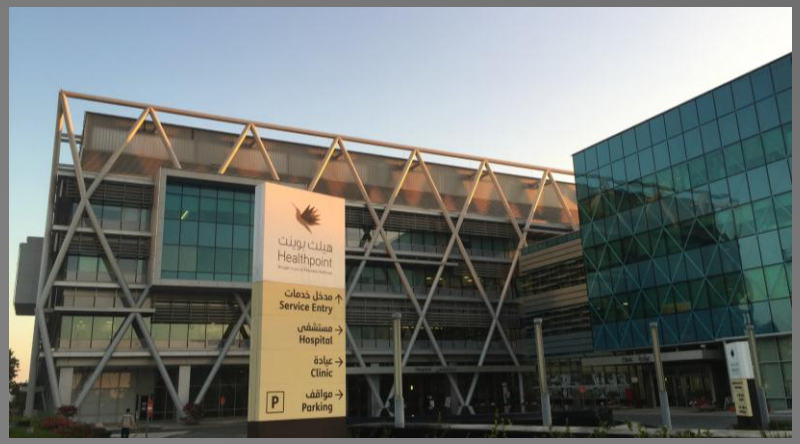
Frontal alignment and Rotation of the Femoral component in TKA

Lyon DIU 2017



Philippe Neyret

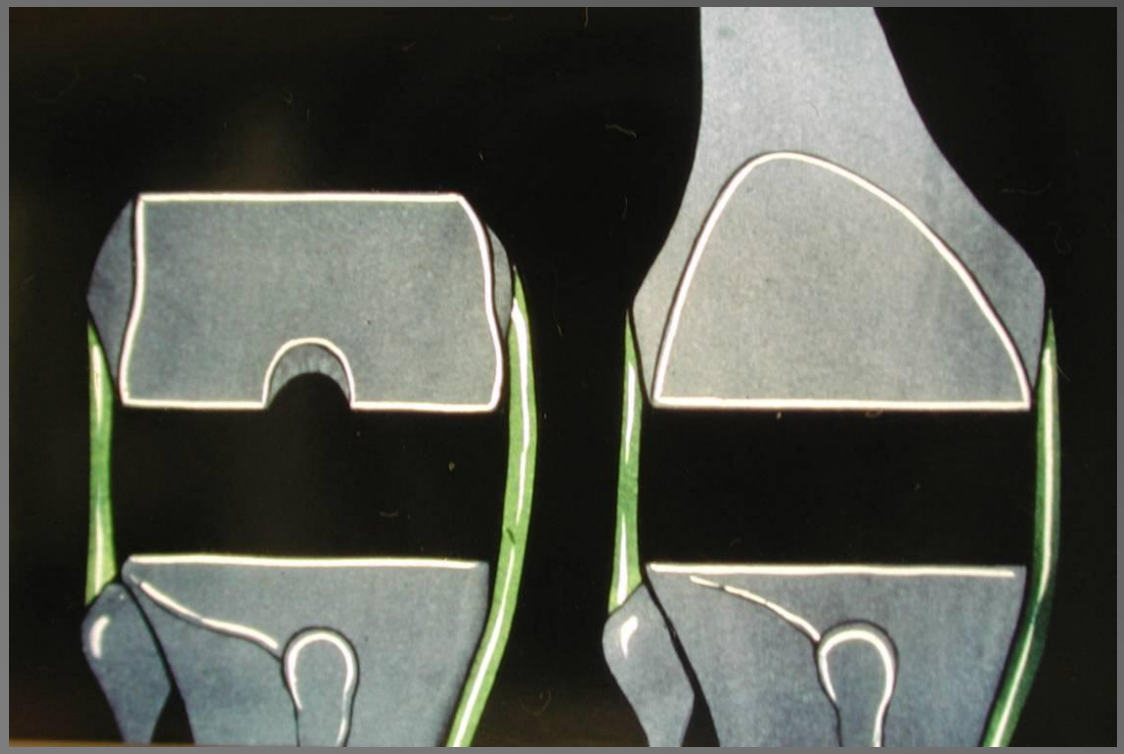
Elvire Servien
Sebastien Lustig

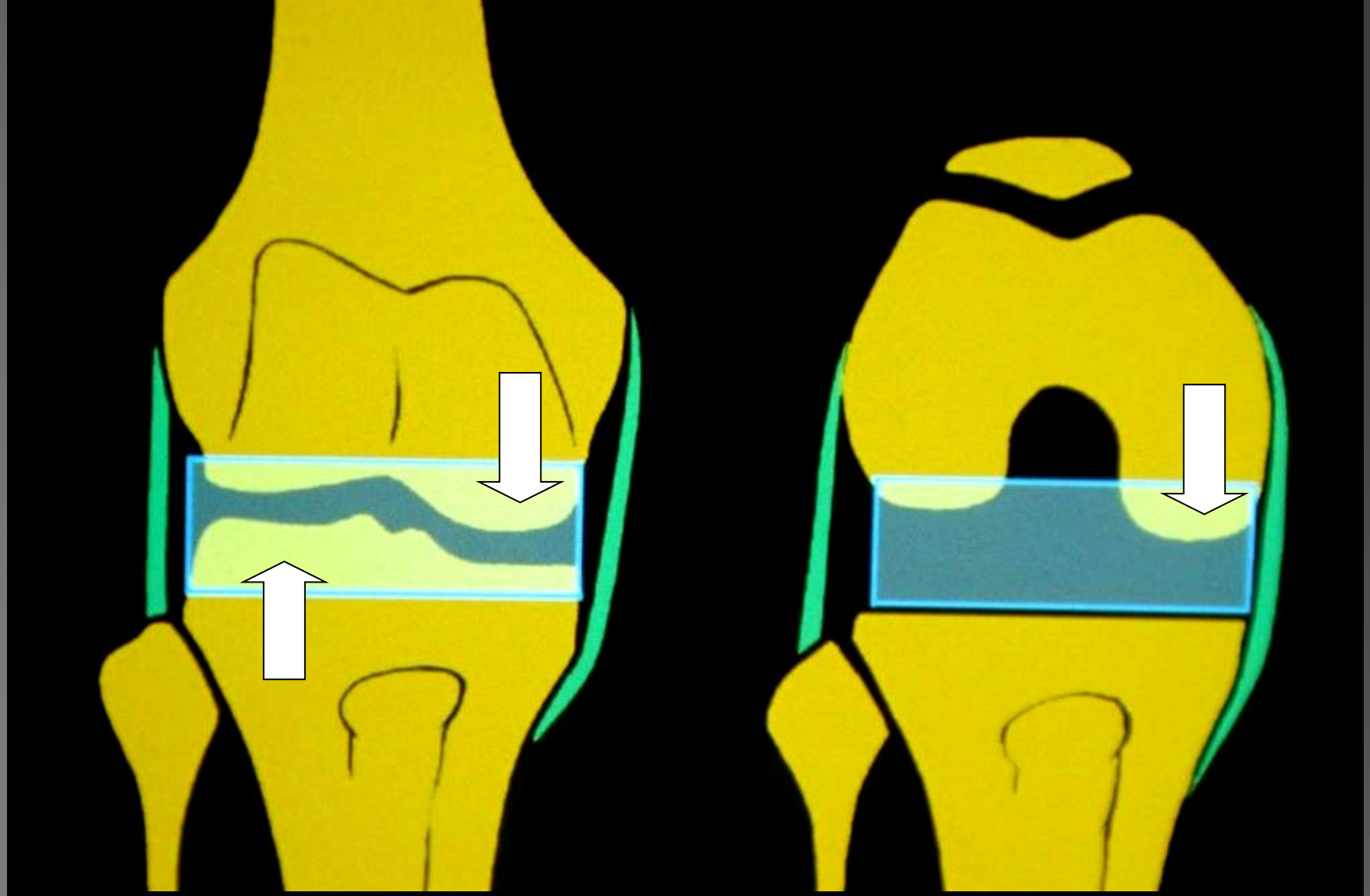
The authors of the next presentation have identified potential conflicts of interest:
Amplitude/ Tornier-Corin

80’ ANALYSIS

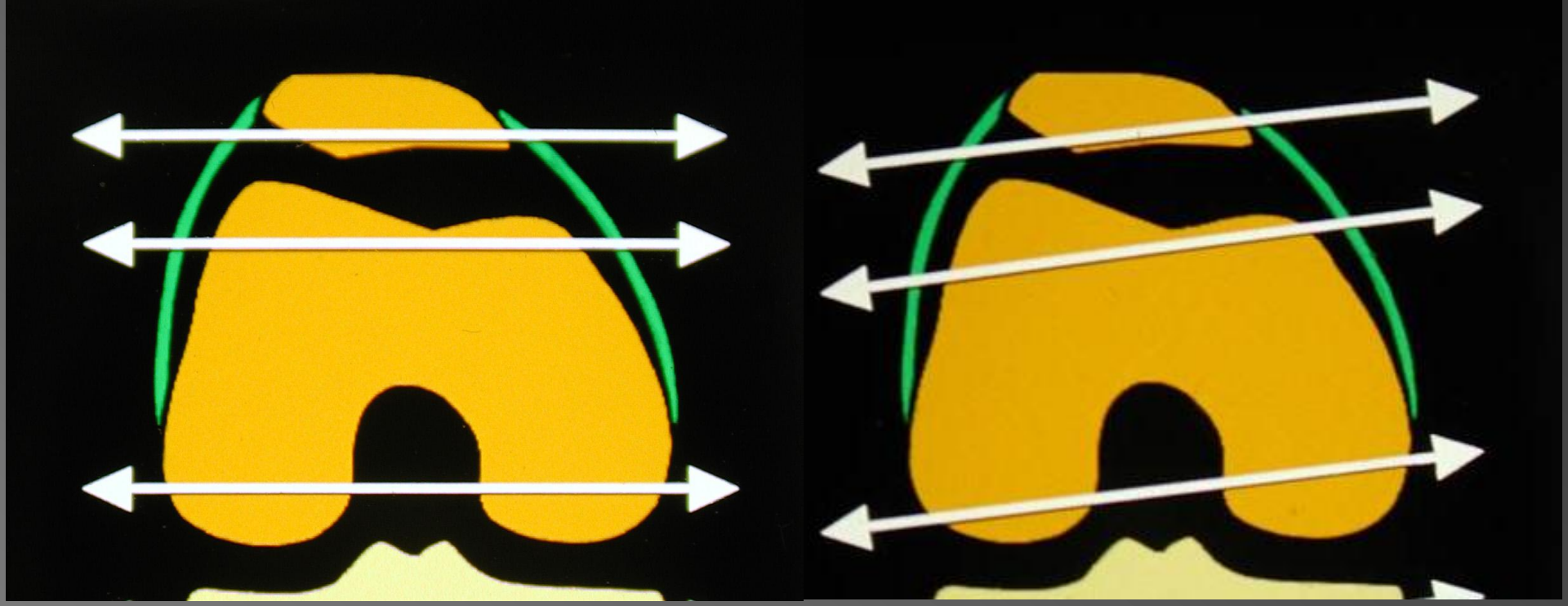
Insall

“Flexion GAP = Extension GAP”

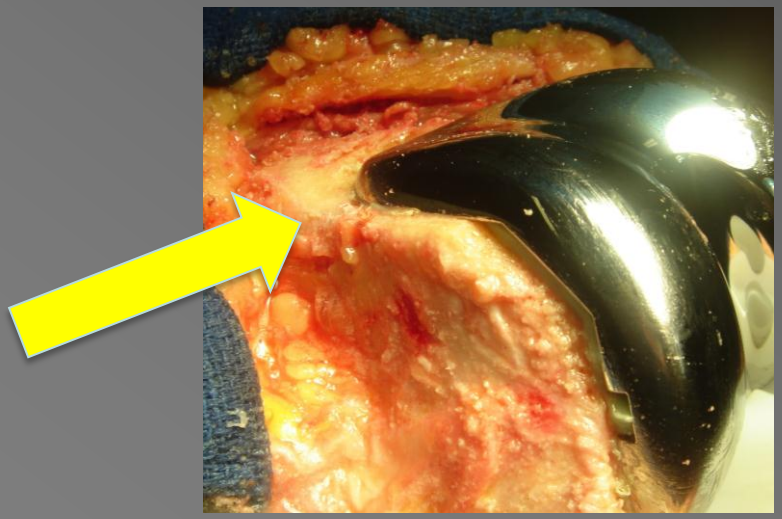


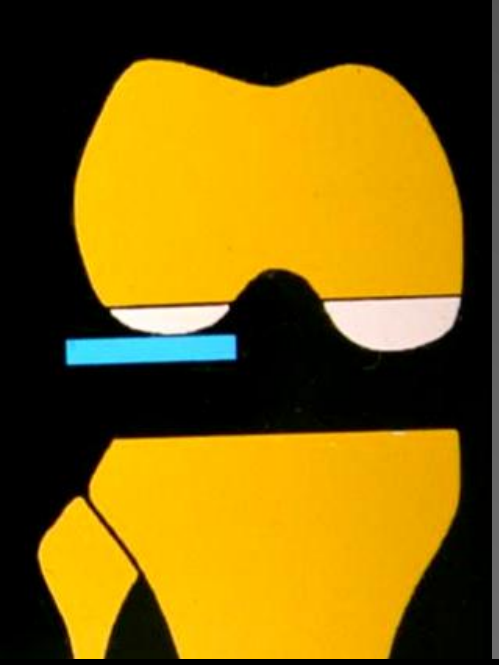


1. Ligament balancing / Gap balancing
Extension – Flexion

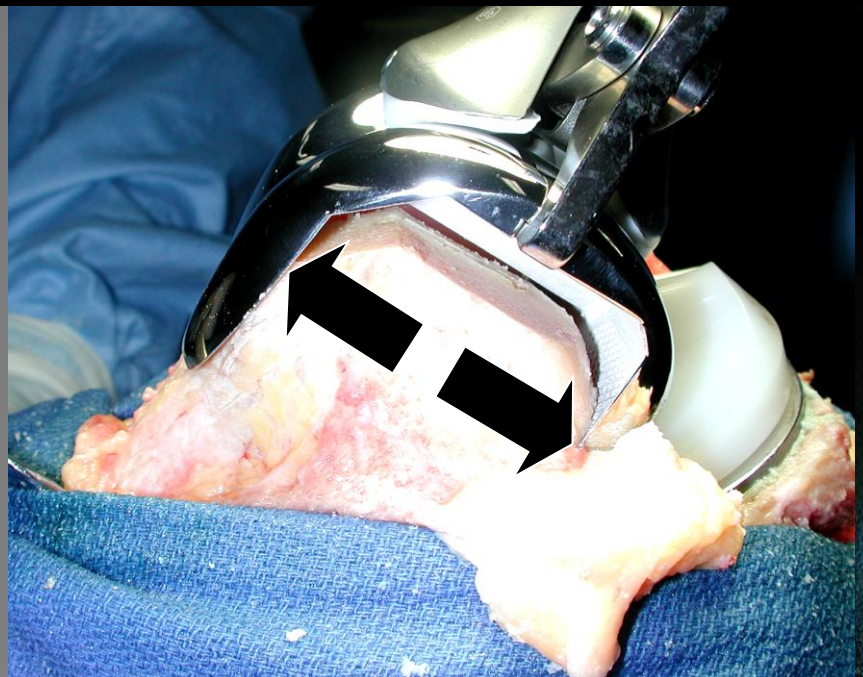


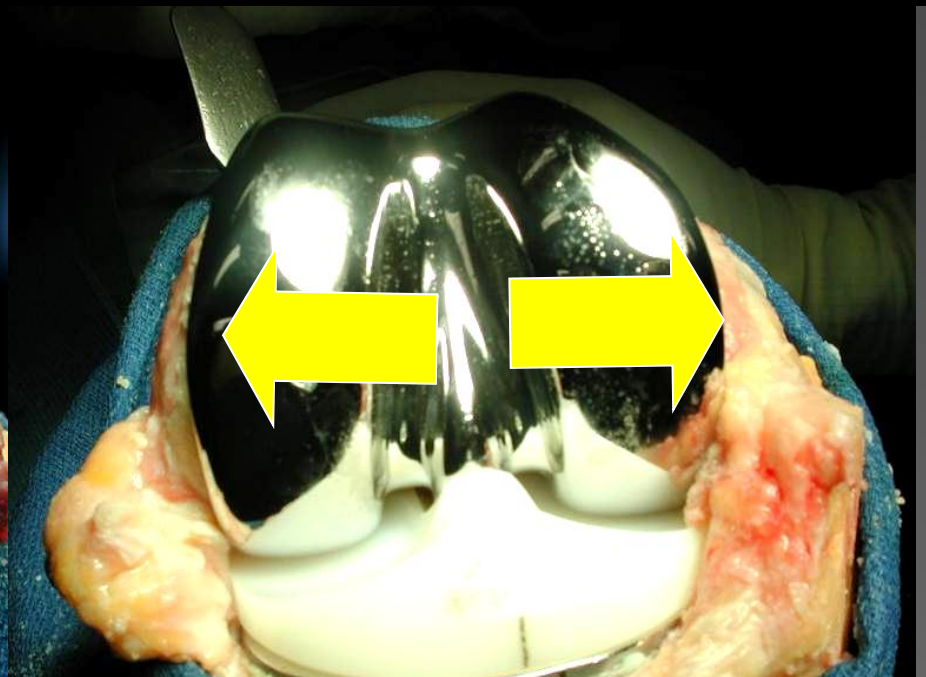
2. Patellar tracking

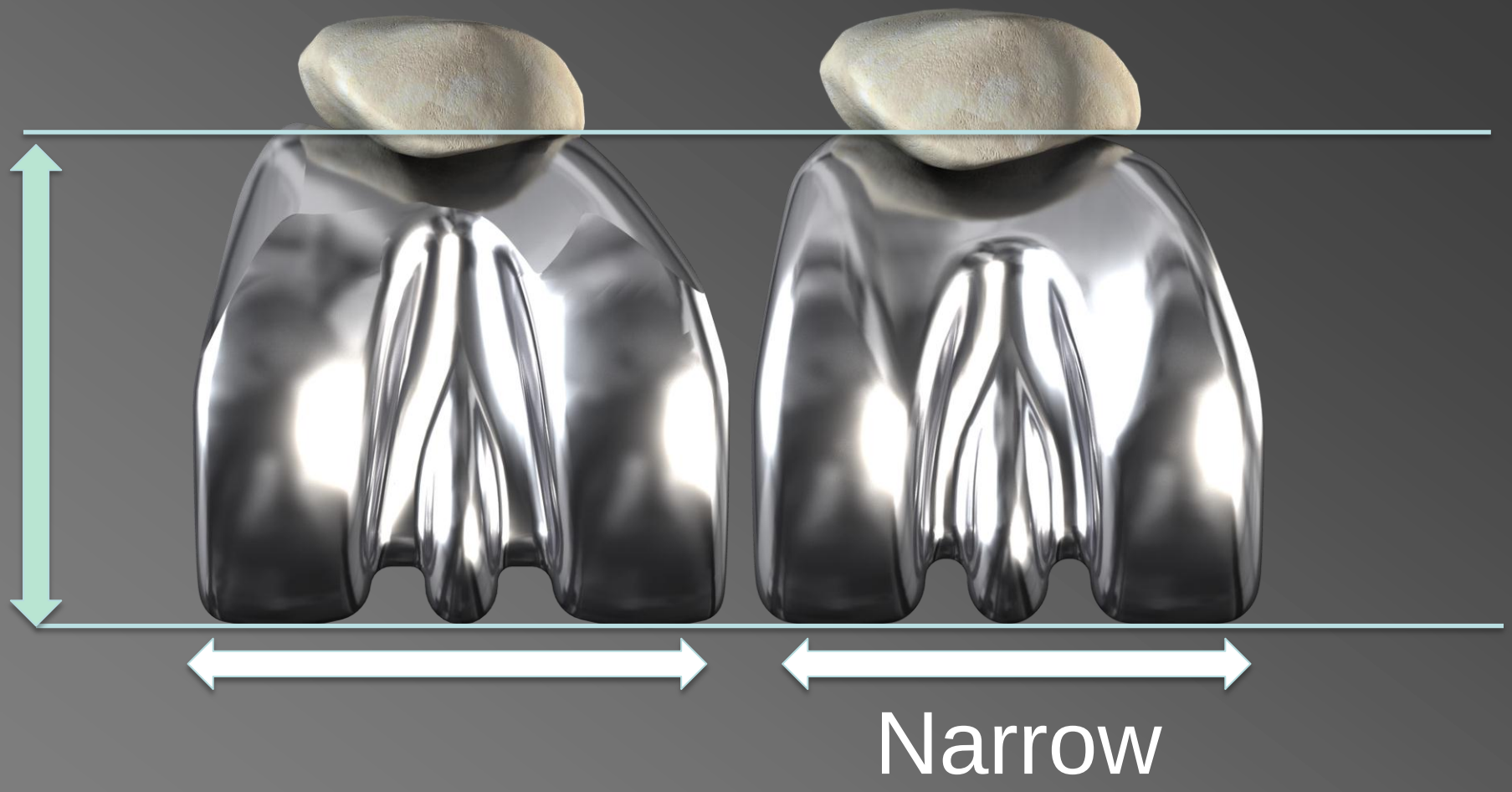




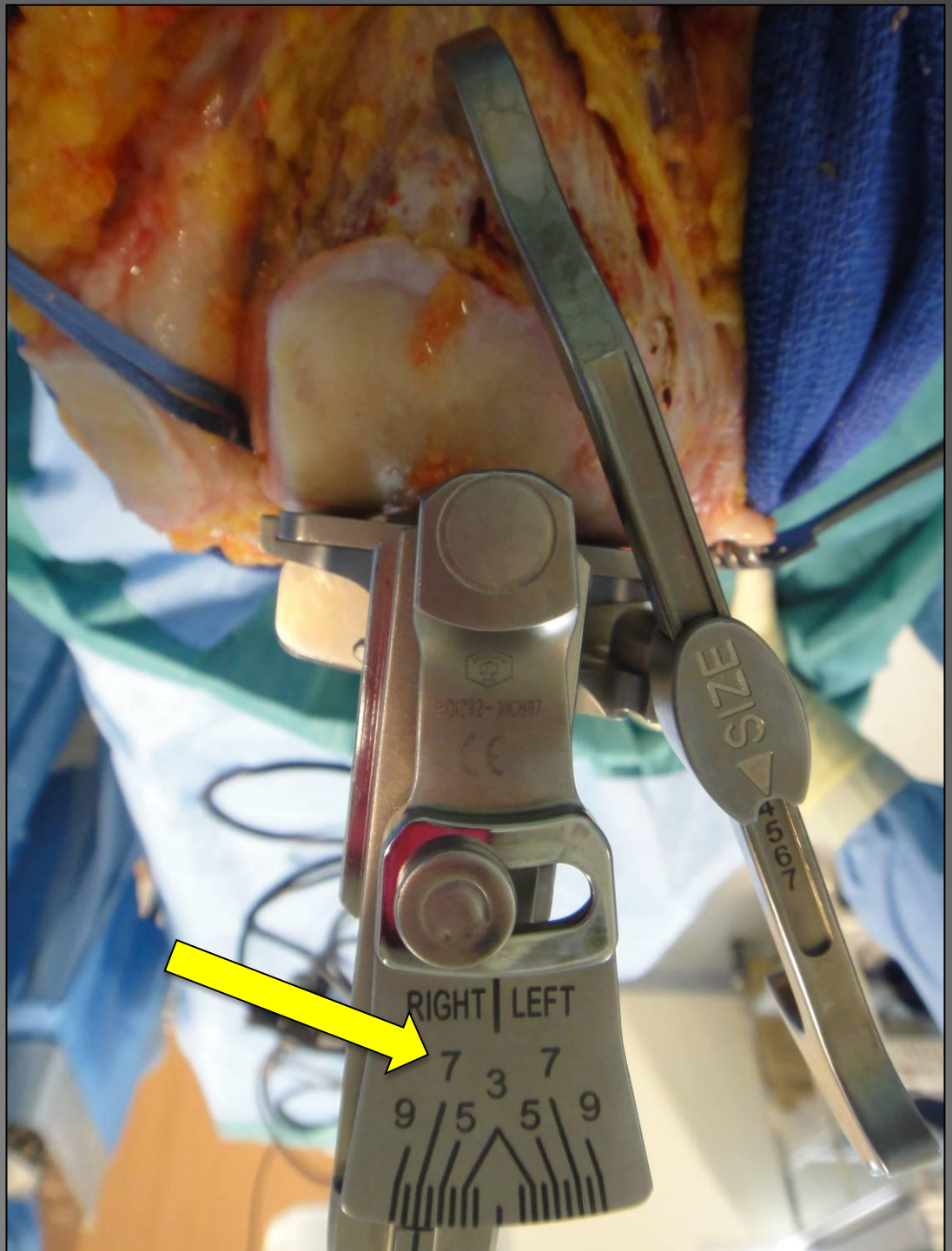
3. Size of the implants

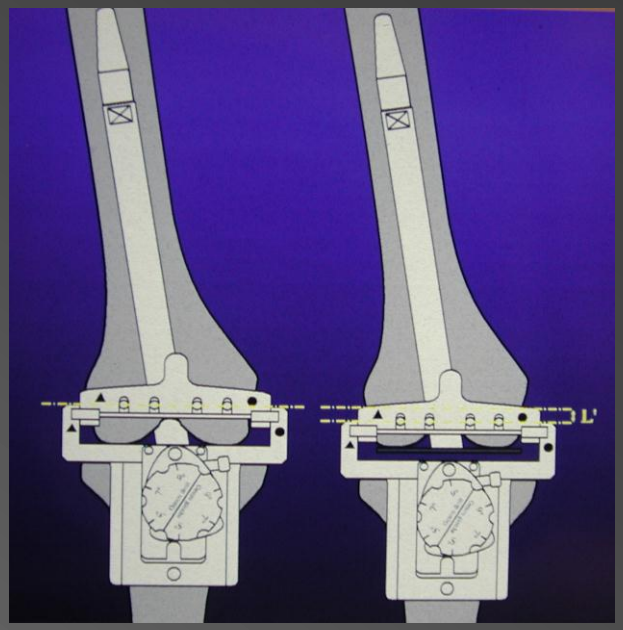






3. Size/ and shape of the implants

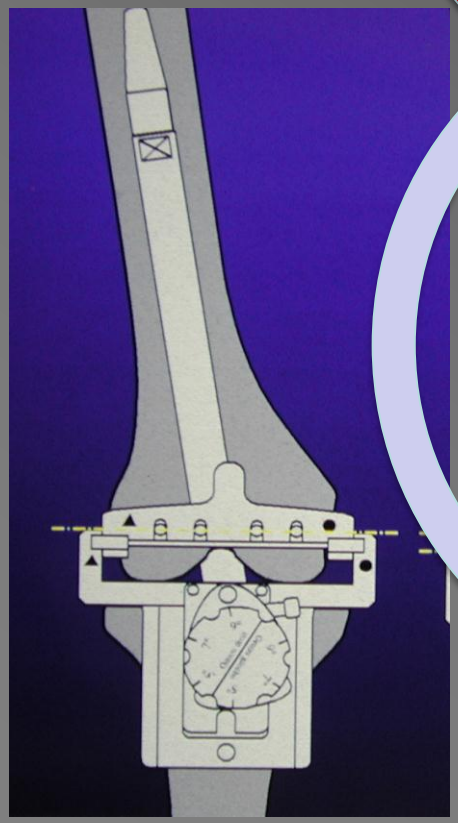


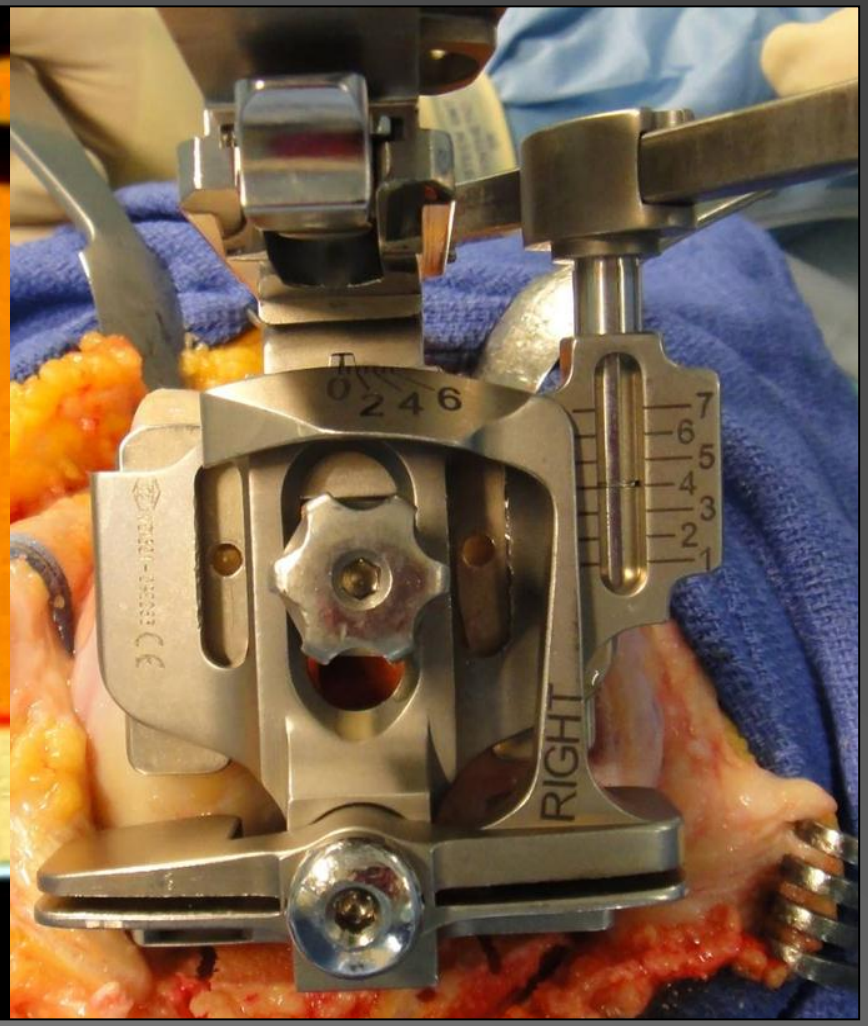


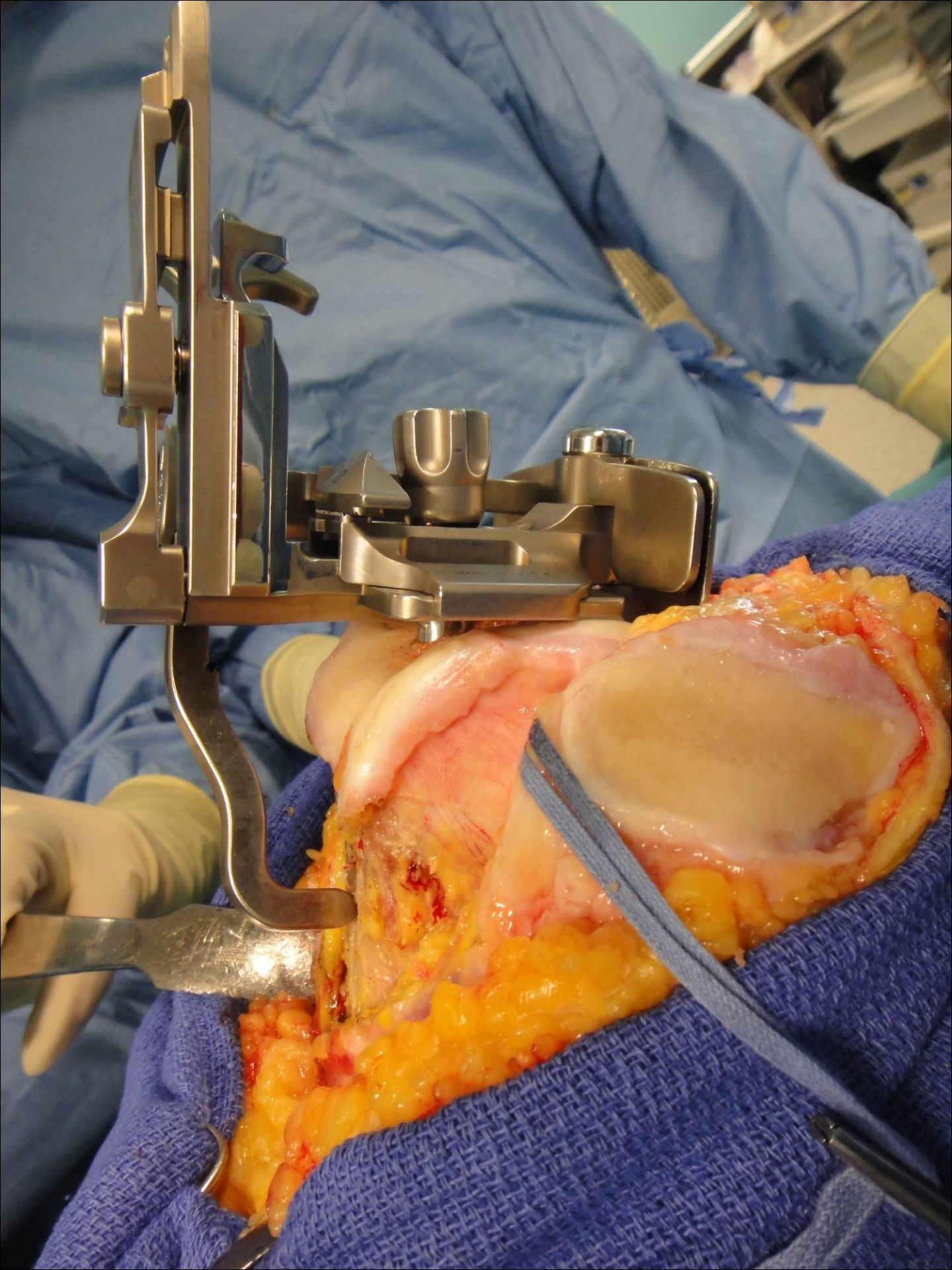
7° valgus in varus deformity

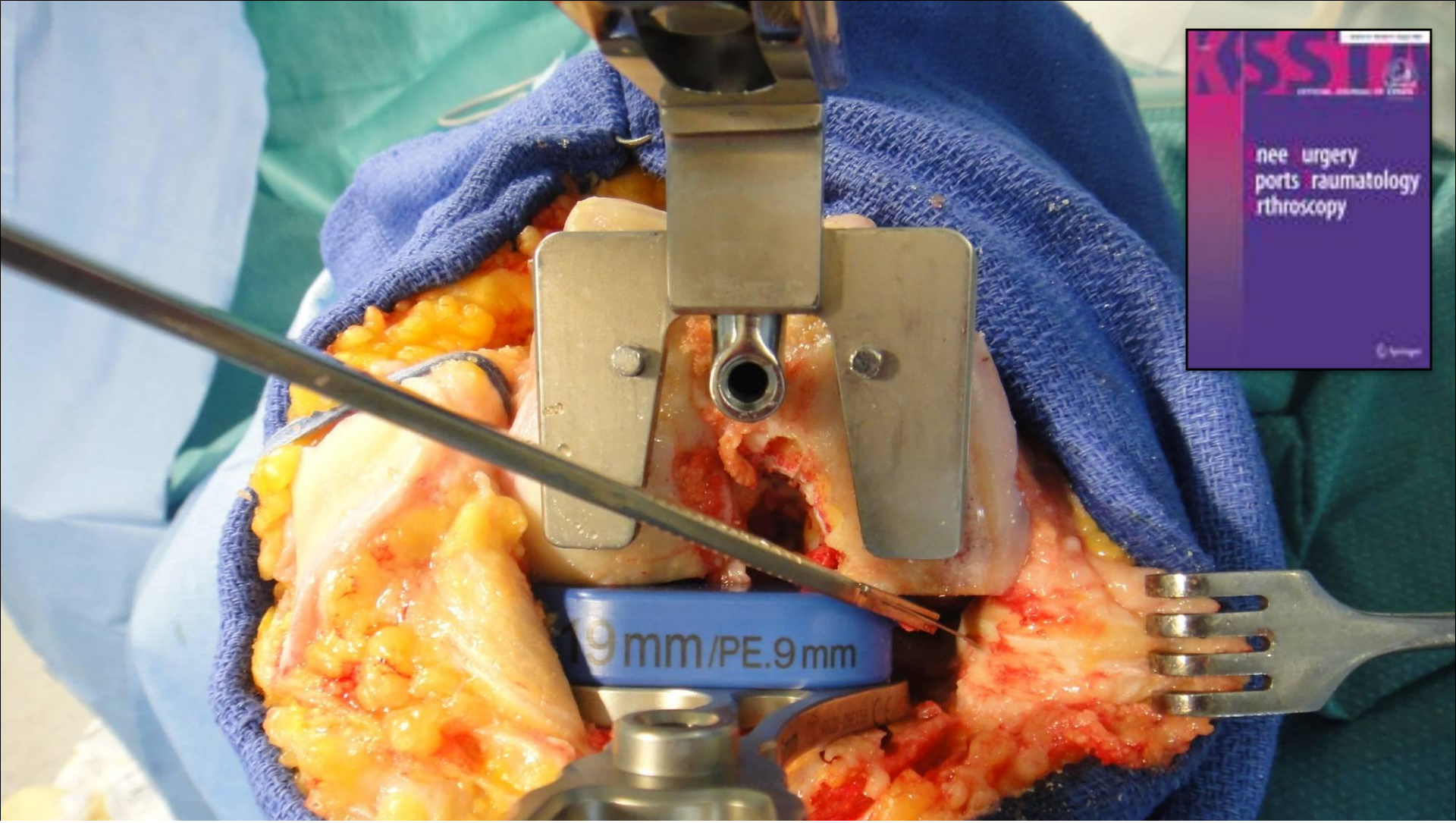
5° valgus in valgus deformity

No
HKS




0 2 4 6
7
6
5
4
3
2
1
RIGHT

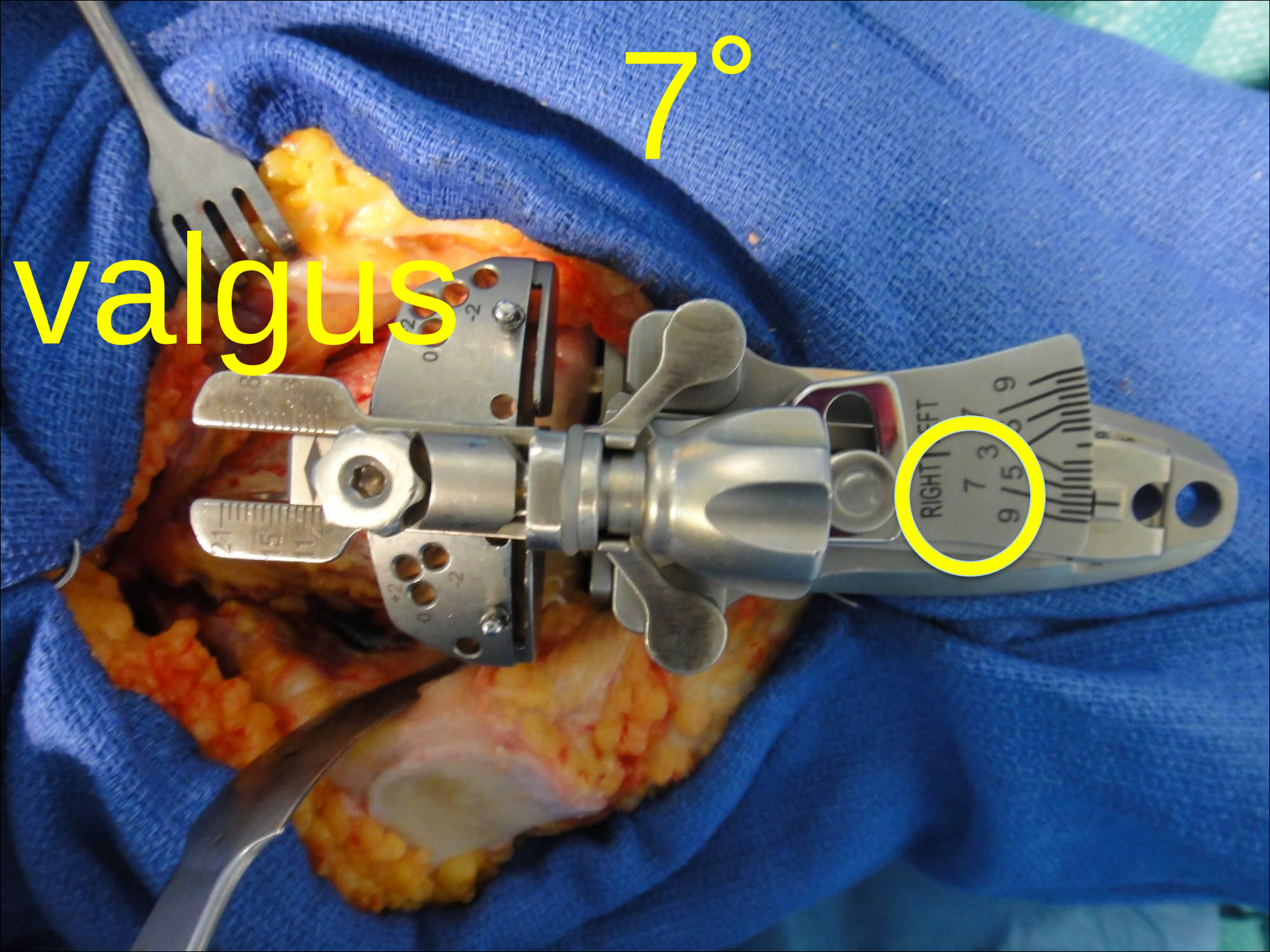


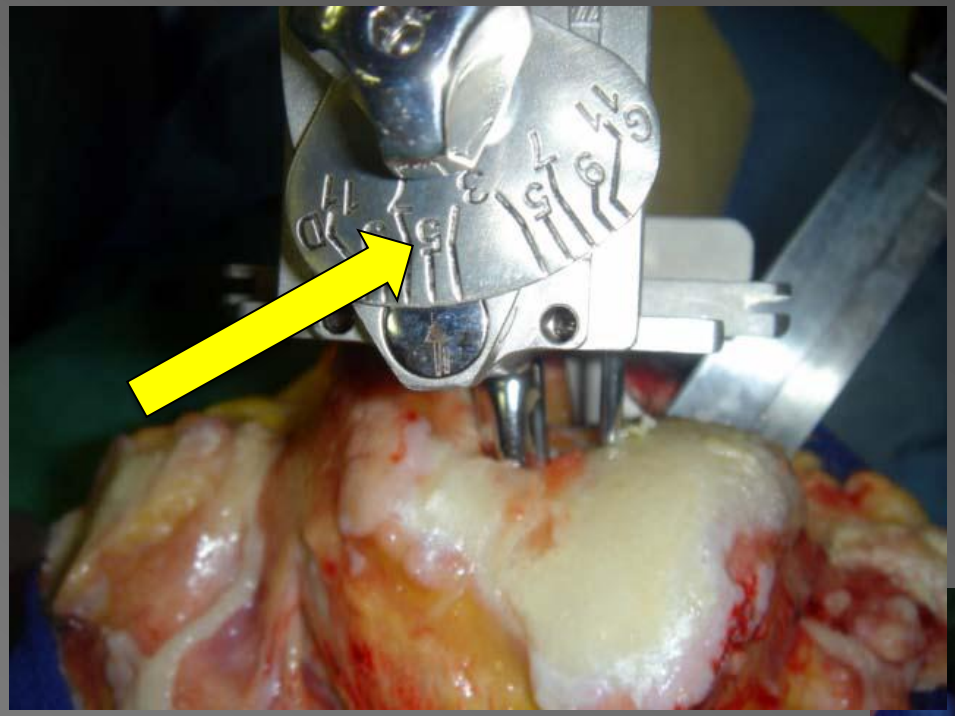


VERDONK.P, PERNIN.J, PINAROLI.A, Aït SI SELMI.T, NEYRET.Ph

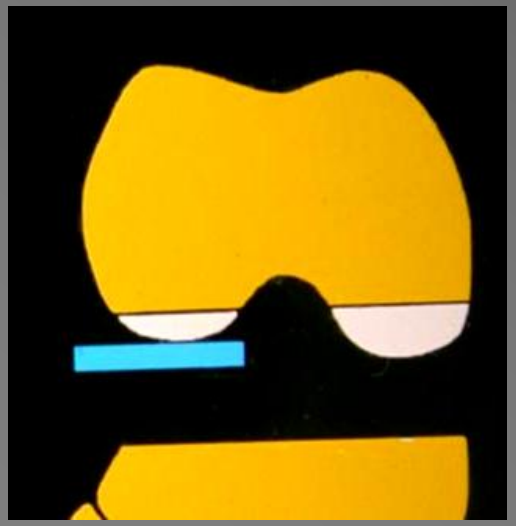
Soft tissue balancing in varus total knee arthroplasty: an algoritmic approach

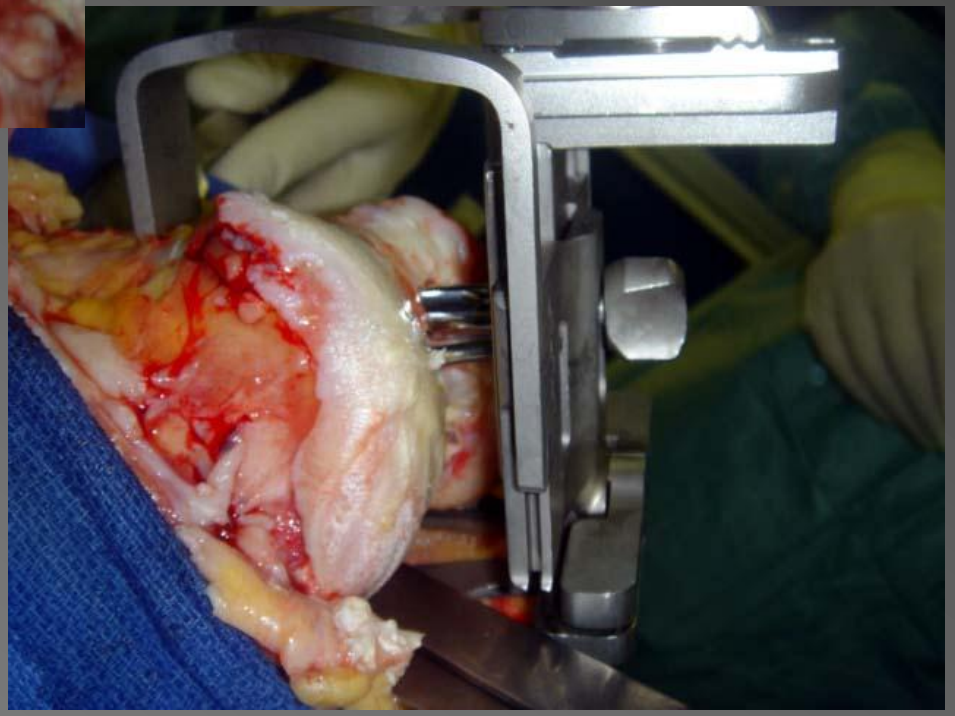
KSSTA (2009) June- Volume17-Number6-A42720: 660-666

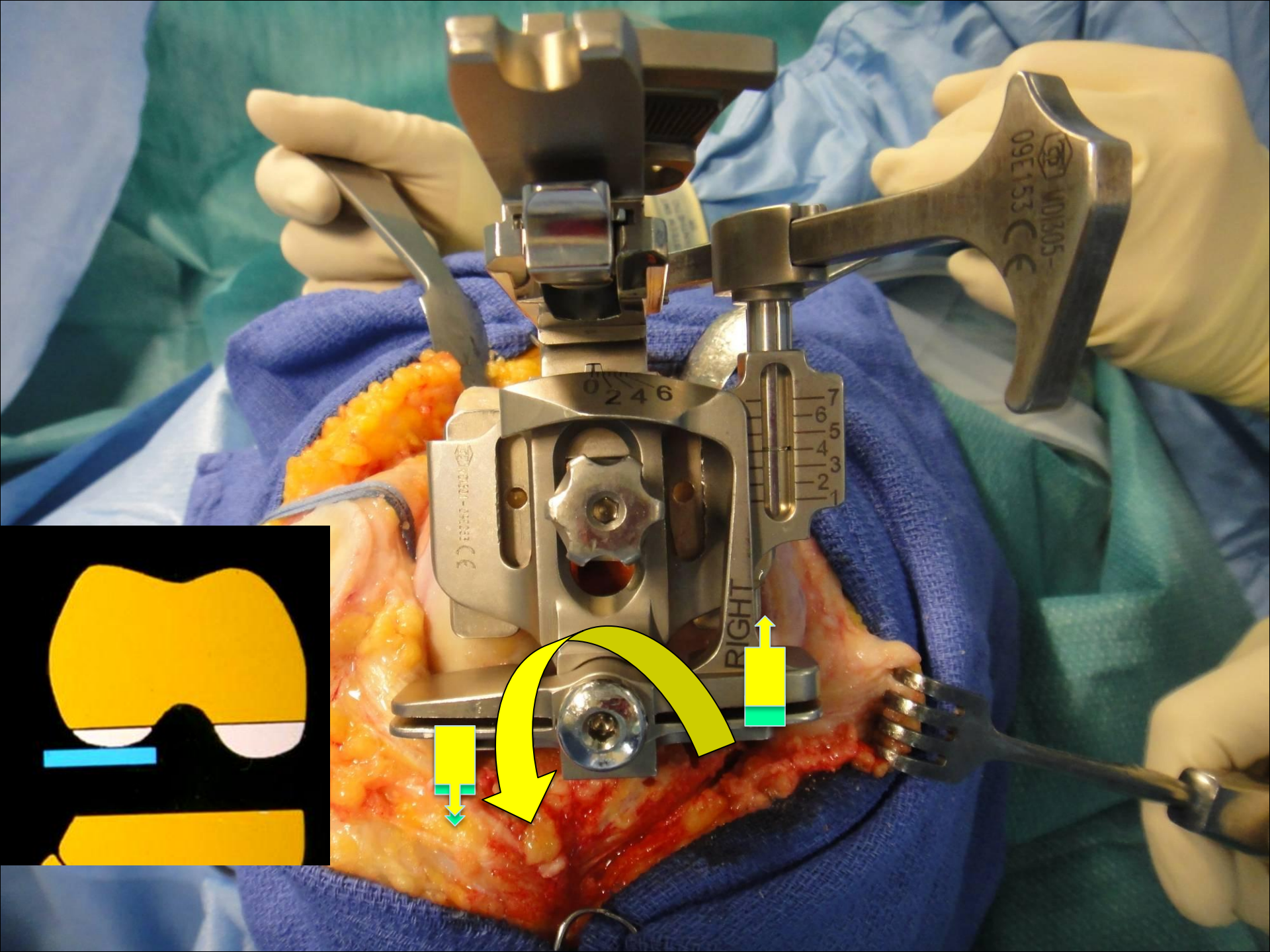

7°
valgus
RIGHT
9
7
3
9/5



5° valgus
in valgus deformity



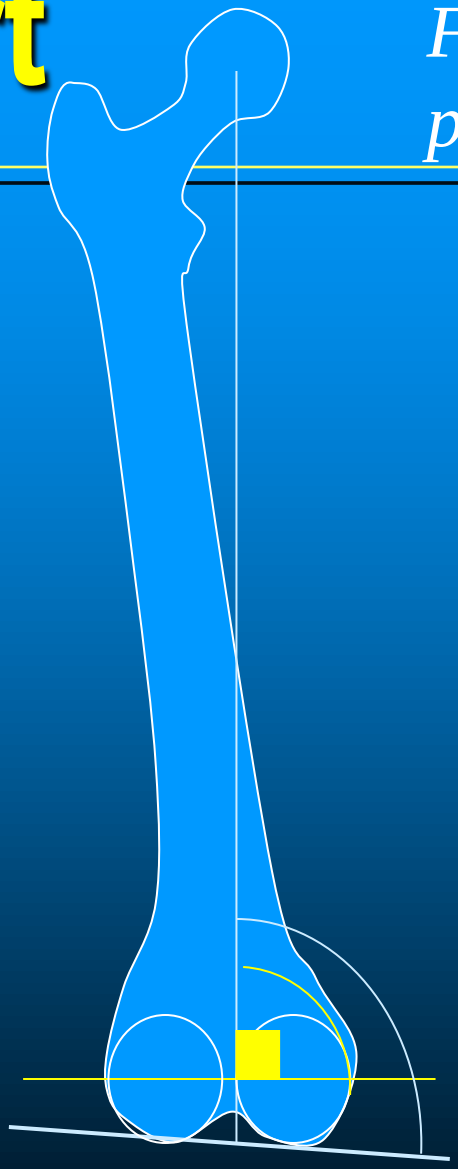



0 2 4 6
7 6 5 4 3 2 1
RIGHT

State of the art

Frontal plane

1. *FMA*
2. *TEA*



?

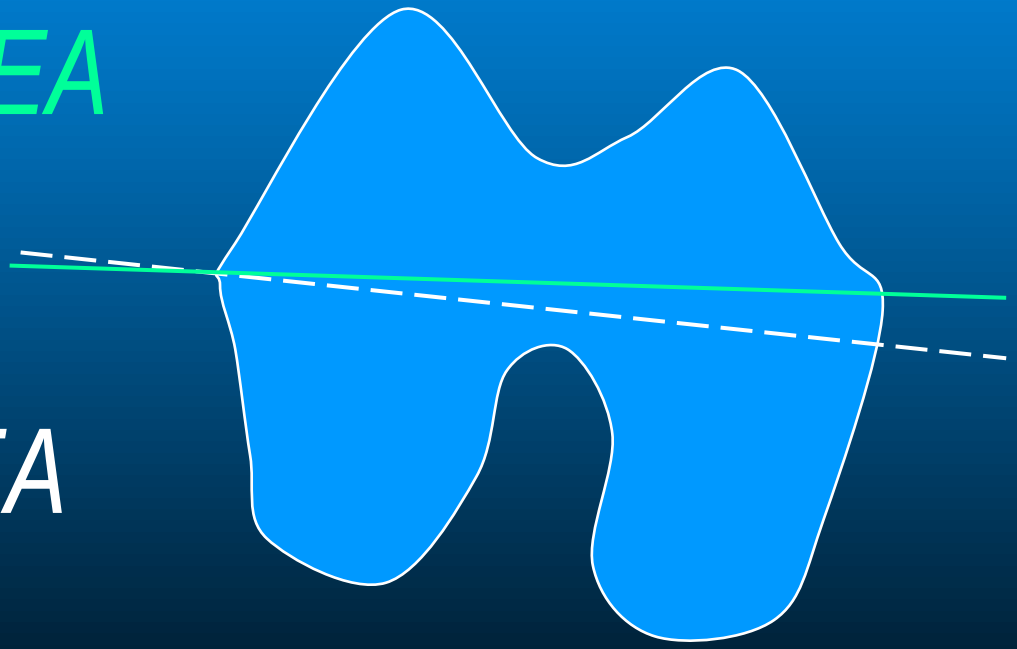
State of the art

Transversal plane

1. *Trans Epicondylar Axis*
   - *surgical TEA*
   - *anatomical TEA*

aTEA

sTEA



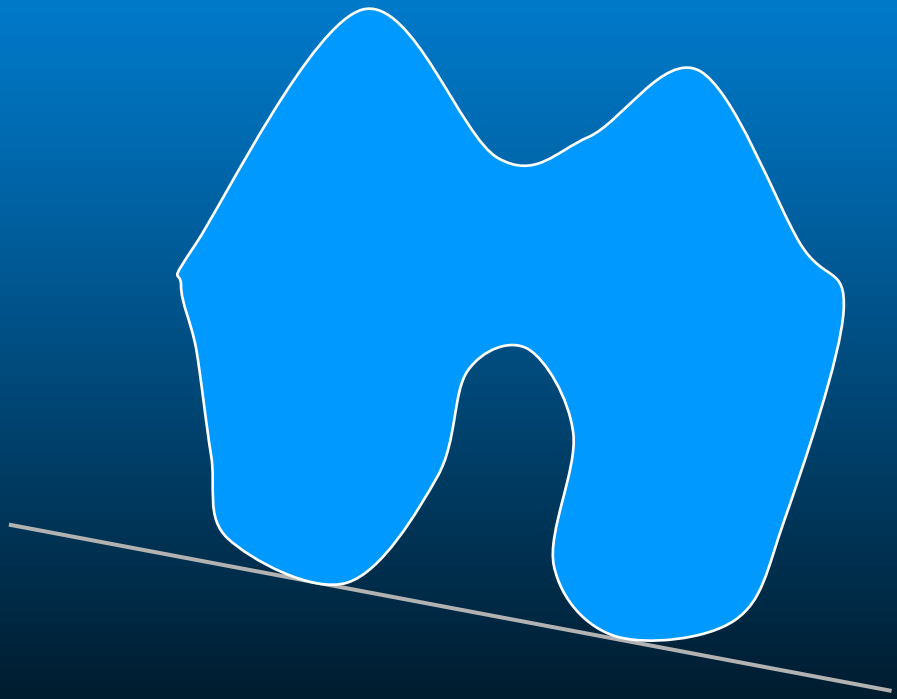
*Berger, CORR, 286, 1993

State of the art

Transversal plane

2. Posterior Condylar Axis

PCA



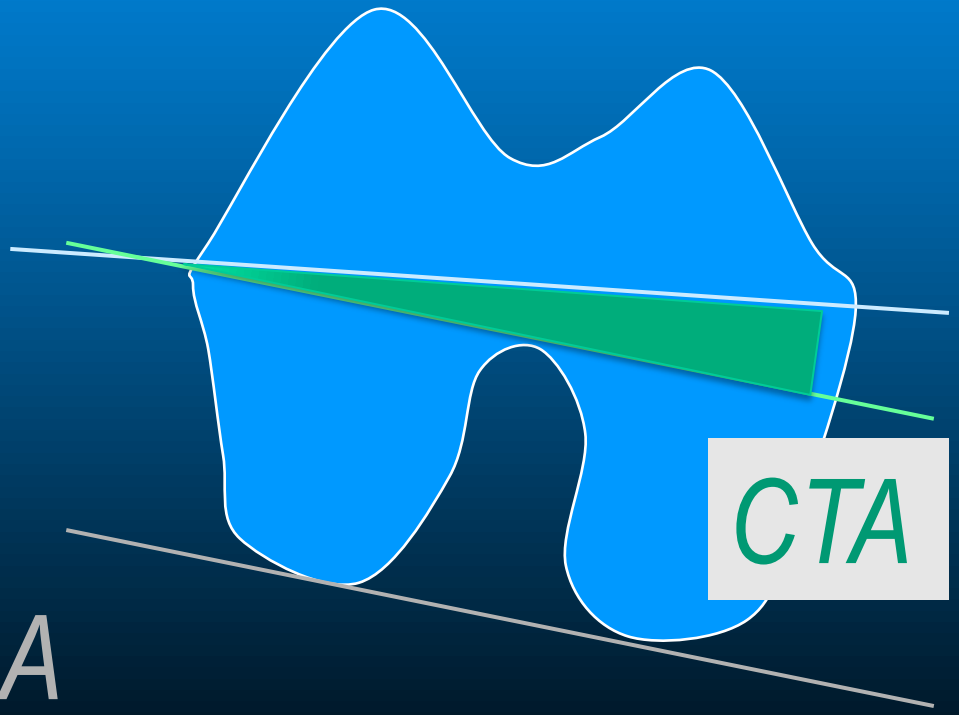
*Berger, CORR, 286, 1993

State of the art

Transversal plane

Condylar Twist Angle

aTEA



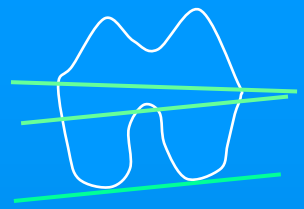
PCA

Landmarks ?

LCL

MCL

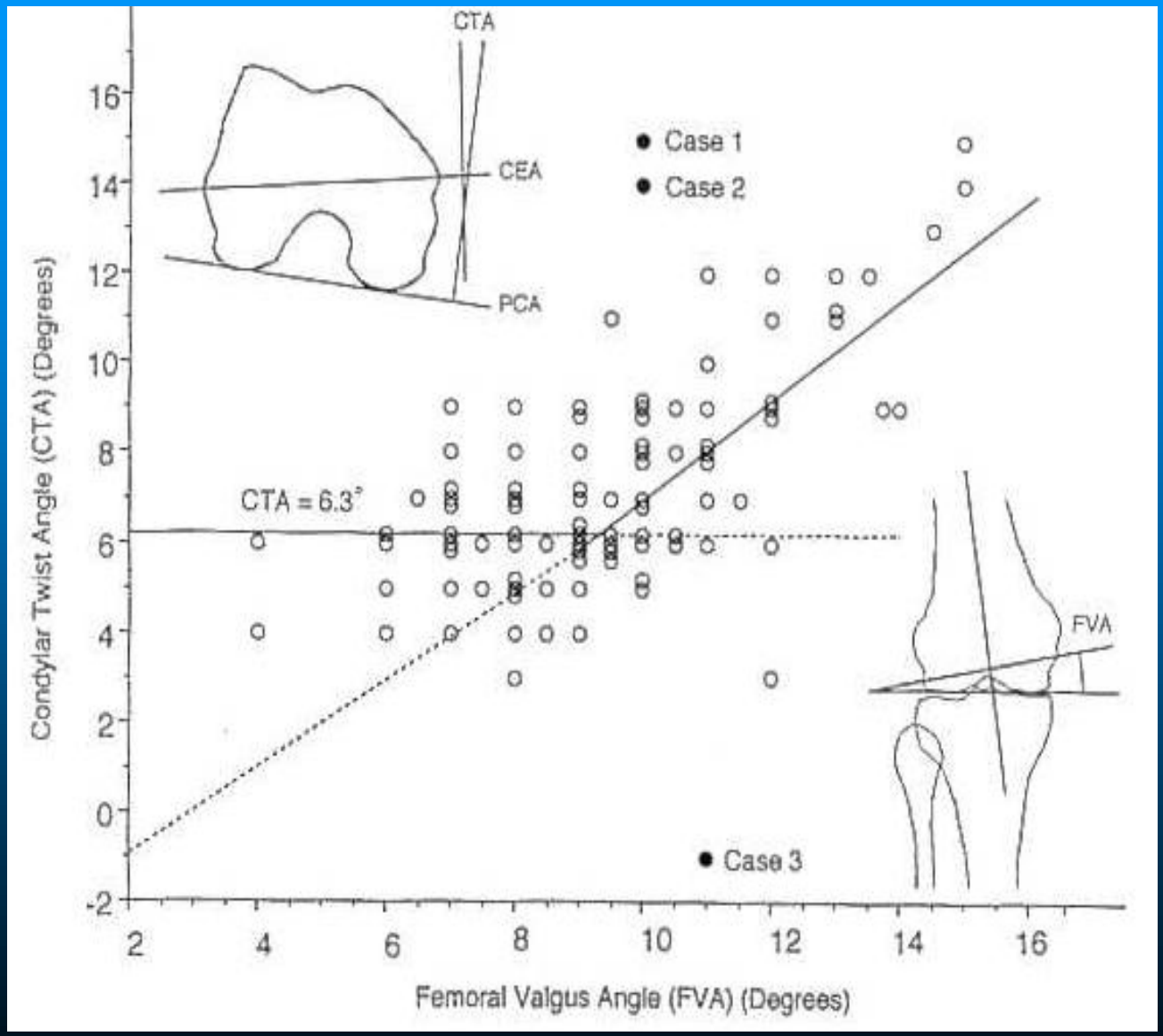
Condylar Twist Angle



Arima J, JBJS 77(A), 1995 *Mantas JP, J.Arthroplsty, 1992* *Yoshioka Y, JBJS 60(A), 1987*	**5°**
Poilvache PL, CORR 331, 1996	**3.6°**
Berger RA PL, CORR 286, 1993	**3.5° m – 0.3° f**
Griffin RA, J.Arthroplsty, 1998	**Osteophytes**
Akagi M, CORR 388, 2001	***6° Nal or Varus** **> 6°** & gradual **valgus**

*(*CEA – about 3° // SEA)*

Relationship between FVA and CTA +/- ??



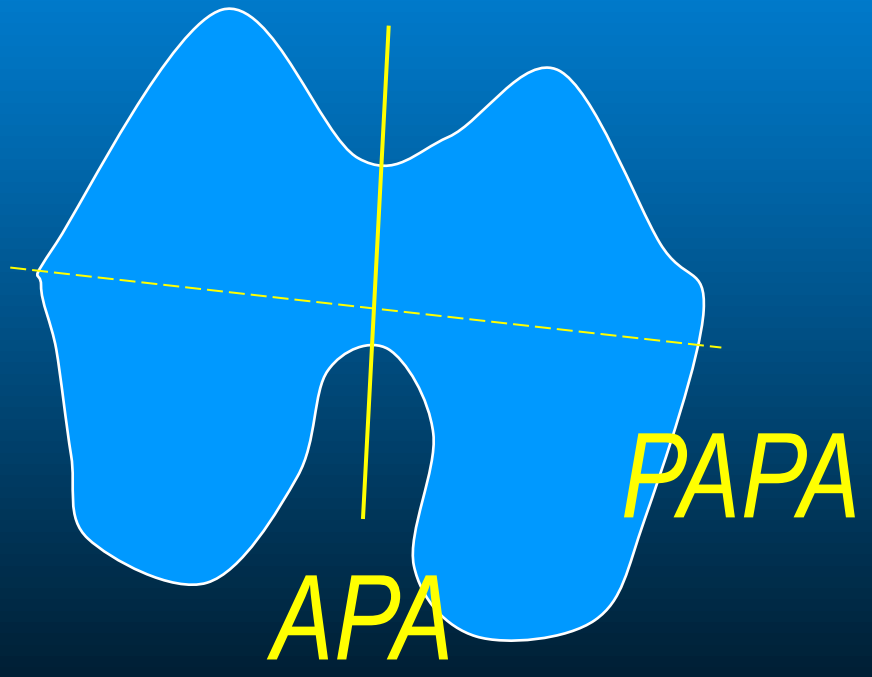
AKAGI M.

CORR, 388, 2001

State of the art

Transversal plane

3. Antero-Posterior Axis APA and its perpendicular PAPA



Whiteside, CORR, 321, 1995 / Akagi, CORR, 388, 2001

State of the art

Frontal and Transversal planes

Rotational alignment of the distal femur: A literature review☆

Revue de Chirurgie Orthopédique et Traumatologique, *Volume 95, Issue 5, September 2009, Pages 449-457*

J. Victor

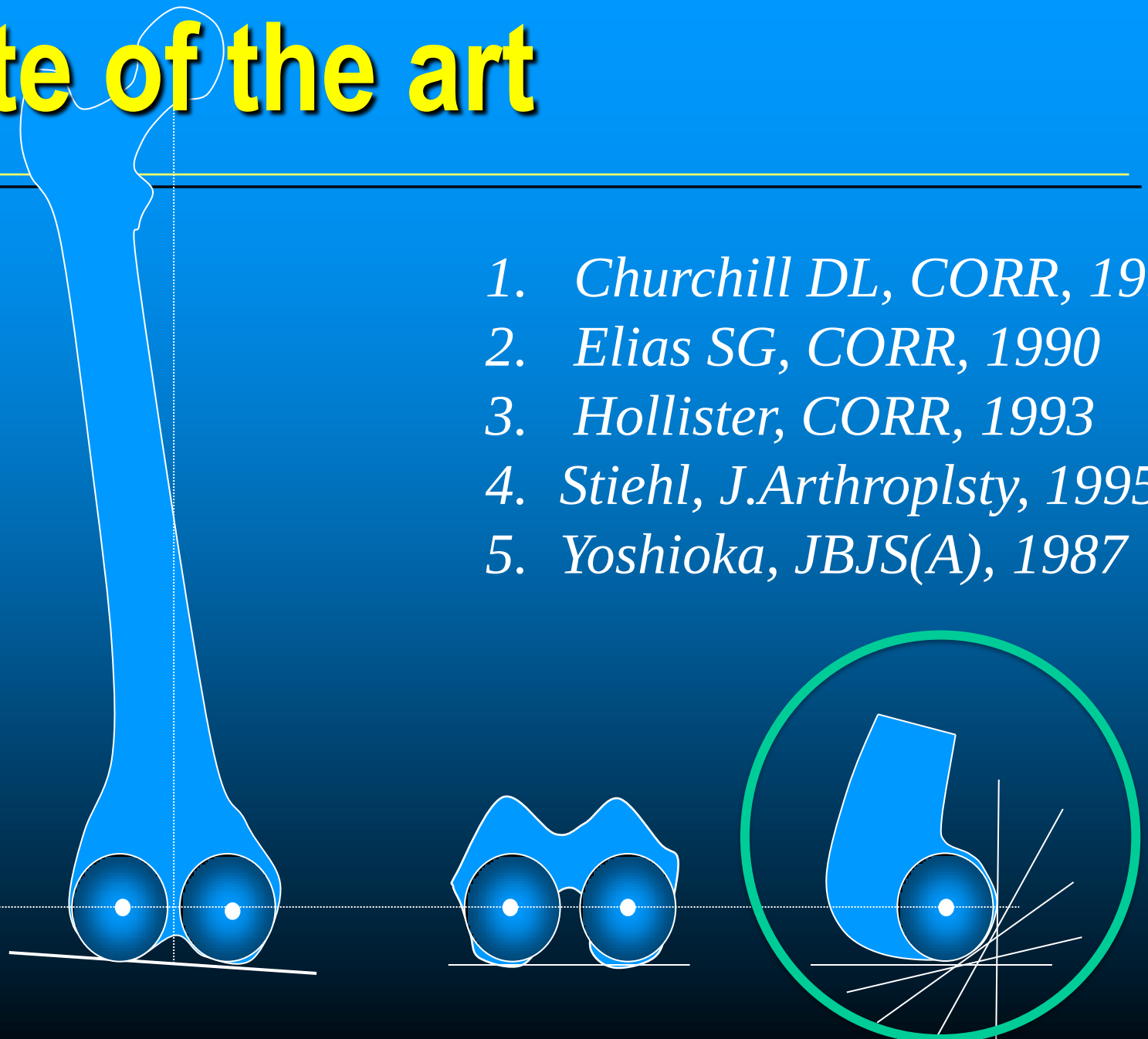
State of the art

Frontal and Transversal planes

Summary

- ….. Based on the published values, the following mean angular relationships between the rotation axes of the distal femur in the axial plane can be calculated**: the posterior condylar line is on average 3° internally rotated relative to the surgical transepicondylar axis (TEA**), **5° relative to the anatomical TEA** and 4° relative to the perpendicular to the trochlear anteroposterior axis.
- The **greatest interindividual variability is described for the trochlear AP axis.**
- The **worst track record regarding inter- and intraobserver variability is for the TEA.**
- Given the large ranges and standard deviations of all reference axes, and the important inter- and intraobserver variability in the surgical location of the TEA, **the use of a preoperative CT scan is recommended**

State of the art



1. *Churchill DL, CORR, 1998*
2. *Elias SG, CORR, 1990*
3. *Hollister, CORR, 1993*
4. *Stiehl, J.Arthroplsty, 1995*
5. *Yoshioka, JBJS(A), 1987*

State of the art

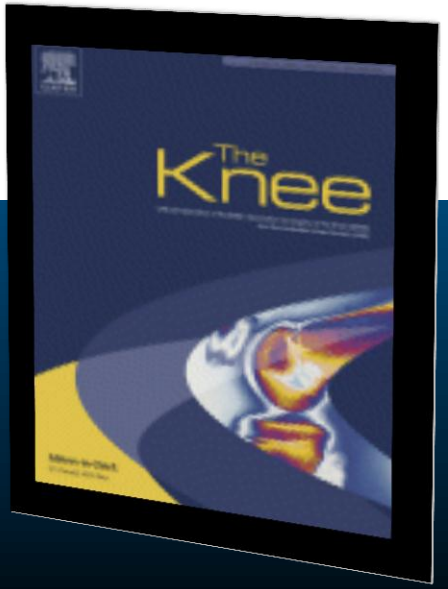
Osseous contours

Knee Surg Sports Traumatol Arthrosc (2008) 16:674–682
DOI 10.1007/s00167-008-0551-9

KNEE

Relationship between the surgical epicondylar axis and the articular surface of the distal femur: an anatomic study

Sébastien Lustig · Frédéric Lavoie · Tarik Ait Si Selmi · Elvire Servien · Philippe Neyret

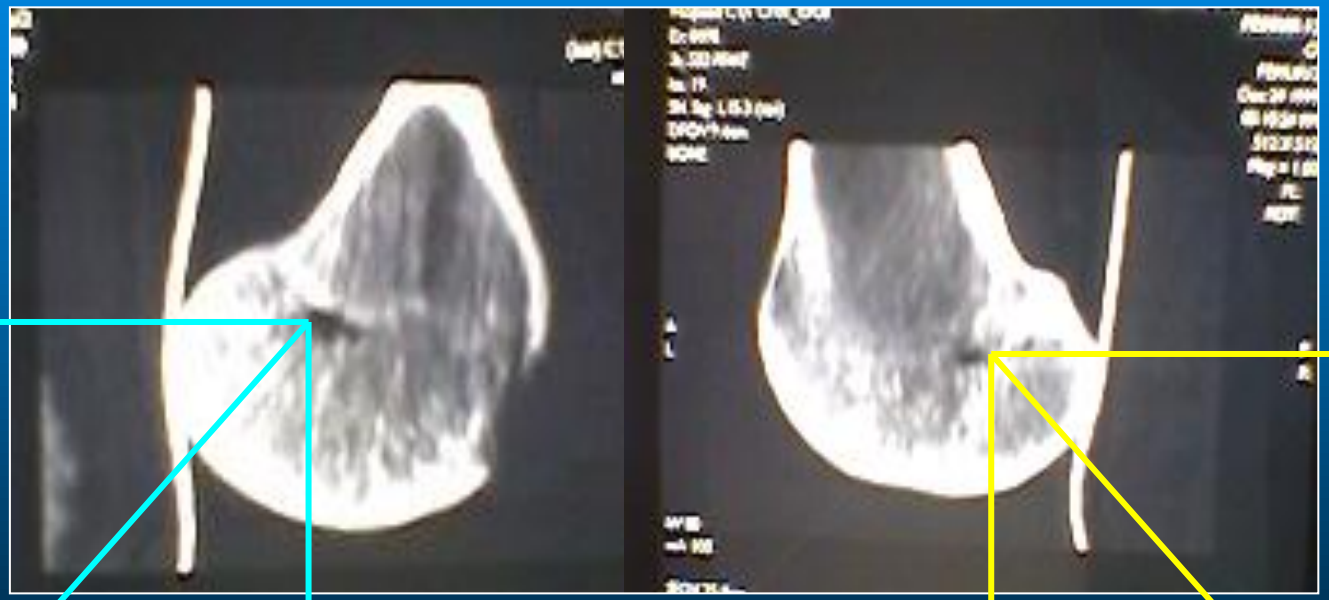


Results

Statistical difference ???

Medial

Lateral



24.6
+/-2.7

22.8
+/-3.0

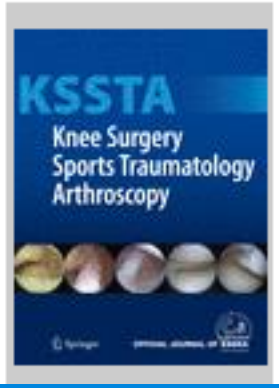
25.5
+/-2.8

25.5
+/-2.4

23.1
+/-2.1

23.3
+/-2.6

KNEE SURGERY, SPORTS TRAUMATOLOGY, ARTHROSCOPY
Volume 16, Number 7, 674-682, DOI: 10.1007/s00167-008-0551-9



KNEE

Relationship between the surgical epicondylar axis and the articular surface of the distal femur: an anatomic study

Sébastien Lustig, Frédéric Lavoie, Tarik Ait Si Selmi, Elvire Servien and Philippe Neyret

- Our critical study of the surgical epicondylar axis of the distal femur reveals that this axis is not equidistant from the posterior and distal surfaces of the femoral condyles.
- We also showed that the contour of the femoral condyles should not be interpreted as being centred on the surgical epicondylar axis.

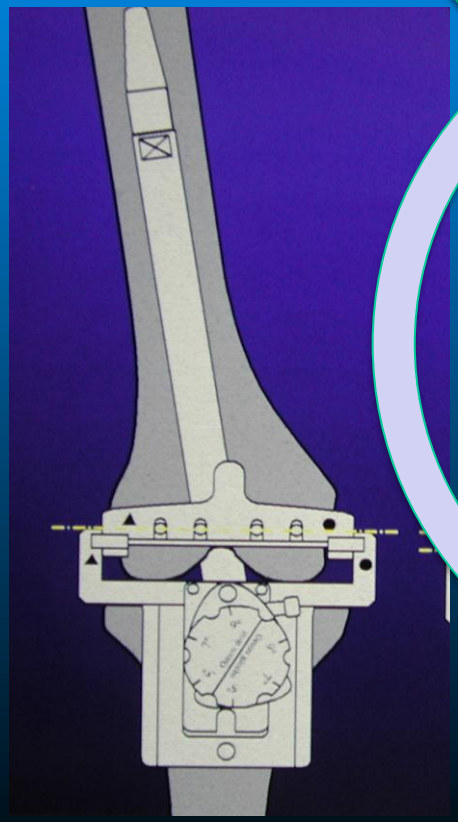
The surgical epicondylar axis therefore does not appear to be an adequate basis for the understanding of the shape of the distal femur.

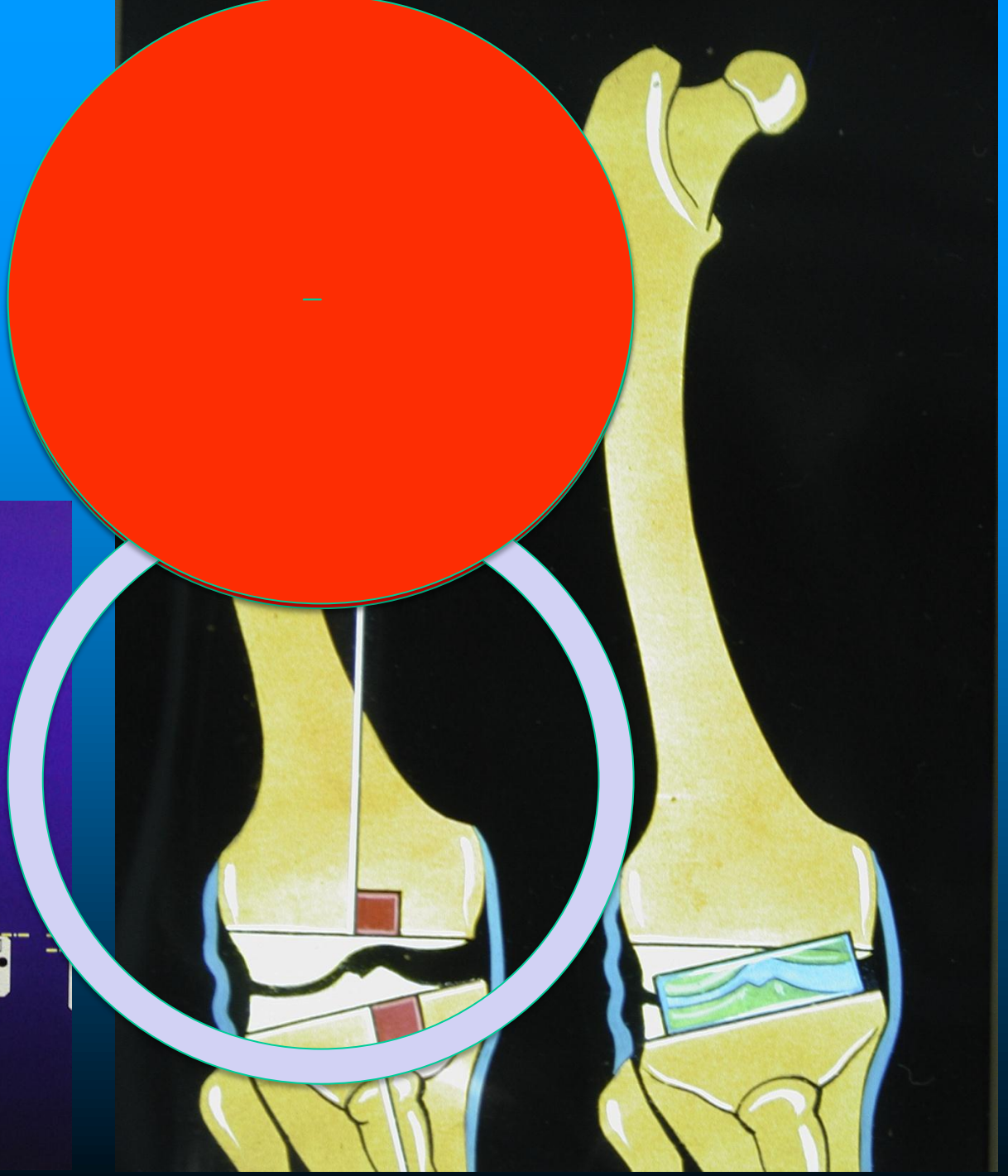
Think

Different !

1. FEMORAL COMPONENT 90° ??

7° valgus

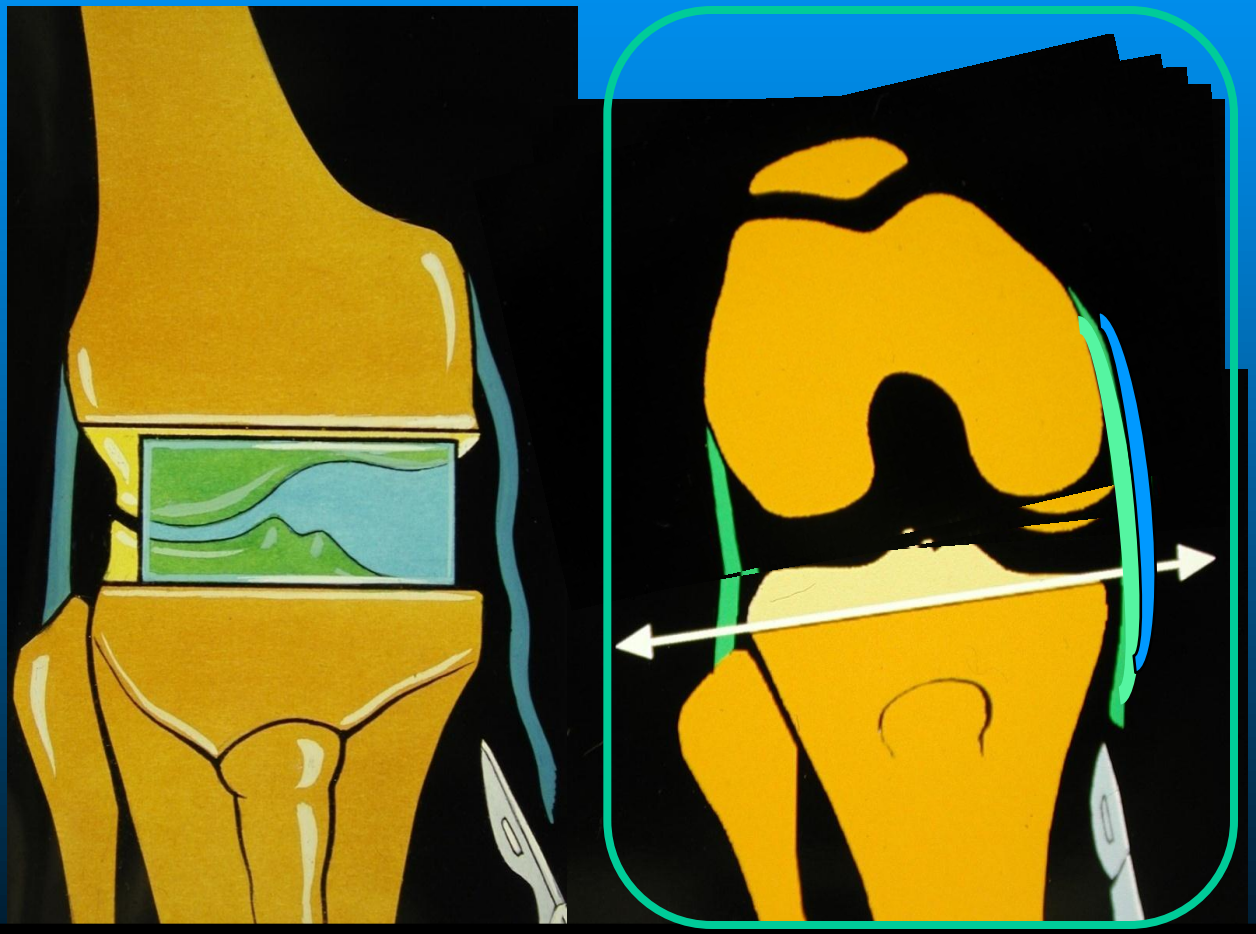




Femoral Varus Deformity

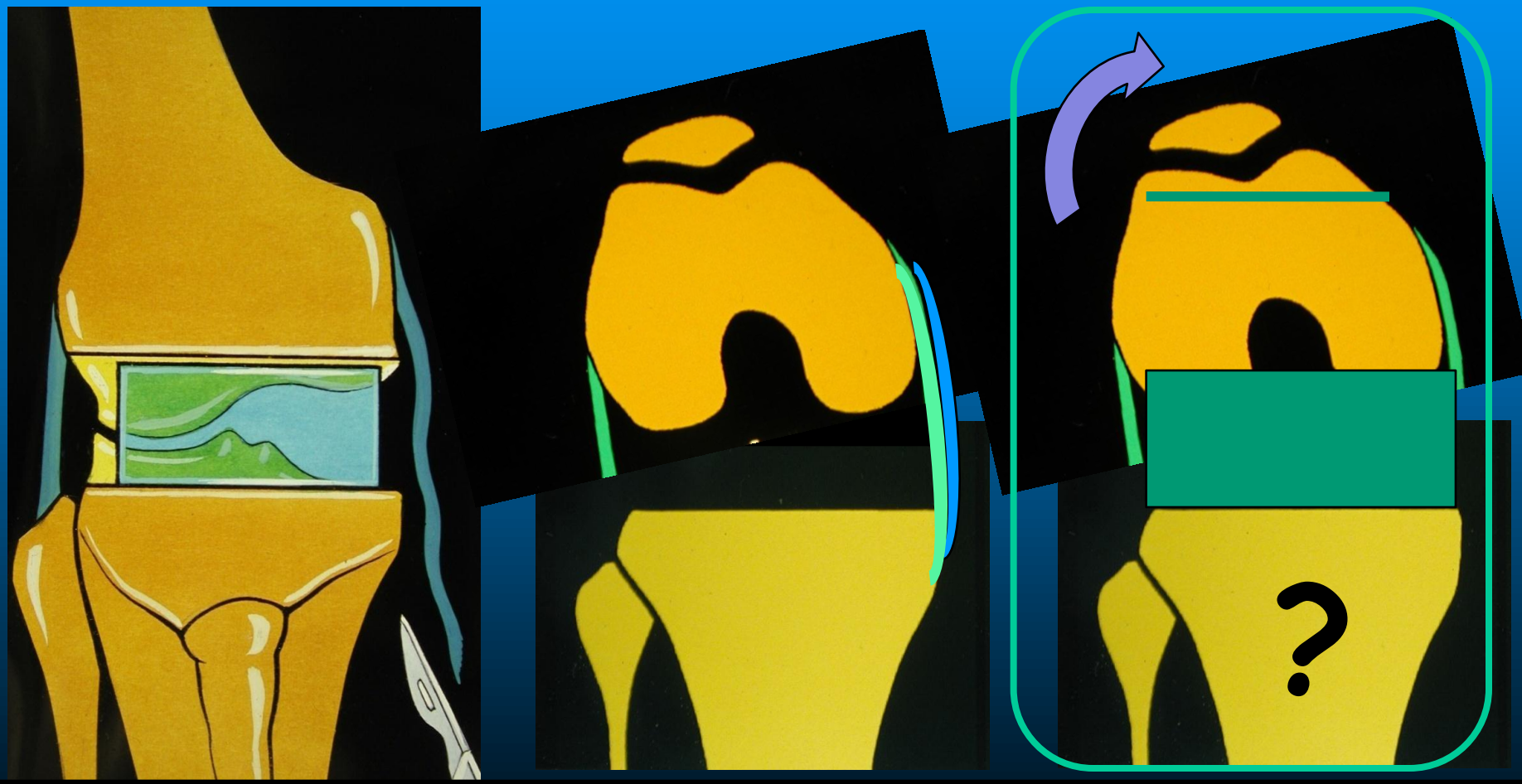
RELEASE

Femoral Varus Deformity



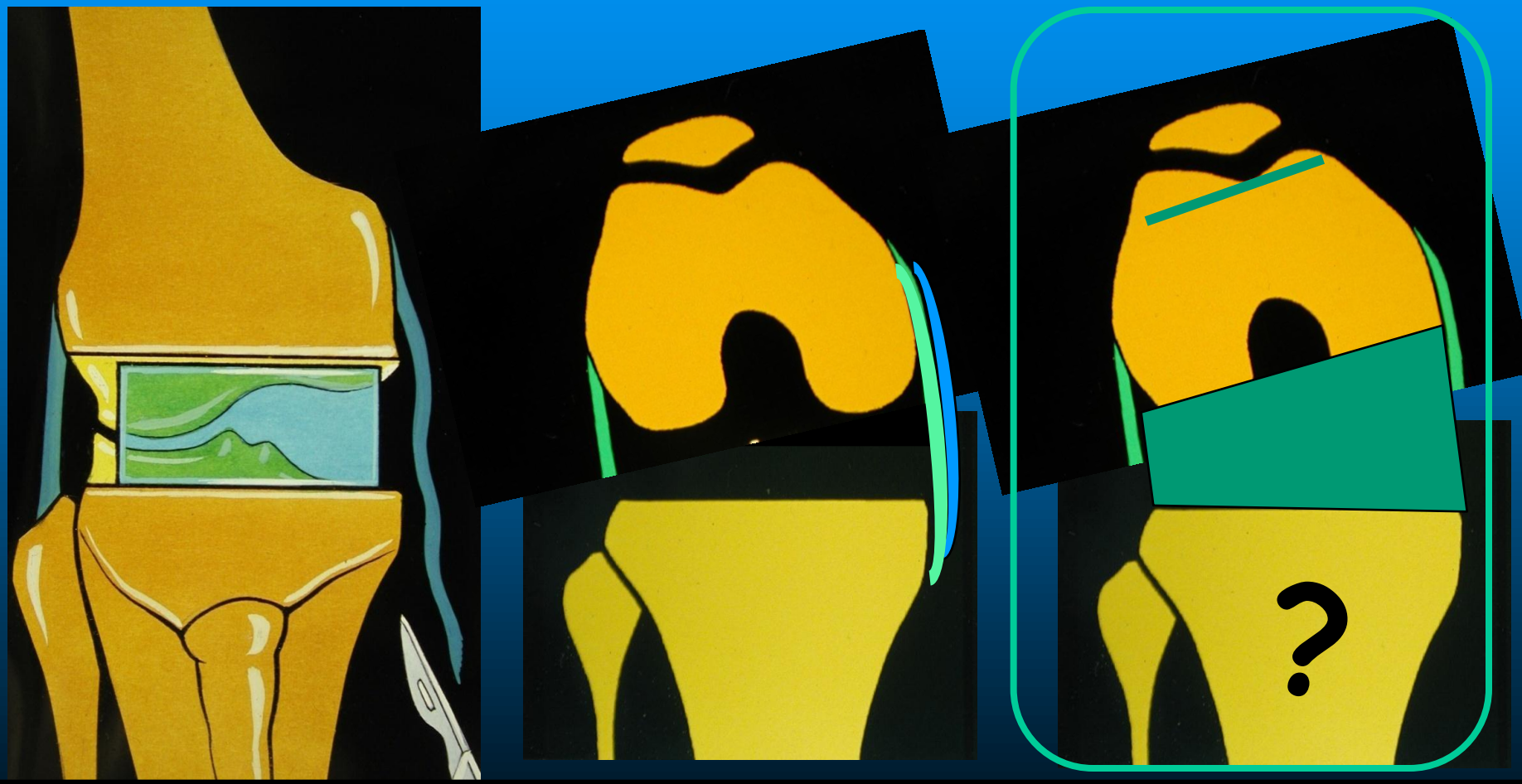
Consequences of the medial release in flexion

Femoral Varus Deformity



Internal femoral component torsion … Patellofemoral tracking ??

Femoral Varus Deformity

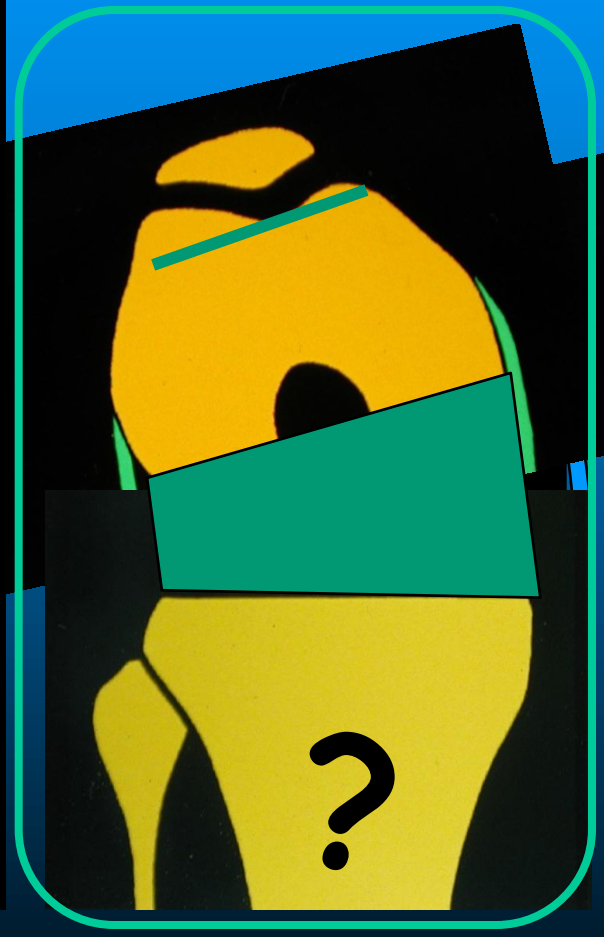


More constrained prosthesis

Femoral Varus Deformity

•Some surgeons suggest in order to compensate the asymmetrical distal femoral cut :

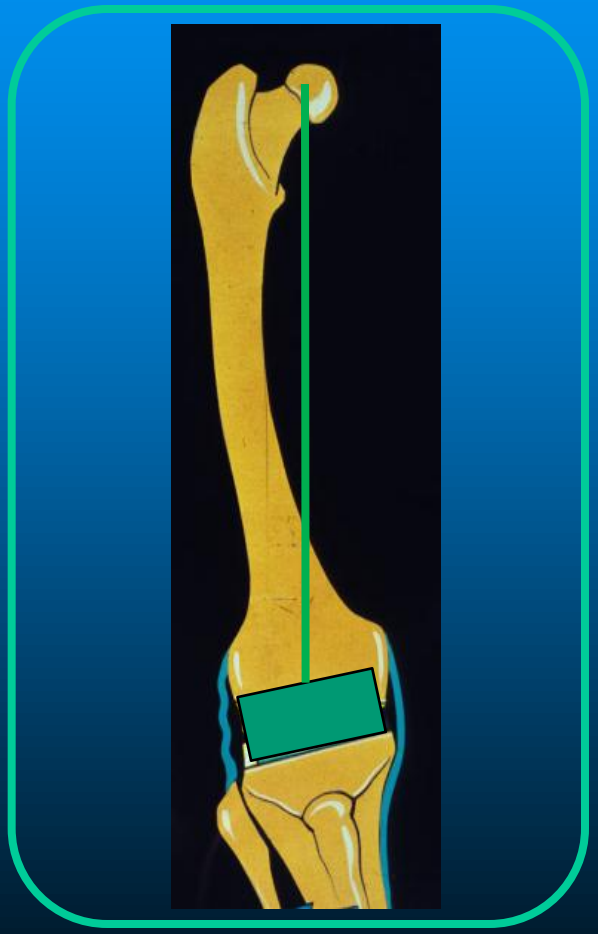
- either to accept a medial laxity
- or to internally rotate the femoral component.



More constrained prosthesis or Internal femoral torsion ??

Femoral Varus Deformity

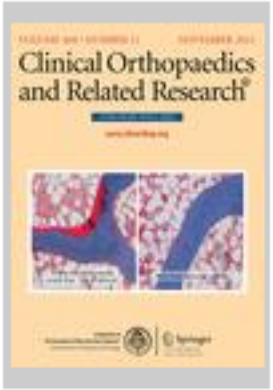
•In case of minor (<6°) Extra articular Varus Femoral Deformity we prefer to accept a small amount of residual varus in the femoral component (but no internal torsion)…



Residual varus

Residual varus deformity does not negatively influence results of total knee arthroplasty in patients with pre-operative varus deformity

CLINICAL ORTHOPAEDICS AND RELATED RESEARCH®
DOI: 10.1007/s11999-011-1988-6 Online First



CLINICAL RESEARCH

Residual Varus Alignment does not Compromise Results of TKAs in Patients with Preoperative Varus

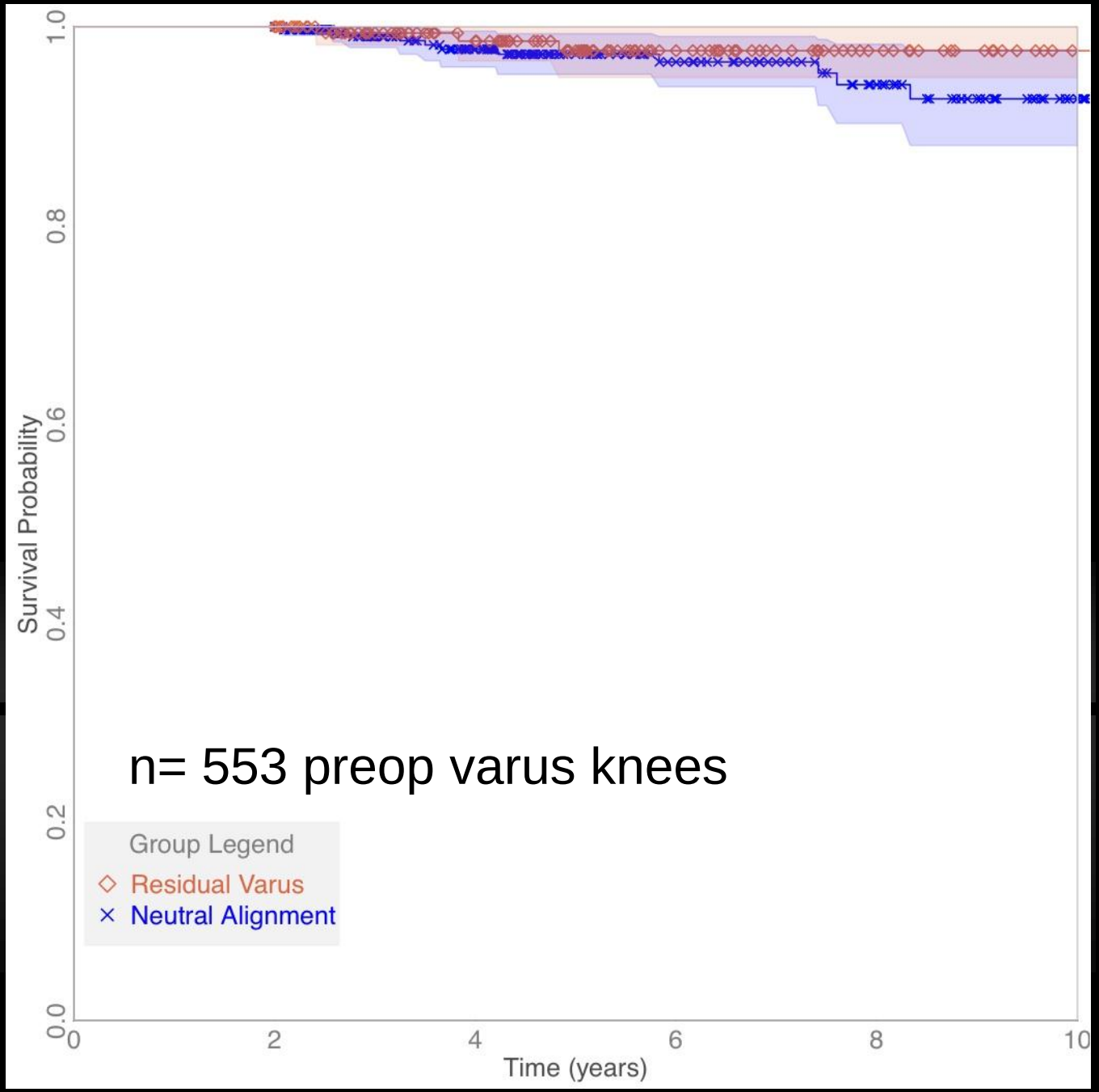
Robert A. Magnussen, Florent Weppe, Guillaume Demey, Elvire Servien and Sébastien Lustig

A Publication of

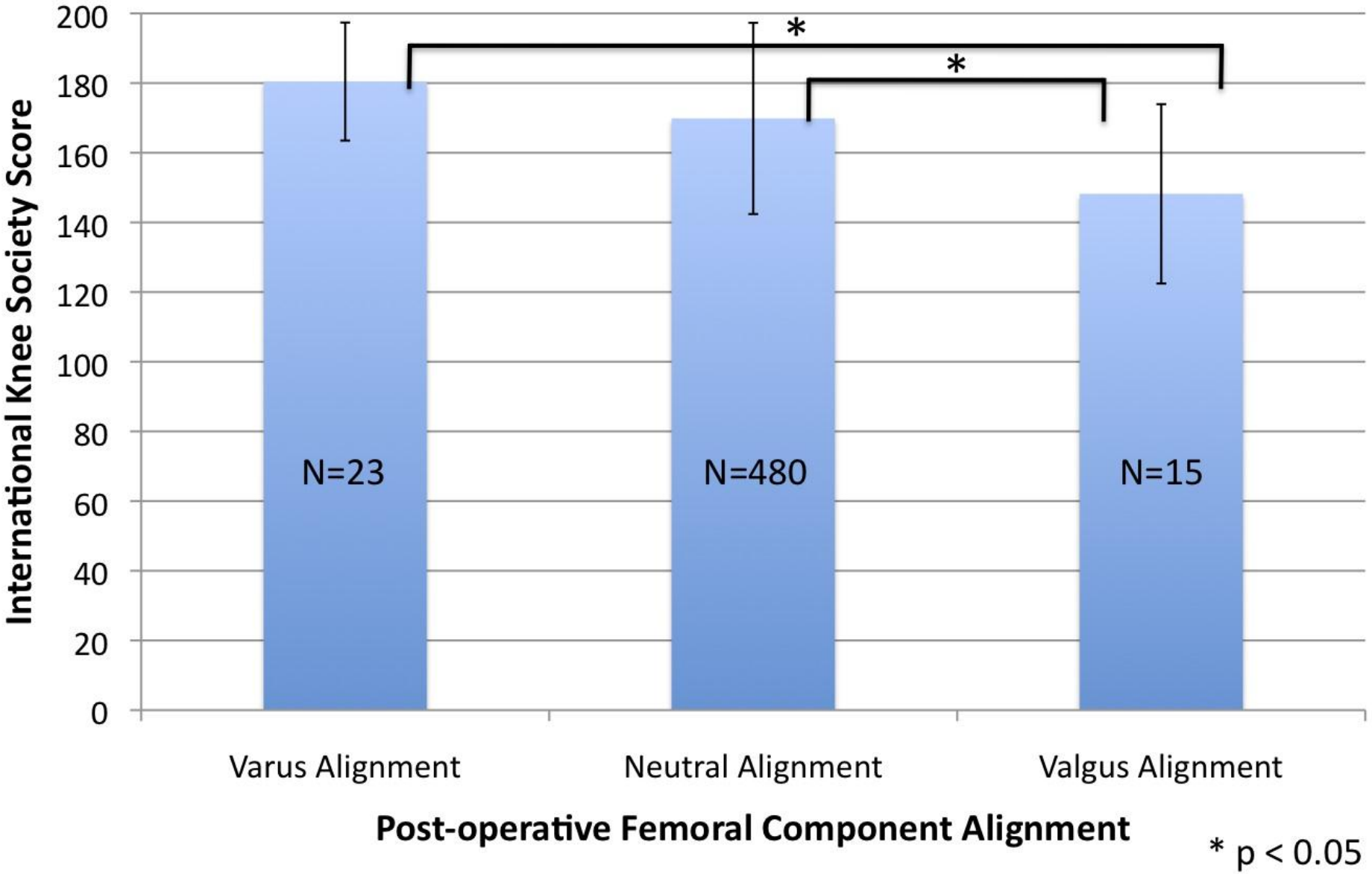
The Association of Bone and Joint Surgeons®

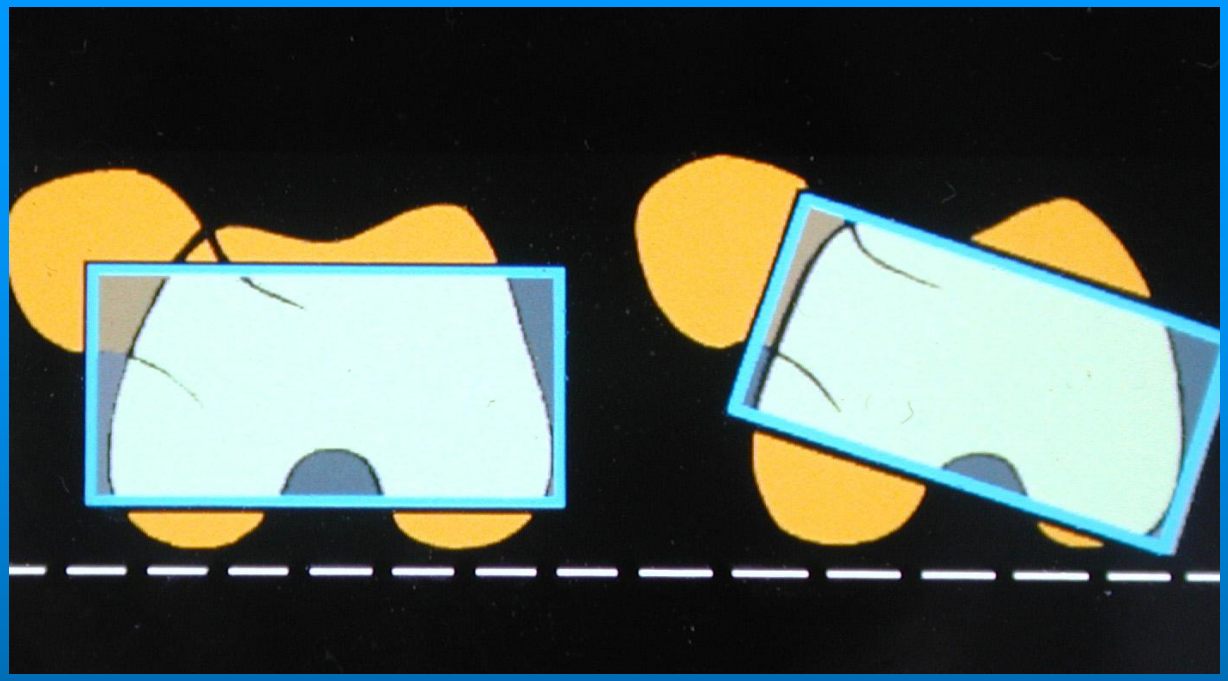
Conclusions

Residual post-operative varus deformity after TKA does not yield poorer clinical results in patients with pre-operative varus deformities, providing tibial component varus is avoided.


1.0
0.8
0.6
0.4
0.2
0.0
Survival Probability
0
2
4
6
8
10
Time (years)
n= 553 preop varus knees
Group Legend
Residual Varus
Neutral Alignment

Preoperative Varus > 3˚

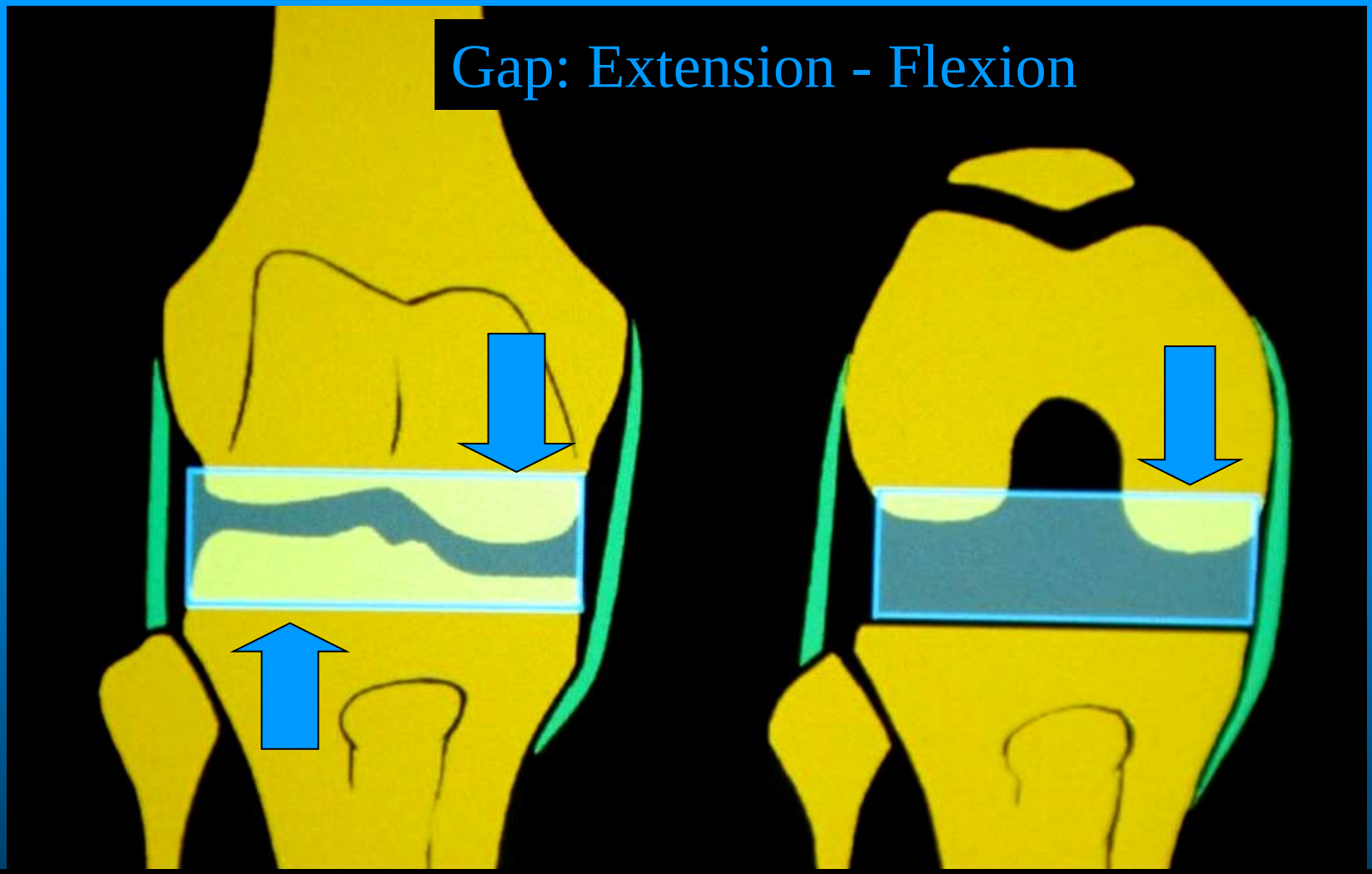




Think

Different !

2. FEMORAL COMPONENT ROTATION



More tibia varum…

more femoral external rotation

?

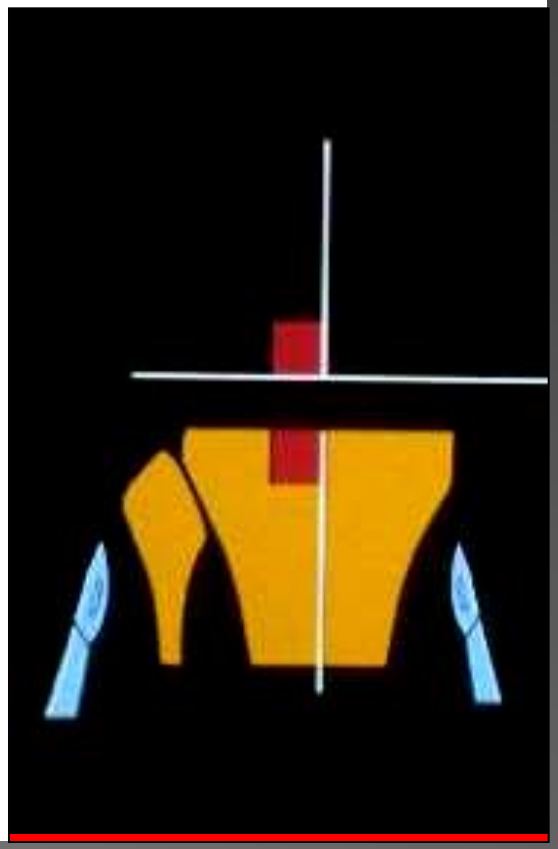
Definition 1

- Releases permit to compensate for asymmetrical tibial cut.

- Tibial cut and Releases

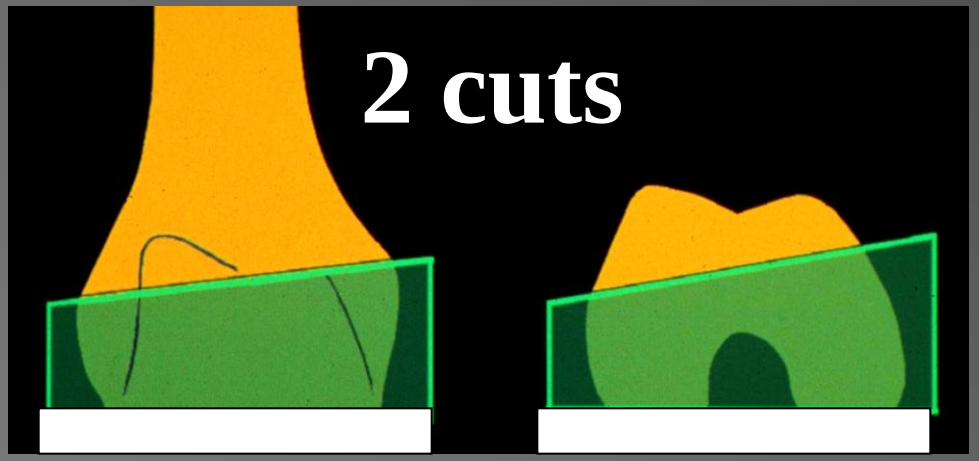
make up the “Tibial Gap”

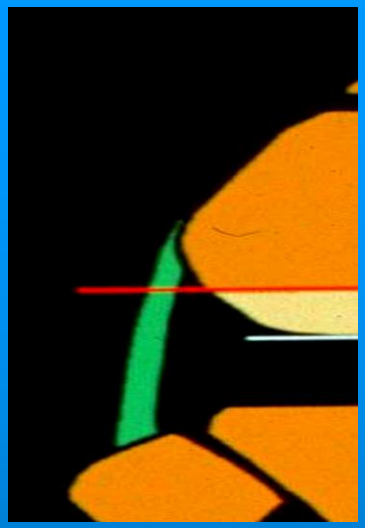
1 cut



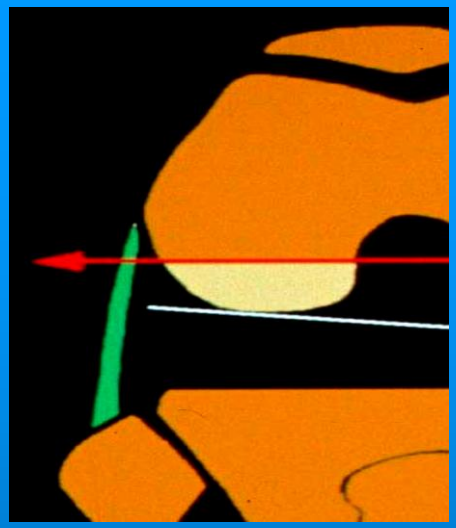
Definition 2

- Femoral cuts create the femoral gap

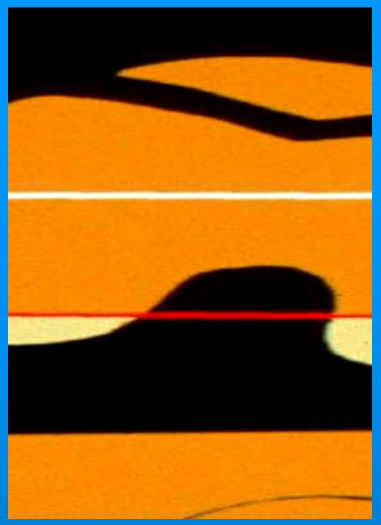




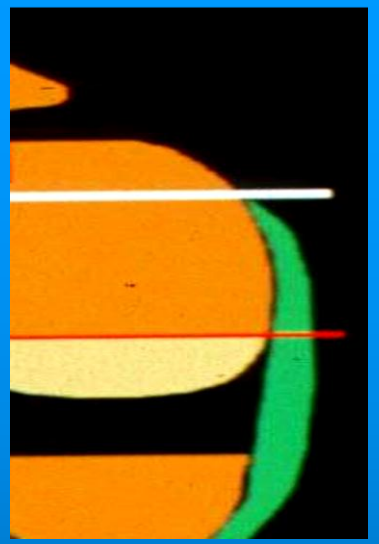
Symmetrical



3° EXT Rotation

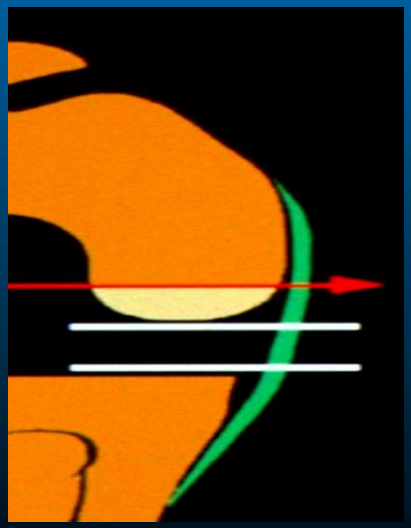


Epicondylar axis

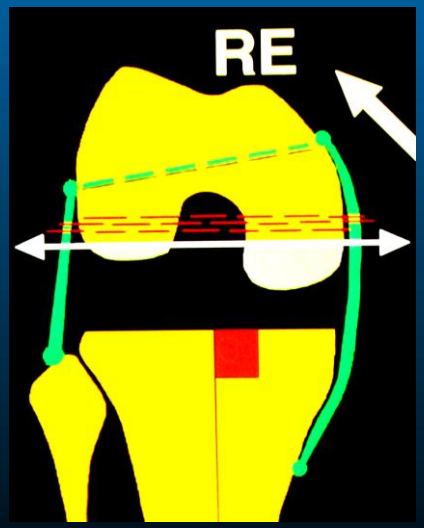


Whiteside’line

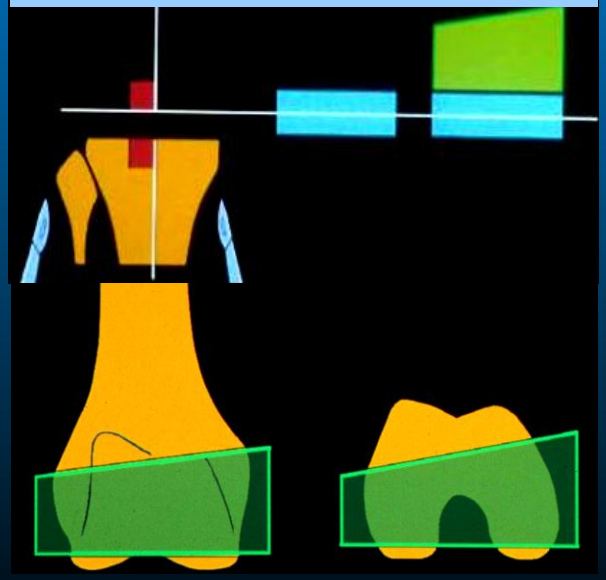
CORES



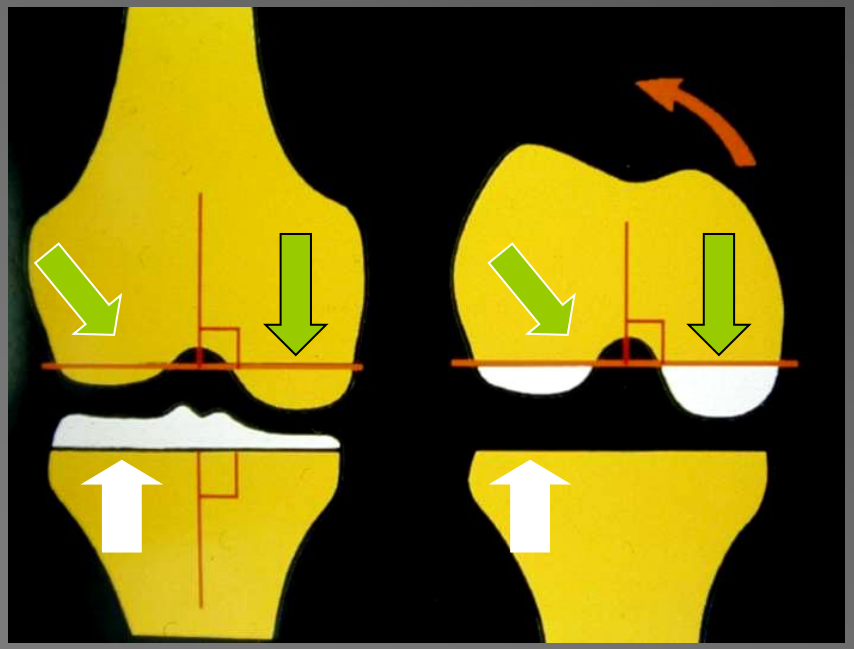
A.Tibial.A

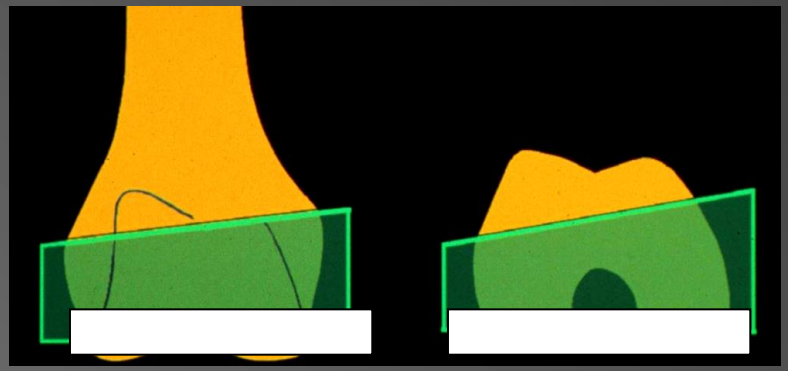


A Trillat’ center, JDG 99

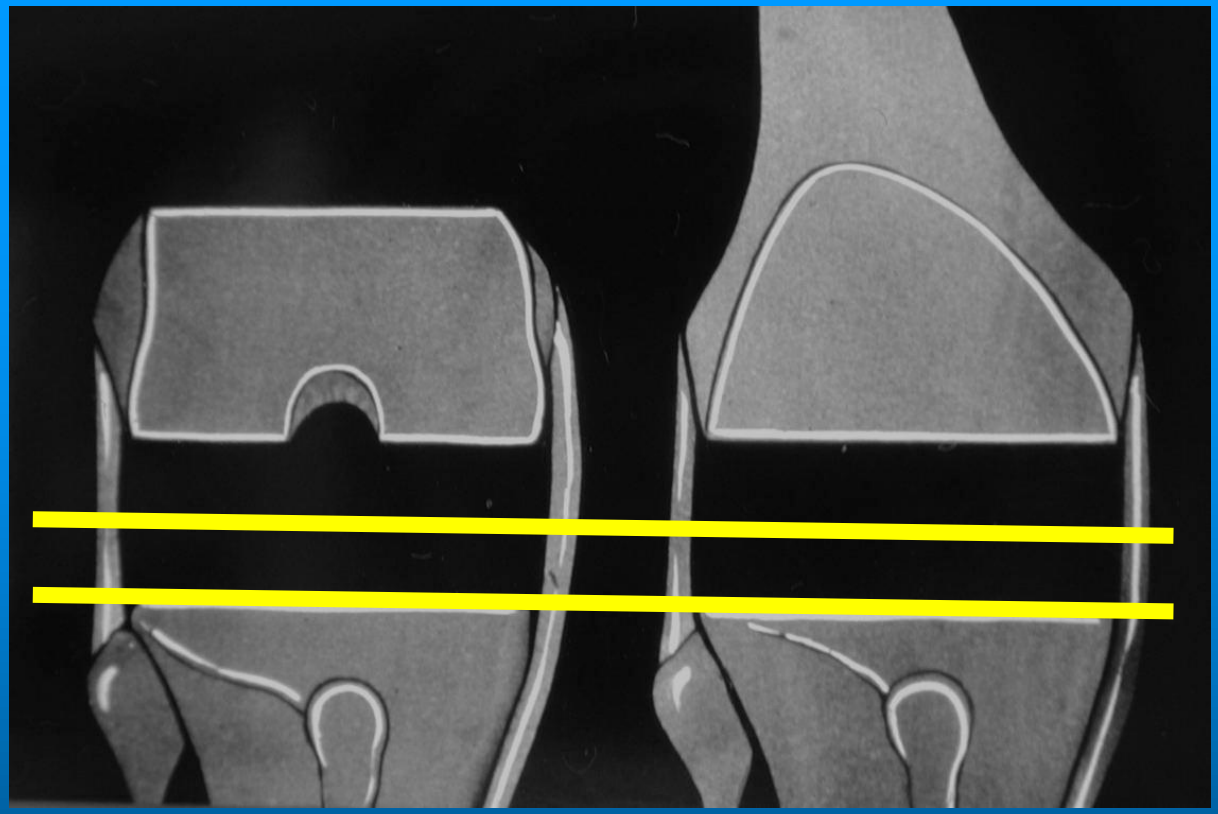


Asymmetrical tibial cut (extra-articular tibial deformity) does not influence femoral component rotation





Asymmetrical distal femoral cut influences femoral rotation



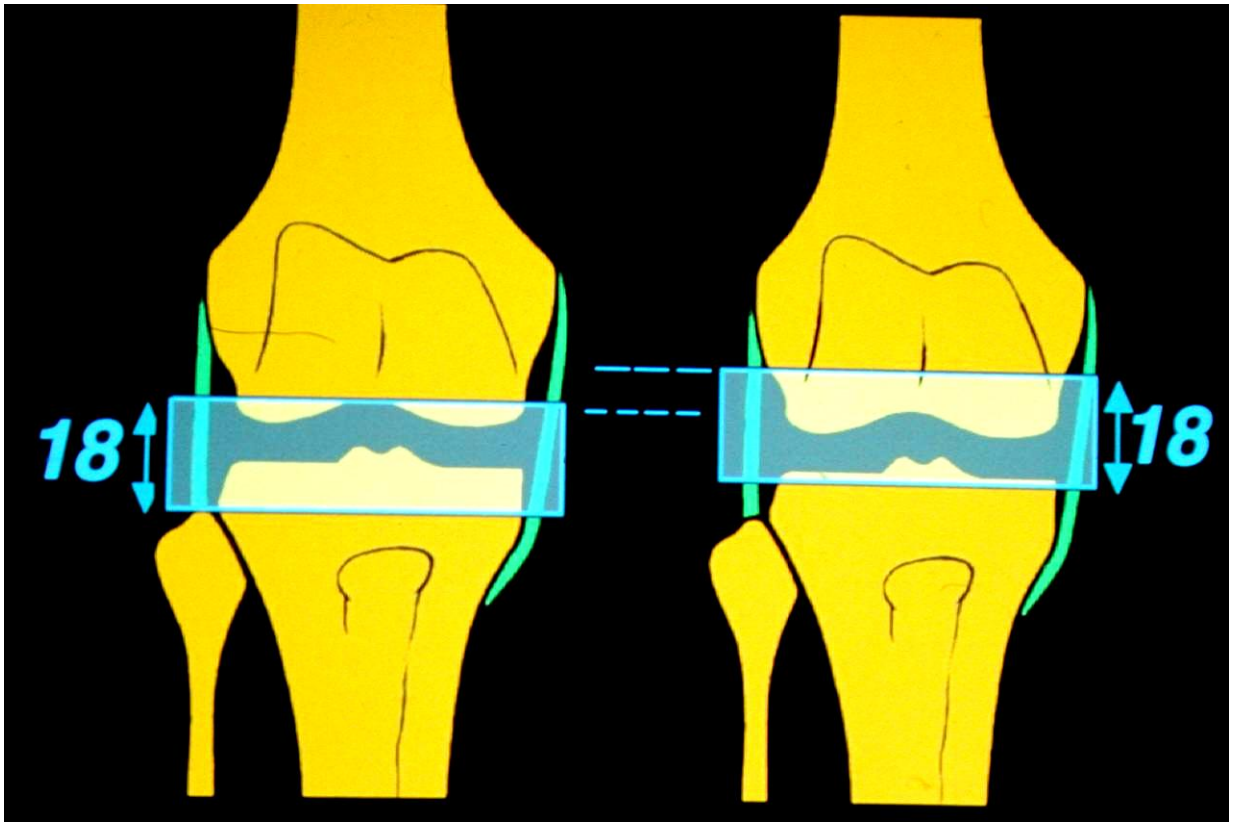
Think

Different !

3. Tibial and Femoral gaps

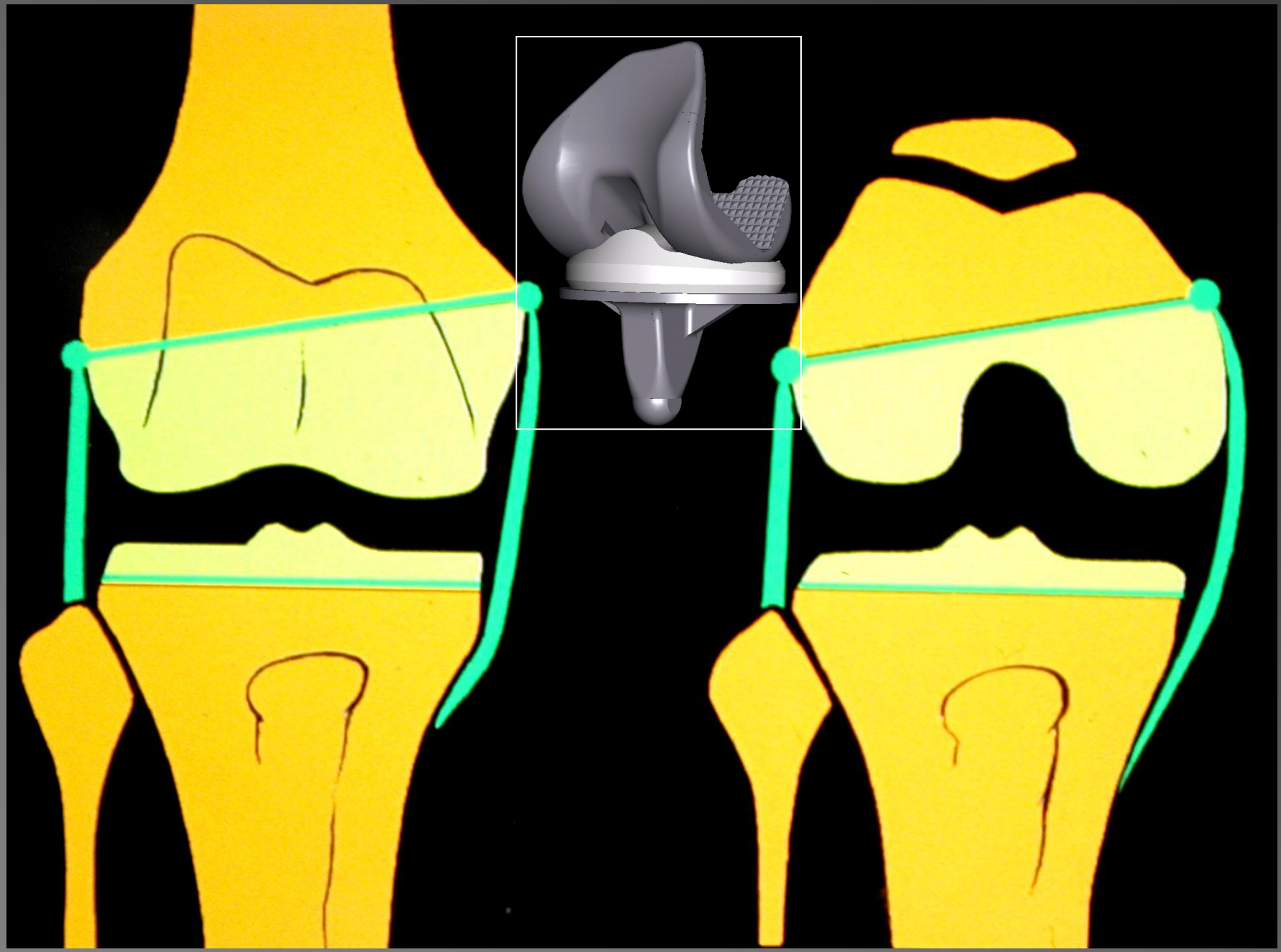
Prosthetic joint line

"Influence of the height of the joint space on the three-dimensional kinematics of total knee prostheses and behavior of the collateral ligaments: an in vitro study"



Chatain F, Marin F, Lavaste F, Skalli W, Neyret Ph RCO, 2002, vol 88: 803-811

Conclusions



Flexion

GAPS

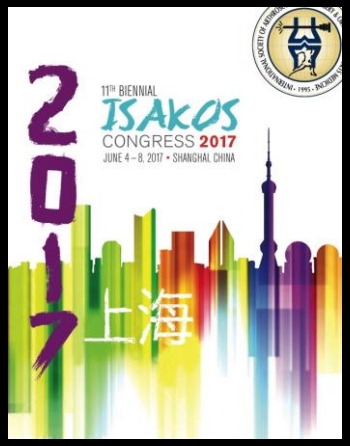
Extension

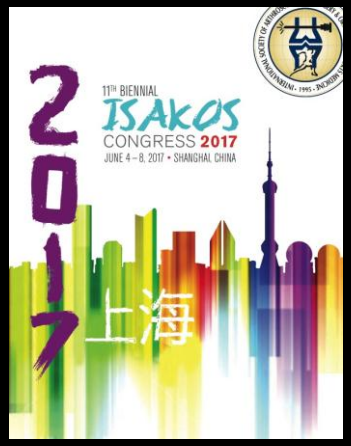
Femoral GAP

Tibial GAP

Our Proposition

- External Rotation of femoral component is recommended in case of femoral valgus
- The amount of rotation depends on the amount of asymmetrical distal femoral cut
- The center of this rotation must take into account the morphology of the two condyles.





Merci

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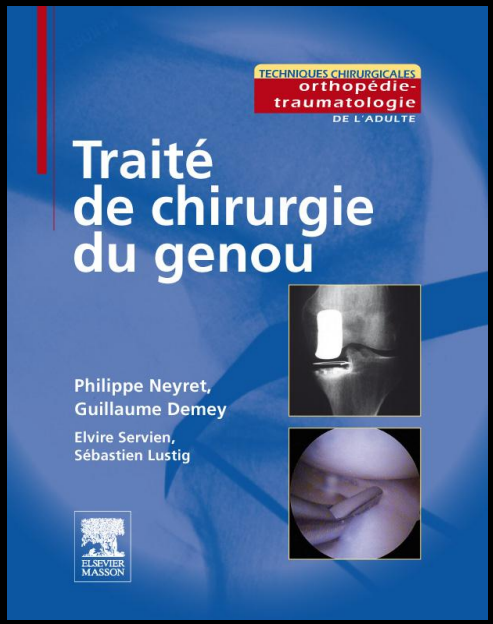
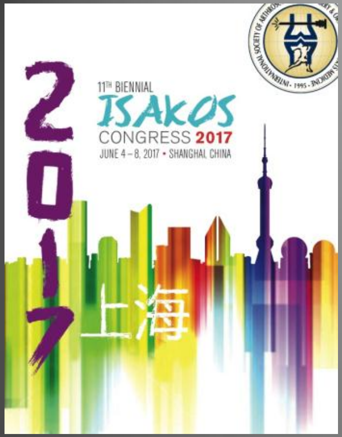
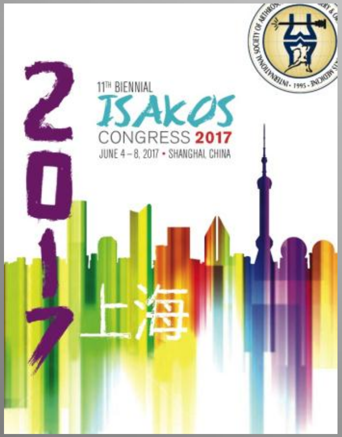
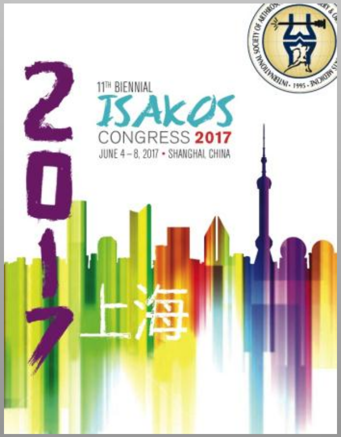
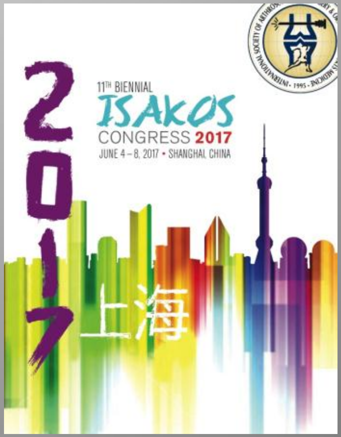
LYON GENOU CENTRE ALBERT TRILLAT

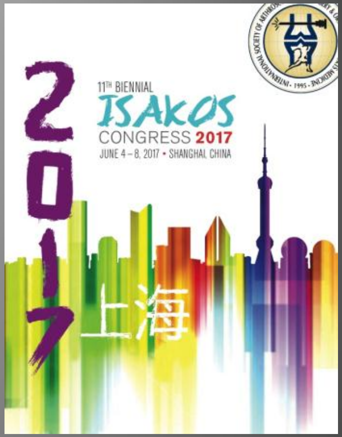












Thank you

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