5th course of advanced surgery of the knee
Val d'Isère, 02-2014

Gap balancing in TKA: dealing with the sagittal plane (recurvatum, flexion contracture, patellar height)

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Recurvatum

From: Erceg M, Rakic M, Acta Clin Croat 2012

- < 1% of TKA patients
- Associated to other deformities:

  genu valgum, capsular, ligamentous laxity & neurological diseases
- Specific attention to neurol. disorders:

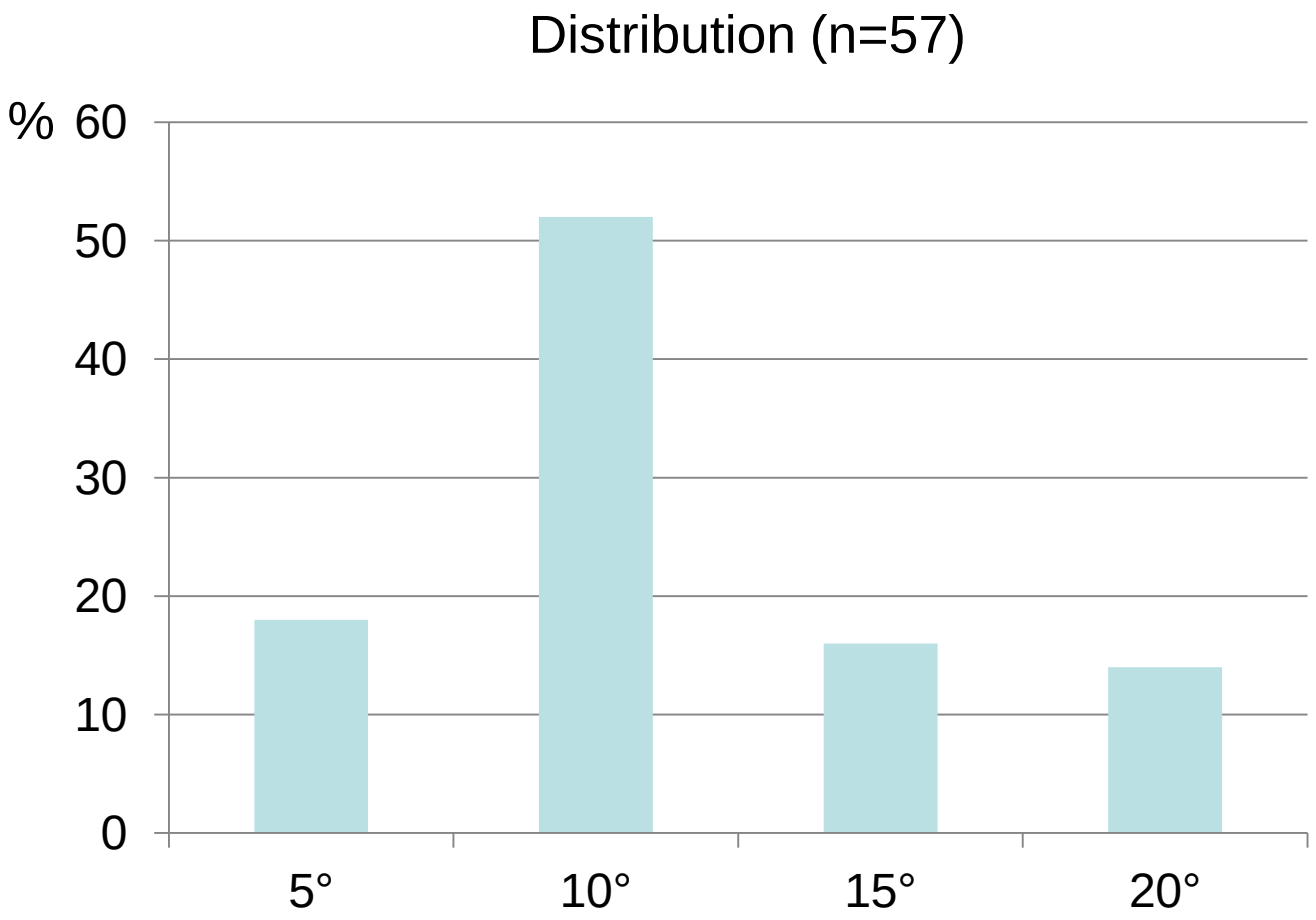
  Fixed plantar flexion, limb muscle function

Meding JB, Clin Orthop Relat Res 2003

Neurological disorders must be ruled out

(recurrence of recurvatum)

Recurvatum



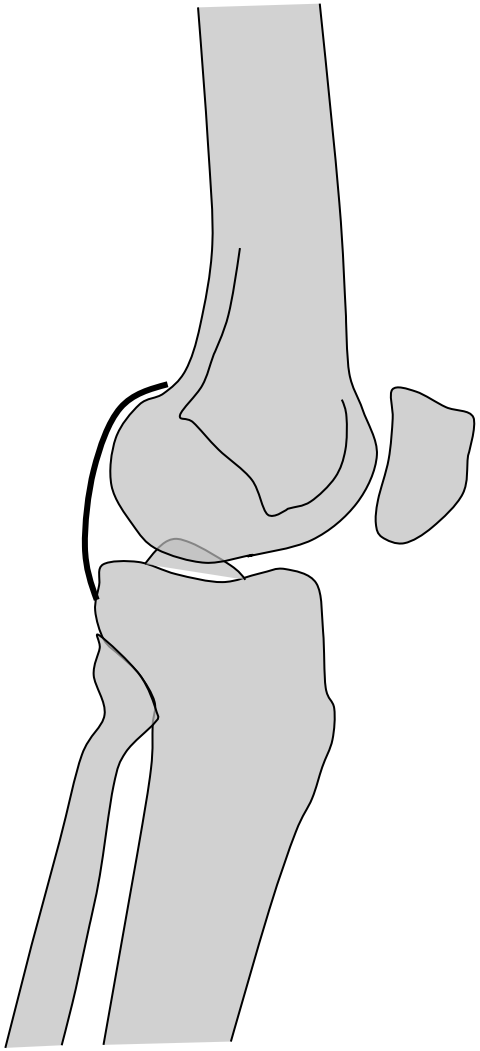
Meding JB, Clin Orthop Relat Res 2001

Recurvatum

Hyperextension

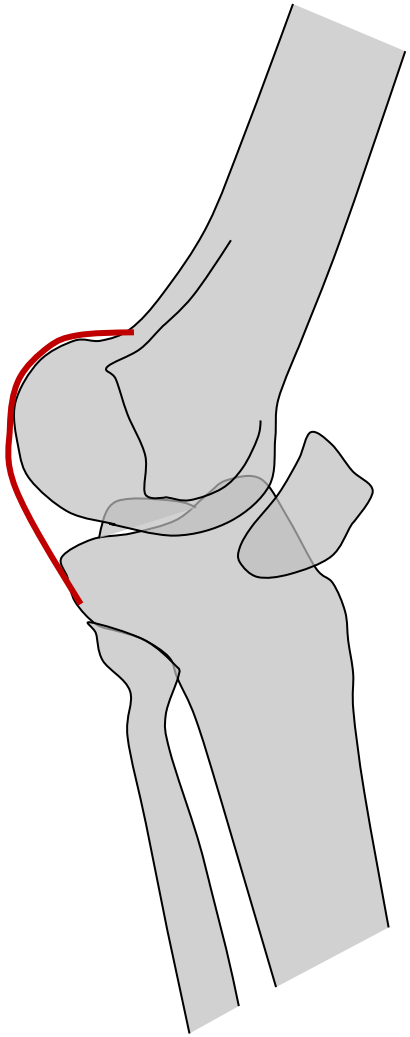
collapse

Recurvatum



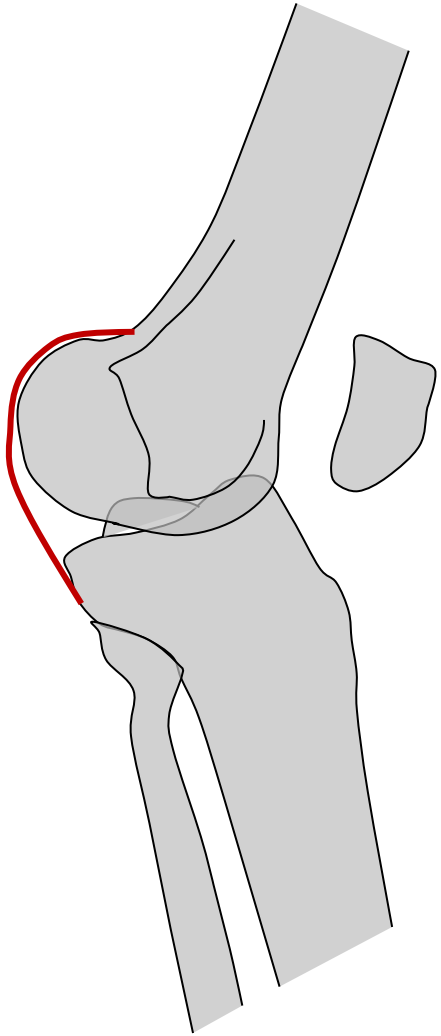
Recurvatum

Severe stretching of posterior capsule & PCL



Bony collapse distal femur & proximal tibia

Recurvatum

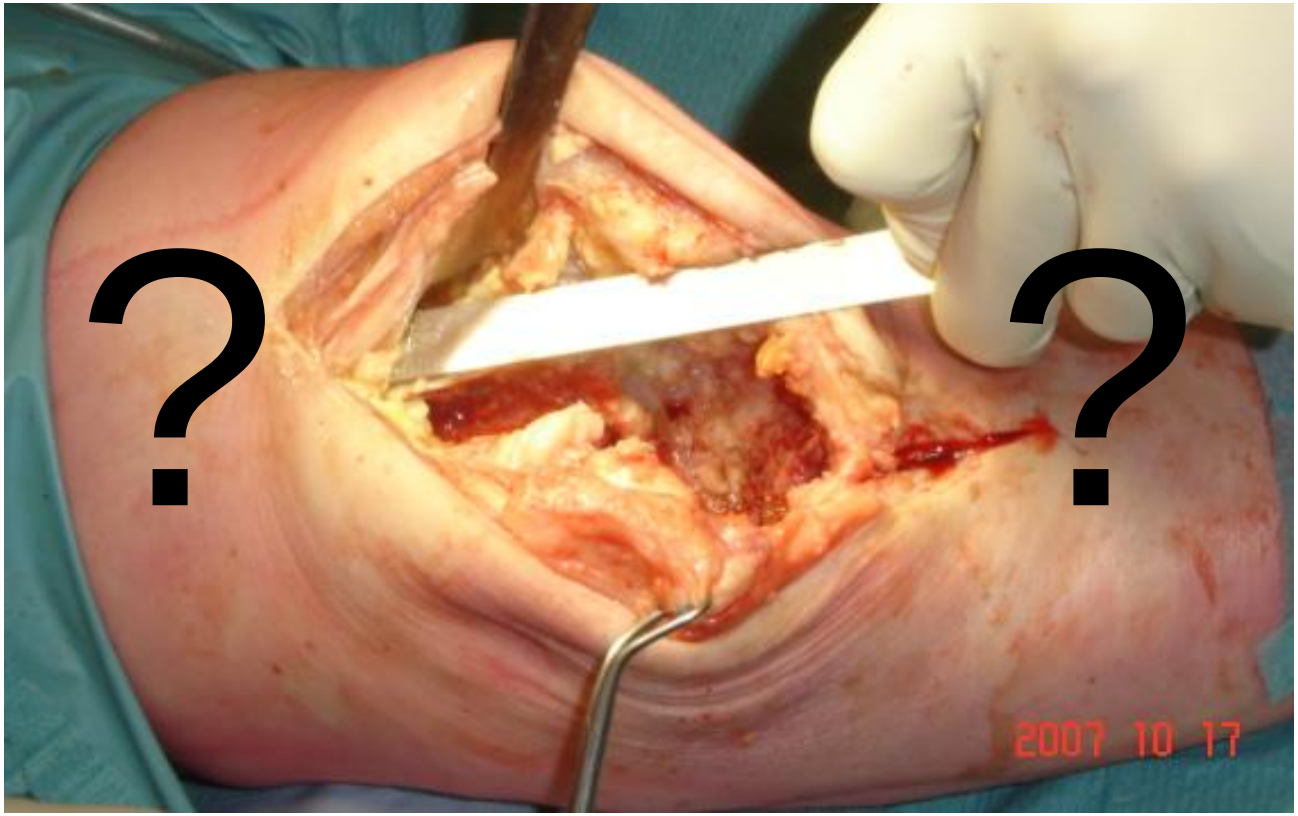


Proximalisation of patella & shortening of extensor mechanism

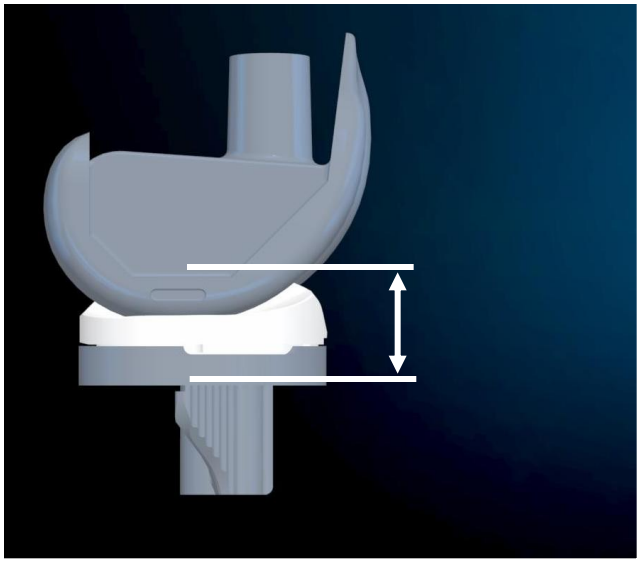
Recurvatum

1. Minimum resection of distal femur
2. Underresection proximal tibia (debatable)
3. Choose small femoral component
4. Choose right level of constraint
5. Avoid slight residual recurvatum intraoperatively

Planning extension gap



Planning extension gap

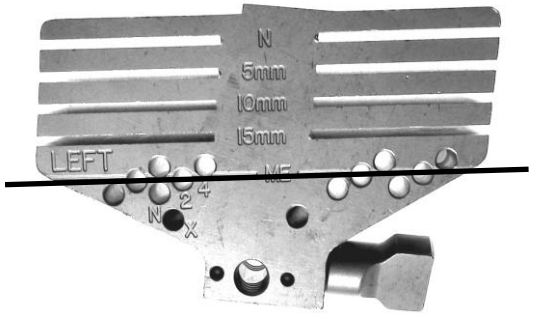


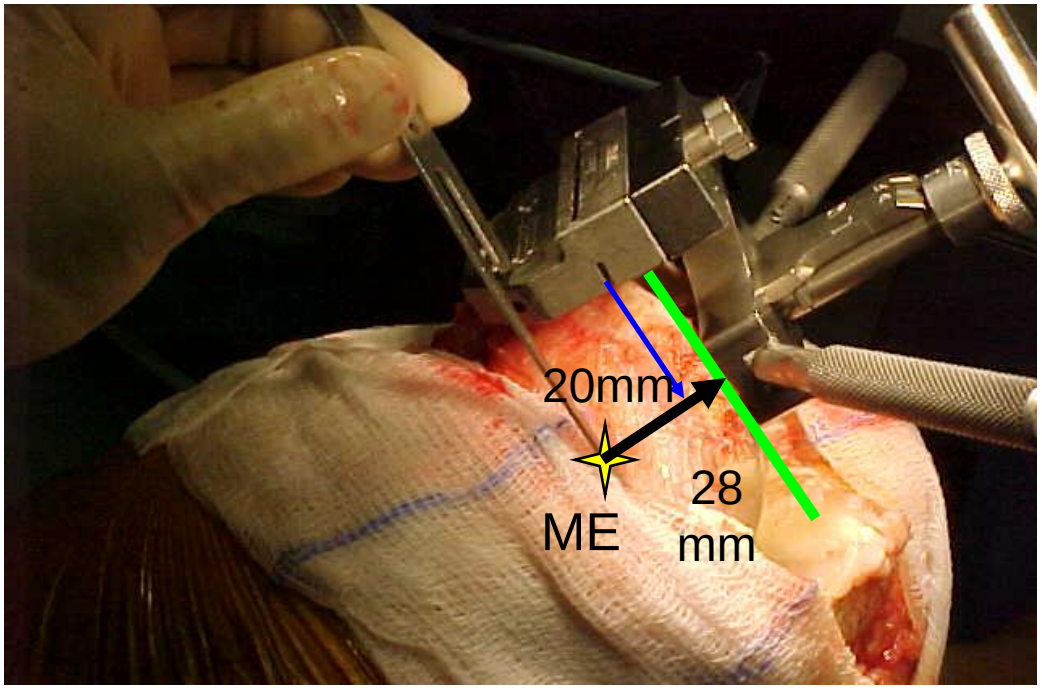
Triathlon® TS Knee System

17.5 - 64.5 mm

- Up to 15 mm femoral distal augment
- 8.5 mm femoral condyle
- Up to 31 mm PE insert
- Up to 10 mm tibial augment

Planning extension gap: epicondylar referencing

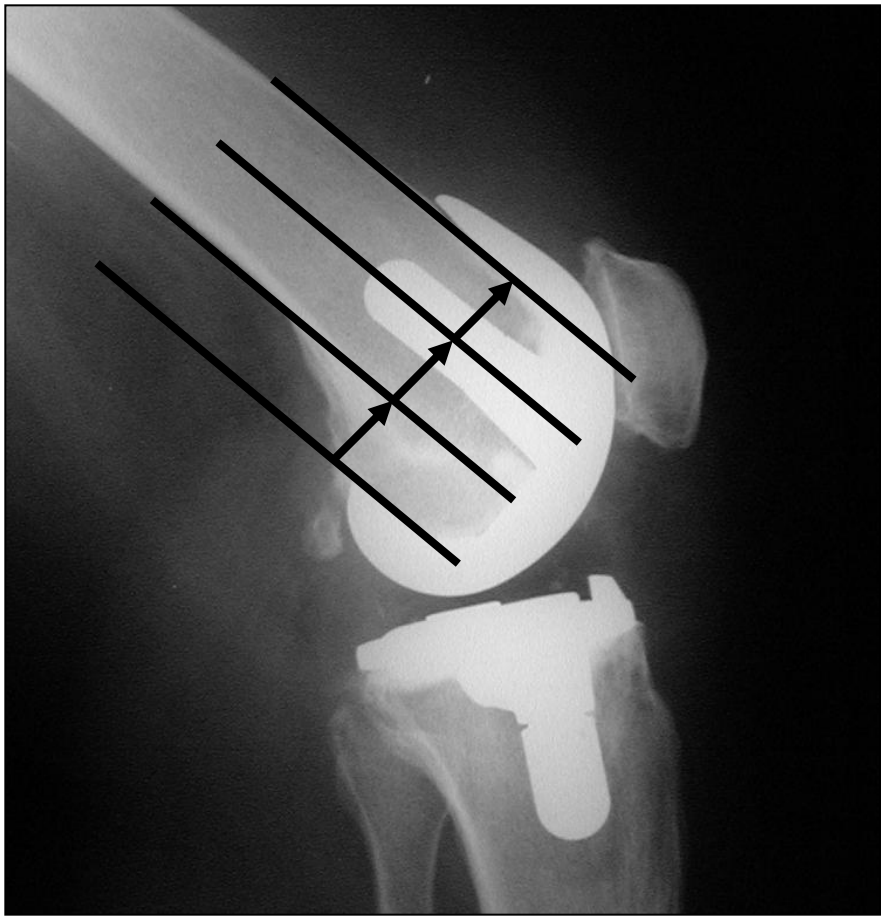




JL

Medial epicondylar line serves as reference
(ME at 28 ± 3,5 mm from joint line)

Planning flexion gap



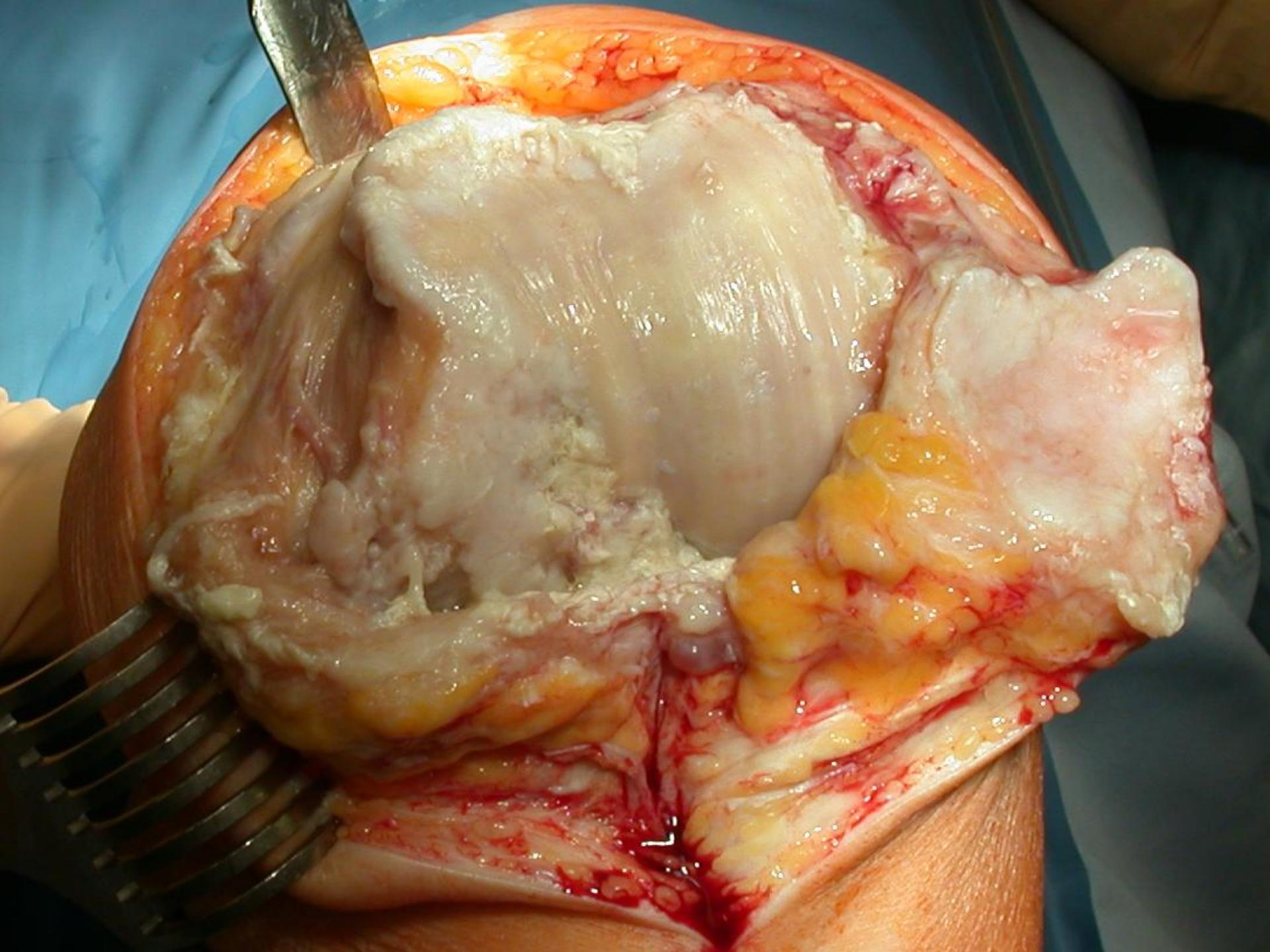
Use previous
or contralateral x-rays

<u>If tight flexion gap:</u>

Use smaller femoral component

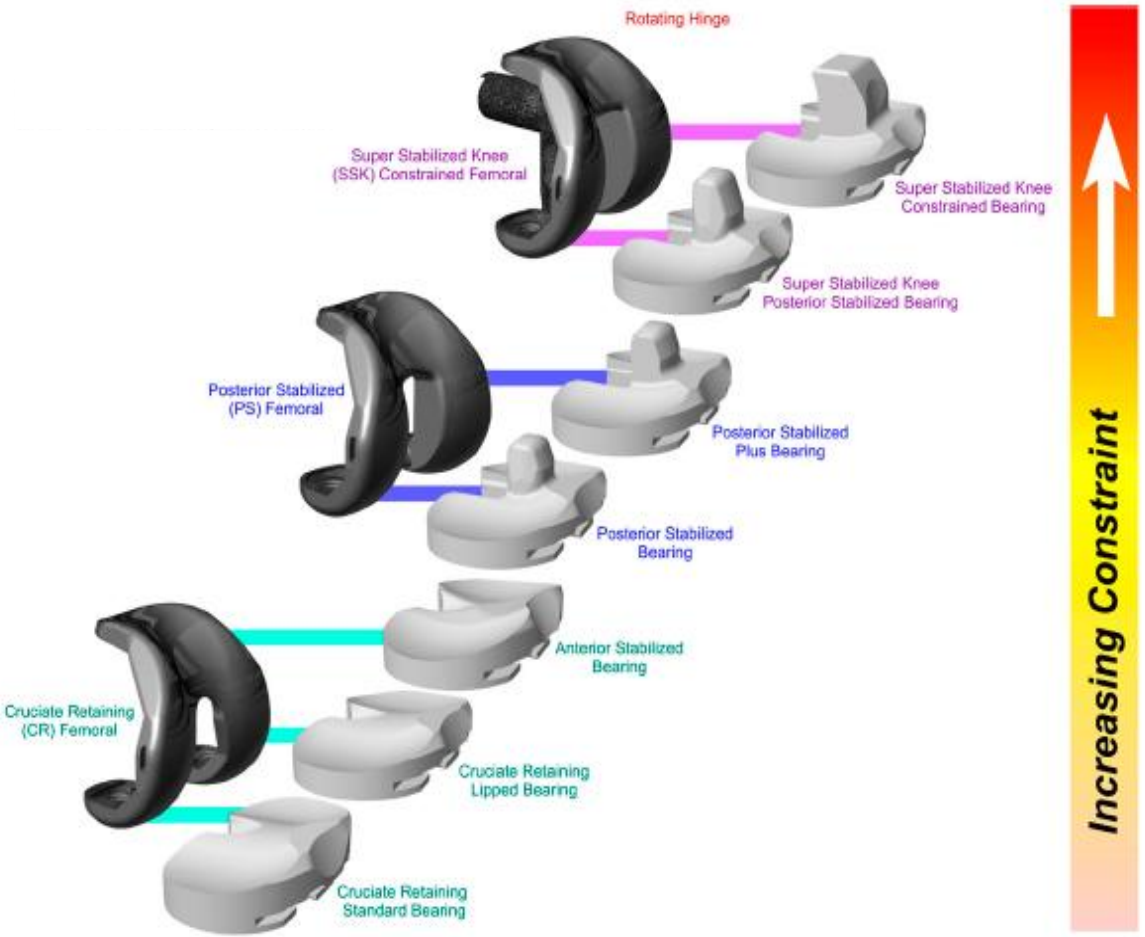
rather than reconsidering

increasing tibial resection



Which level of constraint ?

Continuum of constraint



Lombardi AV, JBJS-A, 2007

Which level of constraint ?

Levels of ligamentous incompetency

Recurvatum knee

Level of constraint	Type of prosthesis	PCL	Collaterals	Quad
0	PCL retaining	+	+	+
1	Post. Stabilized	-	+	+
2	Constrained condylar	-	+/-	+
3	Rotating hinge	-	-	+
4	Rigid hinge	-	-	-

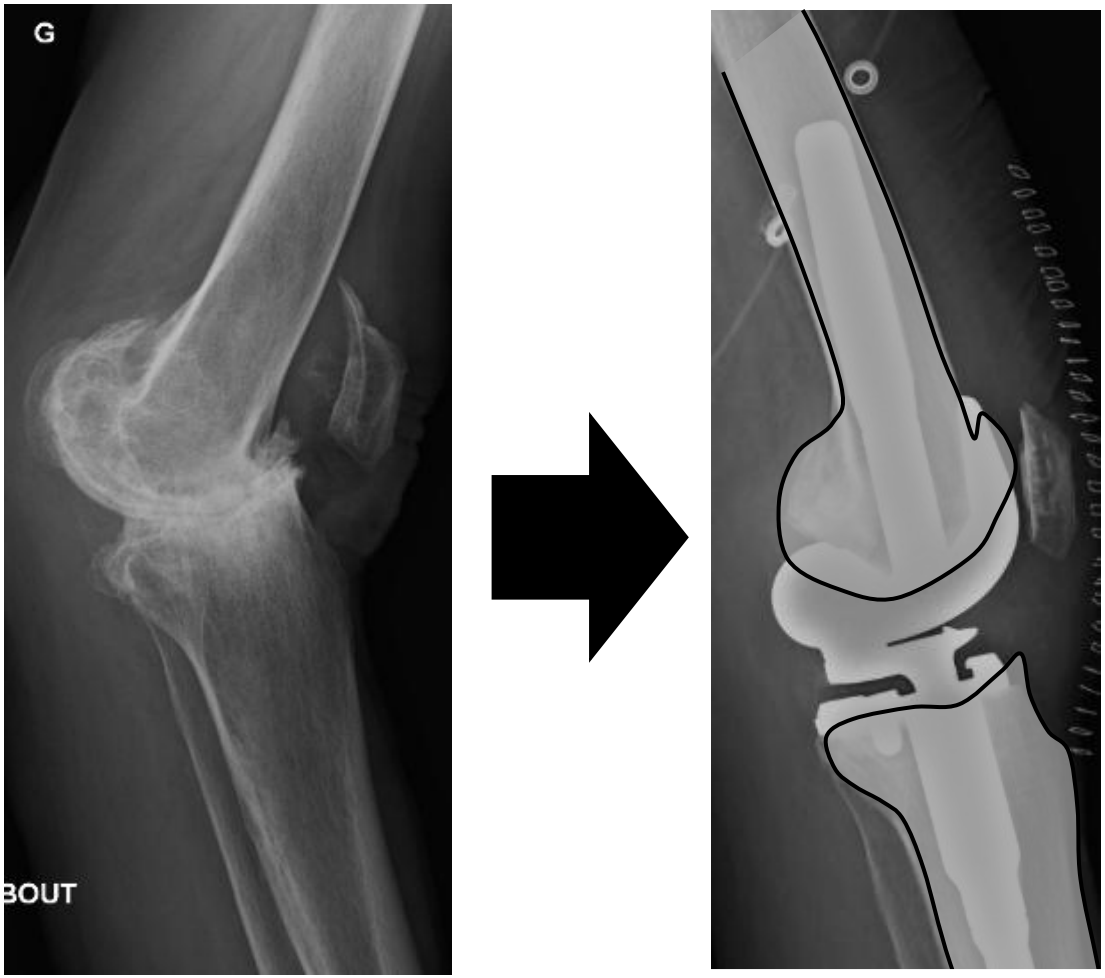
Lombardi AV, JBJS-A, 2007

Which level of constraint ?

♀, 63 years
Rheumatoid arthritis
Major frontal & sagittal instability,
30° recurvatum

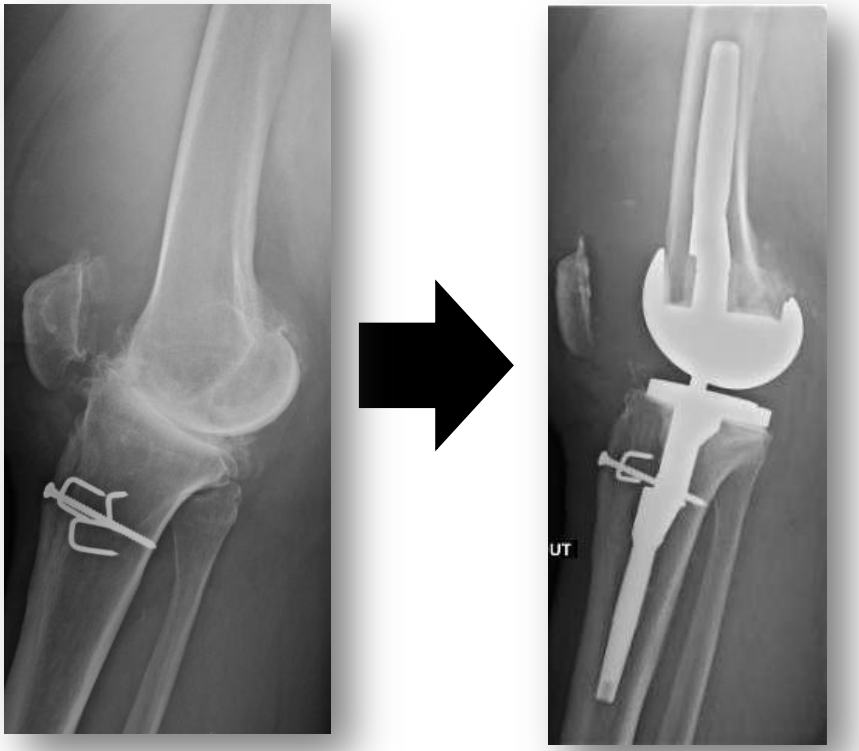
Level of constraint	Type of prosthesis
0	PCL retaining
1	Post. Stabilized
2	Constrained condylar
3	Rotating hinge
4	Rigid hinge

Recurvatum



1. Minimum resection of distal femur & proximal tibia
2. Restoring extension gap
2. Choose adequate level of constraint

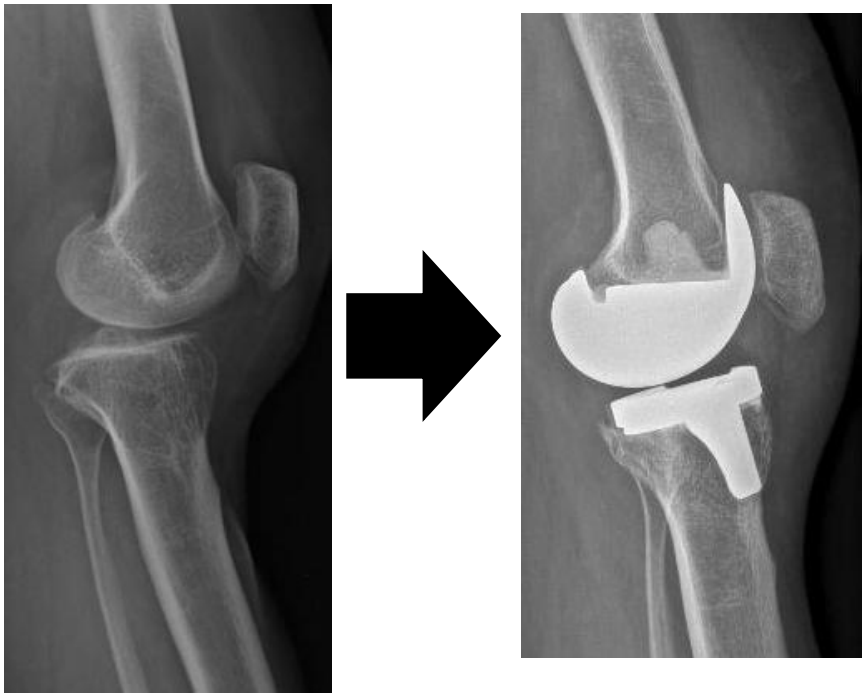
Recurvatum



♂, 61 years
140 kg
Moderate recurvatum

Level of constraint	Type of prosthesis
0	PCL retaining
1	Post. Stabilized
2	Constrained condylar
3	Rotating hinge
4	Rigid hinge

Recurvatum



♀, 59 years
Congenital abnormality,
Mild recurvatum

Level of constraint	Type of prosthesis
0	PCL retaining
1	Post. Stabilized
2	Constrained condylar
3	Rotating hinge
4	Rigid hinge

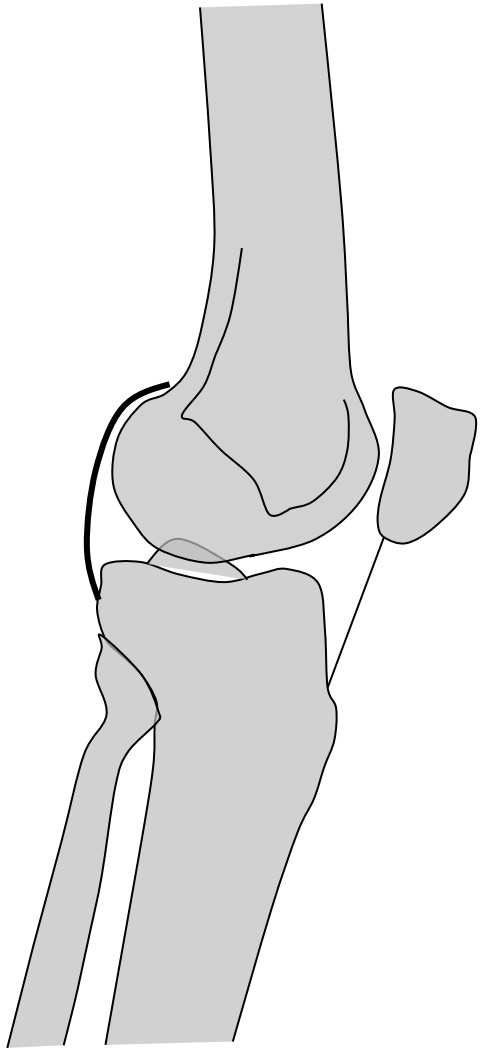
Flexion contracture

- Osteoarthritis
- Inflammatory arthritis
- Hemophilia
- Neuromuscular disorders
- More frequent than recurvatum
- Either isolated or in association with varus/valgus knee

Flexion contracture

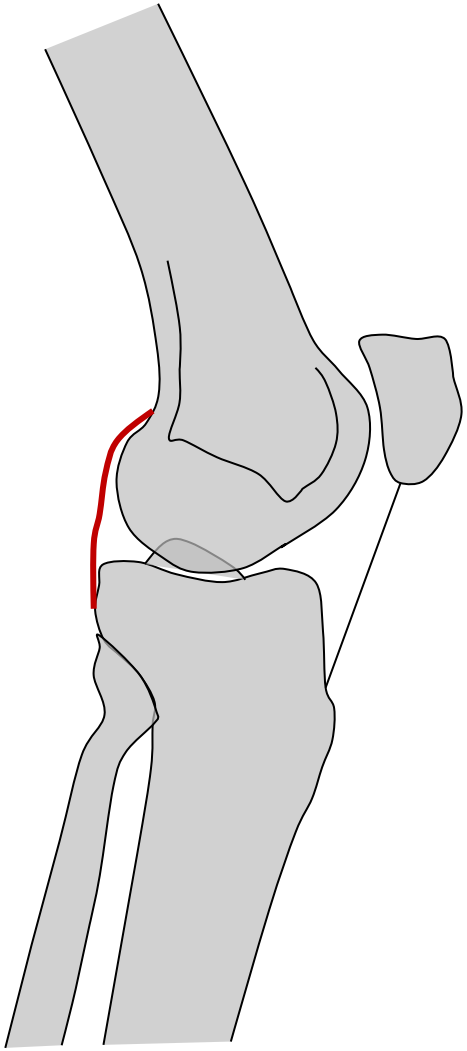
Mild	Moderate	Severe
< 10°	10°-30°	> 30°

Flexion contracture

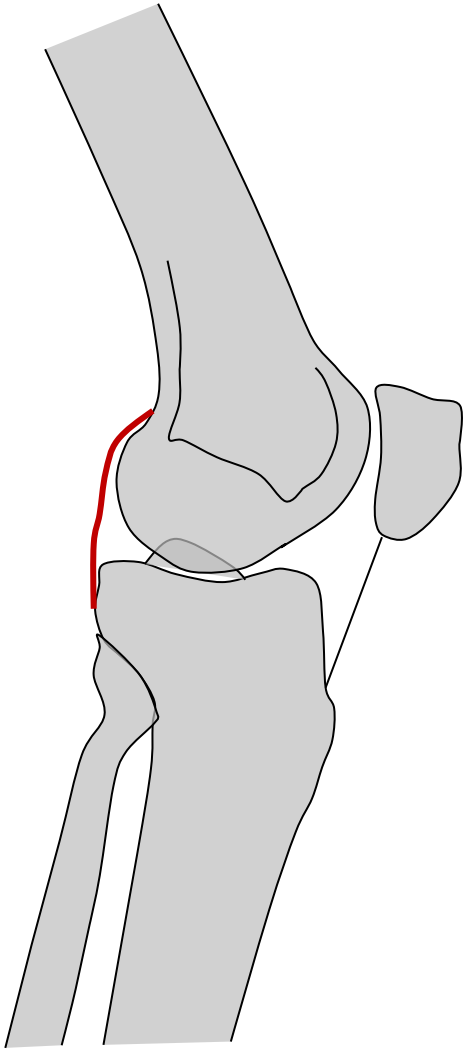


Flexion contracture

Shortening of posterior capsule & soft-tissues



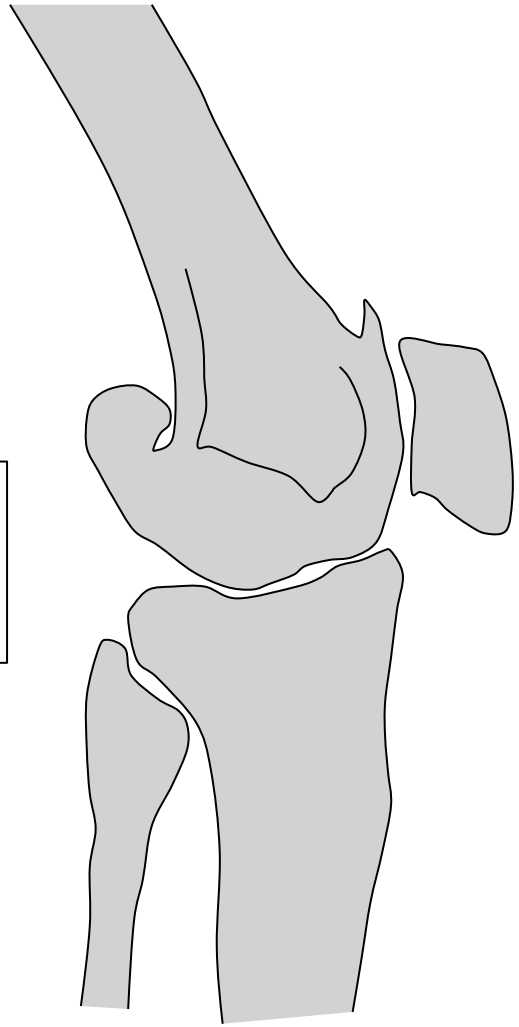
Flexion contracture



Increase of patellofemoral forces

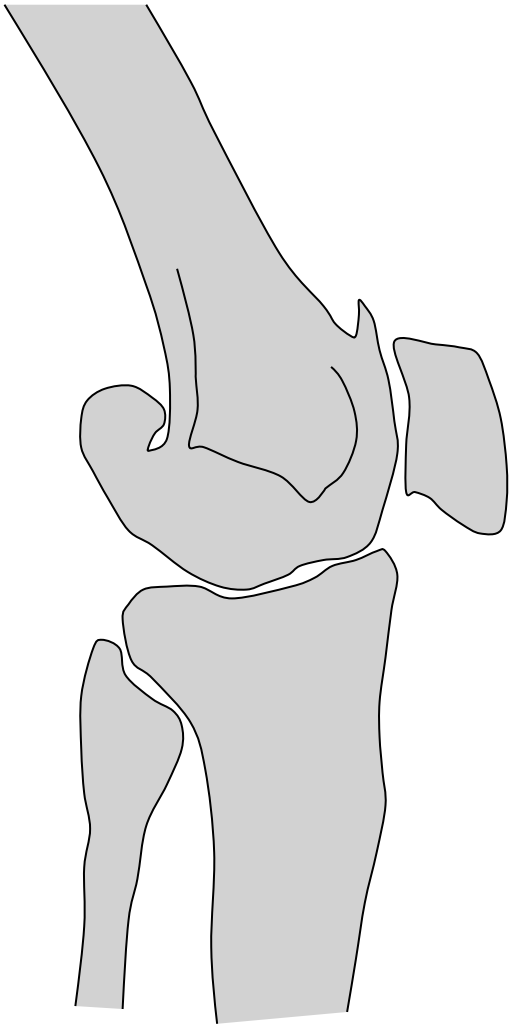
Flexion contracture

Posterior femoral osteophytes



Anterior tibial & intercondylar osteophytes

Flexion contracture



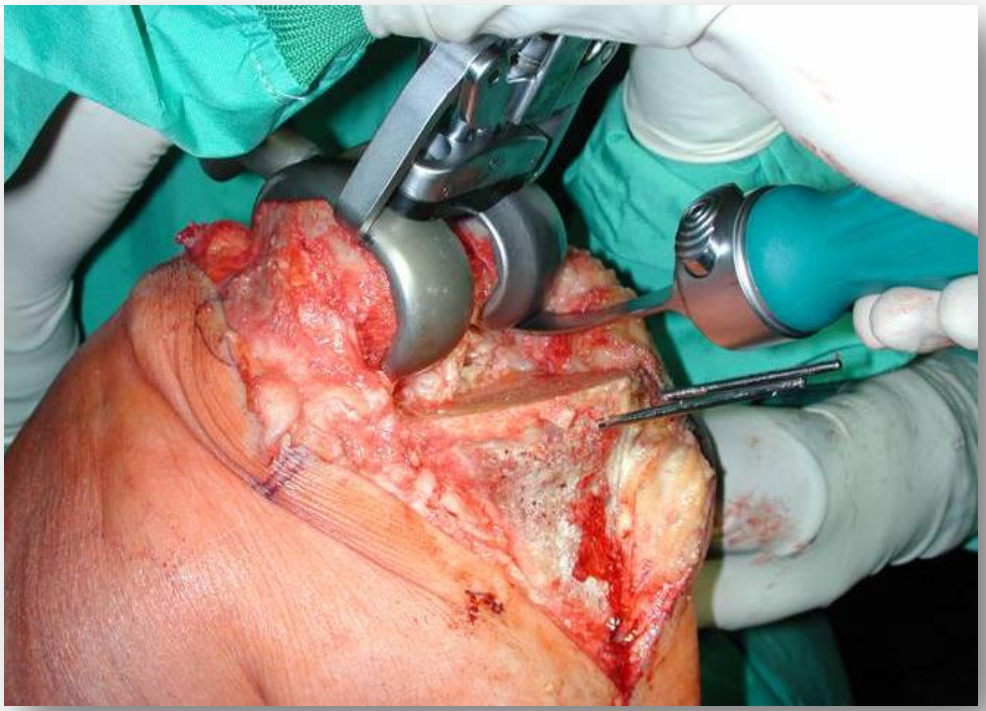
Surgical goals:

1. Realign limb
2. Bone resection
3. Restore soft tissue balance
4. Replace PCL (depending on degree of ©)

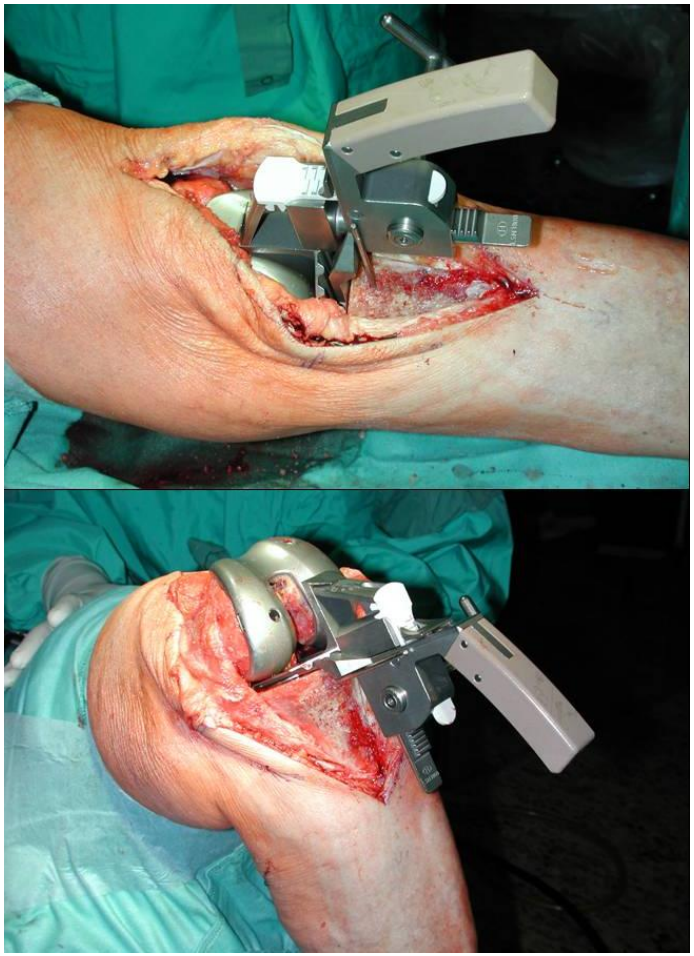
Flexion contracture

Adequate bone resection & removal of posterior condylar osteophytes

+/- subperiosteal elevating of posterior capsule



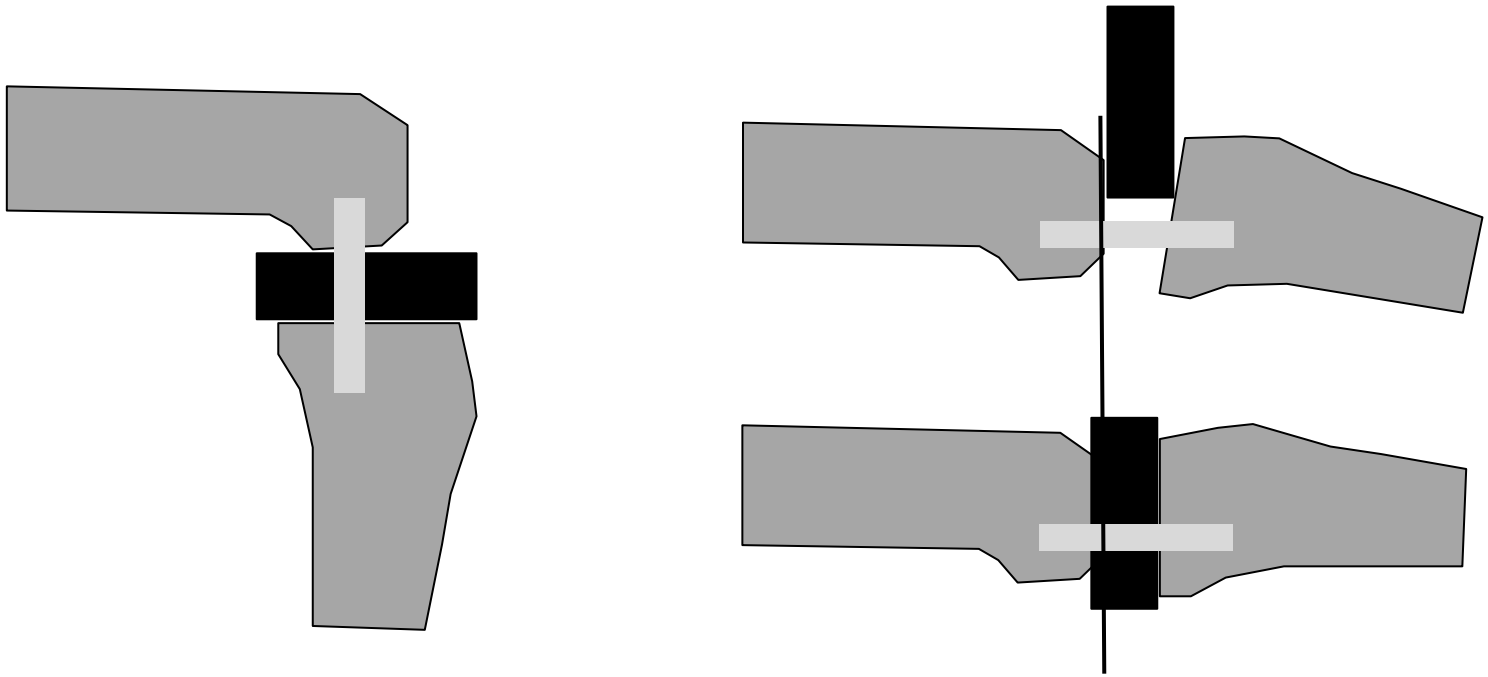
Planning extension gap



Proper ligament balancing

Here: Stryker Ligament Balancer

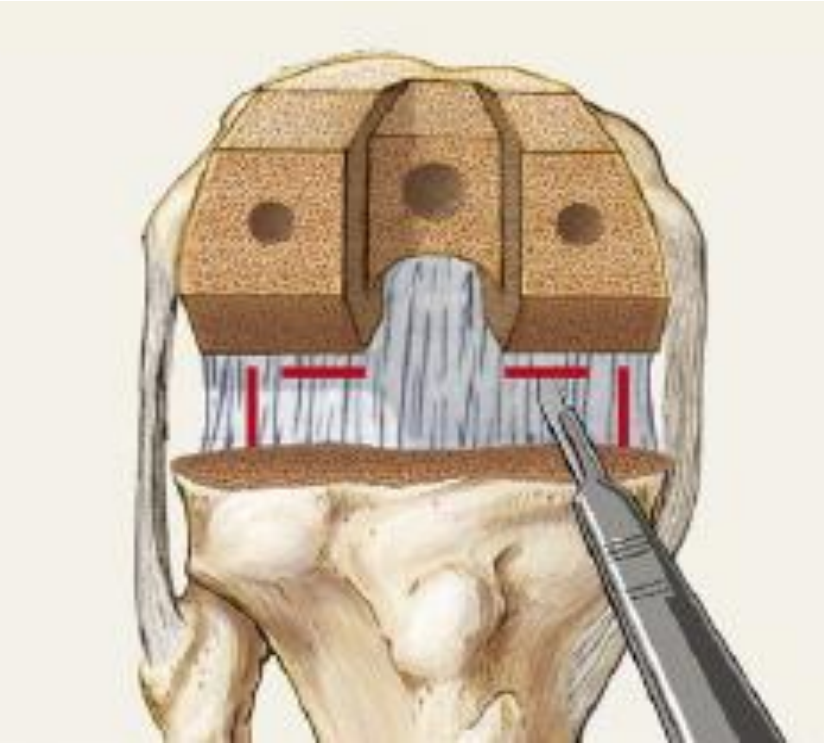
Planning extension gap



Additional distal femur resection
(systematic in moderate flexion contractures: +2mm)

Flexion contracture

Incisions of posterior capsule

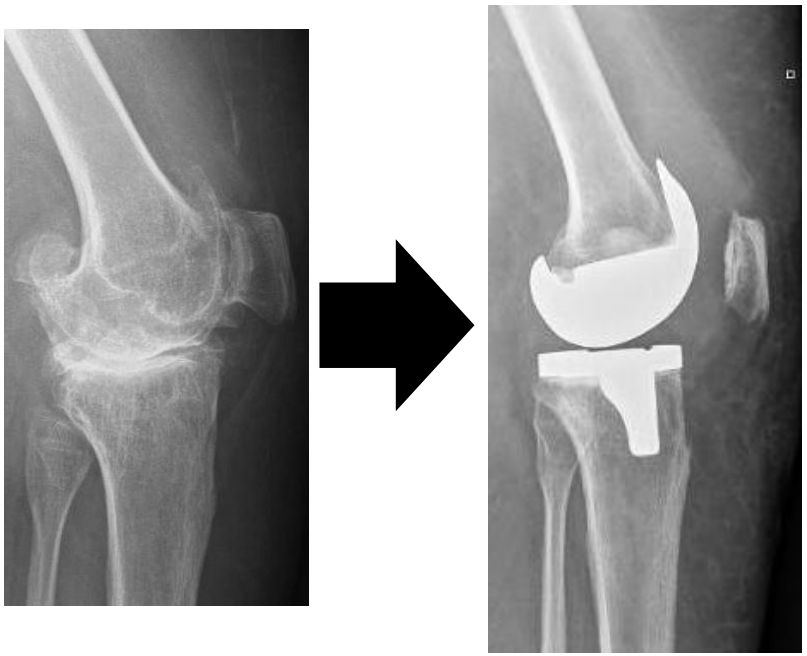


From: Scuderi G and Kochhar T,
J Arthroplasty 2007

- In extension
- Laminar spreader

Which level of constraint ?

Conservation of PCL ?



Level of constraint	Type of prosthesis
0	PCL retaining
1	Post. Stabilized
2	Constrained condylar
3	Rotating hinge
4	Rigid hinge

Which level of constraint ?

Conservation of PCL ?

Level of constraint	Type of prosthesis
0	PCL retaining
1	Post. Stabilized
2	Constrained condylar
3	Rotating hinge
4	Rigid hinge

Patellofemoral

Anterior femoral undersizing

↓

Quadriceps insufficiency + anterior knee pain

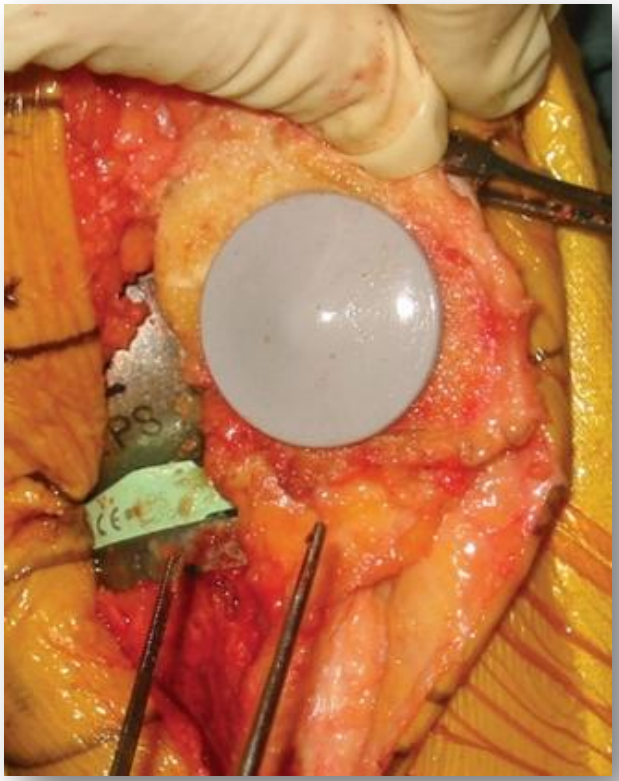
Patellofemoral

Patellofemoral overstuffing

↓

Lack of flexion

Patella baja



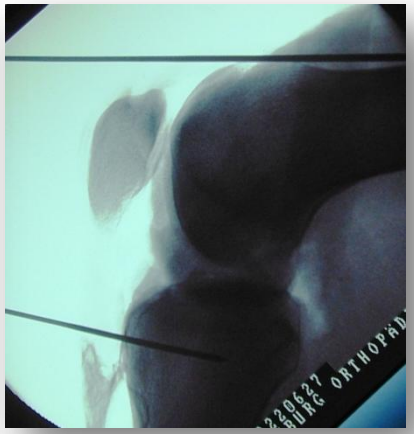
From: Hocking & MacDonald. Managing Patella Problems in Primary TKA.
In: Lotke PA, Lonner JH. Master Techniques in Orthopaedic Surgery.
Knee Arthroplasty.
Wolters Kluwer/Health 2009

Patellar resurfacing:

- Not systematically (in my hands)
- As proximal as possible with smaller patellar button
- Remove inferior portion of patella without compromising stability of patellar tendon

Patella baja


Labelle-Laurin method



ATT proximalization

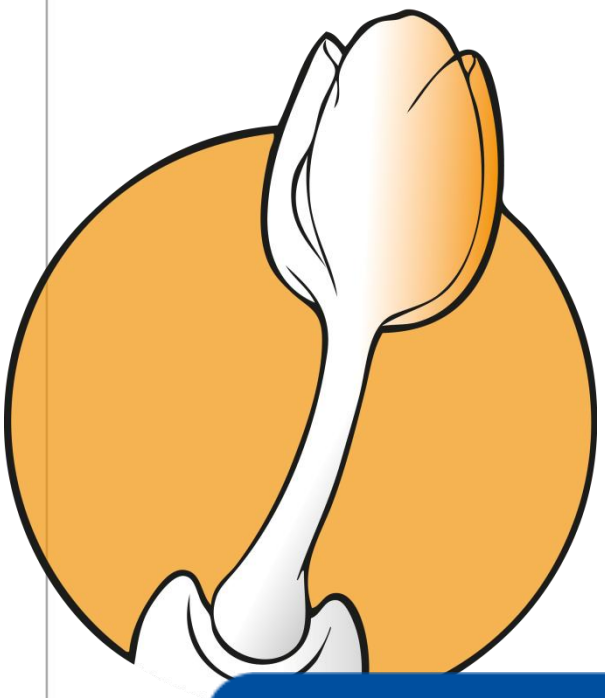
1. Identify physiologic patellar height by lateral radiograph at 90° of knee flexion on contralateral knee
2. Fluoroscopic intraoperative control
3. ATT osteotomy (fragment > 5 cm)
4. Create step-off at superior pole
5. Use compression screws (posterior cortex)

Laurin CA, JBJS-B, 1977

AMSTERDAM / THE NETHERLANDS

16th ESSKA Congress

May 14-17, 2014



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