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European
Knee
Society



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Diagnosis: instability vs laxity

F. Benazzo

INSTABILITY AND LAXITY NOWADAYS

Up to date, many modern forms of Computer Assisted Surgery are not able to prevent the dynamic instability/laxity

Editorial > [Front Surg.](#) 2023 Jul 11:10:1247759. doi: 10.3389/fsurg.2023.1247759.

eCollection 2023.

Editorial: Alignment options and robotics in total knee arthroplasty (TKA) "Alignment, alignment, alignment, but TKA fail mainly for infections and instability"

Pier Francesco Indelli ^{1 2 3 4}, Andrea Giordano Salvi ^{1 4}, Giuseppe Petralia ⁵

It is essential to follow traditional rules:
in diagnosis and in the choice of treatment

LAXITY

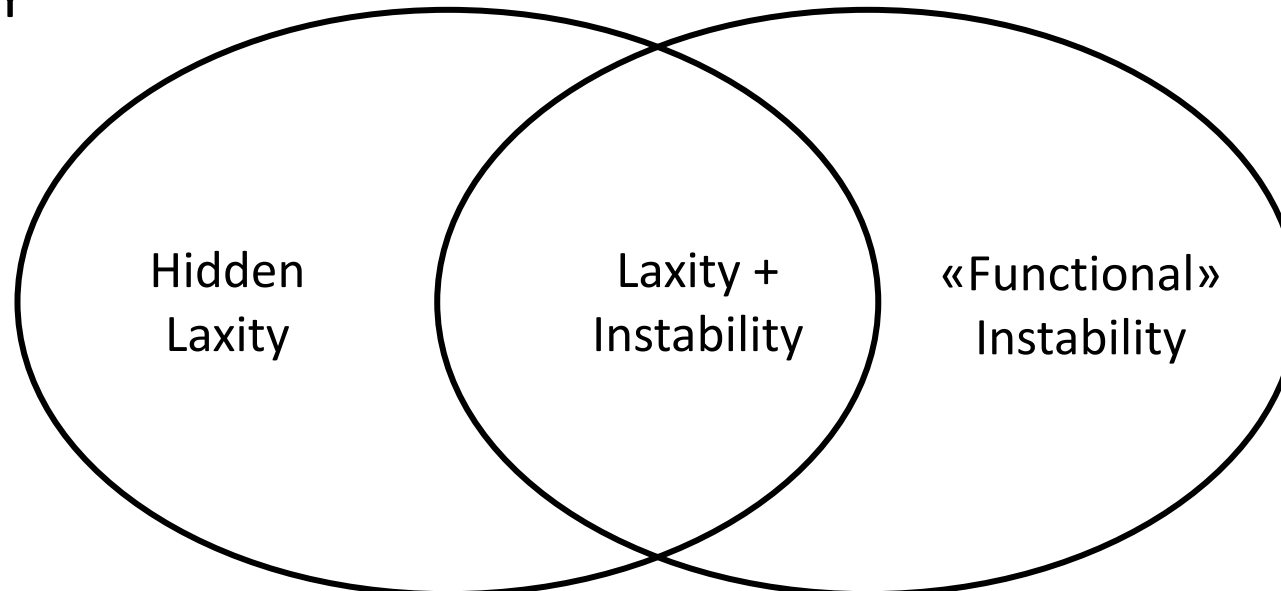
INSTABILITY

Objective mechanical situation:
excessive articular motion
between tibia and femur

Subjective feeling of a knee
unstable/lax or pain with effusion

LAXITY

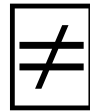
INSTABILITY



LAXITY / INSTABILITY



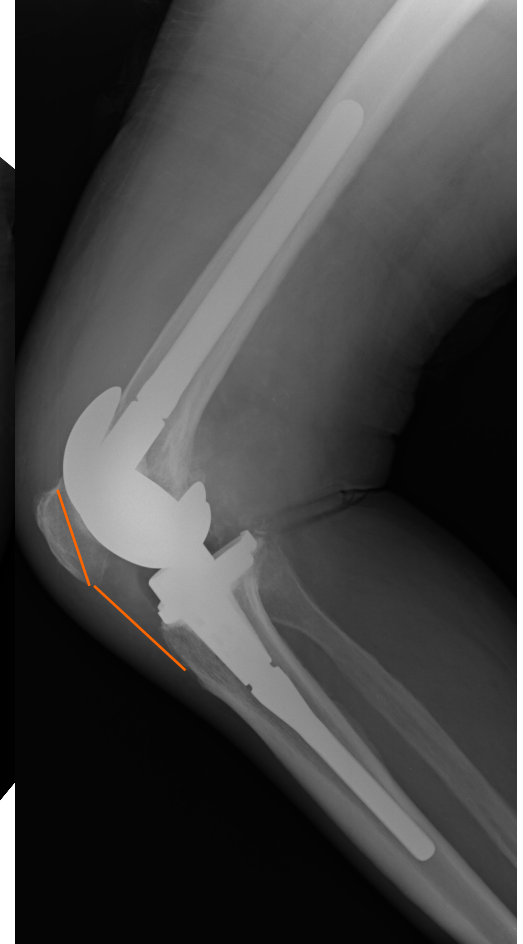
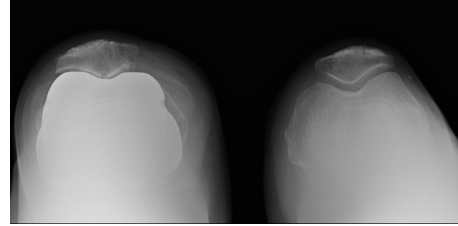
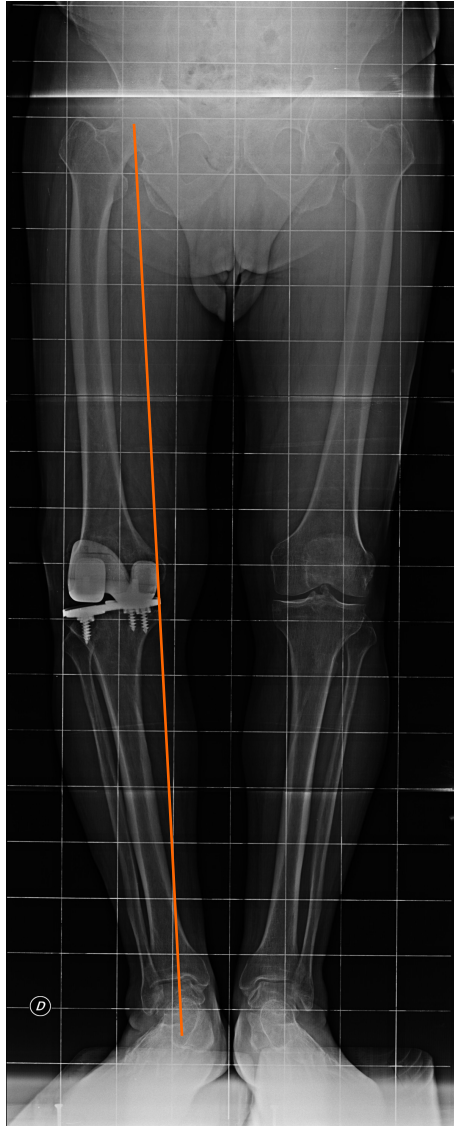
**True laxity causing
permanent instability**
(ligament incompetence)



Pseudo-laxity causing
remediable instability
(bone loss and component
subsidence)



TRUE LAXITY



PSEUDOLAXITY

A: Laxity for femoral subsidence



B: Laxity for excessive tibial varus

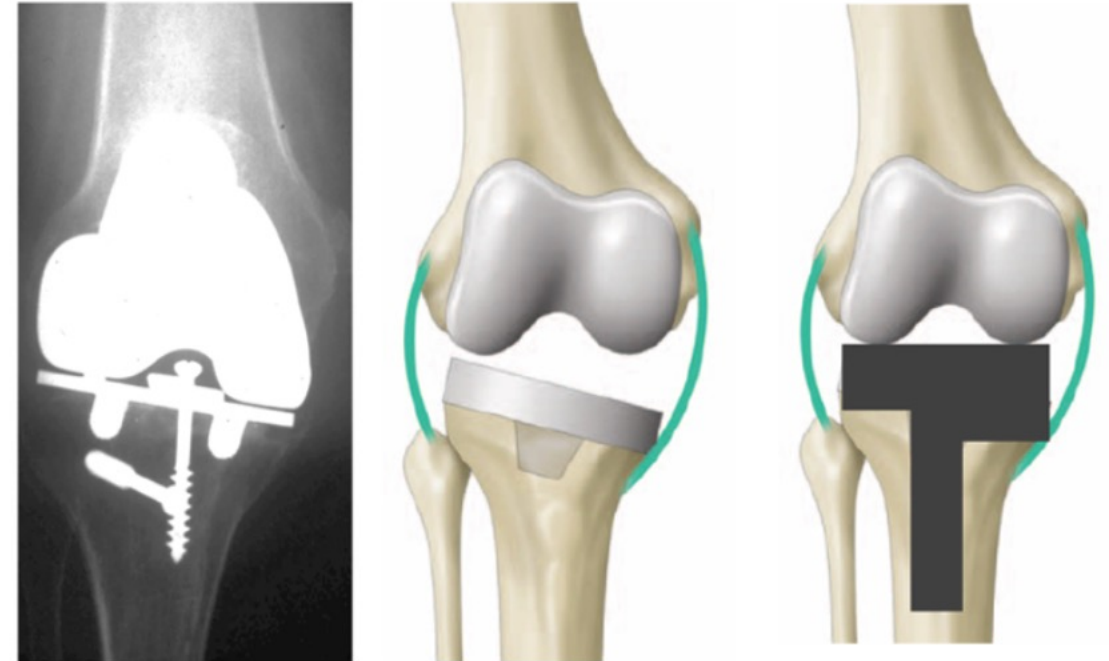
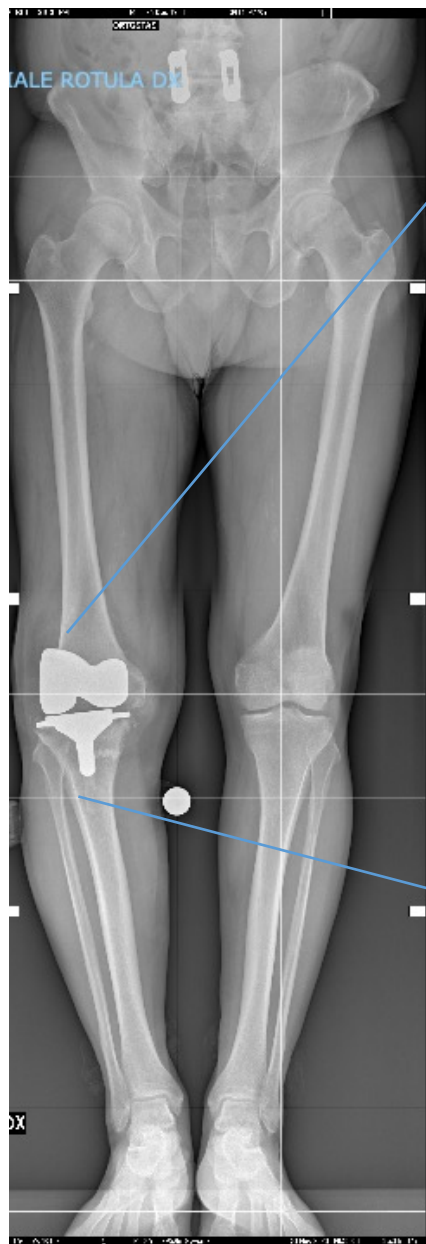


Fig 4 : Chez ce patient, la pièce fémorale est basculée en varus, ce qui induit une laxité avec enveloppe ligamentaire saine. Il suffit de corriger la malposition prothétique pour corriger la laxité, sans prothèse contrainte.

D'après : Bonnin M., Laurent J.-R., Hutten D. Reprises de prothèses totales du genou. EMC (Elsevier Masson SAS, Paris), Techniques chirurgicales - Orthopédie-Traumatologie, 44-848, 2009.



Needs:

- Bone reconstruction
- Stability for better subjective feeling



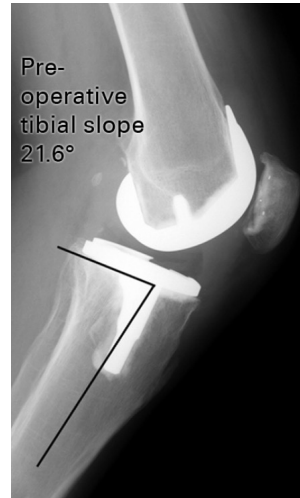
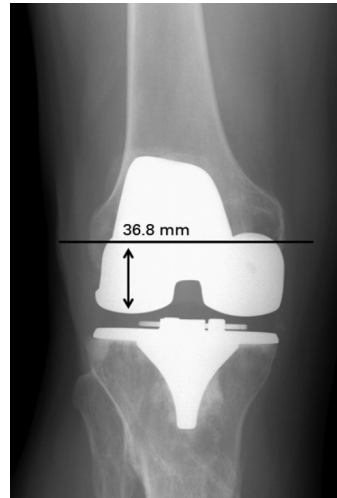
MID-FLEXION LAXITY (SAGITTAL LAXITY)

Due to :

- Excessive femoral resection with elevation of the joint line → downsizing of the femoral component →
- Insufficient reproduction of the posterior condylar offset
- Altered obliquity of the joint line, excessive slope

**Loose flexion
space**

«Any defect on these three points poses a risk of mid-flexion instability of the knee, leading to pain, effusion, or instability, with difficulties in ascending and descending stairs in sequence»



CONCEPT OF FLEXION LAXITY AND INSTABILITY

Flexion instability arises when the flexion space is larger or more lax than the extension gap (therefore when laxity exists)

Symptoms:

- Feeling of 'shifting' or 'sliding,' especially during stairs or rising from sitting
- Anterior knee pain and fatigue in CR-TKA patients
- Diffuse peri-retinacular tenderness and low-grade effusions
- Potential flexion contracture due to overworked quadriceps

Common findings:

- Aseptic effusions
- Tenderness in pes anserinus and hamstring tendons
- Multiplanar instability in flexion with medial and lateral laxity
- Gait observation: assess for compensatory patterns in coronal/AP motion

[Review](#) > [J Am Acad Orthop Surg](#). 2019 Sep 1;27(17):642-651.

doi: 10.5435/JAAOS-D-18-00347.

Flexion Instability After Total Knee Arthroplasty

Jeffrey B Stambough ¹, Paul K Edwards, Erin M Mannen, C Lowry Barnes, Simon C Mears

CONCEPT OF FLEXION LAXITY AND INSTABILITY

Clinical diagnosis:

- combination of patient history, physical exam, and radiographic findings
- diagnosis of exclusion after ruling out infection or other causes

Indicators:

- history of poor outcomes post-arthroplasty
- evidence of imbalance in flexion-extension gaps
- chronic pain and mechanical symptoms

Review > [J Am Acad Orthop Surg](#). 2019 Sep 1;27(17):642-651.

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Flexion Instability After Total Knee Arthroplasty

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GLOBAL LAXITY



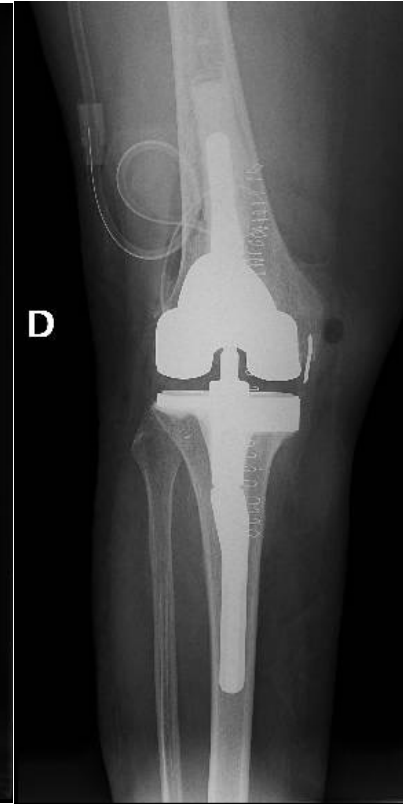
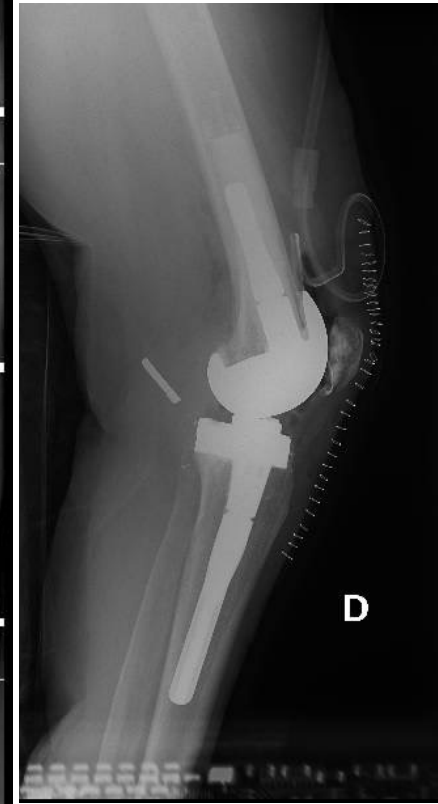
Etiologies

- Polyethylene Wear
- Fracture
- Infection
- Extensor Mechanism Disruption
- Ligament Rupture
- Previous Flexion Instability

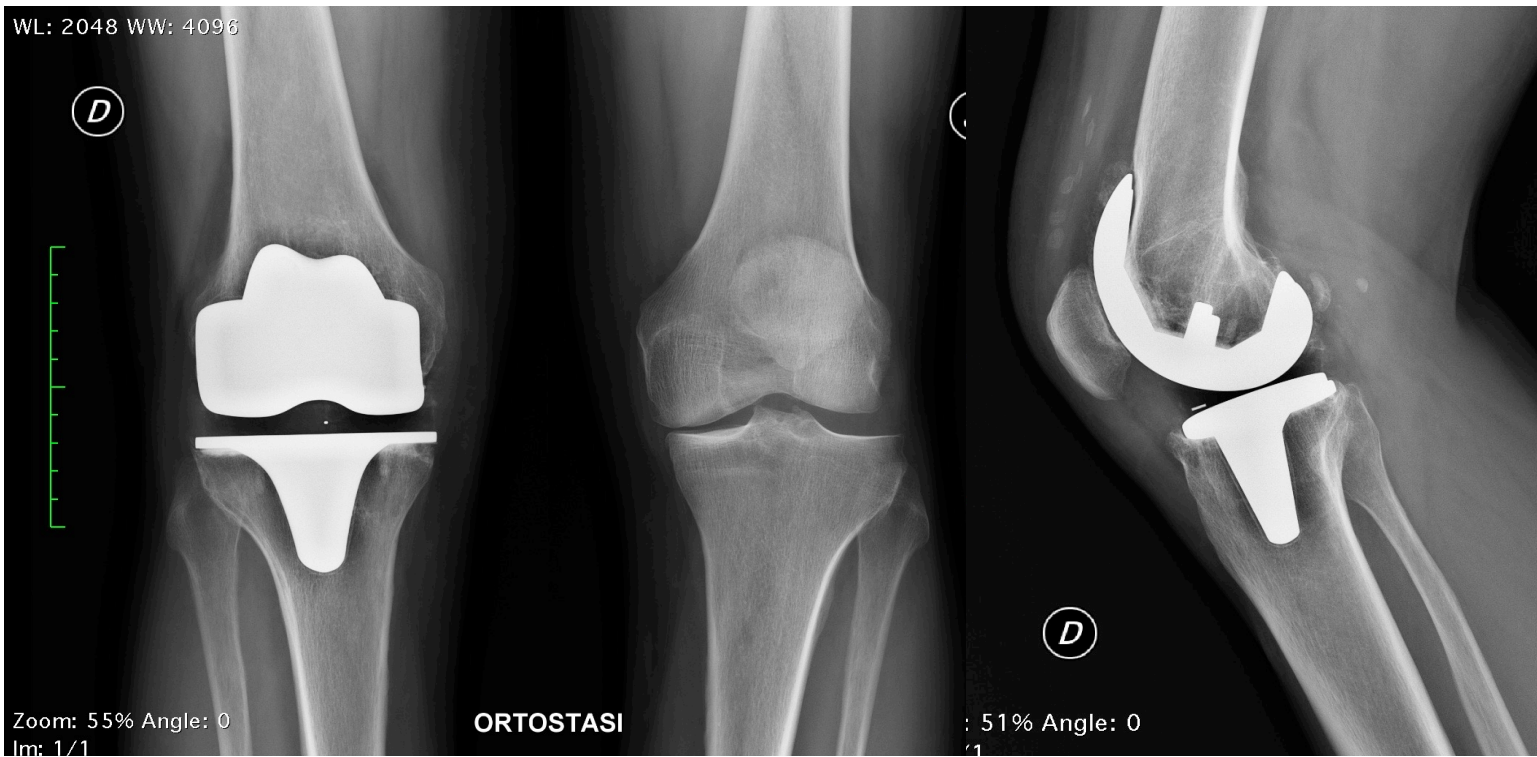
Consequences

- Tibiofemoral Dislocation
- Arterial Laceration
- Poor Outcomes

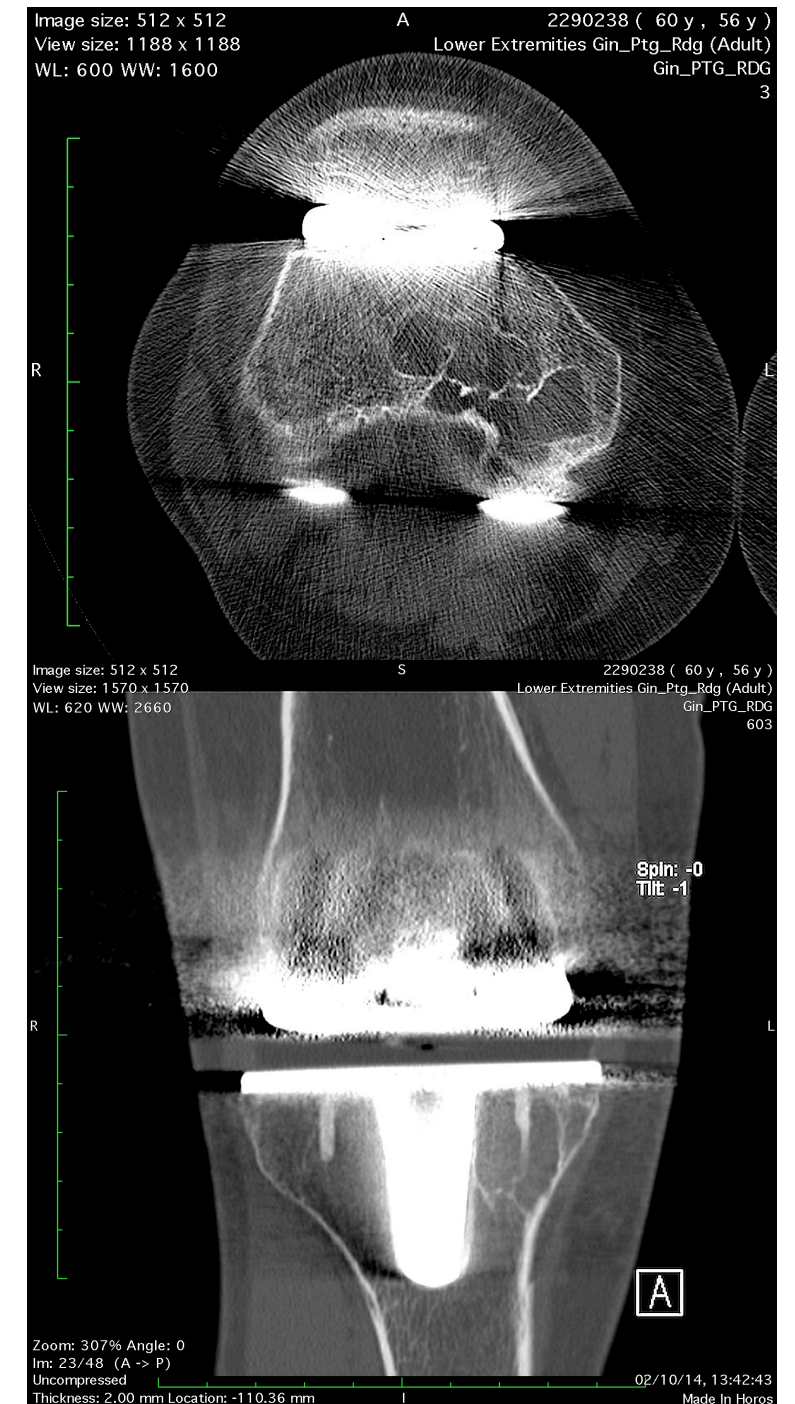
PSEUDOLAXITY – SUBSIDENCE OF THE TIBIAL TRAY

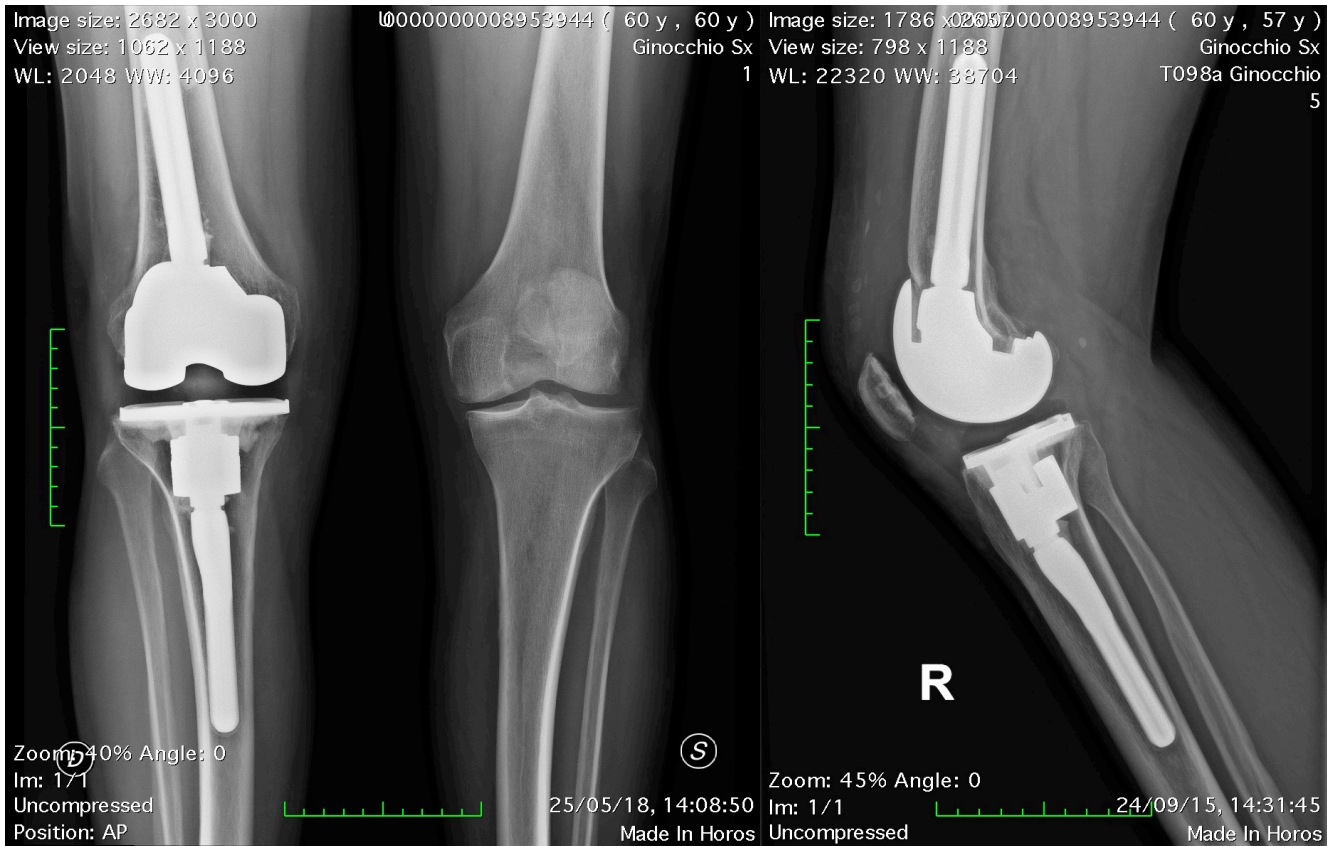


VVC for better feeling of stability



- Patient: Man, 62 years old
- TKA right knee 12 years before
- Progressive pain at weight bearing and walking after 7 years; giving way for pain
- No night pain





- LCCK
- Long polished stems
- Metaphyseal cone (femur)
- Central cone (tibia)
- PS liner



True laxity and severe instability (severe recurvatum!)

- Female, 80 ys old
- BMI: 40,6 (morbid obesity)
- Right TKA (2011) and left TKA (2012)
- Progressive disability after minor trauma on the left side



Solution: RHK

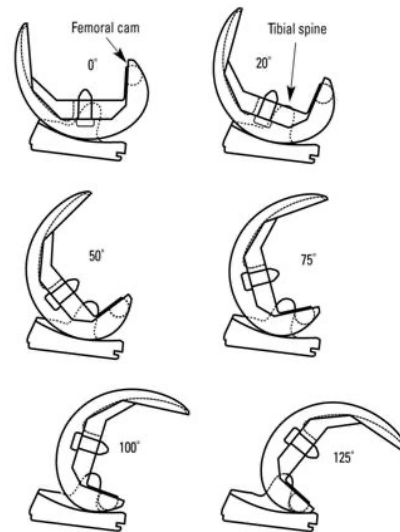
- Rotating Hinge Knee
- TM diaphyseal femoral cone (small)
- TM tibial cone and bone grafting
- Short stems (15 x 30)
- No patellar resurfacing



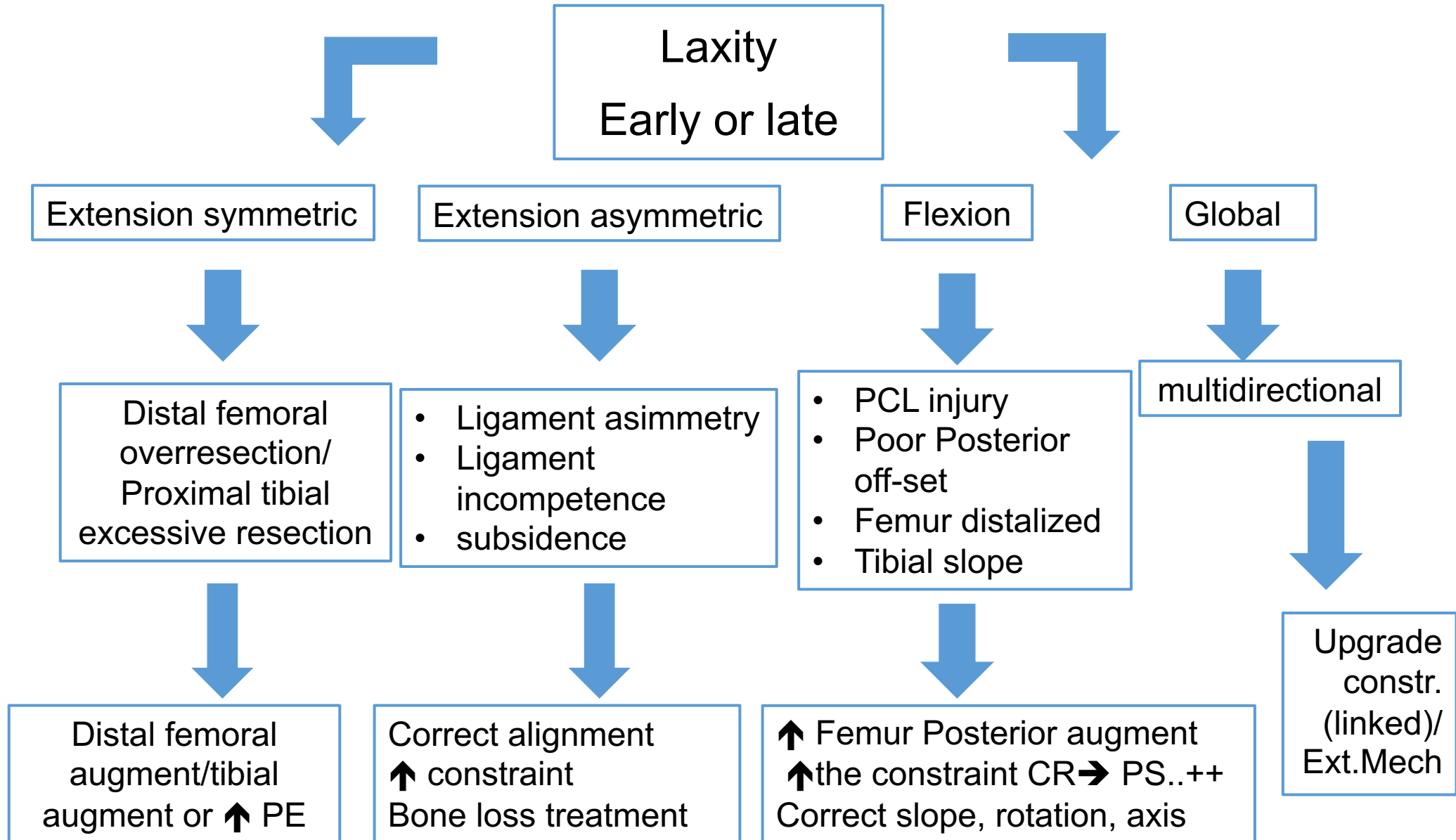
What is Constraint ?

‘ the resistance to displacement & rotation between femoral & tibial components when forces & moments are applied ’

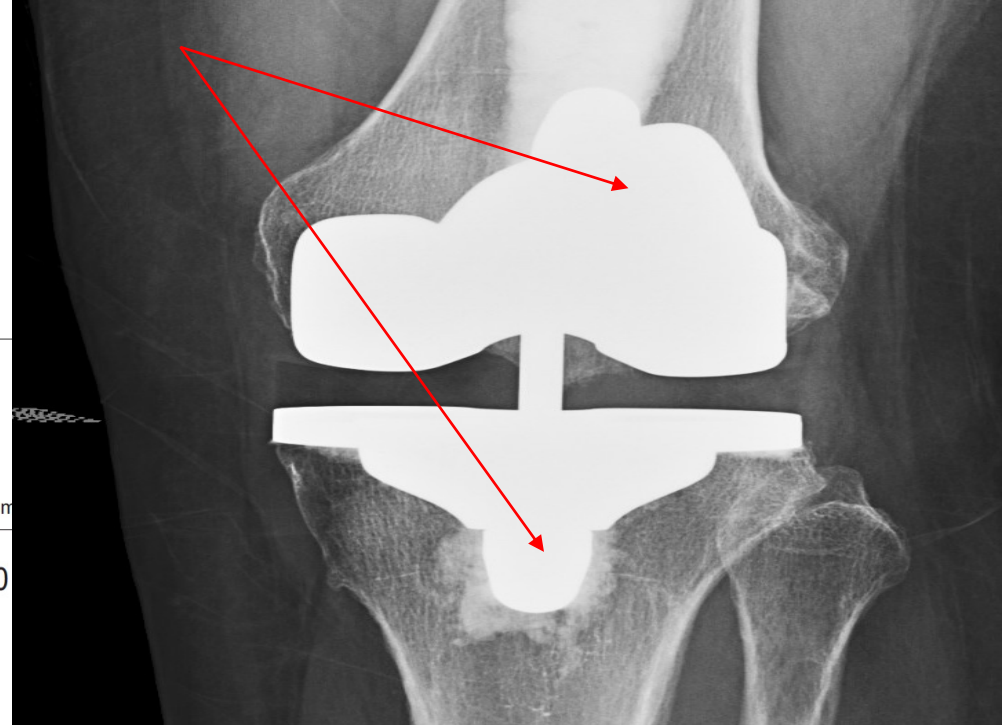
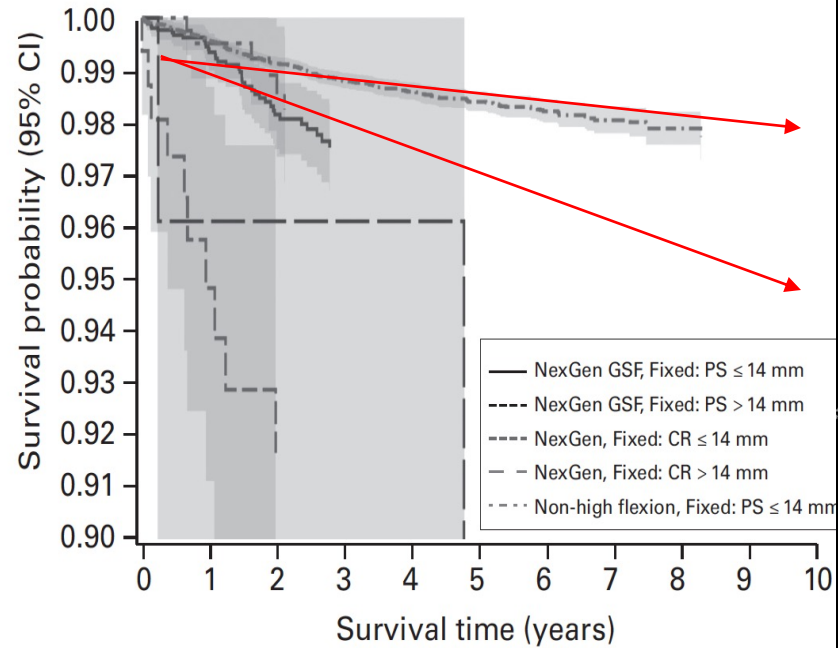
P. Walker (2005)



CHOICE OF CONSTRAINT

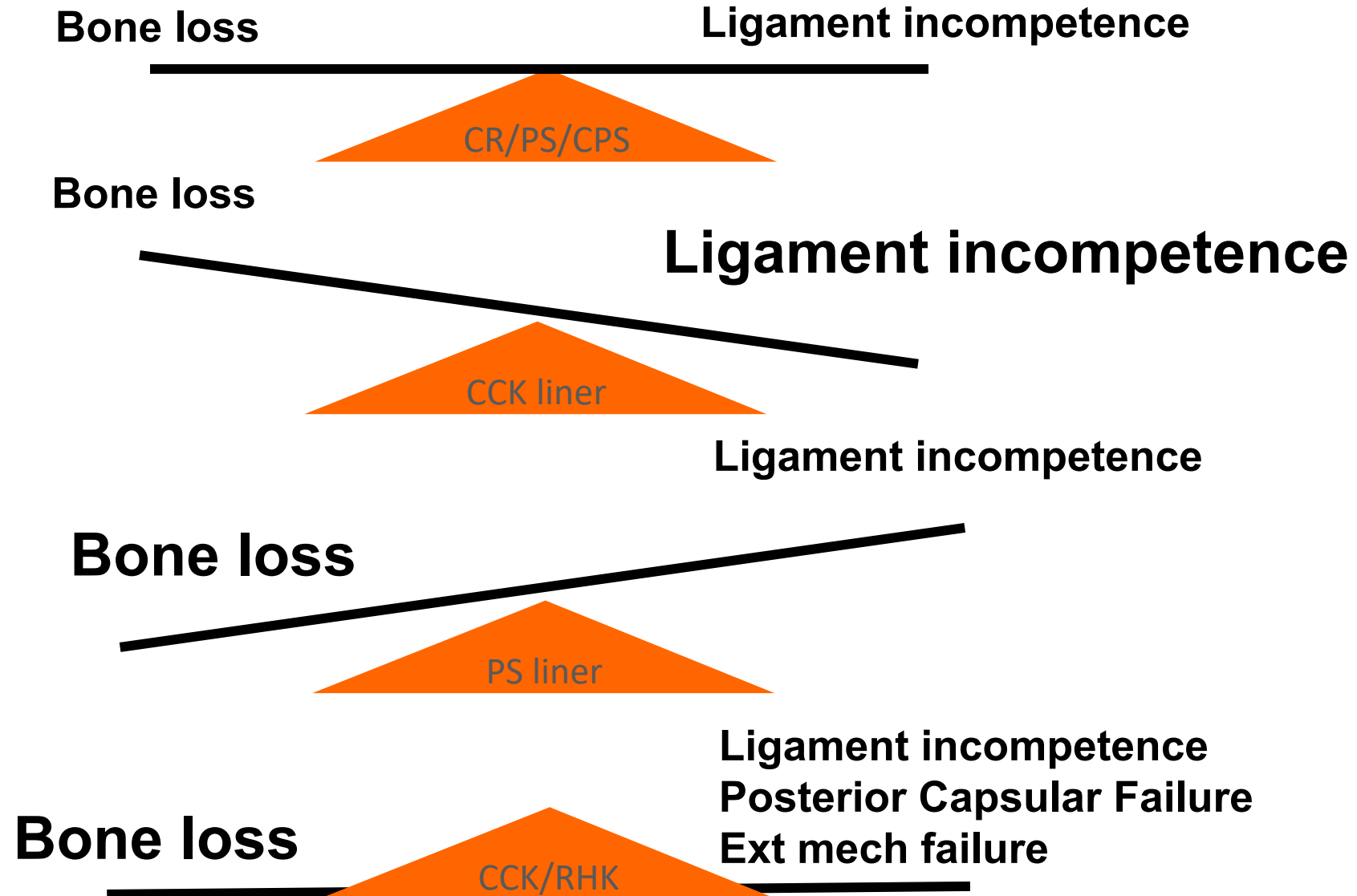


BEWARE: Polys Greater than 14mm



Berend+ JOA 2010
Namba+ BJJ 2014

Level of constraint



Our algorithm in revision

Revision
Implants

**Bone loss: reconstruction
(cones, augments)**

**Ligament
incompetence**

CCK
(components)

**Bone loss: reconstruction
(cones, augments)**

**Ligament incompetence
Posterior Capsular Failure
Ext mech failure**

RHK/Hinge

CR/MC/UC/PS/CPS/PS+

- Rare, very early revisions
- UNI (?!!)
- Liner Exchange

CCK with PS liner

- Very well balanced knee
- Higher demanding/younger patient

CCK with CCK liner

- **Ligament laxity/insufficiency**
- Lower demanding patient

RHK/Hinge

- great deformity, old/low demanding patient
- Need to upgrade the constraint
- **Very severe ligament insufficiency** or bone loss
- Ext Mech failure
- Posterior capsular failure

Conclusions

- Diagnosis rationale: true laxity / pseudolaxity
- Bone reconstruction: basic step to regain ligament competence
- Not mandatory to increase the level of constraint
- Tendency to use CCK liner with CCK design: internal bracing concept

New concepts?

Robots, personalized alignments, and modern implants are introducing new concepts...

"A loose lateral flexion gap (3-6 mm) in functionally aligned CR TKA does not negatively affect short-term outcomes and may improve stair descent"

> [Knee Surg Sports Traumatol Arthrosc.](#) 2024 May;32(5):1317-1323. doi: 10.1002/ksa.12087. Epub 2024 Mar 21.

Functionally aligned total knee arthroplasty: A lateral flexion laxity up to 6 mm is safe!

Jeremy Nixon ¹, Baha John Tadros ^{1 2}, Ignacio Moreno-Suarez ², William Pretty ², Dermot Collopy ^{1 2}, Gavin Clark ^{1 2 3}

TAKE-HOME MESSAGE

- Important to distinguish between laxity and instability for accurate diagnosis and treatment
- Rule out infection and identify the cause
- For revisions: appropriately choose the degree of constraint
- Robotic technologies: do they play a role?