Dealing with bone loss in difficult primary Total Knee Arthroplasty

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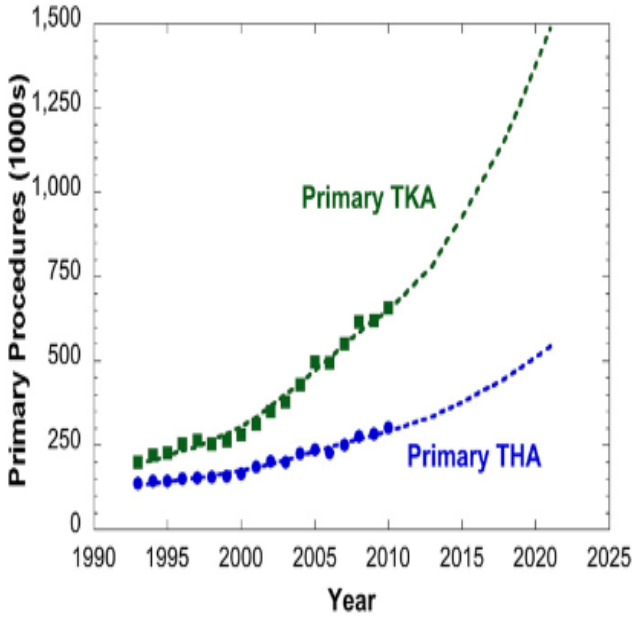
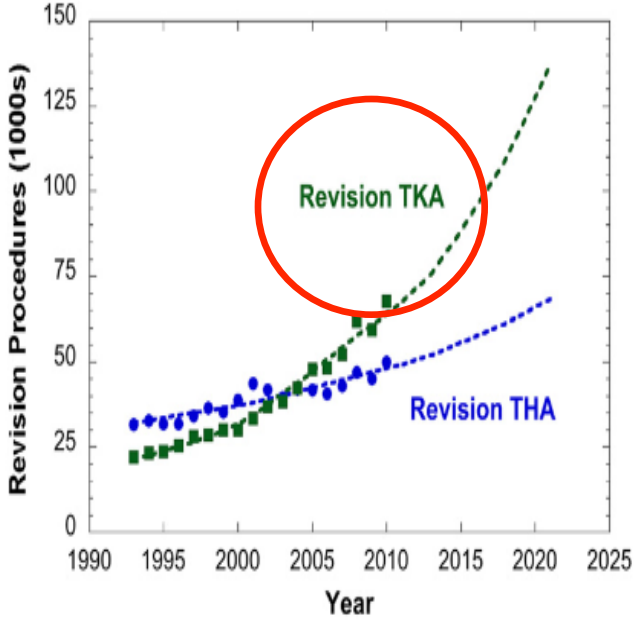
Vision 2020: Perspectives of revision TKA





Kurtz S et al, JBJS Am 2014

Revision Total Joint

Procedure	2005	2010	2015	2020
Primary total hip arthroplasty	231,648 (184,165 to 279,132)	293,094 (237,717 to 348,472)	378,089 (308,449 to 447,729)	511,837 (413,092 to 610,583)
Primary total knee arthroplasty	471,088 (386,256 to 555,920)	655,336 (555,891 to 754,782)	926,527 (799,578 to 1,053,476)	1,375,574 (1,193,173 to 1,557,975)
Revision total hip arthroplasty	42,451 (26,279 to 58,623)	48,209 (29,296 to 67,122)	55,647 (31,851 to 79,442)	65,964 (32,030 to 99,898)
Revision total knee arthroplasty	47,262 (31,724 to 62,800)	64,129 (45,861 to 82,397)	88,274 (64,869 to 111,679)	127,510 (93,614 to 161,405)

*The values are given as the number of procedures, with the 95% CI in parentheses. Confidence intervals are approximate values only and did not incorporate some sources of uncertainty (e.g., future population) in the data.

TKA

Knee Osteoarthritis

+

=

Total Knee Arthroplasty

- Alleviating pain
- Restore Knee Function

TKA: Basic requirements

"Just enough, not too much"

- **Mobility**
- **Stability**

→ **Constraint**

Best compromise

- **Alignment**
- **Fixation**

→ **Stem and augments**

Basic questions

Systematic

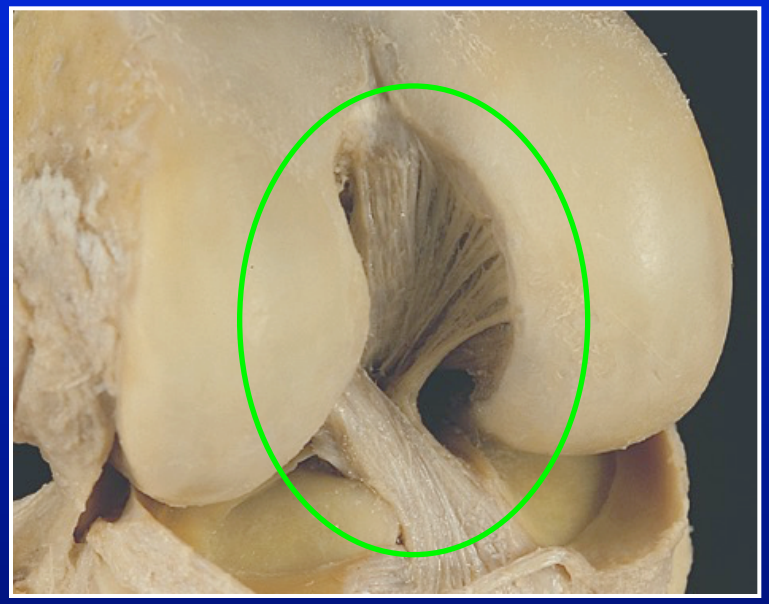
- **W**ear / **B**one stock
- **S**tability
- **A**lignement

Pr. J.M. Aubaniac, 1972

Systematic preoperative Evaluation

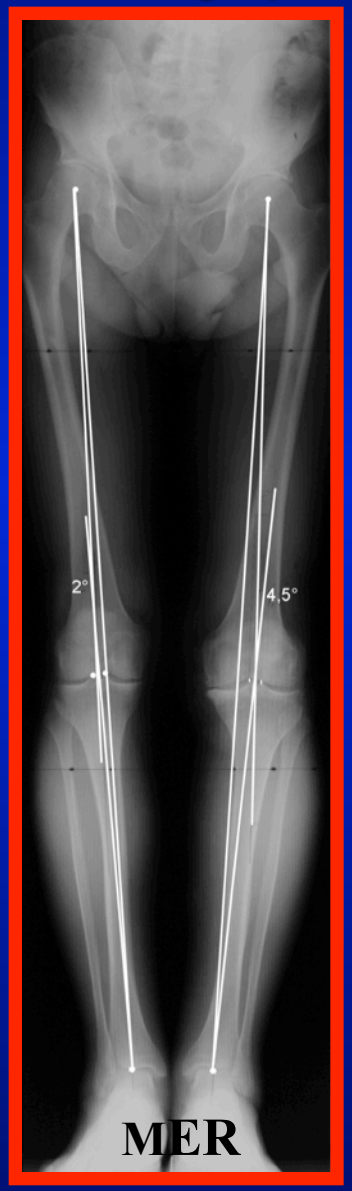
1. Clinical evaluation :

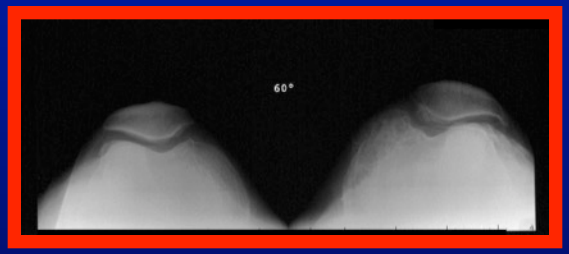
- Range of motion
- Sagittal and frontal stability +++
- Patellofemoral joint status

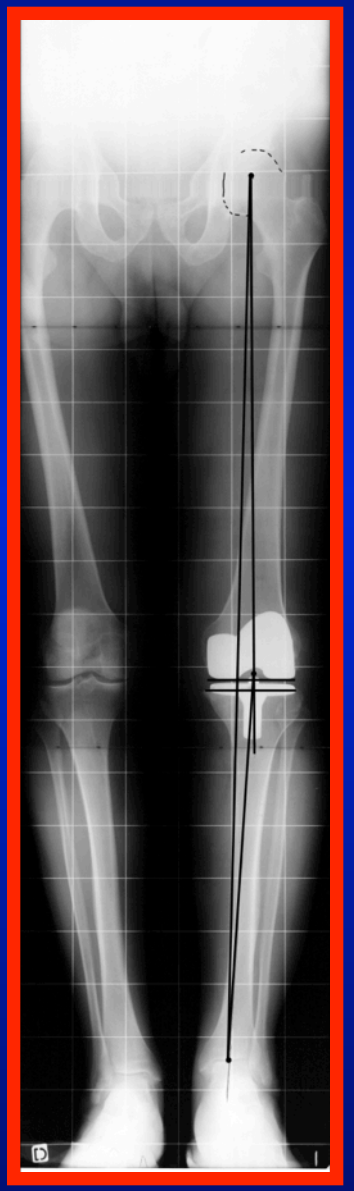


Systematic preoperative Evaluation

Radiographic evaluation





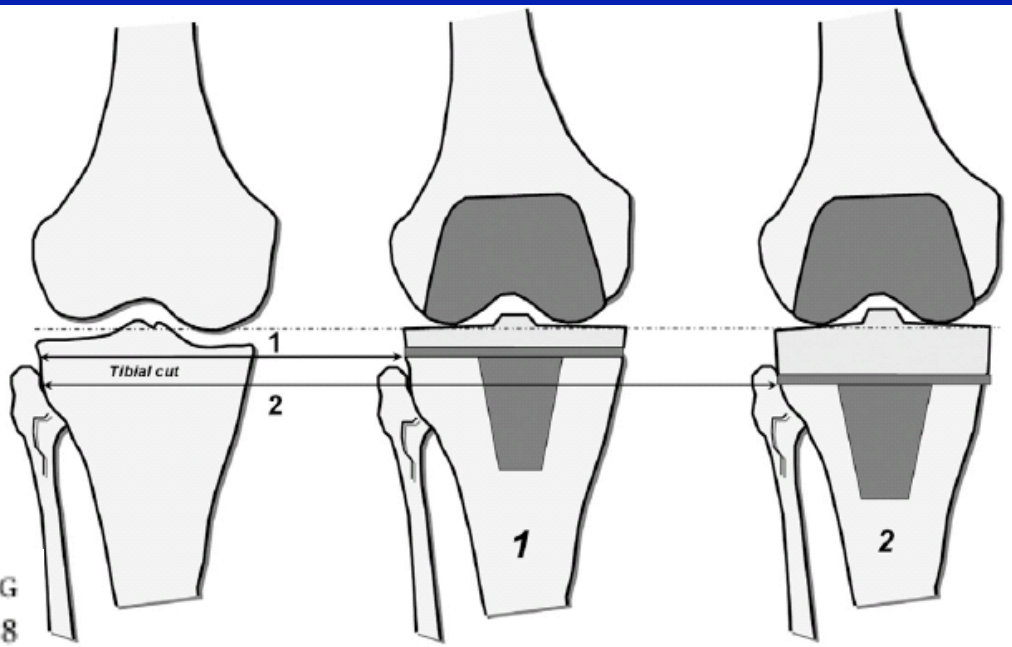


TKA ⇔Stable Knee

Instability after TKA 10 to 22%

Compromise
Motion stability

➡ **Best option?**



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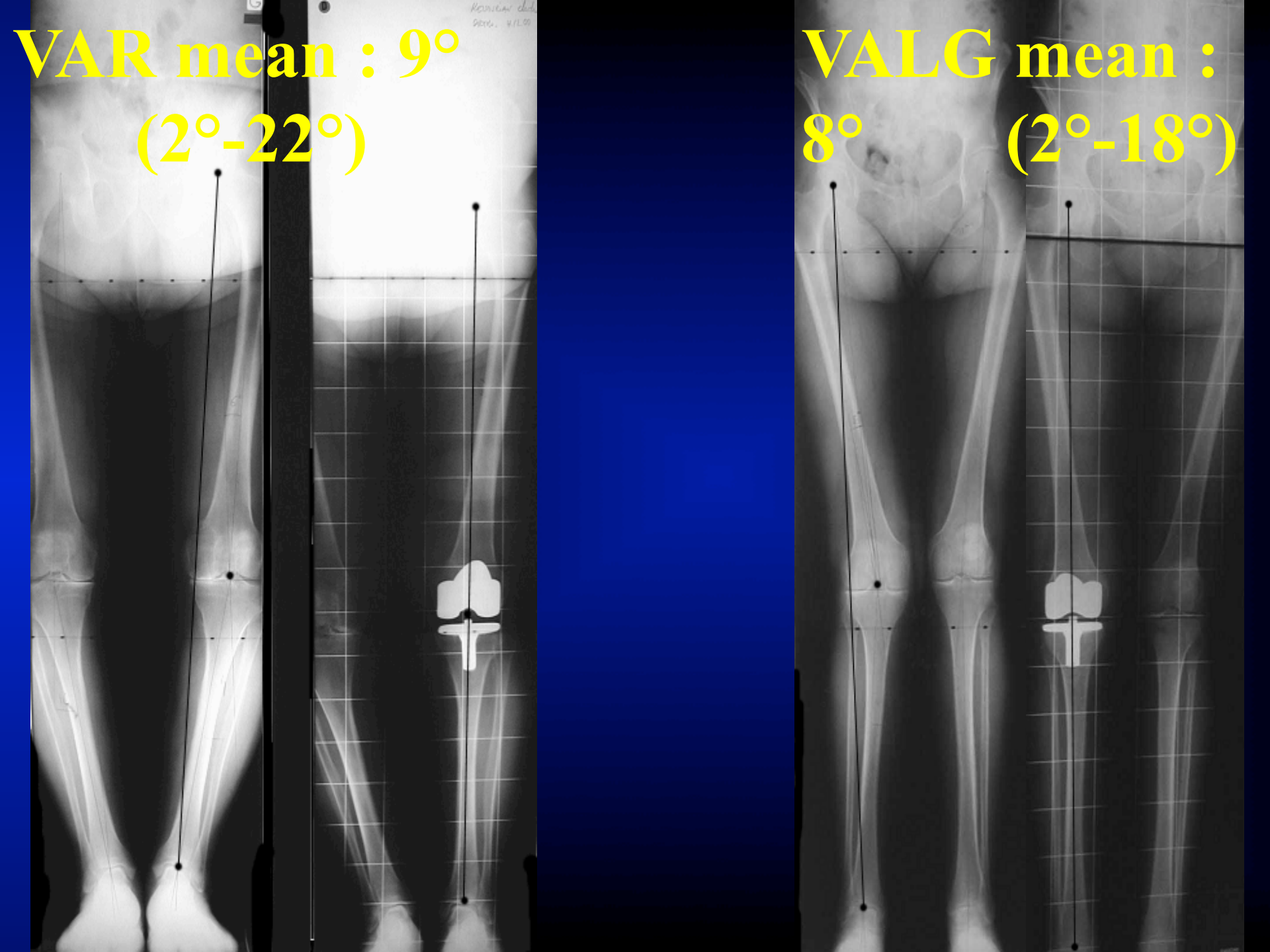
VOLUME 90-A · NUMBER 1 · JANUARY 2008

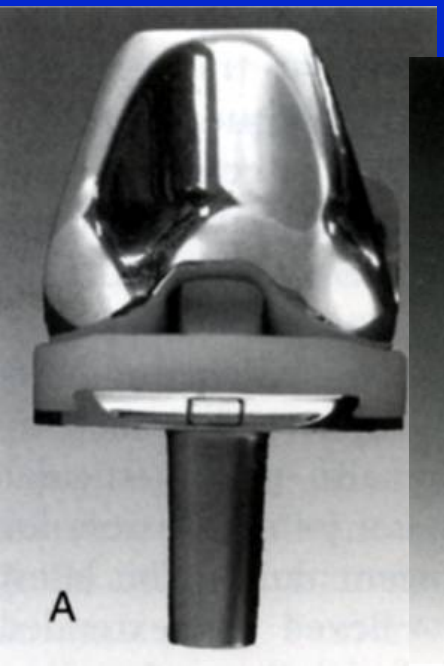
Instability After Total Knee Arthroplasty

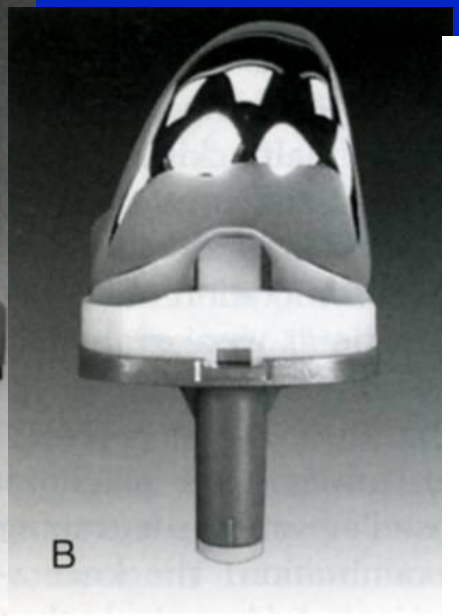
By Sebastien Parratte, MD, and Mark W. Pagnano, MD

An Instructional Course Lecture, American Academy of Orthopaedic Surgeons

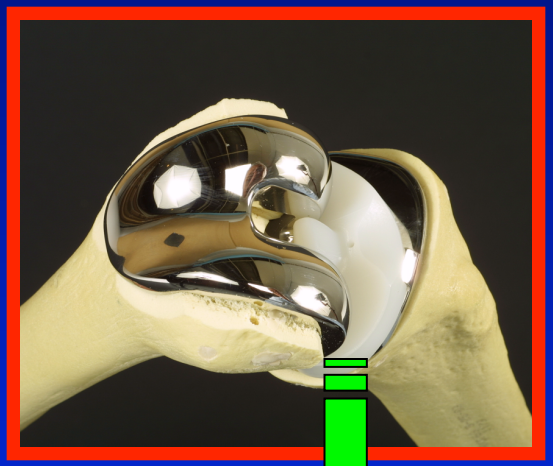

VAR mean : 9°
(2°-22°)
VALG mean :
8° (2°-18°)

Improving Design of TKA
Moving towards Persona(l) fit





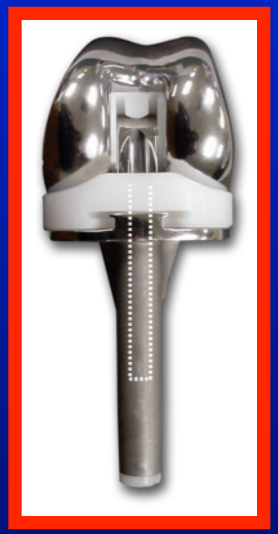
LPS flex

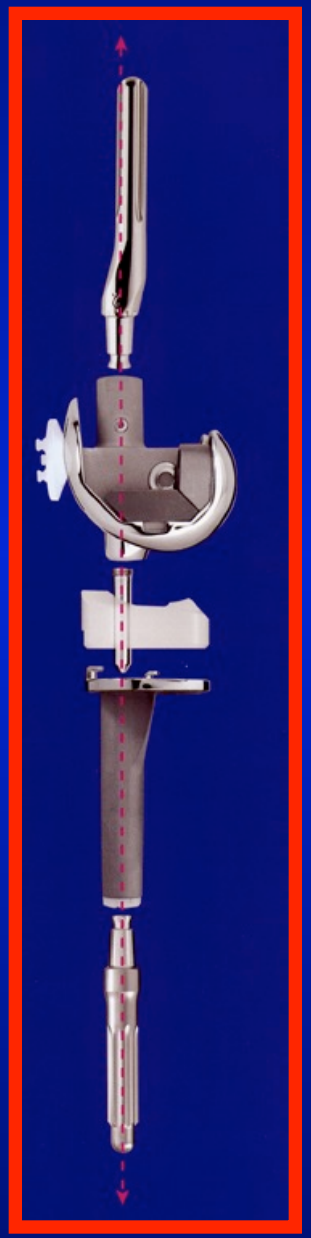


LPS flex +
wedge +stem

C C K

R H K



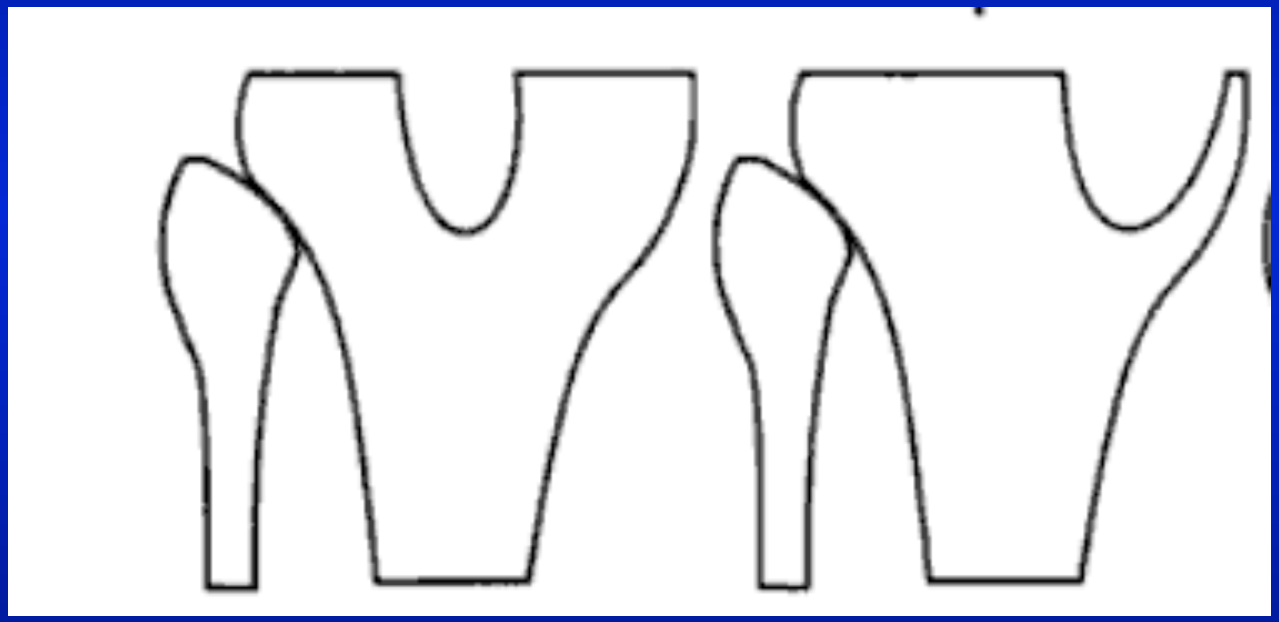


Management of bone loss

1. Where ?
2. Why ?
3. What can we use ?
4. Why and how do I use Tantalum

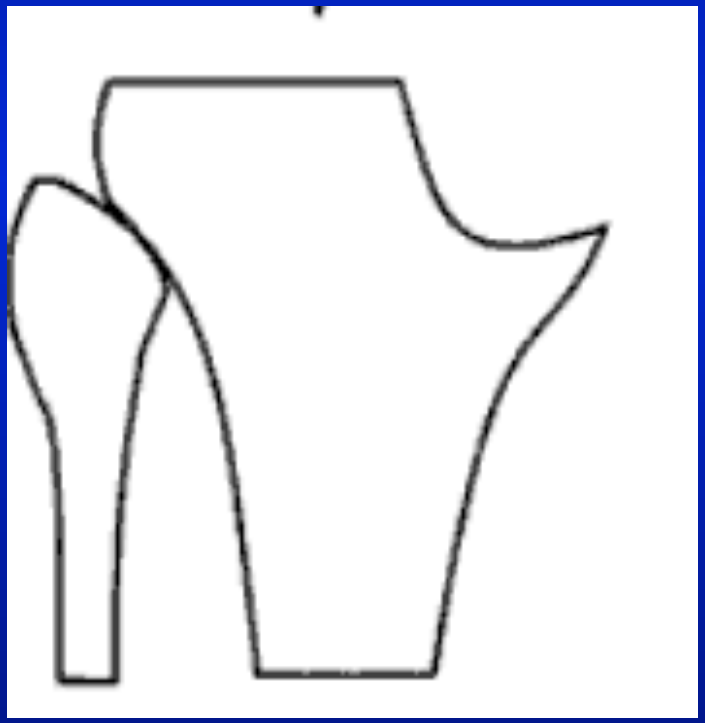
In the real life

Cavitary = fill

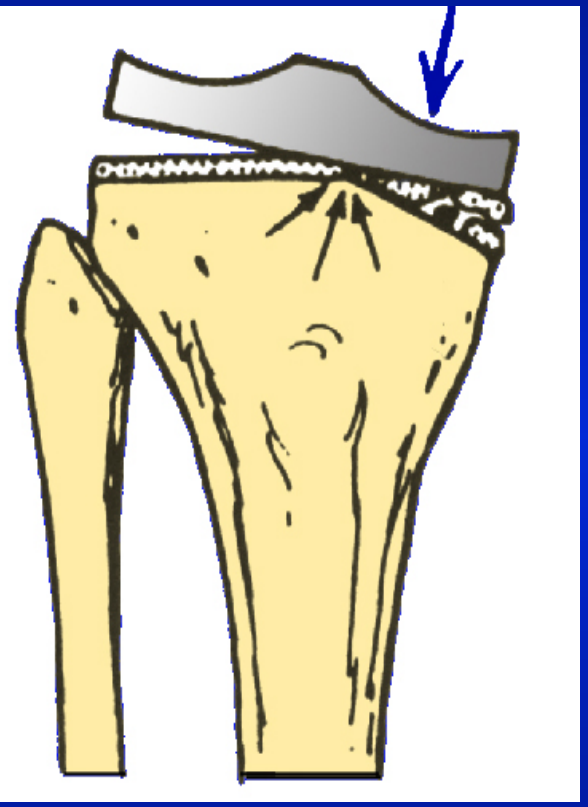


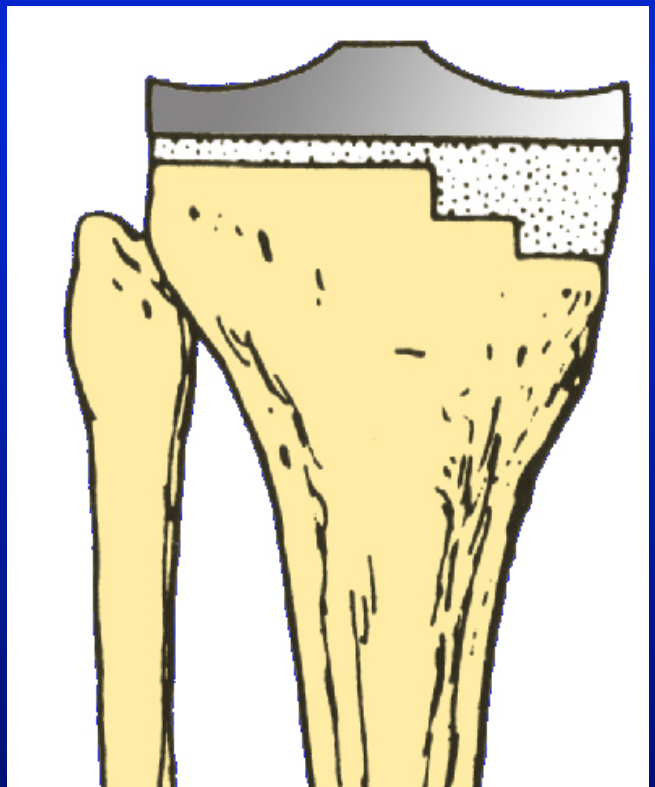
In the real life

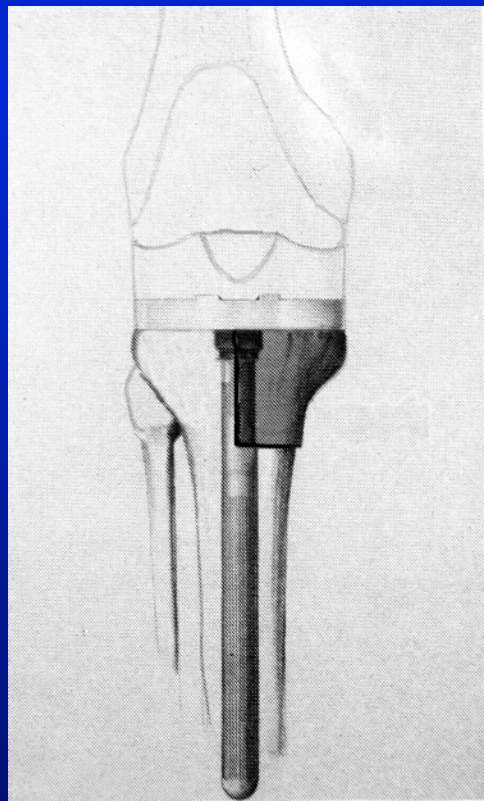
Segmental = rebuild



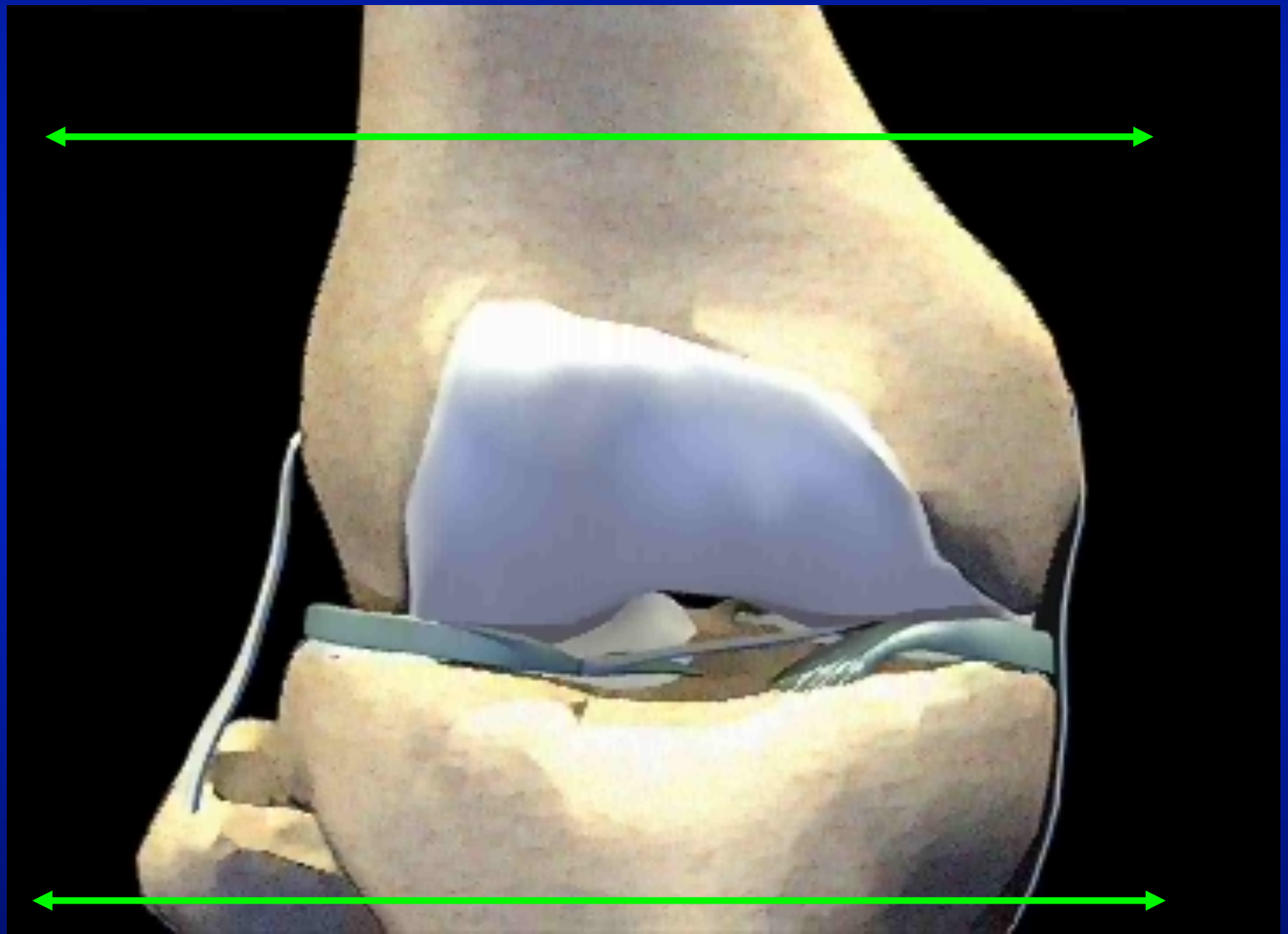
1st Key point at this step: the bone stock



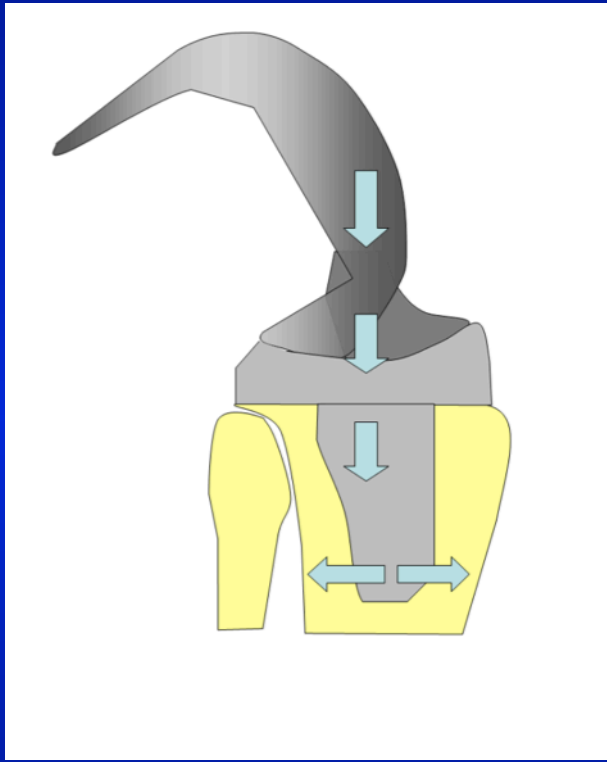




2nd Key point at this step: the ligaments



Need for higher constraints



Problems

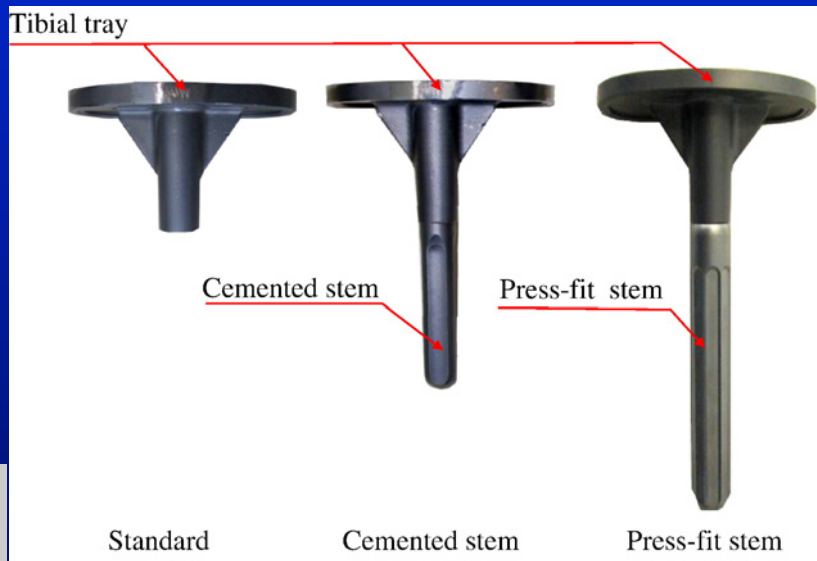
- Higher constrains
- Increase bone stress
- Need for a stem

Different type of stems

Tibial / Femoral :

- Cemented
- Uncemented
  - Hydroxy-apatite
  - Trabecular-metal

Hybrid Fixation



The influence of different tibial stem designs in load sharing and stability at the cement–bone interface in revision TKA; Completo The Knee 2008

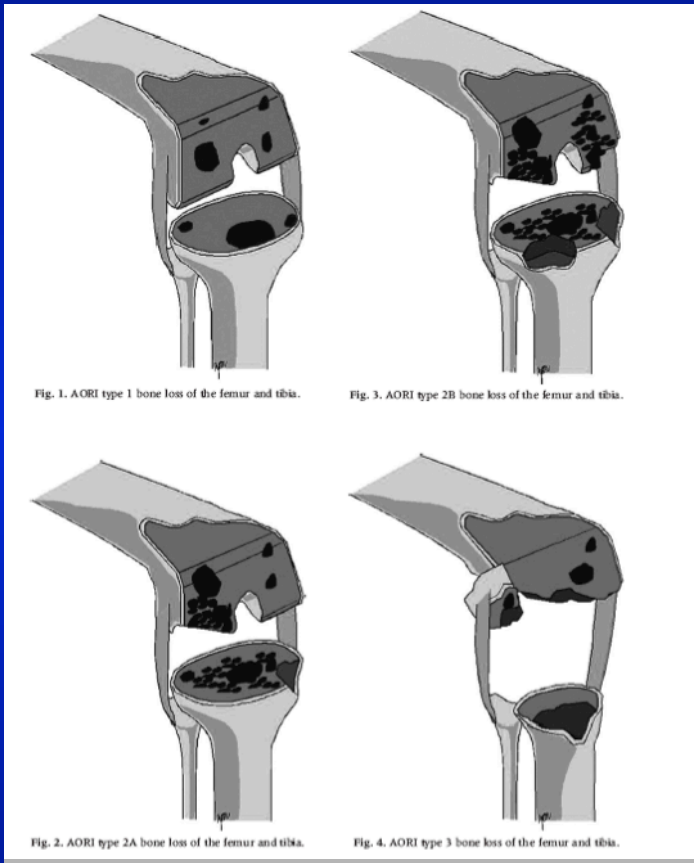
Stems in TKA ?

Advantages :

- Better stability
- Better alignment
- Better stress loading :
  - Proximal tibia
  - Distal femur

Indications :

- Constraint TKA : ligament failures
- Bone loss and revision
- Post-traumatic arthritis



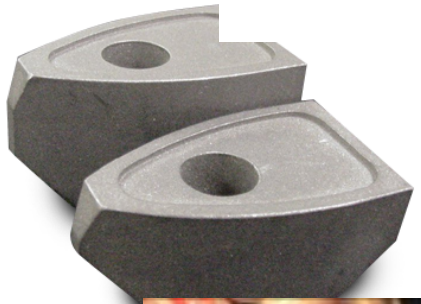
Anderson Orthopedic Research Institute

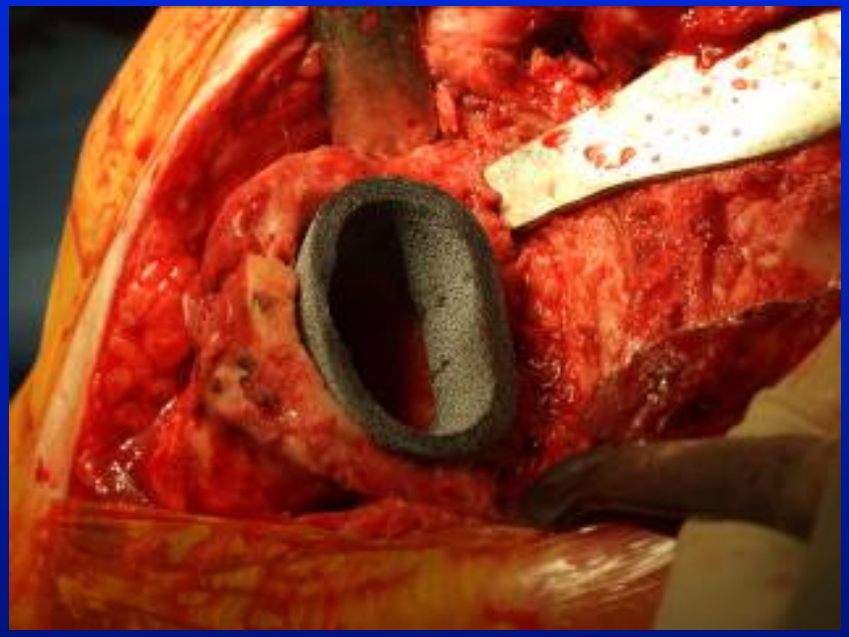
Strategies of stem fixation and the role of supplemental bone graft in revision total knee arthroplasty; Nelson CL. JBJS 2003

The Role of Stems and Augments for Bone Loss in Revision Knee Arthroplasty; Marbry M. JA 2007

Combination with augments

- Goals of the augments
  - Fill the defect
  - Improve implant stability
  - Bone ingrowth





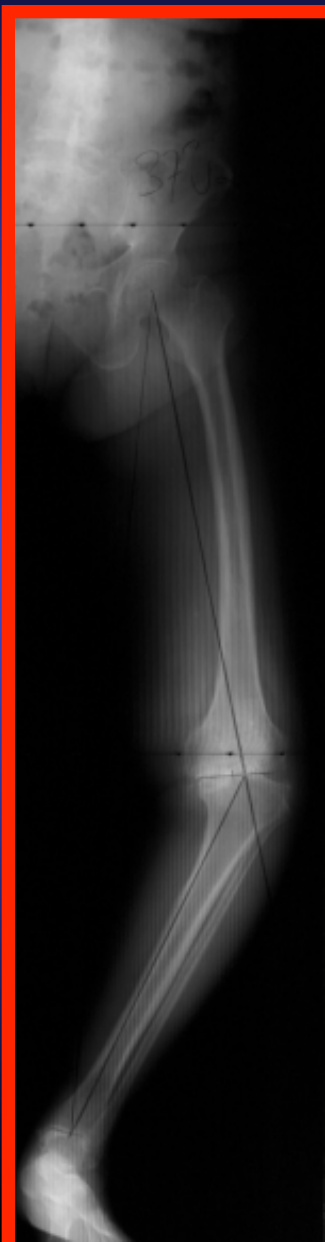
A need for modularity

Ex. of instability: loose in extension

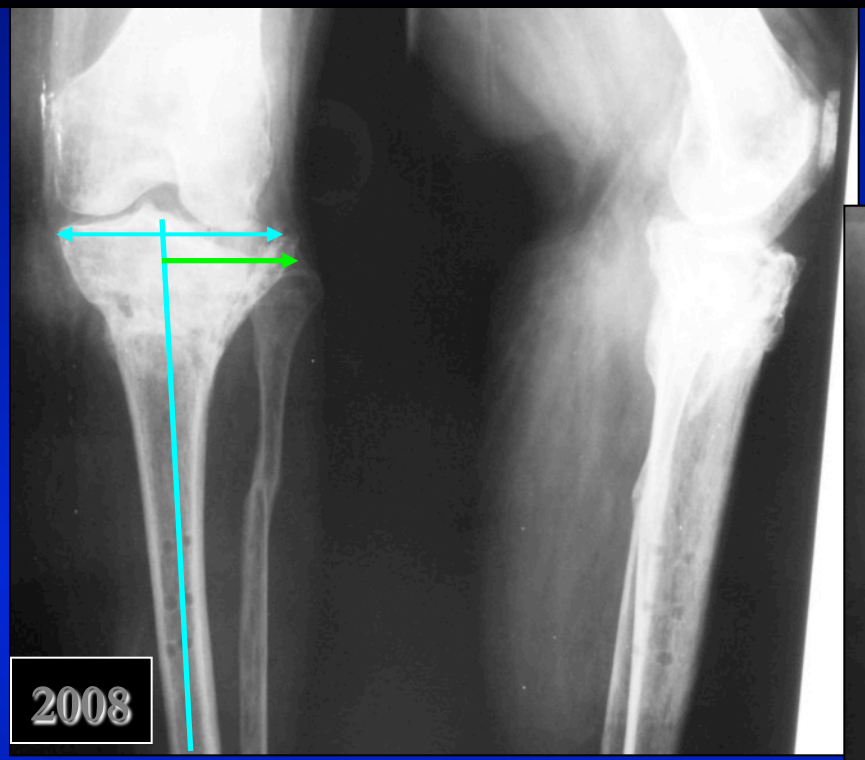
- Augment distal femur
- Use stem
- Increase constraint : LCCK type

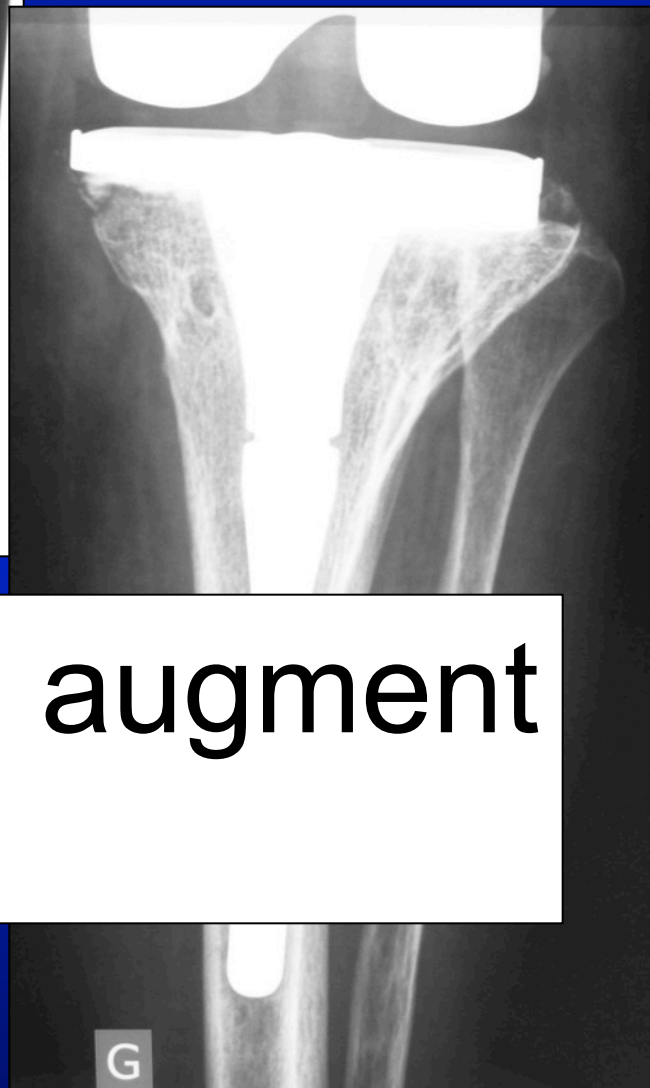
Bone loss in difficult primaryTKA

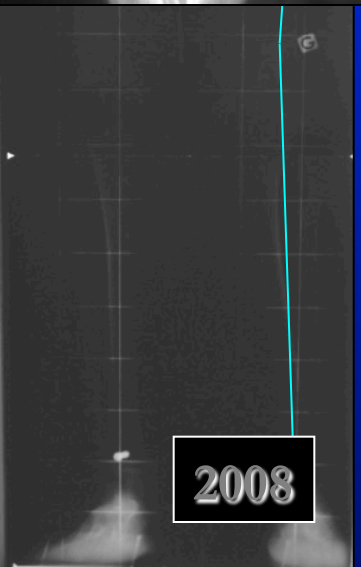
- Large deformities
- Previous osteotomy
- Post-traumatic arthritis
- Infection



Post-traumatic OA

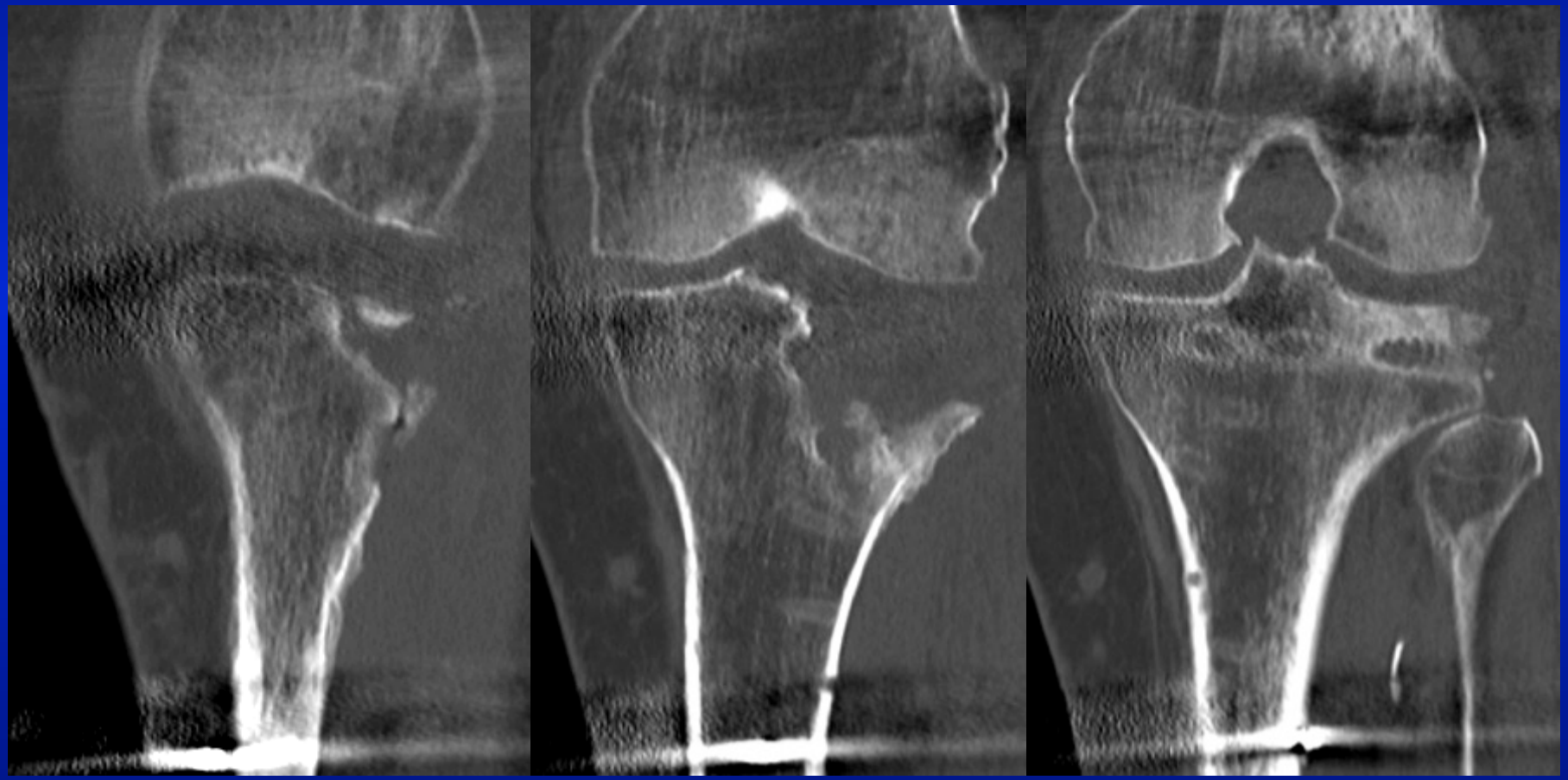






⇒Need for an augment
= Stems +++

Identify the bone loss : CT

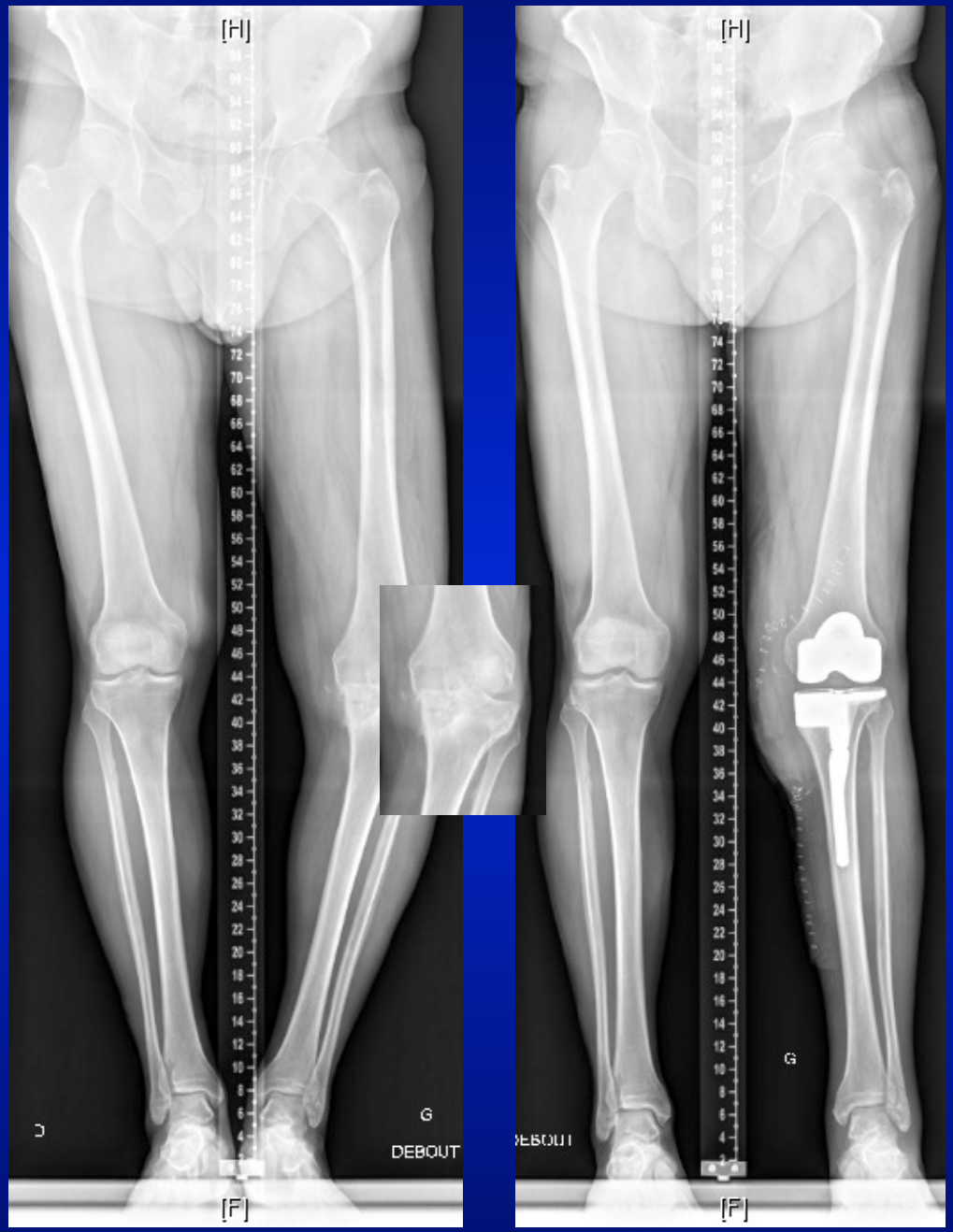


Fill the bone loss

Goals of the augments

– Compensate the defect

– Improve stability



Our Clinical Experience

Acta Orthopaedica 2015; 86 (1): x–x

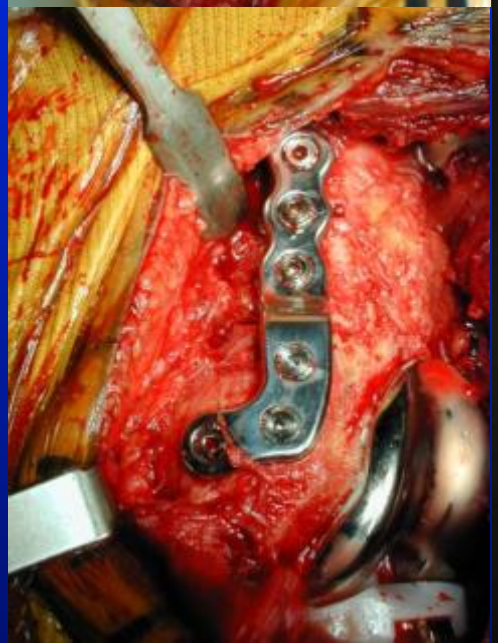
Lower function, quality of life, and survival rate after total knee arthroplasty for posttraumatic arthritis than for primary arthritis

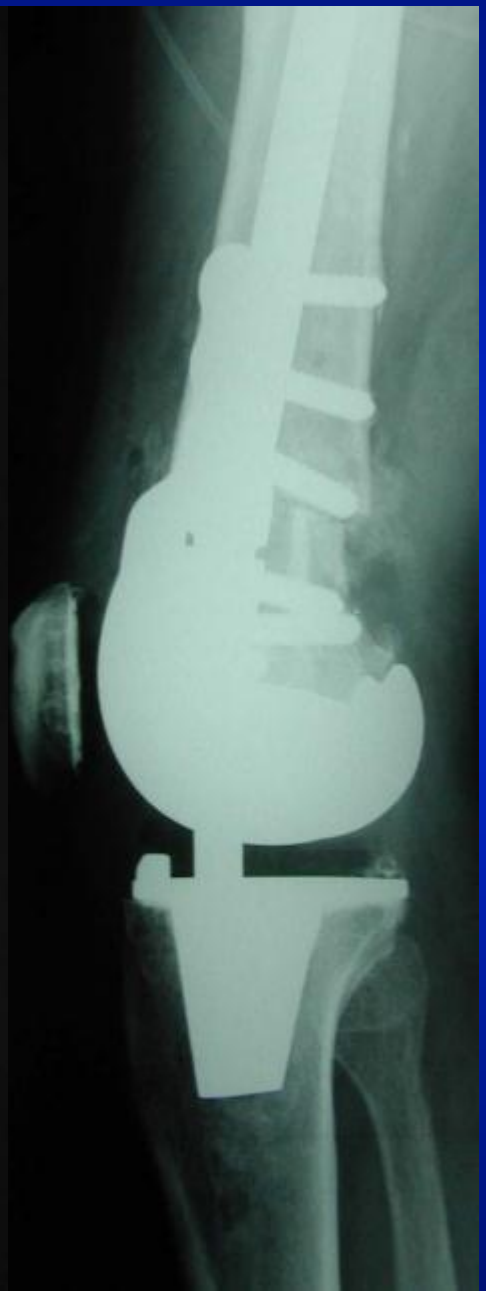
Alexandre LUNEBOURG [1,3], Sebastien PARRATTE [1,3], André GAY [2,3], Matthieu OLLIVIER [1,3], Kleber GARCIA-PARRA [1], Jean-Noël ARGENSON [1,3]

Bone loss and Malunion

external rotation

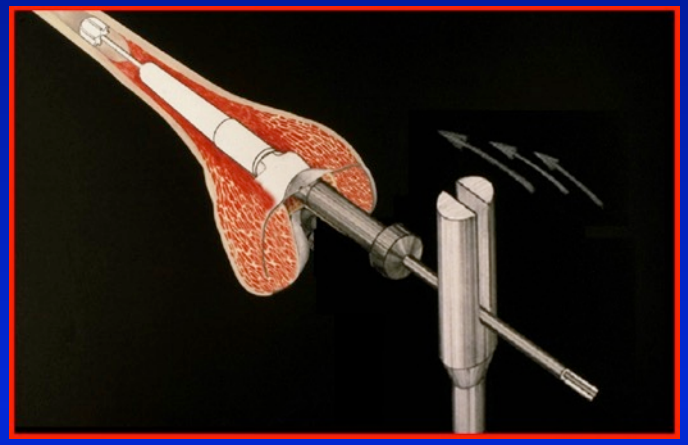
One Stage





The good use of modularity

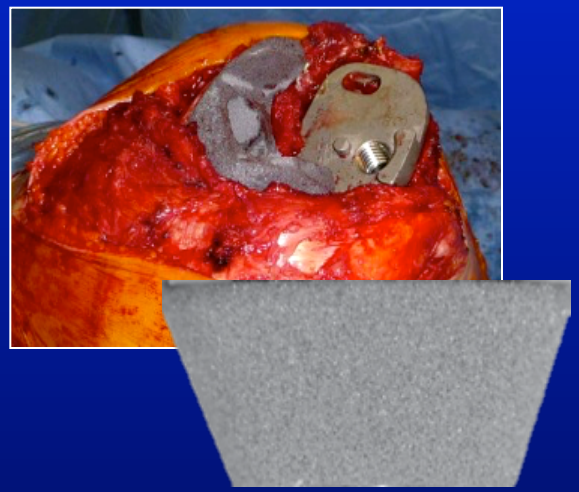
Allograft



Augments

Bone Substitute

Cones TMT®



Choose the correct modular component








Planning modularity : Femur

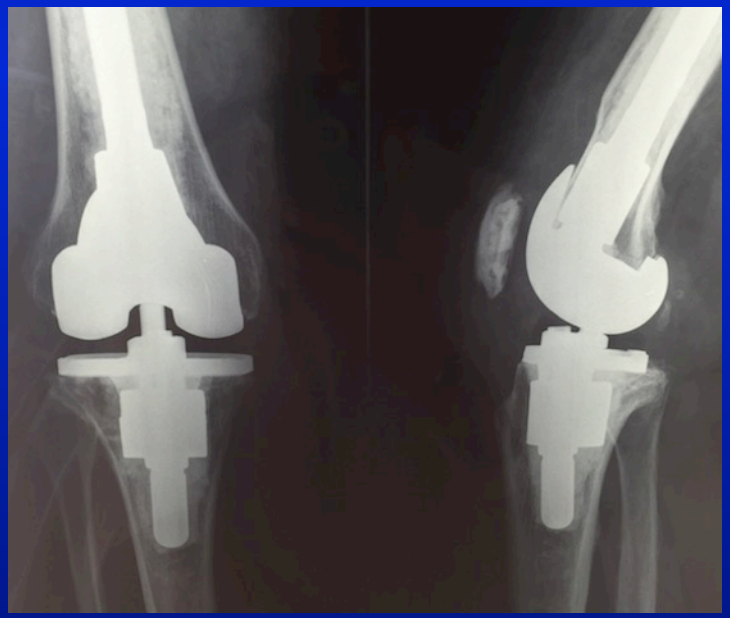
Fig. 48

Fig. 49

Then use a stem

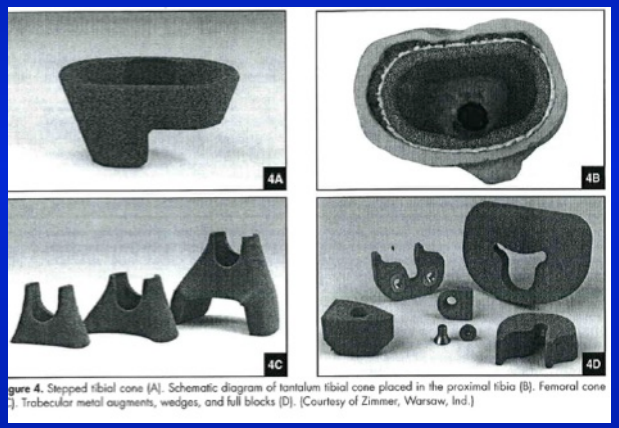
Long stem
Metaphysal fixation

Short stem
Cemented

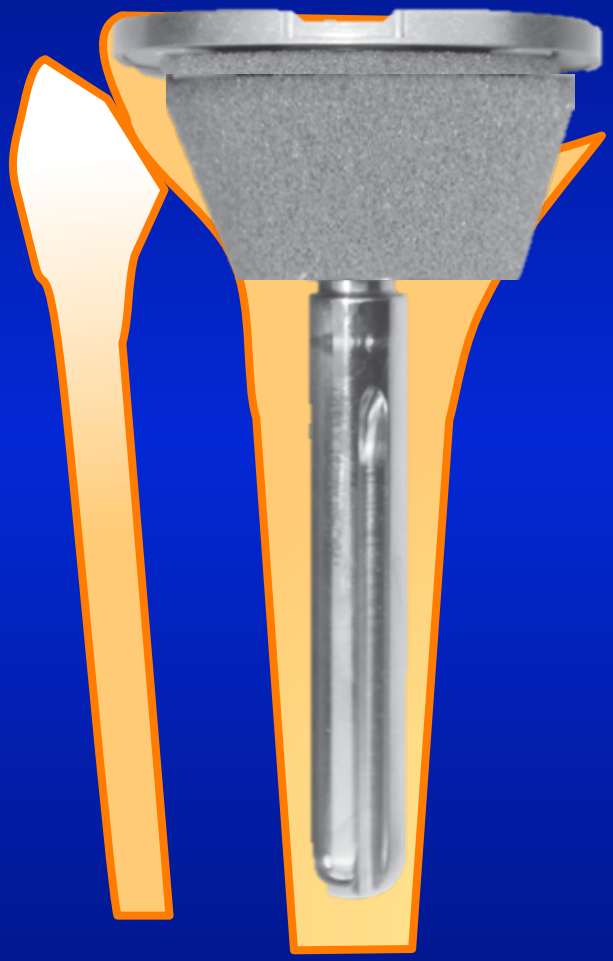


Combined with cone

Levine B et al (The journal of Knee Surg, 2007, 20, 185-94)



gure 4. Stepped tibial cone (A). Schematic diagram of tantalum tibial cone placed in the proximal tibia (B). Femoral cone]. Trabecular metal augments, wedges, and full blocks (D). (Courtesy of Zimmer, Warsaw, Ind.)

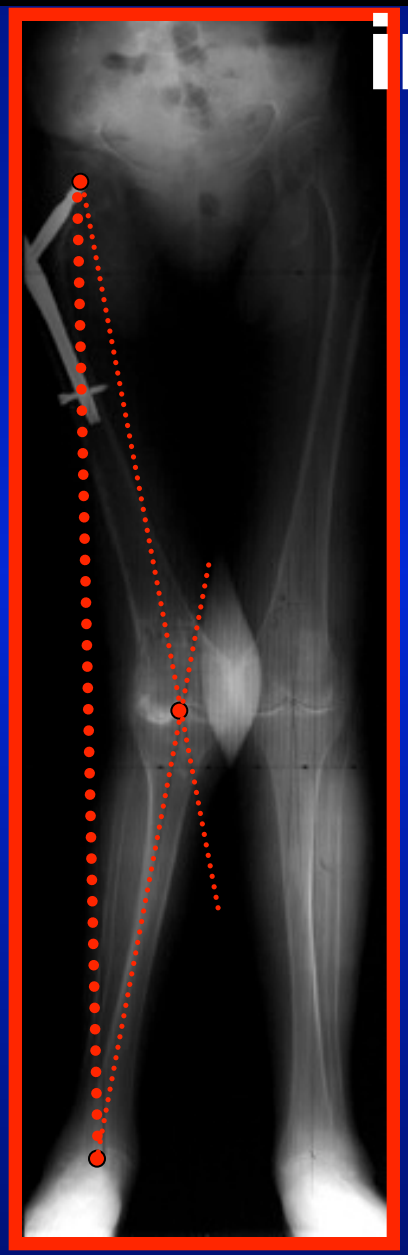


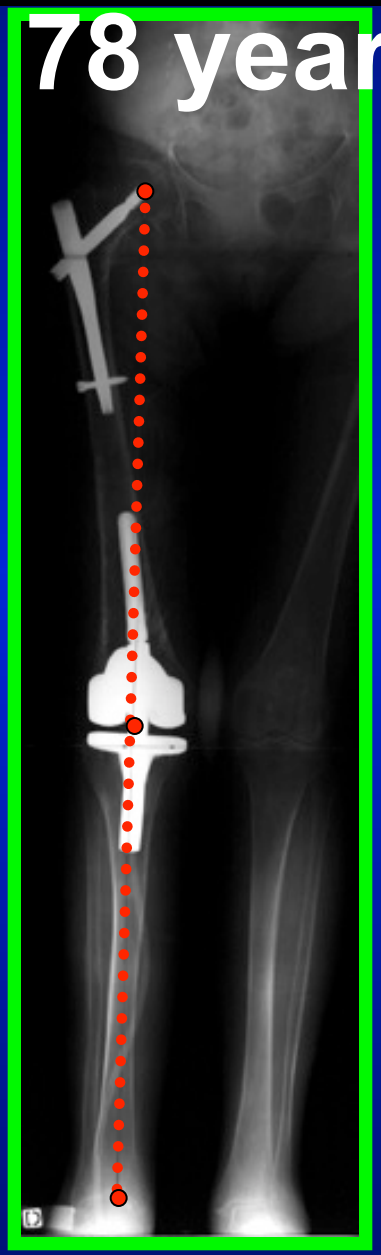
One basic principal:

Tantalum should be directly in contact with the host bone

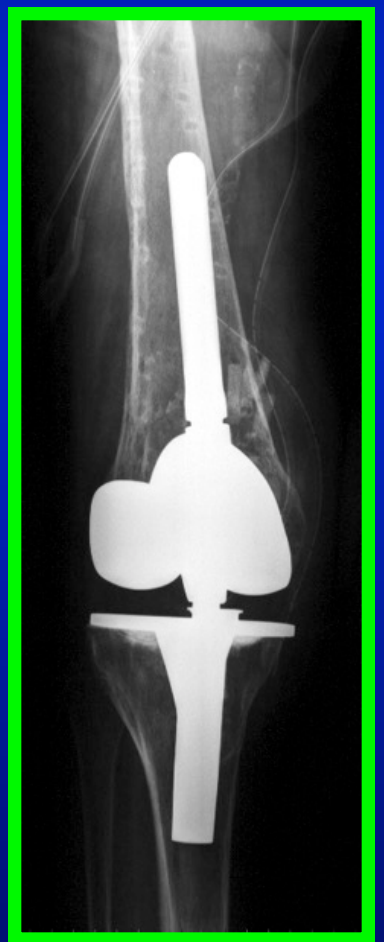
Problems with long stems

Limits in Primary TKA , valgus knee in 78 years old woman





- Rotating hinge

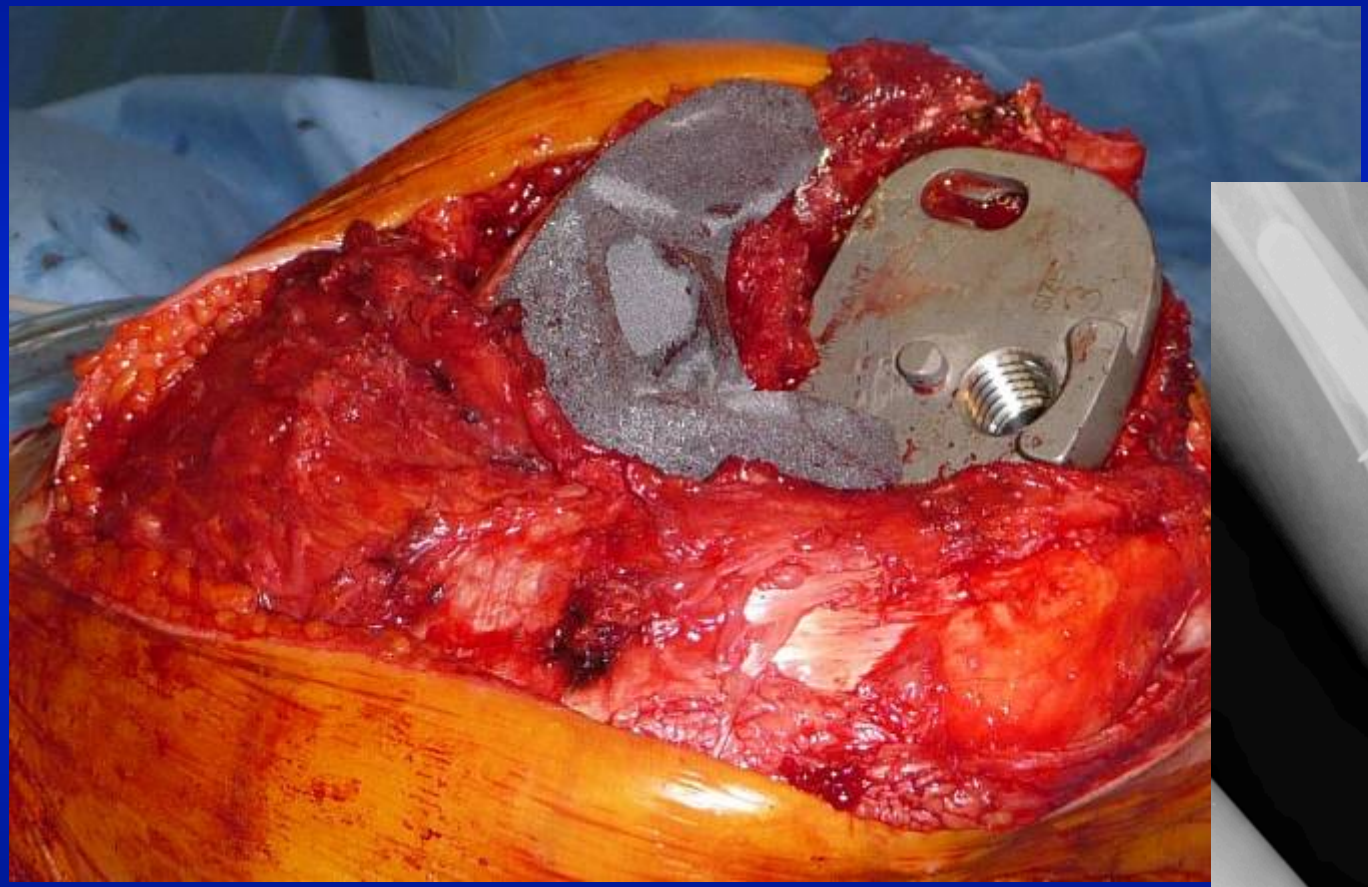


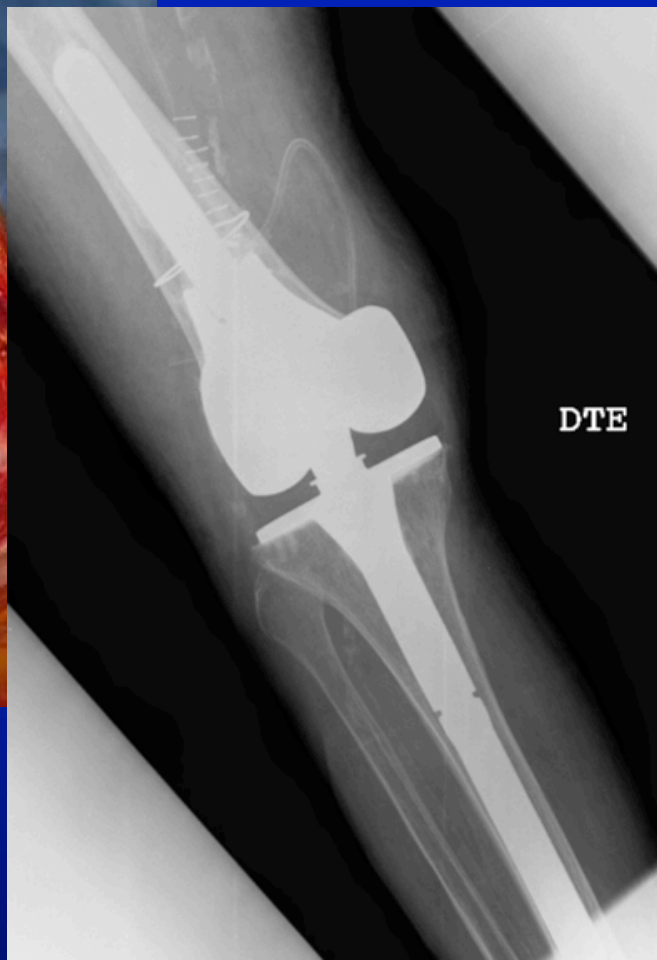
Trauma : major bone loss

♀ 85 years-old , Alone

at home Painfull knee before

TM femoral Augment





Conclusion

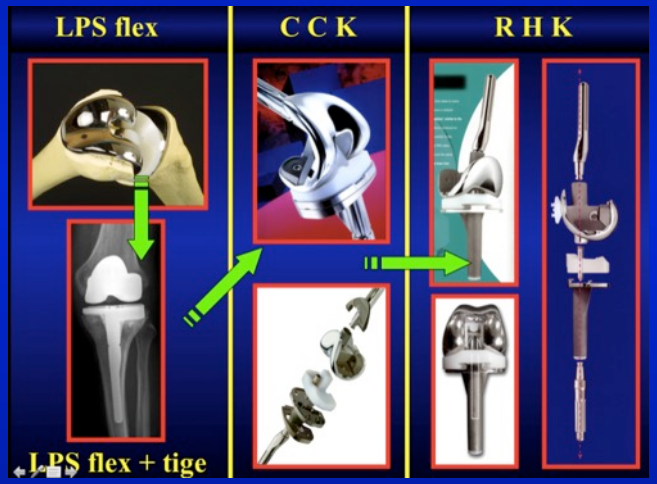
- **Pre-op analysis**
  - Wear,
  - Bone stock
  - Alignement
  - Stability

- **Pre-operative planning⇔ Constraint**

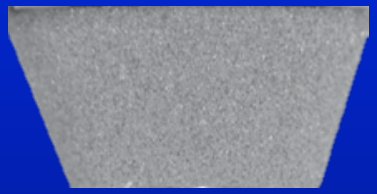
  =>Just enough, not too much

Planning is key: Know your tools

Implant



Bone loss filling



Stems

Order for the good ones !