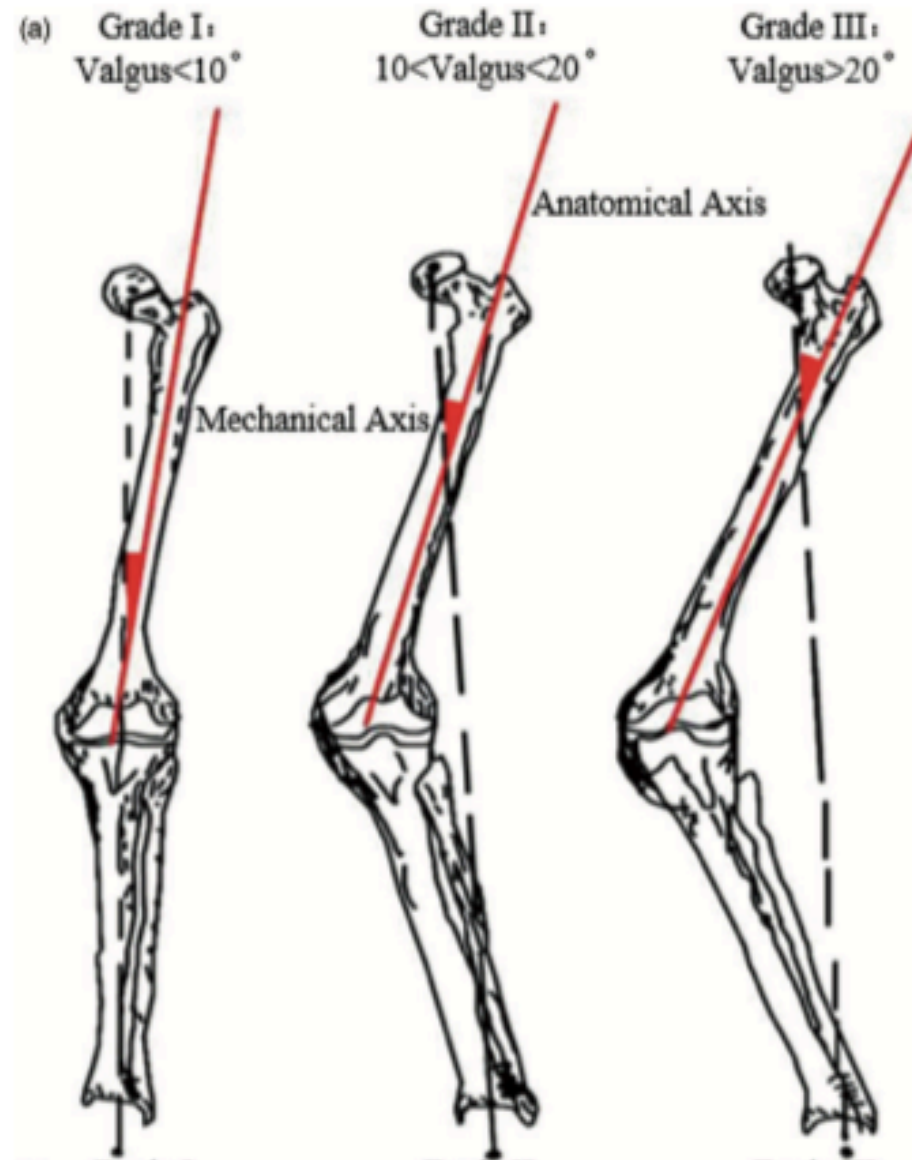


# Varus Knee classification

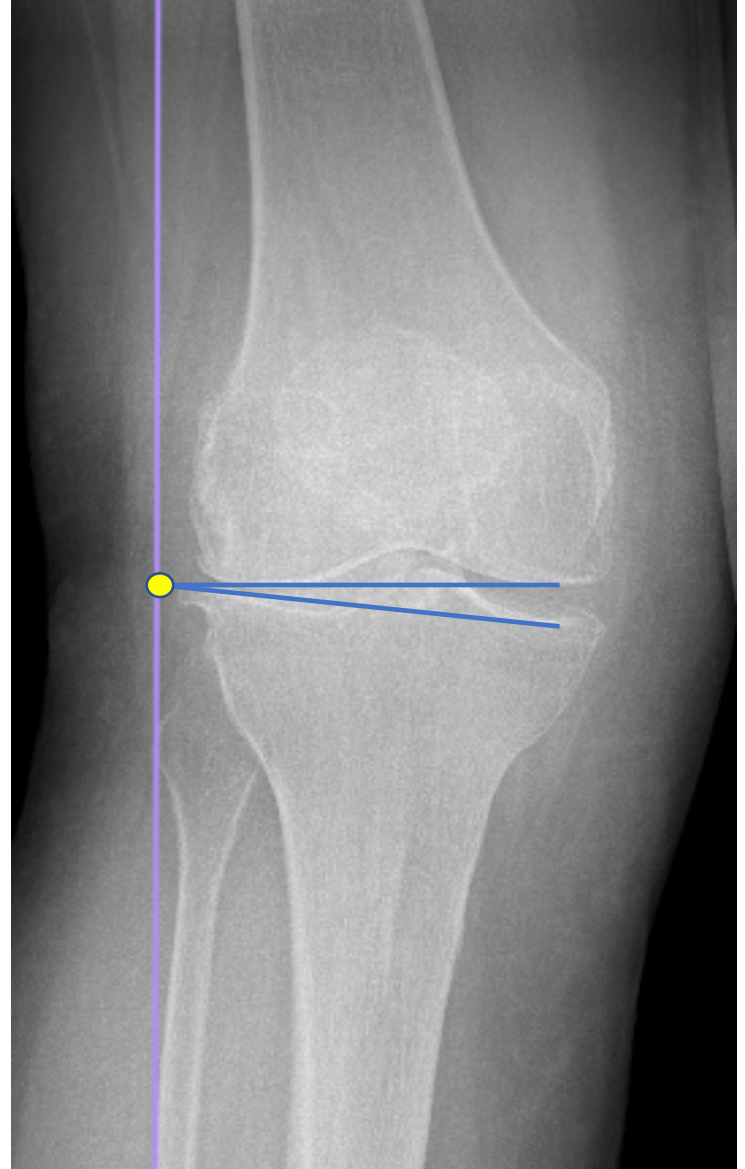




# Valgus Knee classification

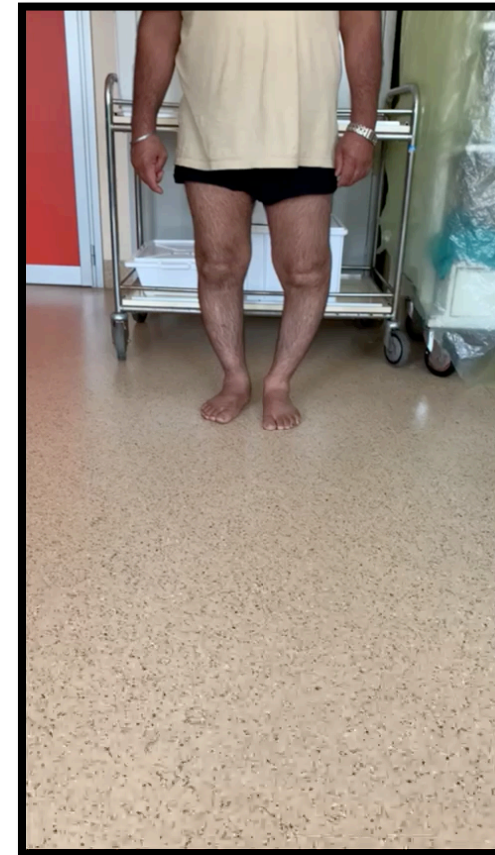




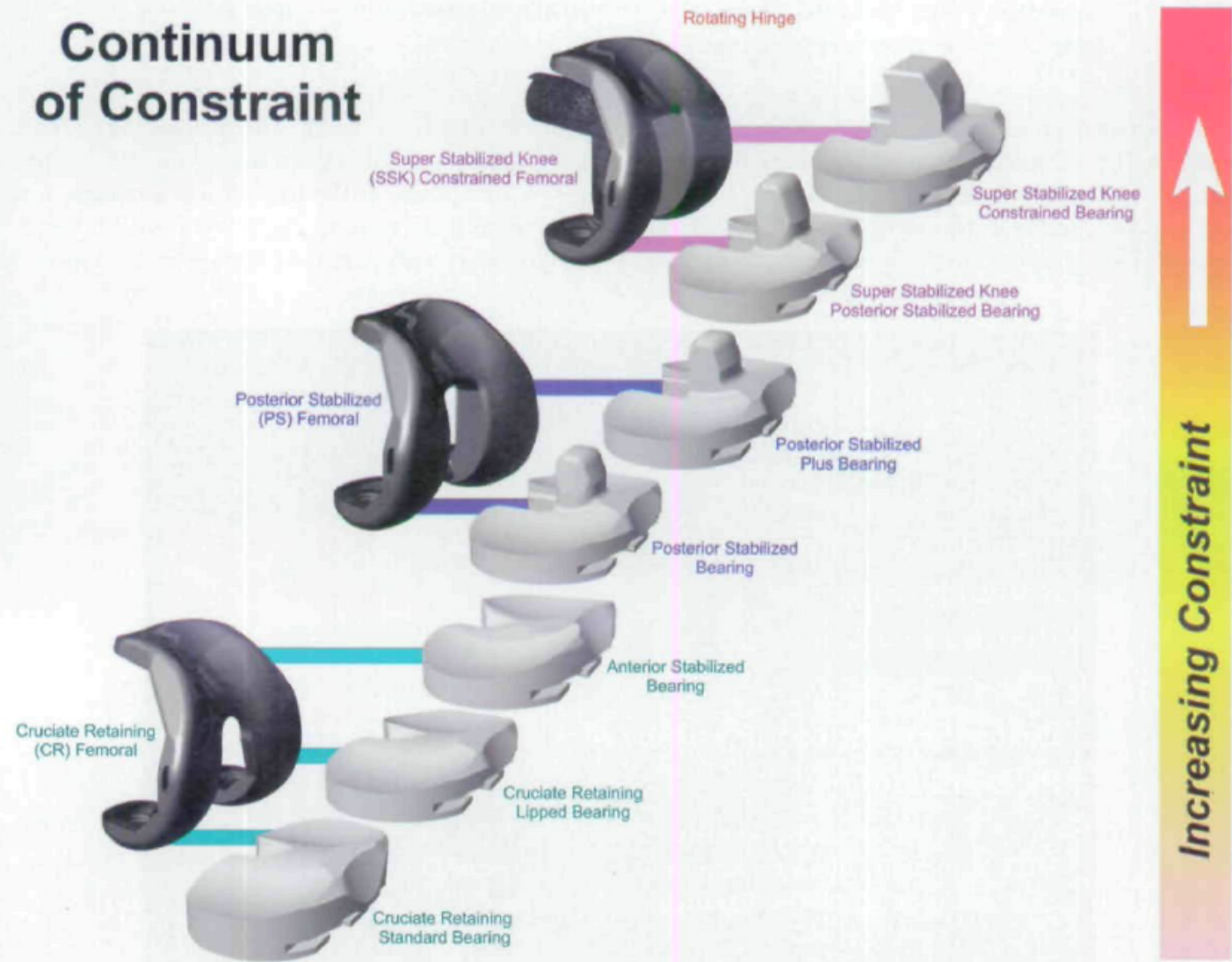


# Soft tissue assessment Clinical examination

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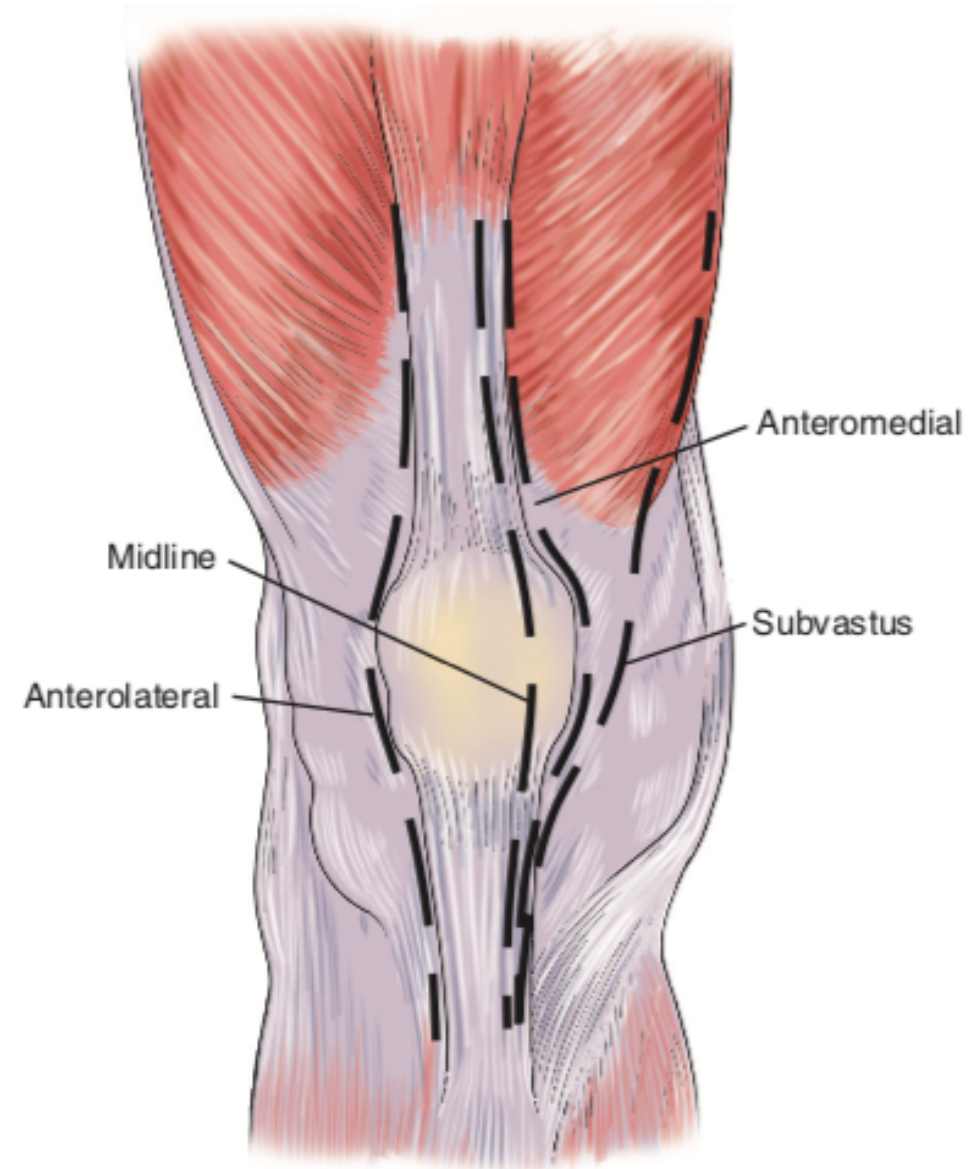
# Continuum of Constraint



# Surgical approach

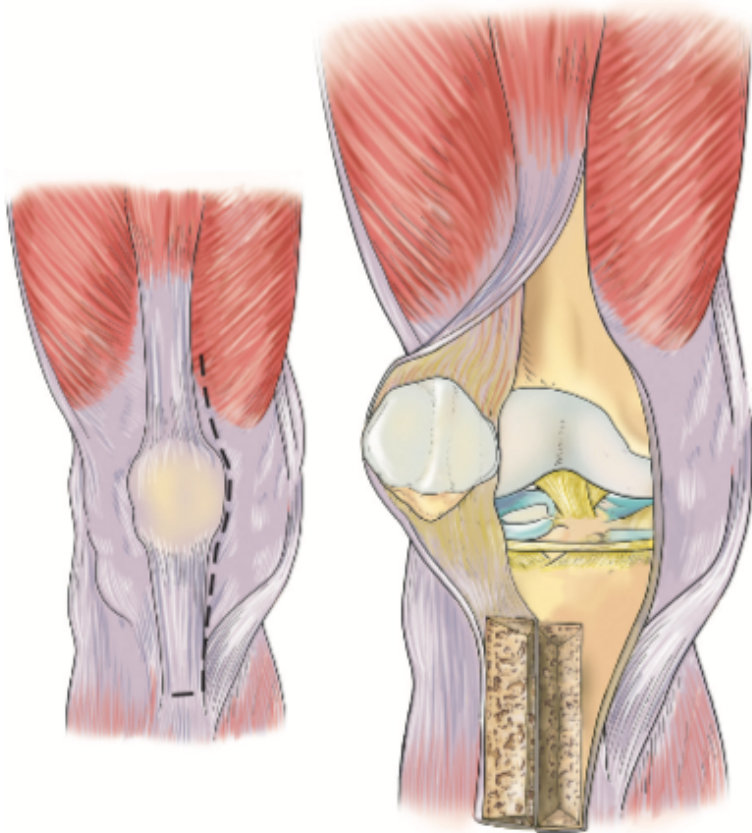
## Potential issues

- Stiff knee
- Patella Baja
- Fixed valgus deformity

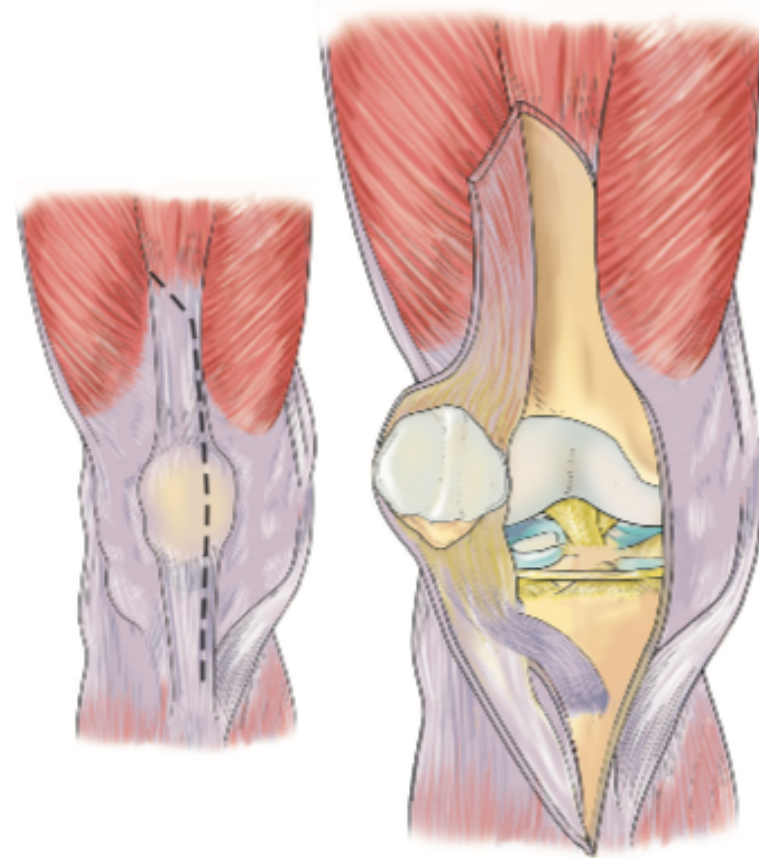


# Surgical Approach Stiff knee

Tibial tubercle Osteotomy



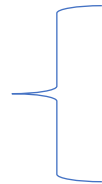
Quadriceps snip



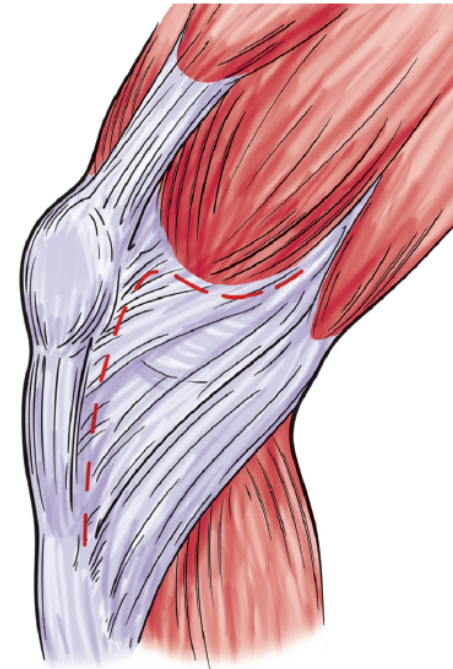
# Surgical Approach Patella Baja

Congenital

Acquired



- ACL Recon
- HTO
- TTA osteotomy

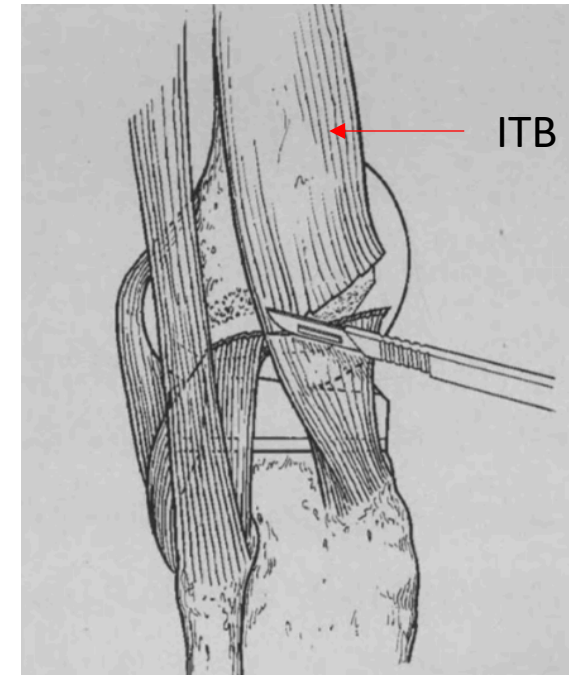
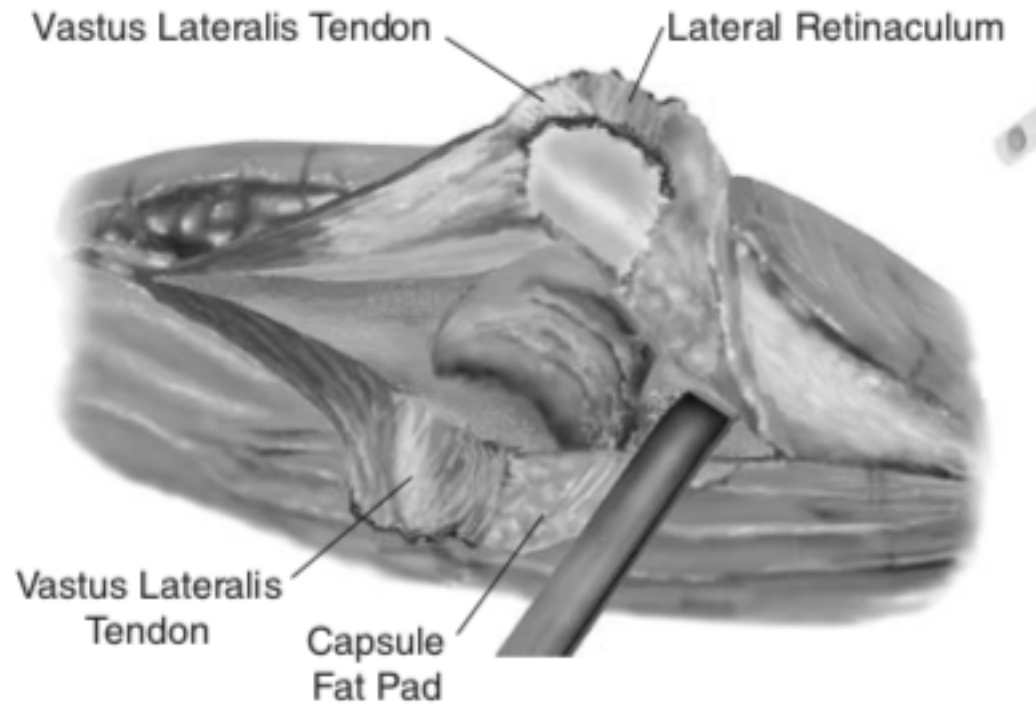


Challenging exposure during MIS procedures

# Surgical approach

## Fixed valgus deformity

Keblish lateral approach



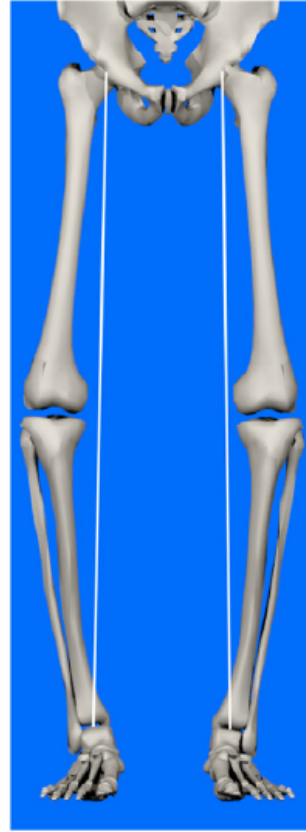
# Alignment philosophies

Constitutional alignment



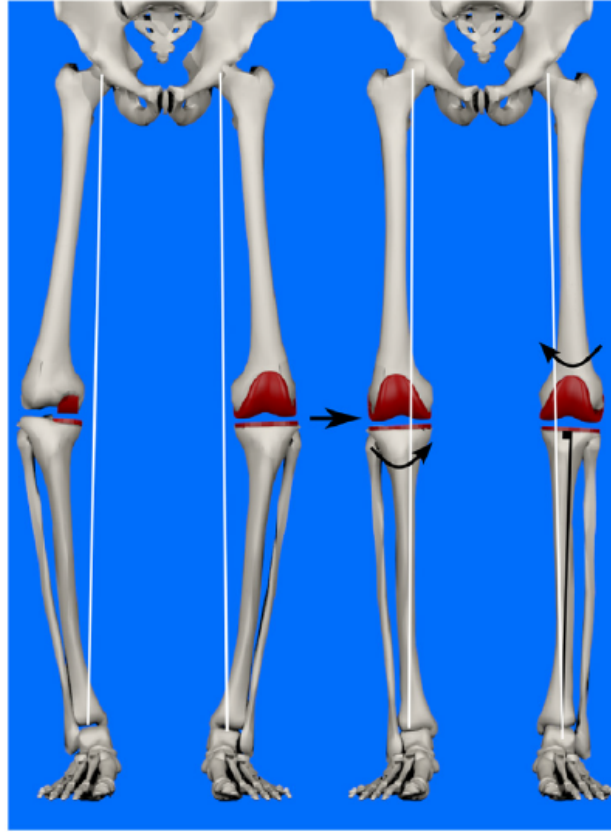
Patient-specific  
Alignment techniques

UKA KA



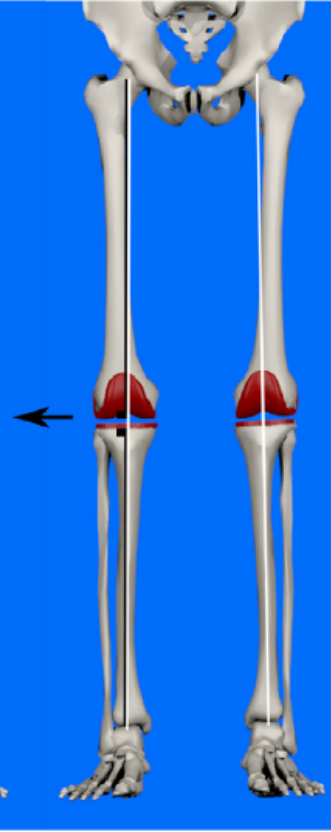
Hybrid  
Alignment techniques

rKA aMA



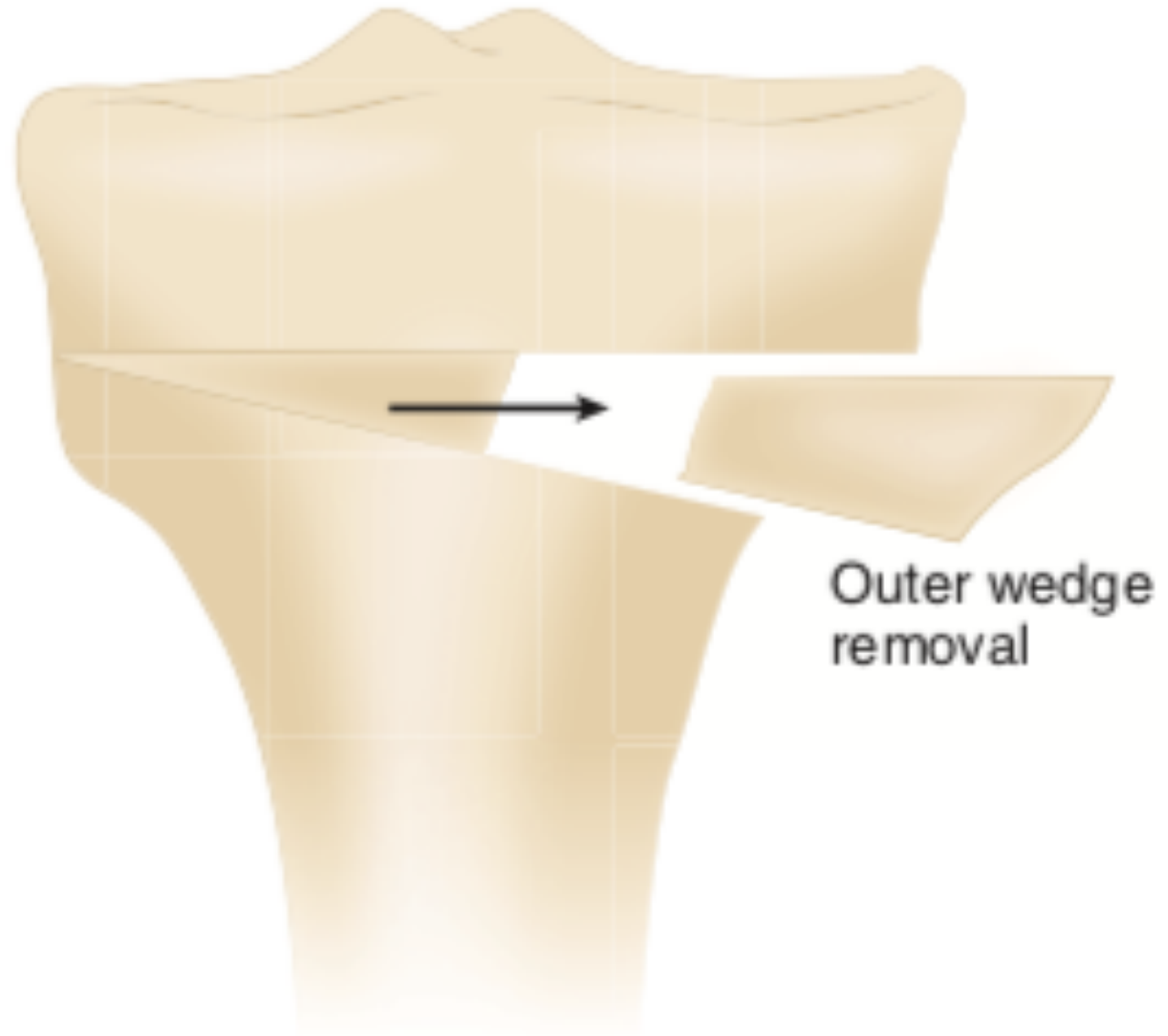
Systematic  
Alignment techniques

MA AA



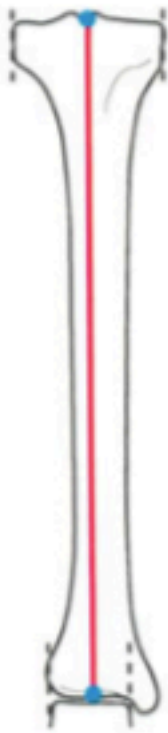


Knee  
arthroplasty  
=  
intra-articular  
osteotomy

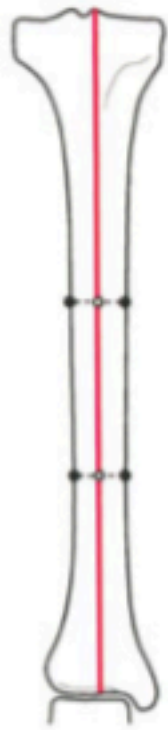


# Femoral Offset

a.



Mechanical axis

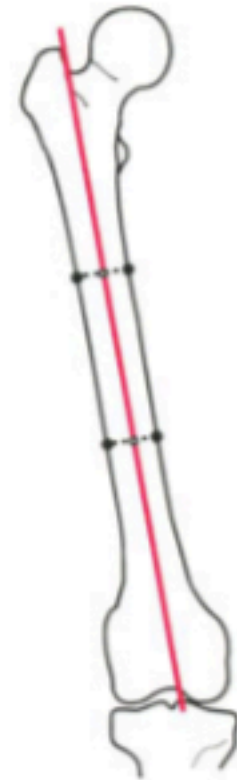


Anatomic axis

b.

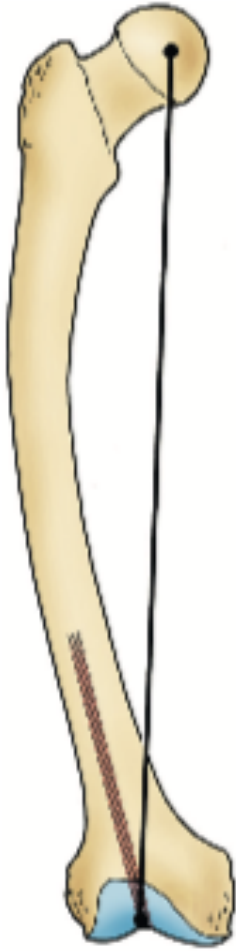


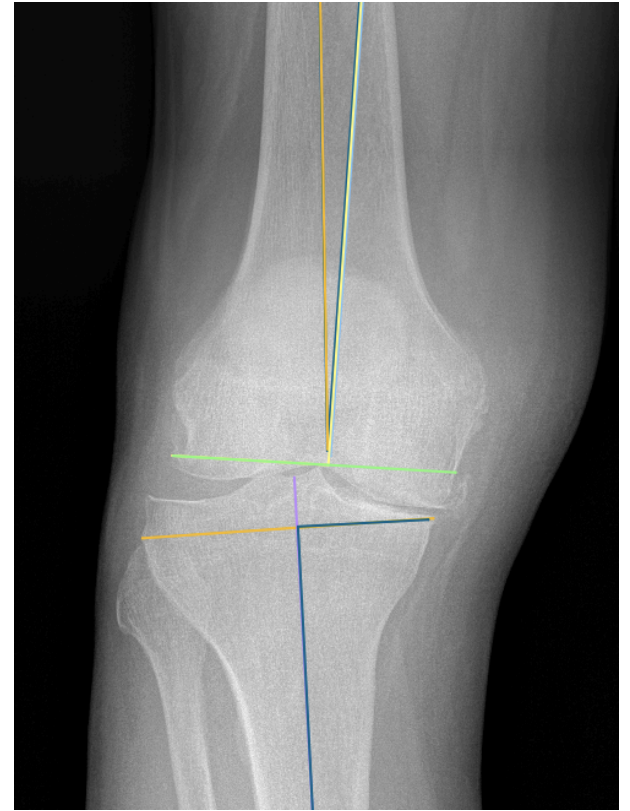
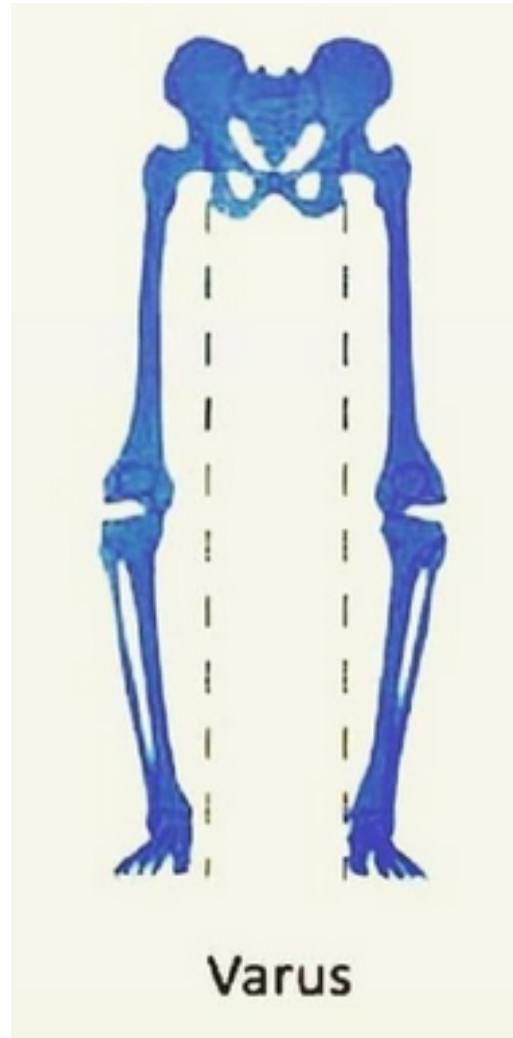
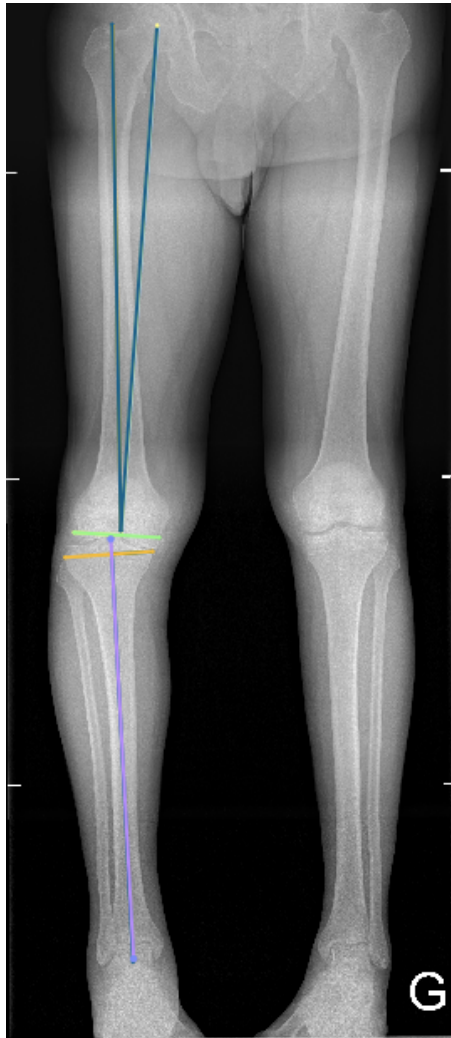
Mechanical axis

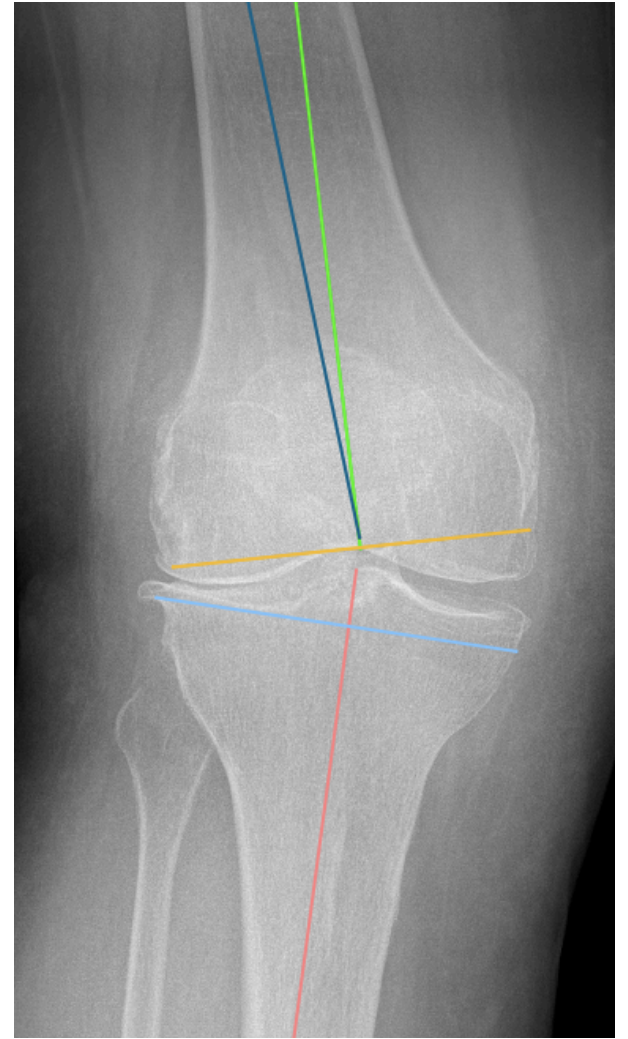
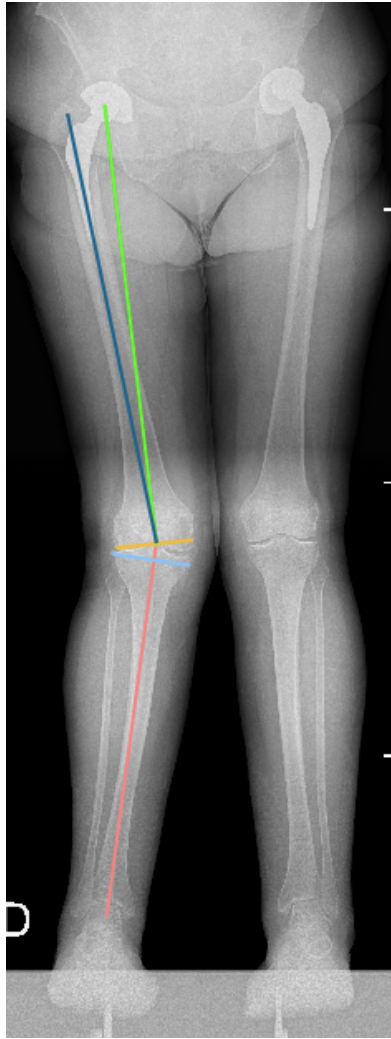


Anatomic axis

# Anatomical Mechanical Angle (AMA)







# Extra-articular deformity



# Restoration of Joint Line



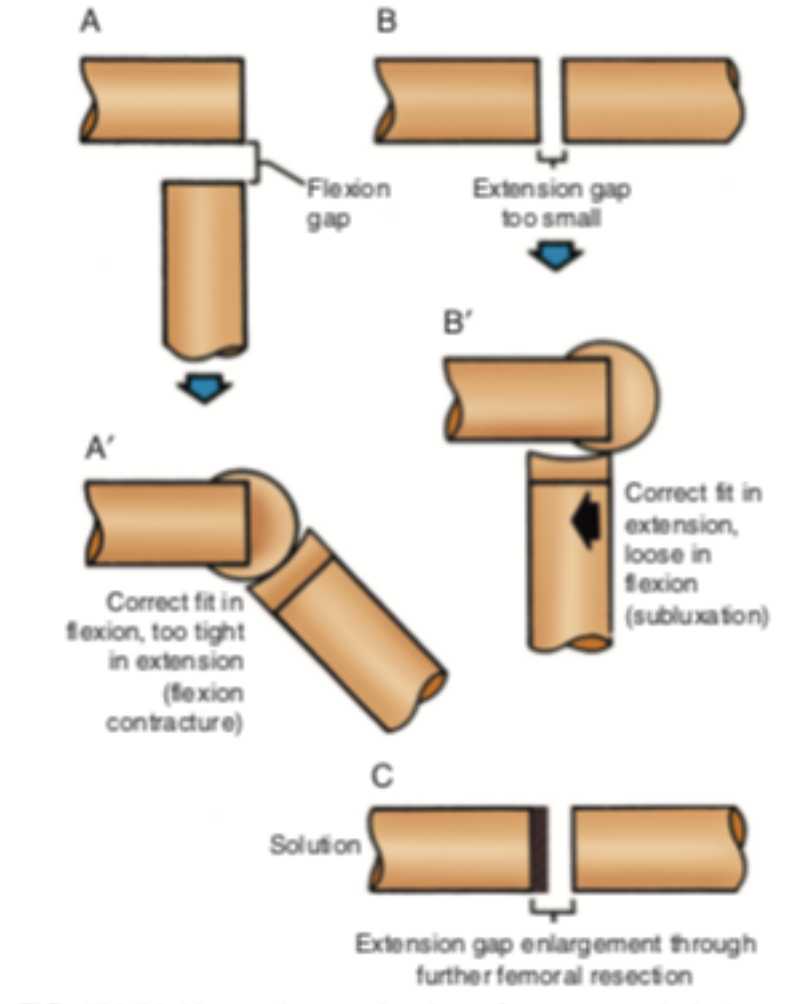
$$\text{RESECTED BONE} = \text{IMPLANT THICKNESS} - \text{SAW BLADE KERF} - \text{CARTILAGE WEAR (if present)}$$

# Compromise on JL

FCC: Moderate 15-30° Severe > 30°

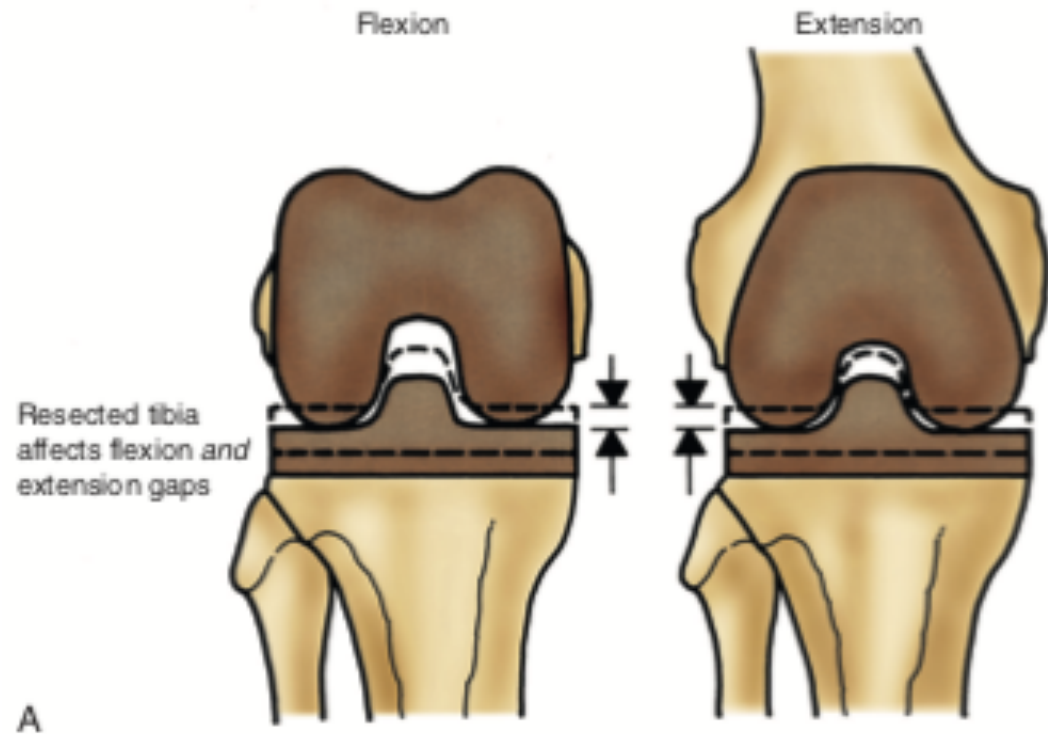
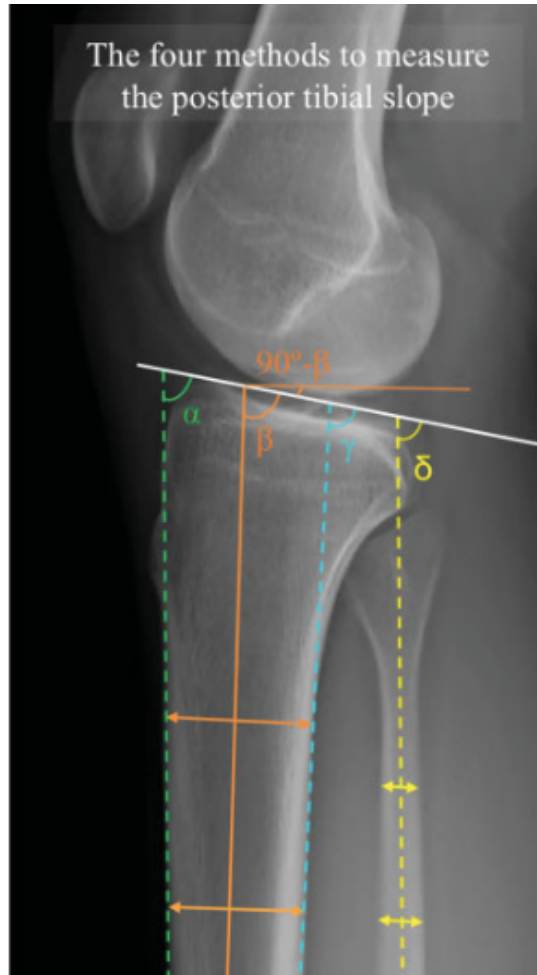
Additional femur resection 2-6 mm

2 mm resection will give appr. 4° extension





# Tibial cut impact flexion gap too



# Patellar resurfacing



# Patellar Fracture in Knee arthroplasty

Prevention is better

Intraoperative patellar fractures can occur, but are rare

The strongest risk factor is resurfacing of the patella

Other risk factor

BMI > 30

Sex (M>F)

Patella Thickness

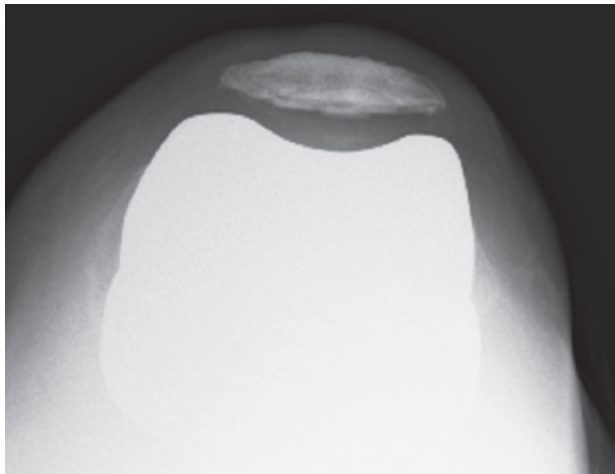
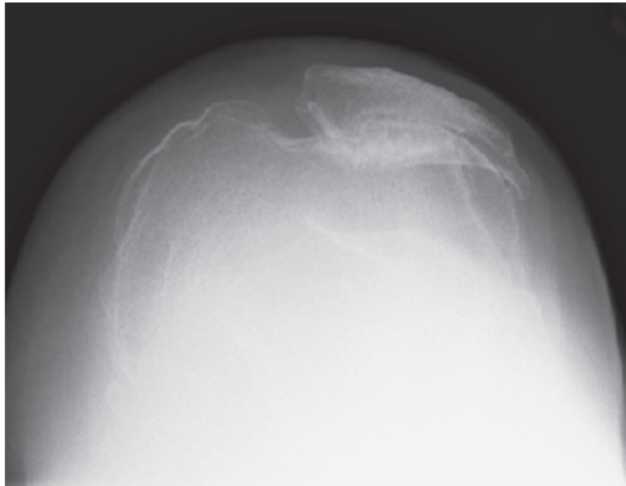
Uncemented Patella implant

Patellar implant with Large central Peg

Lateral Retinacular Release

Revision surgery

# Patella dysplasia



Risk of fracture if resurfaced (no consensus)

Patella  
reshaping

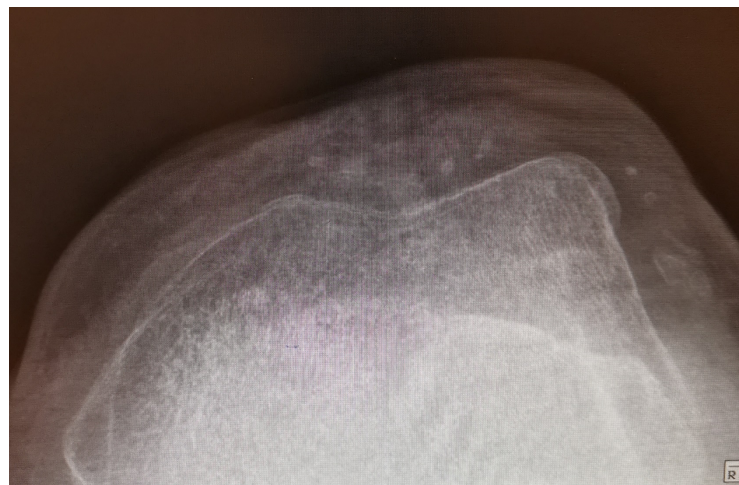
Lateral Facetectomy

Resection of osteophytes

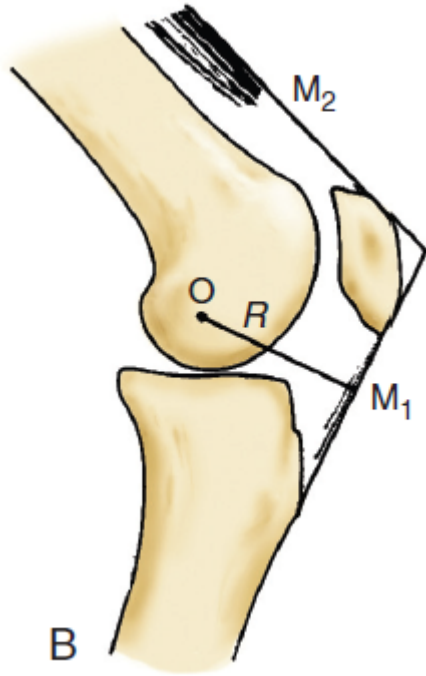
Circumpatellar electrocautery

Zhang LZ, Zhang XL, Jiang Y, et al: Lateral patellar facetectomy had improved clinical results in patients with patellar-retaining total knee arthroplasty. *J Arthroplasty* 27(8):1442, 2012

# Patellectomy Issue in Knee arthroplasty



# Patellectomy Issue in Knee arthroplasty

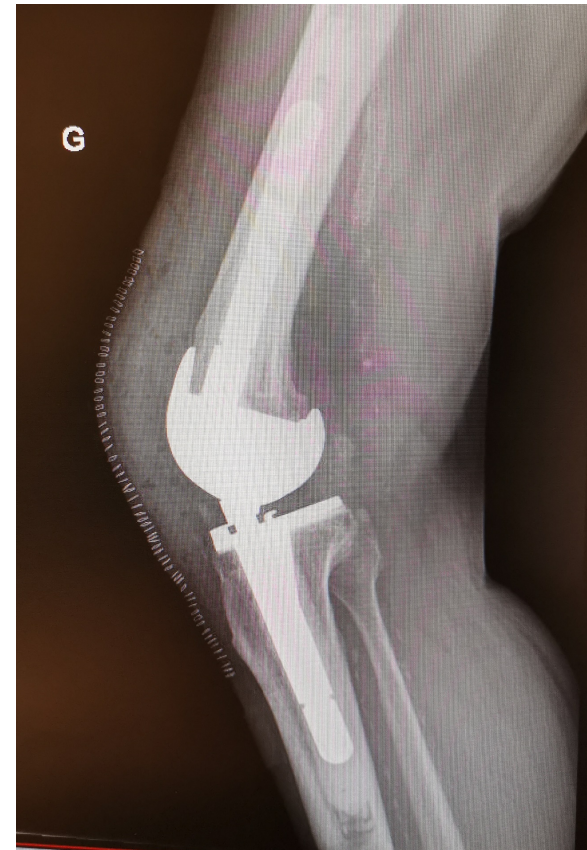
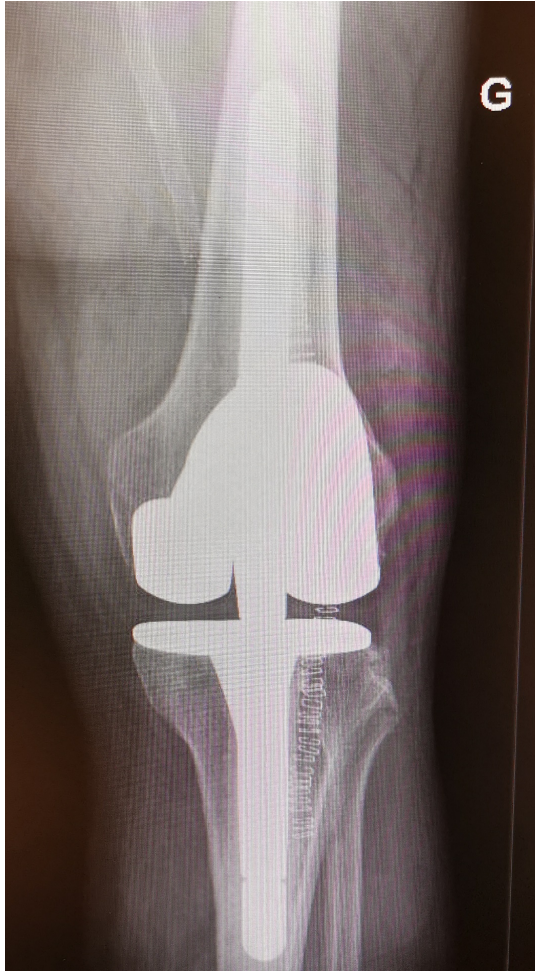


The subsequent reduction in extensor mechanism strength leads to a  
instability issue



Hinge implant

# Patellectomy Issue in Knee arthroplasty



# Take home messages

- PUC is better, but rule out the contra-indications
- Sometimes the arthroplasty cannot be balanced with low constraint implant
- Know the pros and cons of the surgical approach
- Knee arthroplasty is an intra-articular osteotomy
- The strongest risk factor for patellar fracture is the patella resurfacing