# *Lateral fixed bearing UKA*
# *Special features and current indications*

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# 5- to 16-Year Follow-Up of 54 Consecutive Lateral Unicondylar Knee Arthroplasties With a Fixed-All Polyethylene Bearing

Sebastien Lustig, MD, PhD,*† Ahmed Elguindy, MD,*‡
Elvire Servien, MD, PhD,*‡ Camdon Fary, FRACS,§ Edouard Munini, MD,*
Guillaume Demey, MD,*† and Philippe Neyret, MD*†


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Contents lists available at ScienceDirect

The Knee


## Progression of medial osteoarthritis and long term results of lateral unicompartmental arthroplasty: 10 to 18 year follow-up of 54 consecutive implants

Sébastien Lustig[a,*], Timothy Lording[a,b], Florent Frank[a], Caroline Debette[a], Elvire Servien[a], Philippe Neyret[a]

SYMPOSIUM: PAPERS PRESENTED AT THE ANNUAL MEETINGS OF THE KNEE SOCIE


## Lateral Unicompartmental Knee Arthroplasty Relieves Pain and Improves Function in Posttraumatic Osteoarthritis

Sebastien Lustig MD, PhD, Sebastien Parratte MD, PhD,
Robert A. Magnussen MD, Jean-Noel Argenson MD,
Philippe Neyret MD

## High Survival Rate and Very Low Wear of Lateral Unicompartmental Arthroplasty at Long Term
## A Case Series of 54 Cases at a Mean Follow-Up of 17 Years

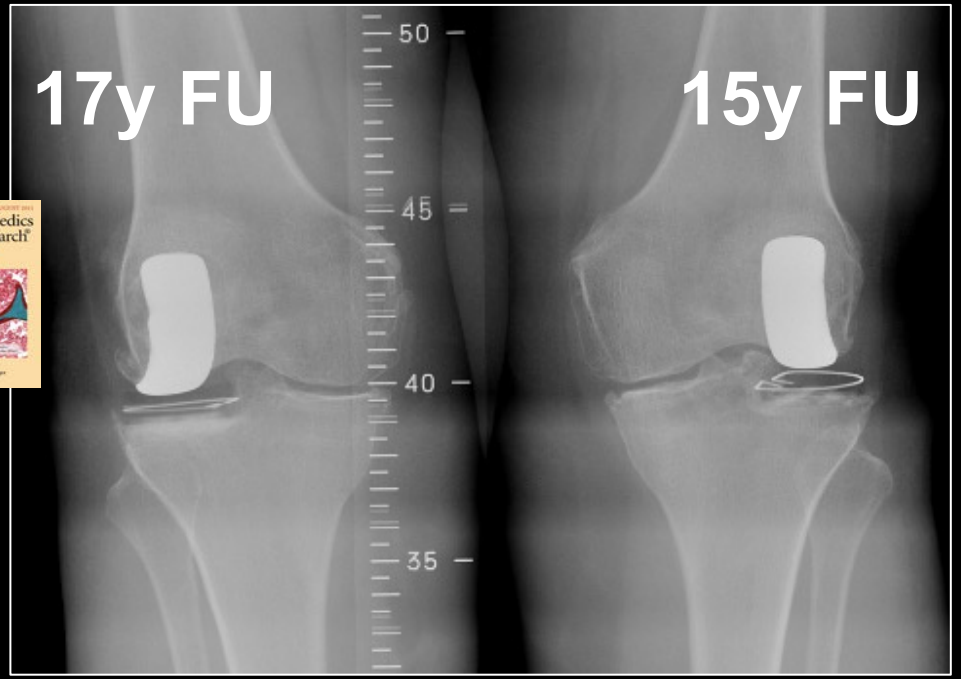
Etienne Deroche, MD [a], Cécile Batailler, MD [a,*], Timothy Lording, MBBS, FRACS [b], Philippe Neyret, PhD, MD [a], Elvire Servien, PhD, MD [a], Sébastien Lustig, PhD, MD [a]


Knee Su
DOI 10.1007/s00167-013-2585-x

KNEE

## Lateral uni-compartmental knee replacement: current concepts and future directions

E. Servien · A. Merini · S. Lustig · P. Neyret

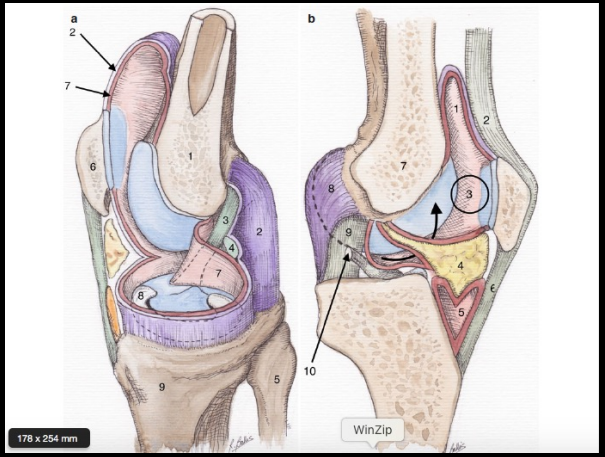


# Rule 1

Anatomy, Physiology, and Biomechanics of the Native Knee

Romain Gaillard, Bujar Shabani, Rosa Ballis, Philippe Neyret, and Sébastien Lustig

Knowledge of knee anatomy

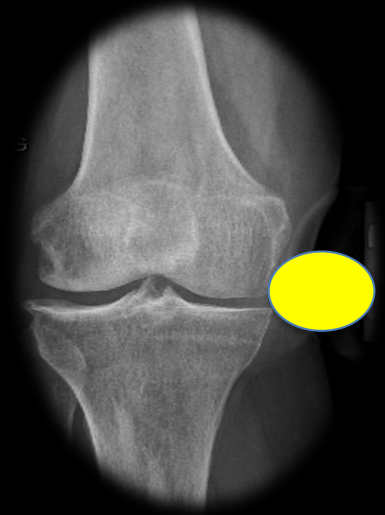


# Anatomy - Femur

Hypoplastic in the transverse plane

Reduced Posterior Condylar Offset

(Matsuda S. et al.2004)



# Anatomy - Femur

Hypoplastic in the transverse plane

Reduced Posterior Condylar Offset

(Matsuda S. et al.2004)

« … »lateral compartment of the knee is less constrained than the medial compartment « … »less tolerant for mobile-bearing implants and ACL deficiency.

# Anatomy - Tibia

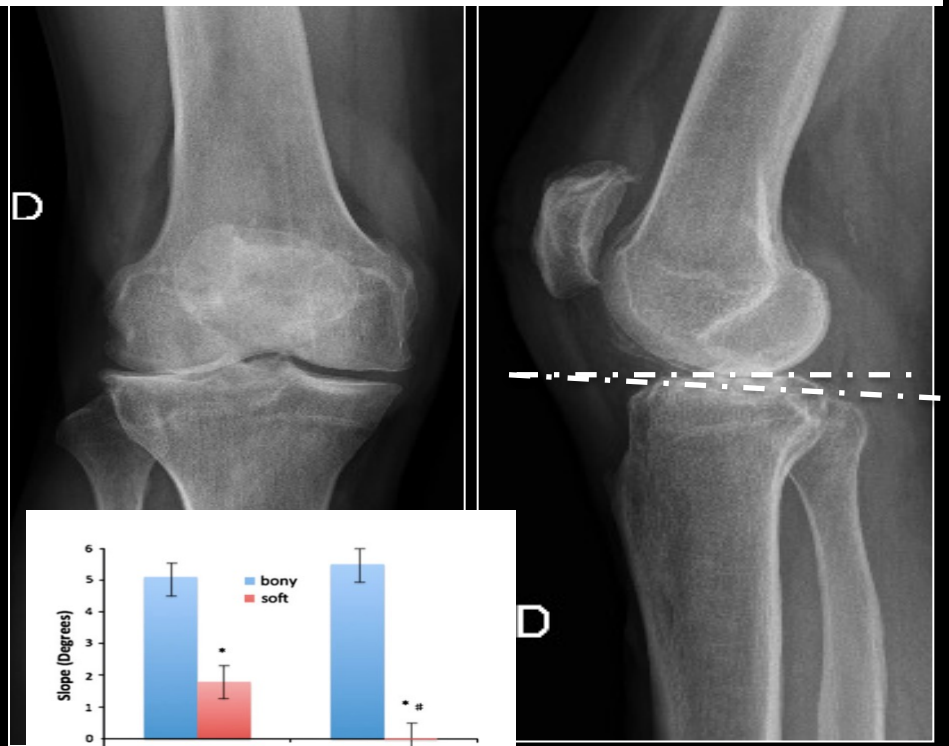
- Rarely responsible for valgus in primary cases
  (Matsuda S 2004, Khan FA 2008)
- Lateral tibial subcortical bone strongest posteriorly (Hvid, I. 1988)
- Posterior slope of the lateral plateau different:
  (Lustig et al. 2012)

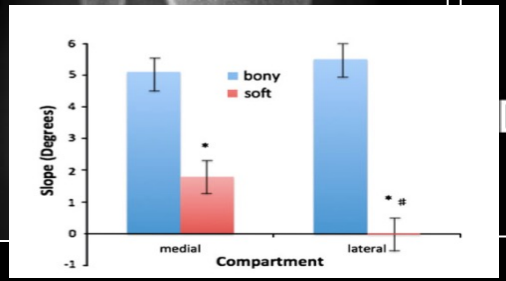
Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-012-1990-x

KNEE

**Influence of soft tissues on the proximal bony tibial slope measured with two-dimensional MRI**

Sébastien Lustig · Corey J. Scholes ·
Sean P. M. Leo · Myles Coolican · David A. Parker



# Screw home

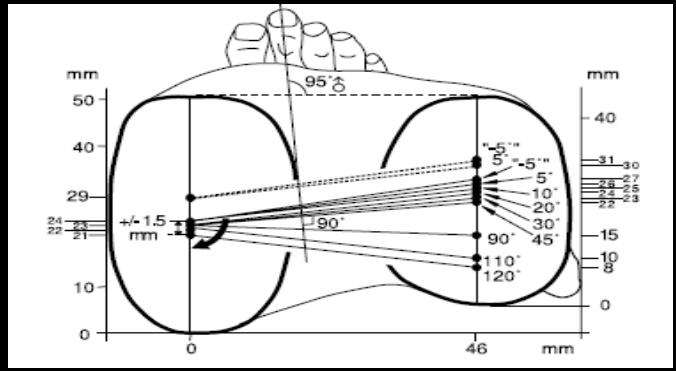
EXTERNAL ROTATION OF THE TIBIA IN EXTENSION

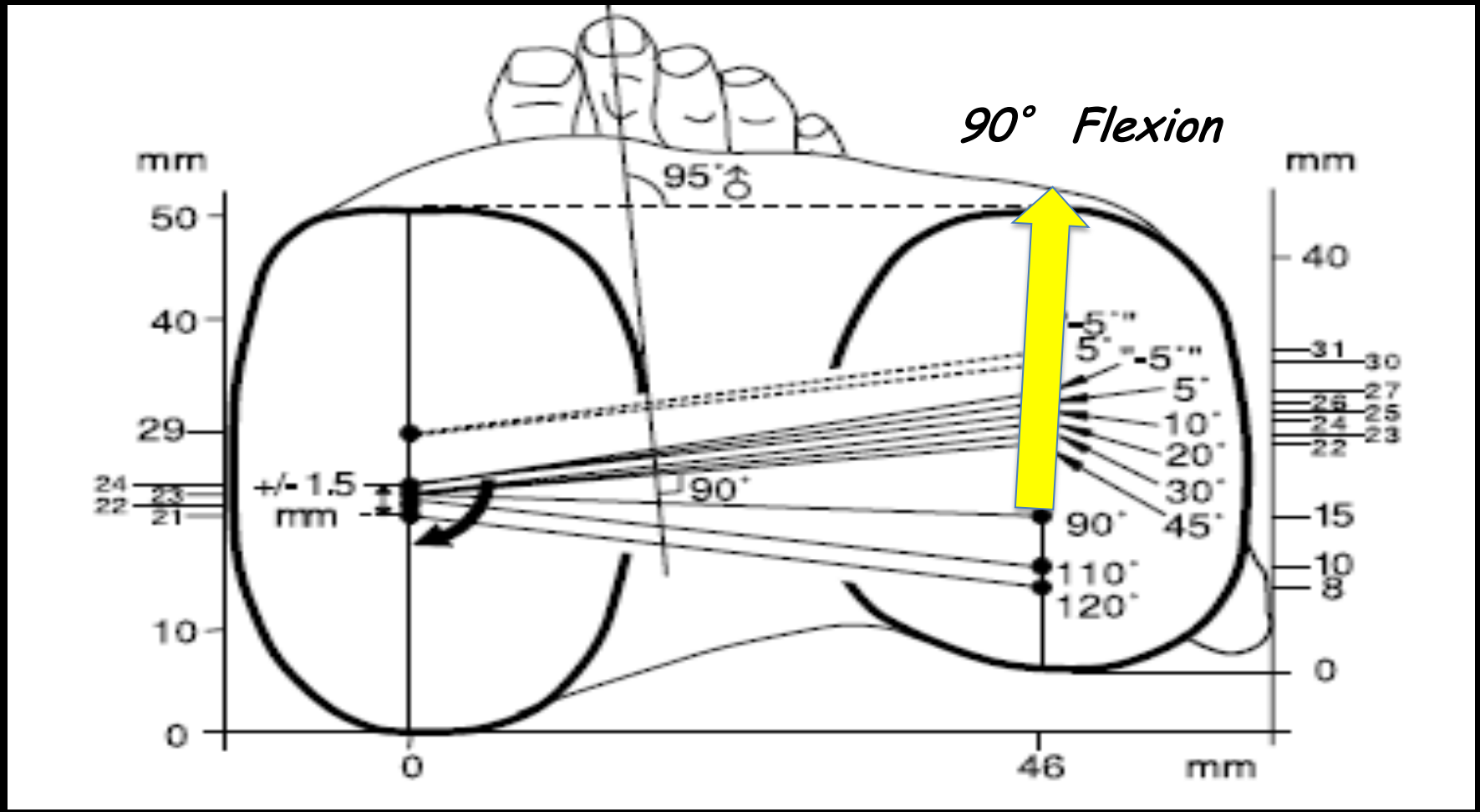
Translation of the femur on tibia in flexion:

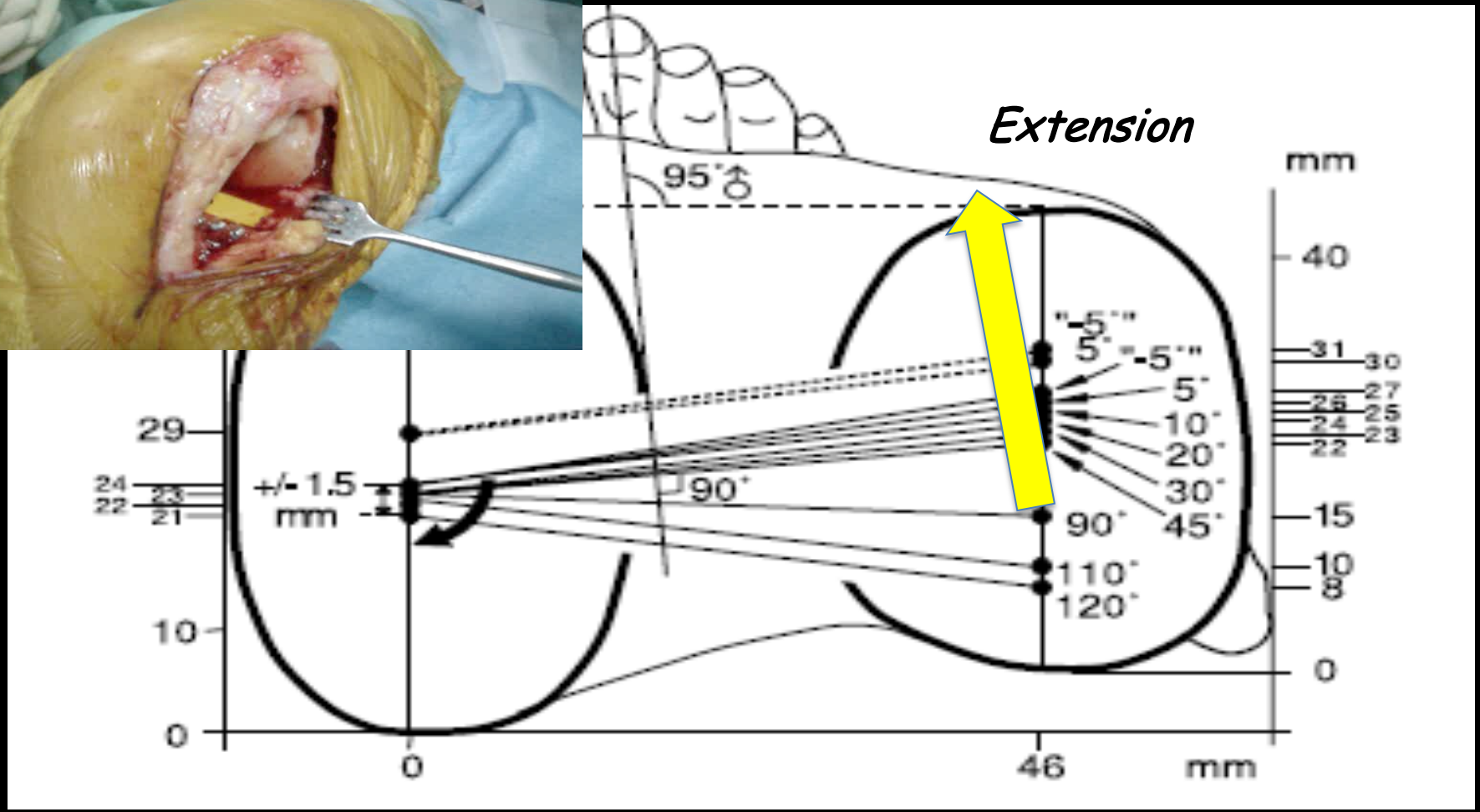
1.5 mm medial vs 9-15 mm lateral

further increasing in deep flexion

(Iwaki H. and Nakagawa S., 2000; Kärrholm et al. 2000)




90° Flexion
mm
95°
50
40
29
24
23
22
21
10
0
+/- 1.5
mm
90°
-5°
5°
-5°
5°
10°
20°
30°
45°
90°
110°
120°
0
46
mm
mm
40
31
30
27
26
25
24
23
22
15
10
8
0


Extension
95°
mm
40
31
30
27
26
25
24
23
22
"-5°"
5°
"-5°"
5°
10°
20°
30°
45°
90°
90°
110°
120°
15
10
8
0
29
24
23
22
21
+/- 1.5
mm
10
0
0
46
mm

# *Rule 2*

# Understand key points of surgical technique

Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-013-2585-x

KNEE

**Lateral uni-compartmental knee replacement: current concepts and future directions**

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# Surgical Technique

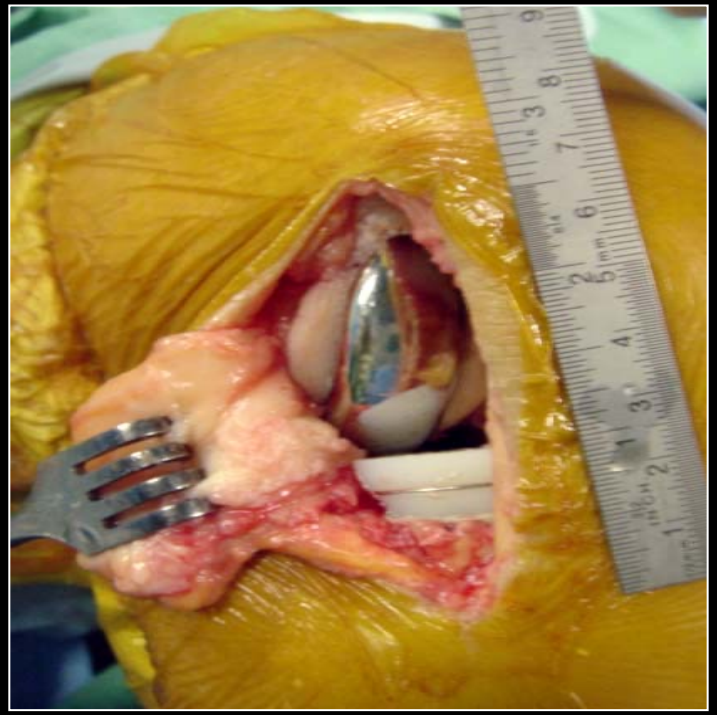
Lateral UKA → lateral approach

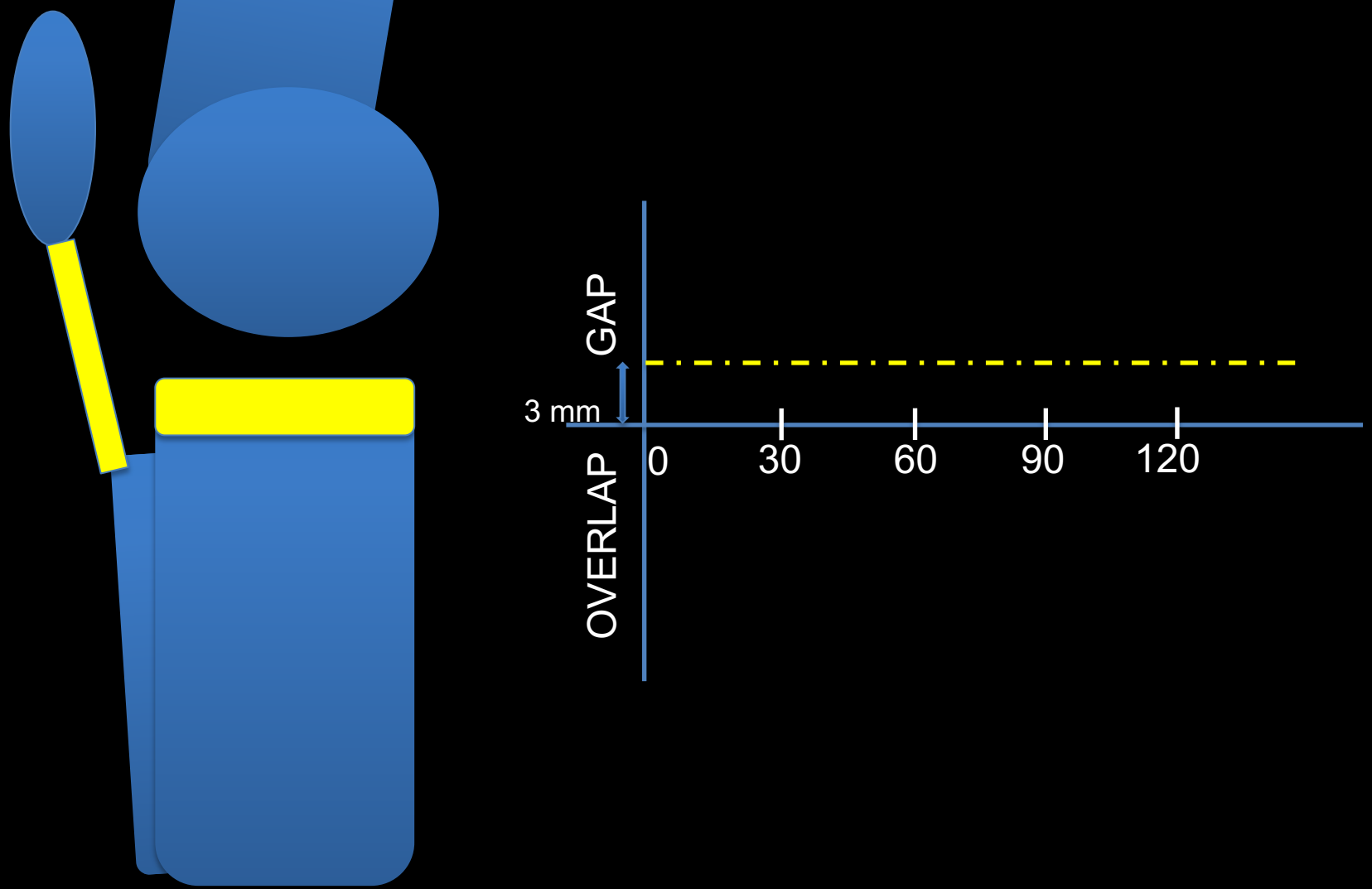
Minimal invasive evolution (8 to 10 cm)

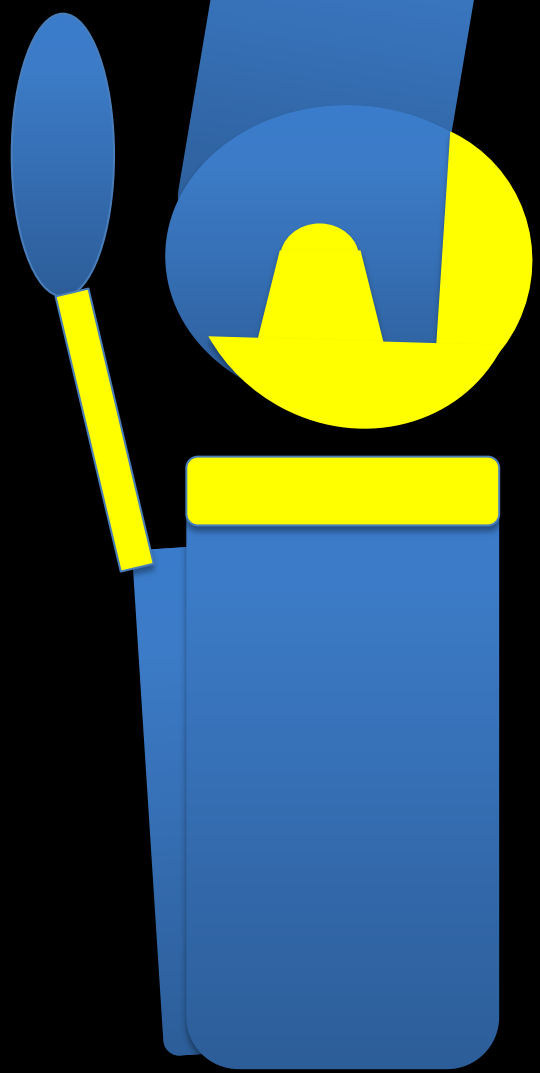
Tibial cut first then femoral cut

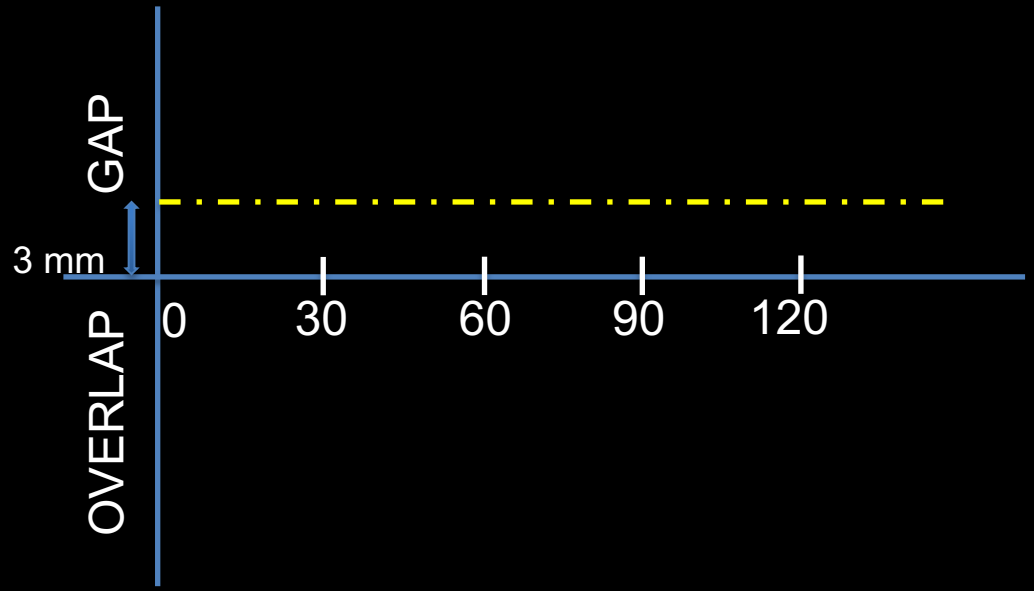
« Hypocorrection » (respect extra-articular deformity)

# SURGICAL TECHNIQUE




GAP
3 mm
OVERLAP
0
30
60
90
120

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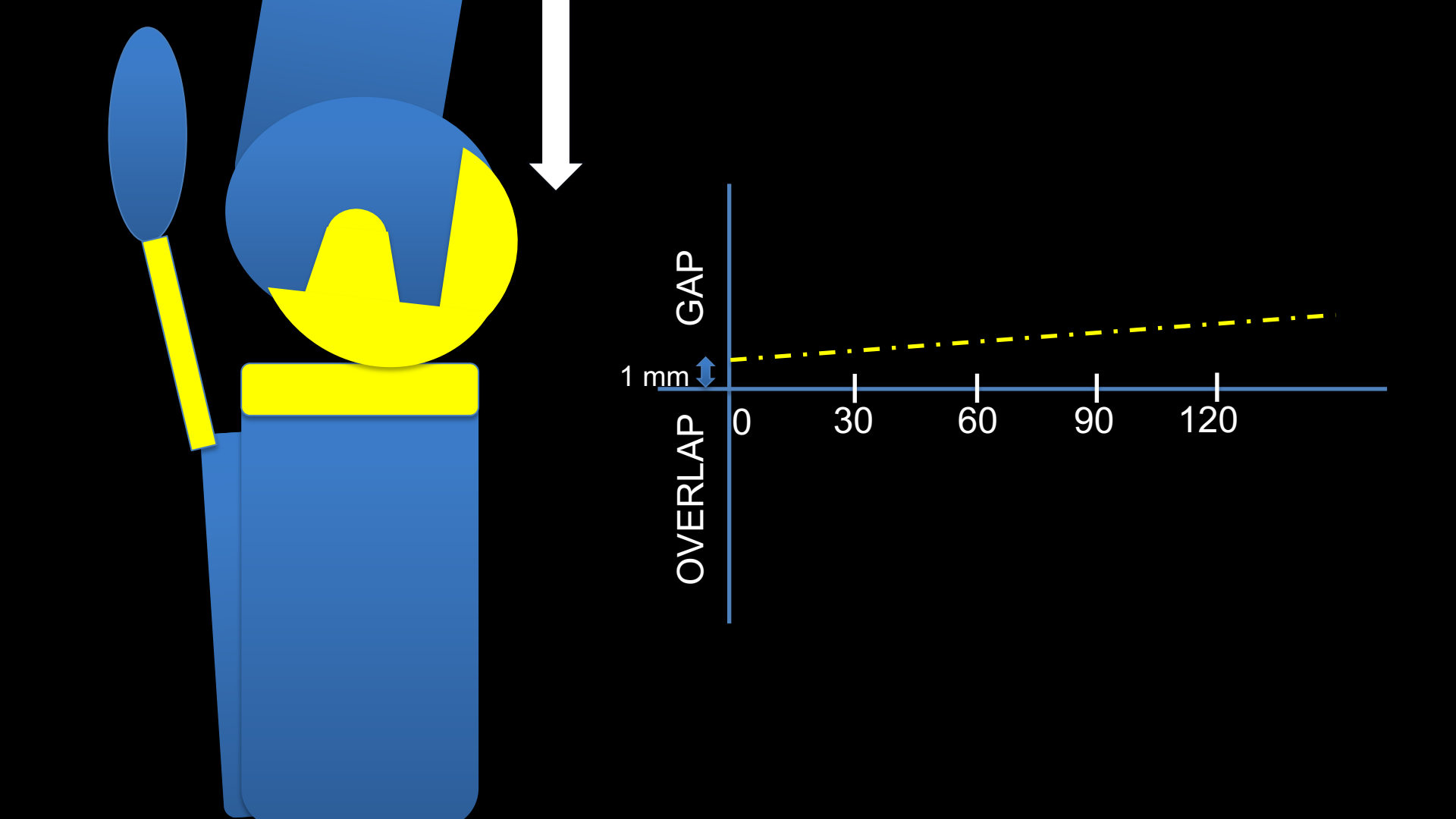
3 mm
OVERLAP
0
30
60
90
120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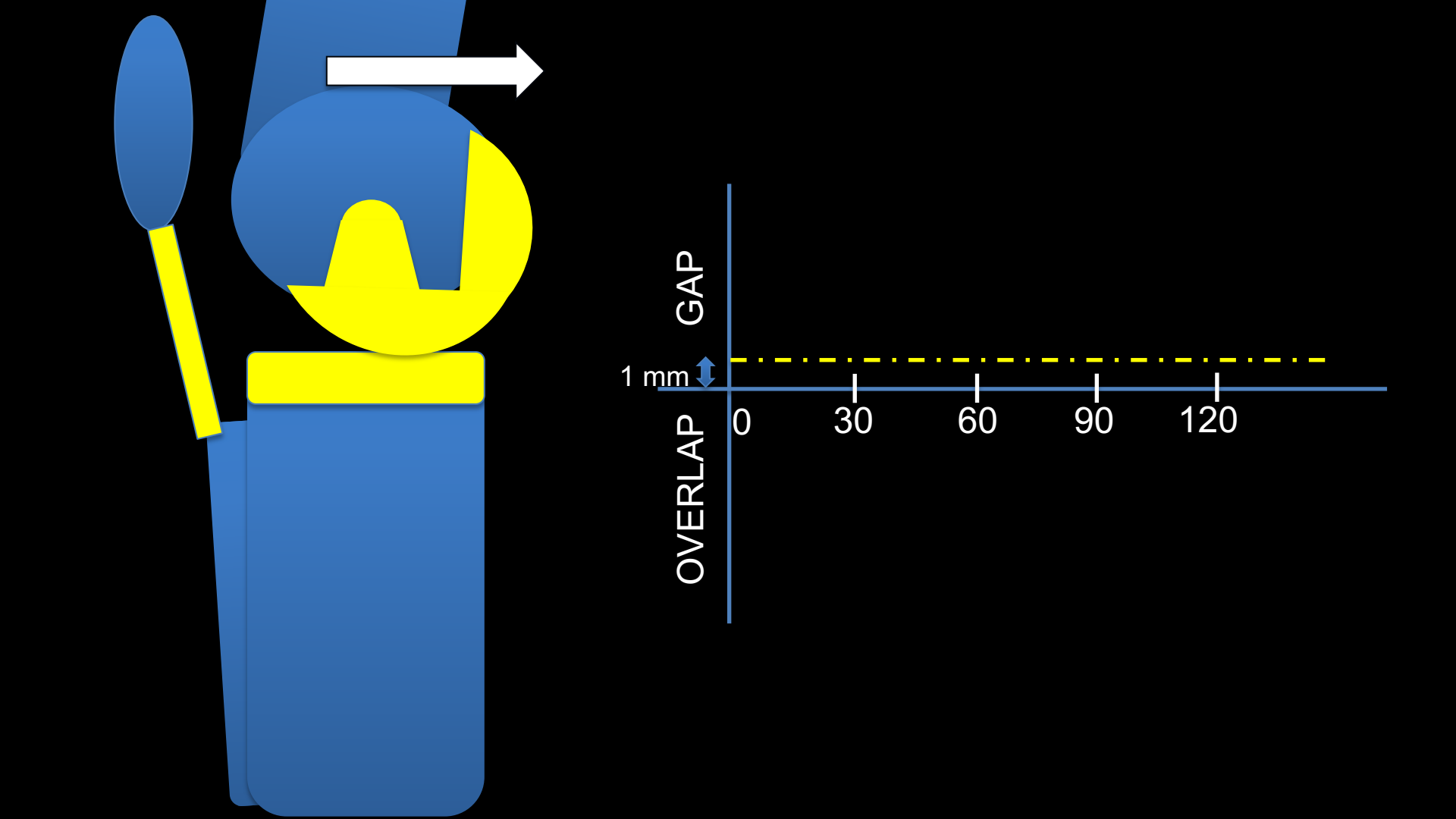
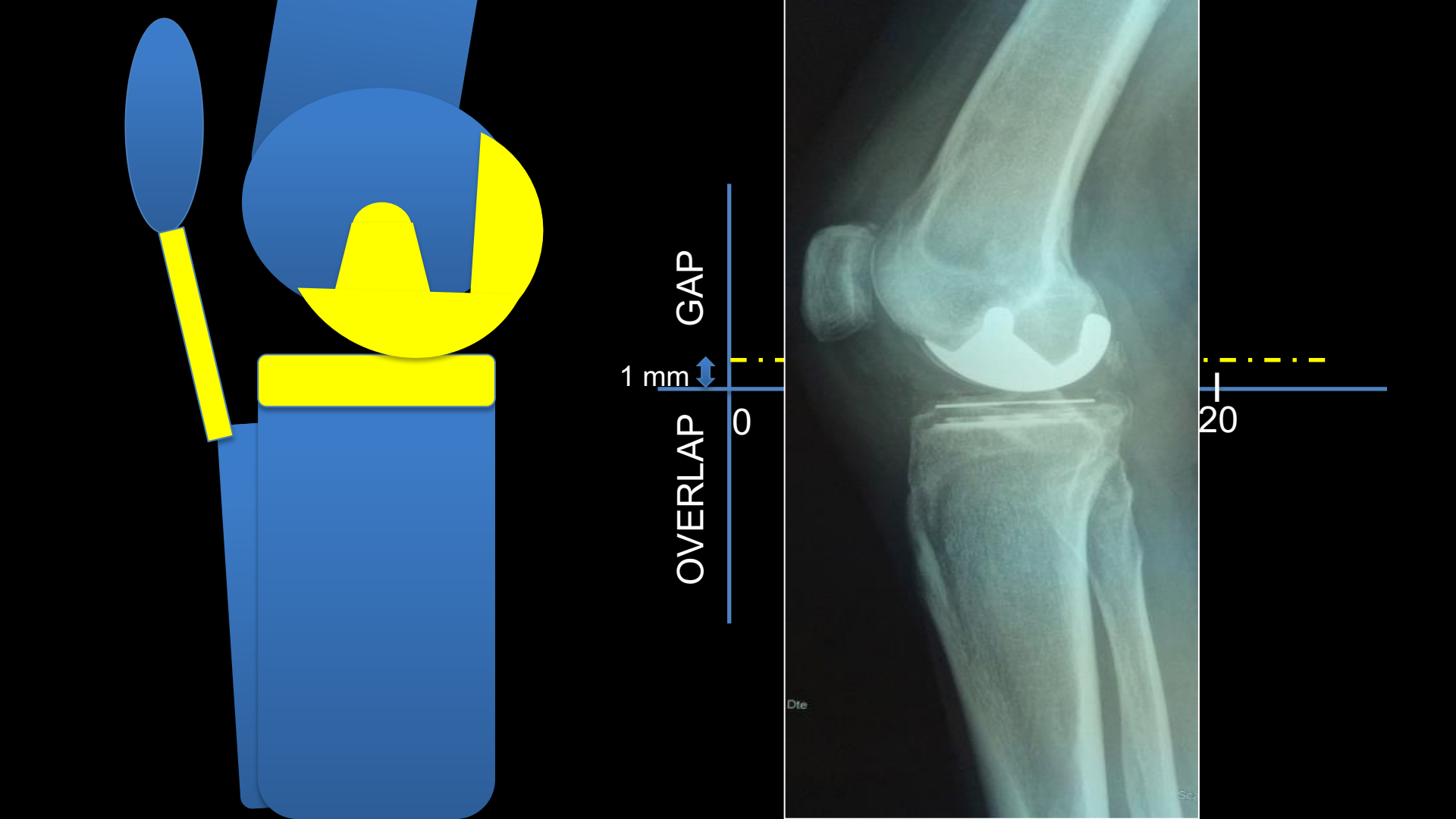
1 mm
OVERLAP
0
30
60
90
120


GAP
1 mm
OVERLAP
0
30
60
90
120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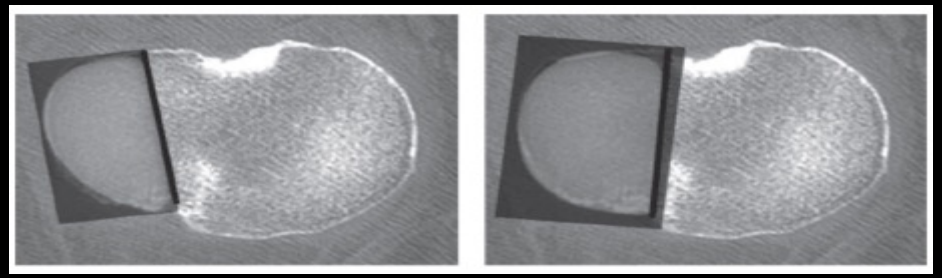
0
OVERLAP
20

# Rotation

ORIGINAL ARTICLE

**Tibial component rotation assessment using CT scan in medial and lateral unicompartmental knee arthroplasty**

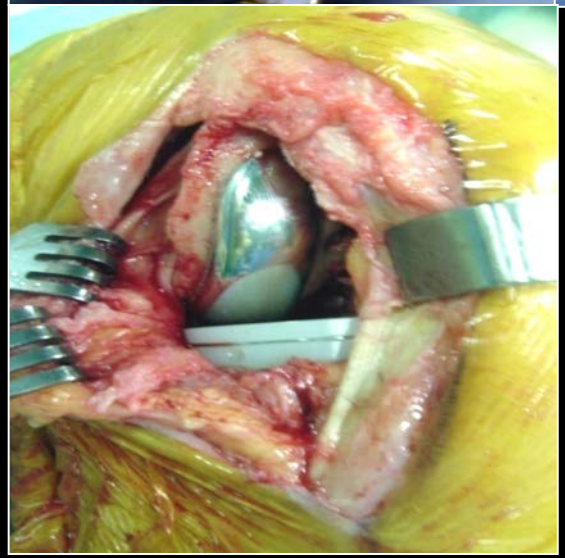
E. Servien[a,*], C. Fary[d], S. Lustig[a], G. Demey[a], M. Saffarini[b], S. Chomel[c], P. Neyret[a]

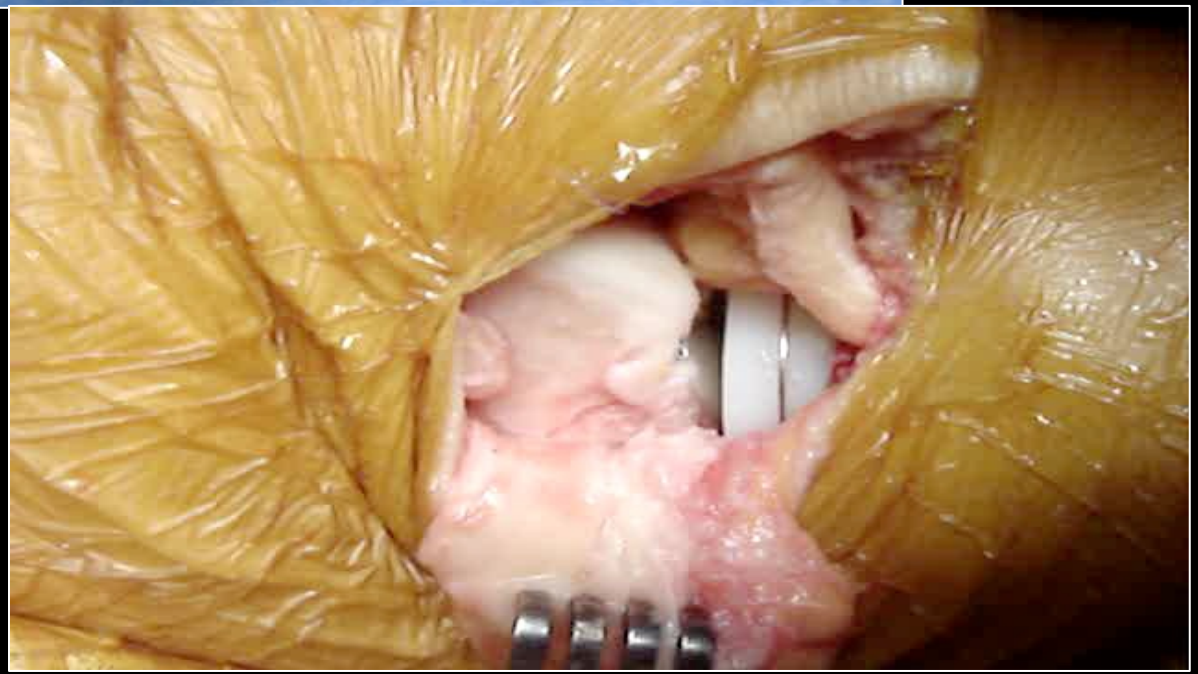
# Tibial resection

- ***Sagittal cut***
- 10-15˚ of internal rotation relative to the sagittal axis of the tibial plateau and
- close to tibial spine
- in order to accomodate the femoral component during the screw home phenomenon

Berend K. et al 2012

# Perfect stability



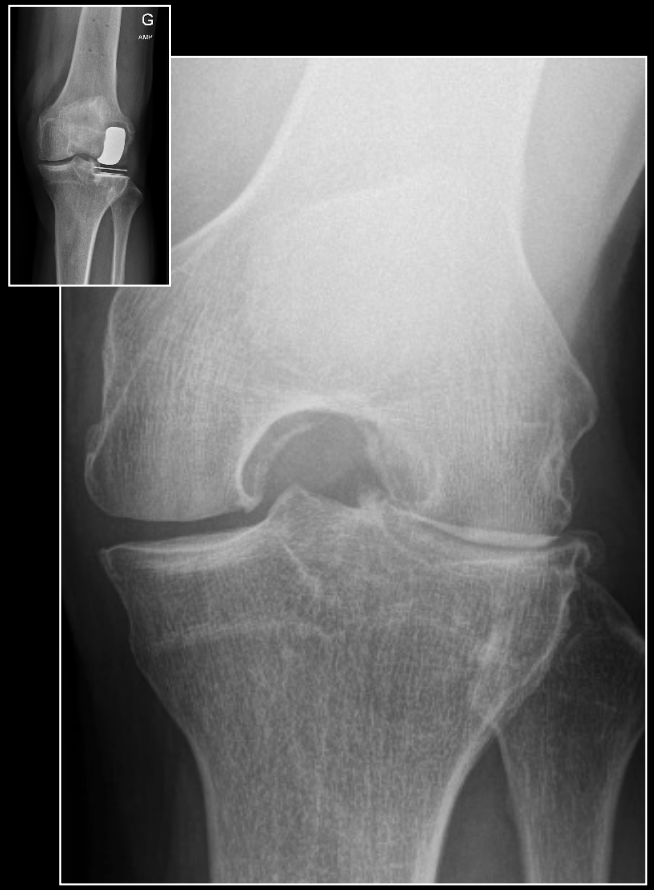


# *Rule 3*

Be aware of pitfalls

# Indications

Del ……marguerite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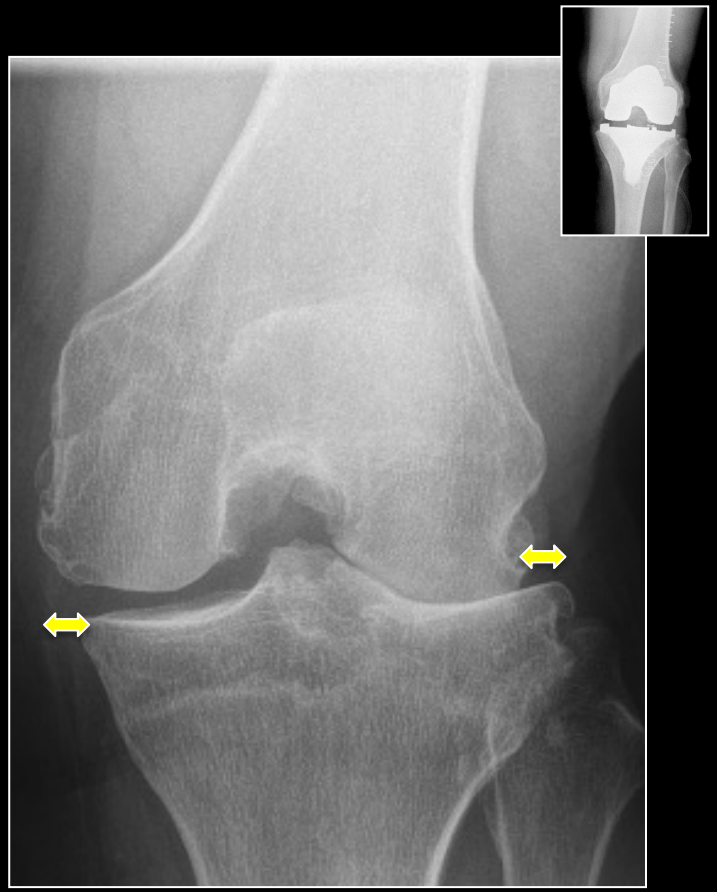
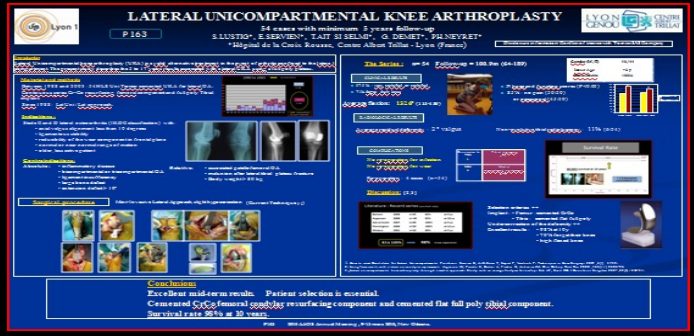


# Pitfalls




Lustig et al. **Poster 163 – AAOS New Orleans March 2010**

Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-013-2585-x

KNEE

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Servien et al. KSSTA 2013

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Lustig et al. JOA 2011

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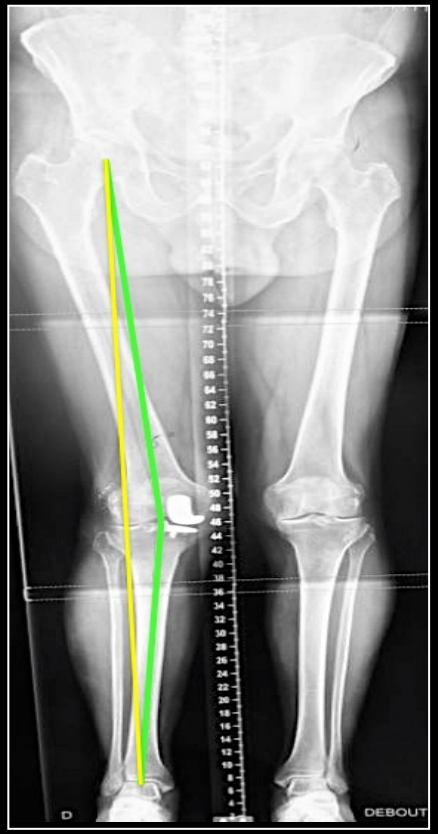
Lustig et al. The Knee 2015

# No overcorrection

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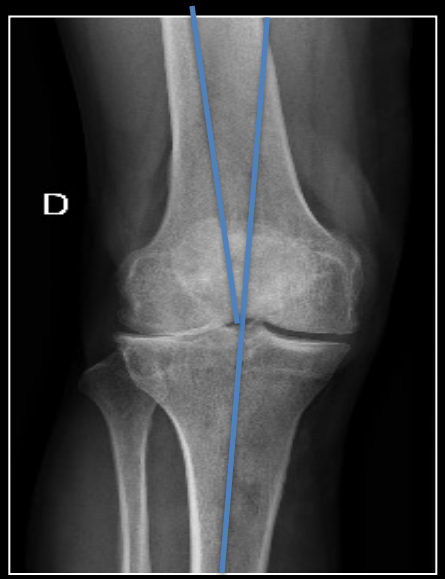
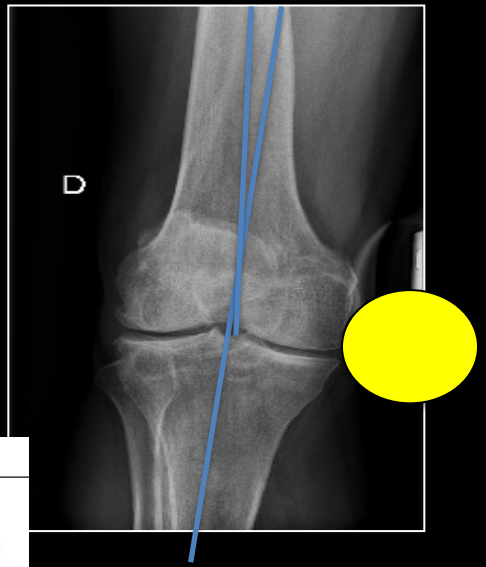
alignment after lateral UKA [46]. Our philosophy is to correct only the articular wear, respecting any extra-articular constitutional deformity. All three cases of medial progression in our series had a post-operative varus femorotibial alignment, signifying overcorrection.

With regards to the patellofemoral joint, some authors



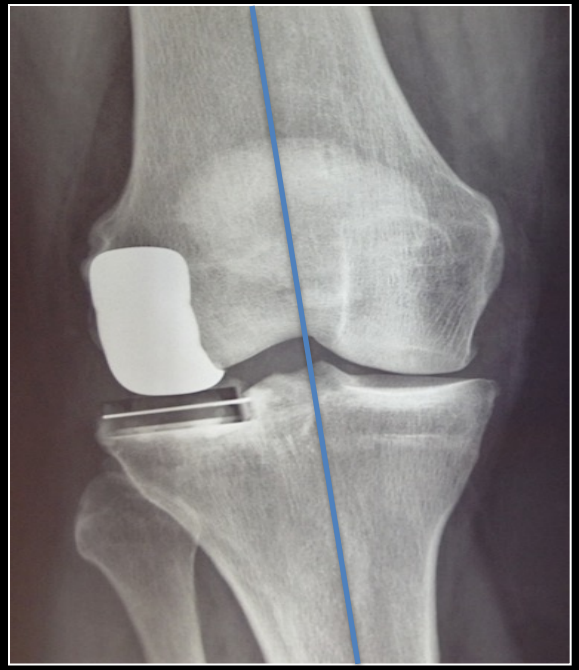




Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-014-3248-2

KNEE

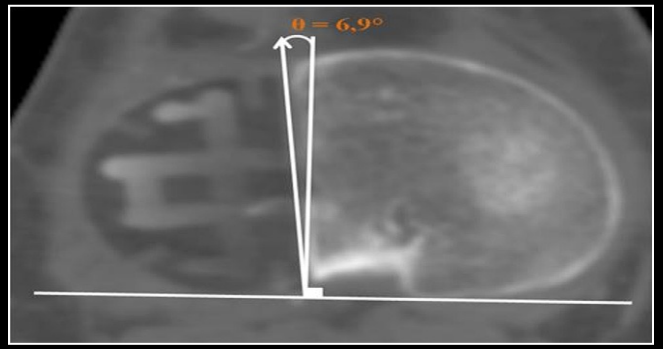
**The coronal alignment after medial unicompartmental knee arthroplasty can be predicted: usefulness of full-length valgus stress radiography for evaluating correctability**

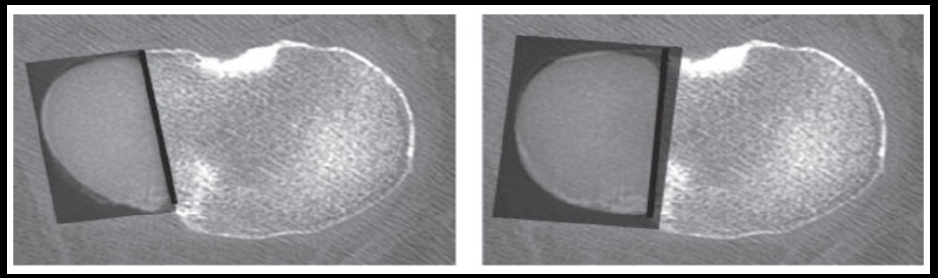
Yasutaka Tashiro · Shuichi Matsuda · Ken Okazaki · Hideki Mizu-uchi · Umito Kuwashima · Yukihide Iwamoto



Lateral UKA

# Rotation



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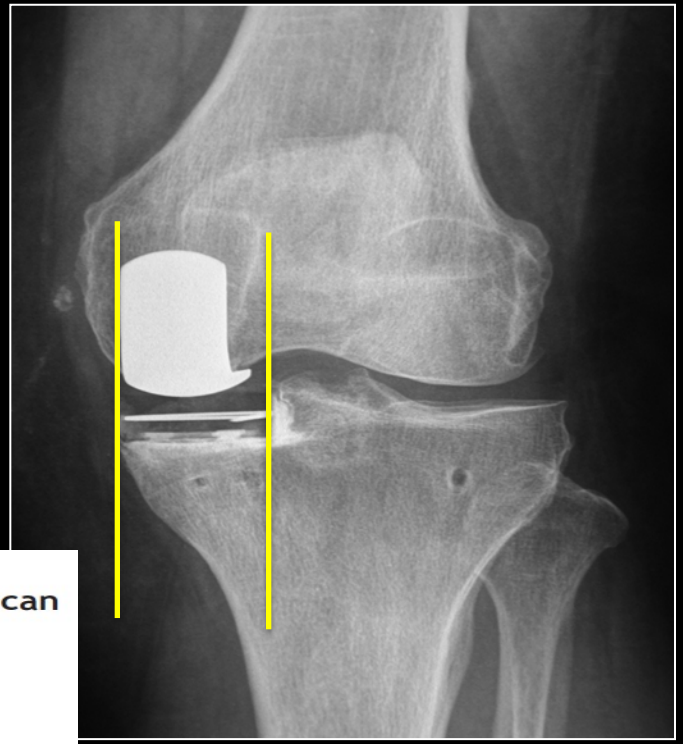
# Rotation

Medial UKA



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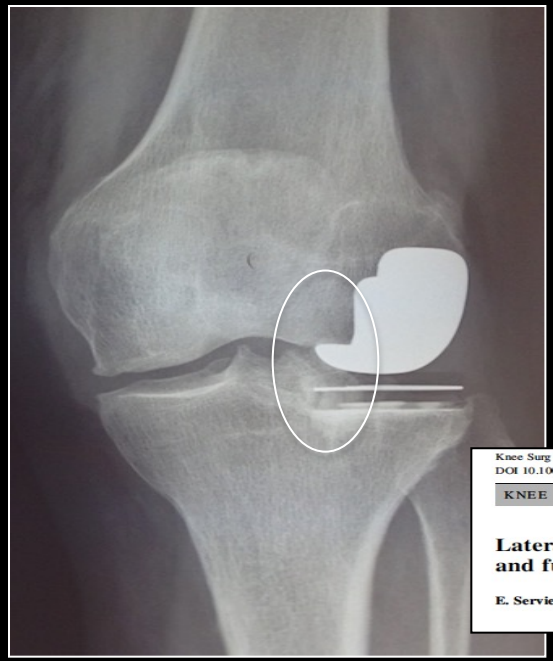
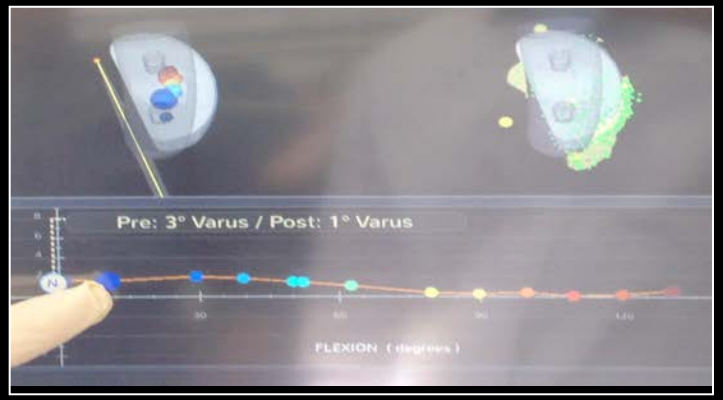
# Rotation

Lateral UKA ++



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KNEE

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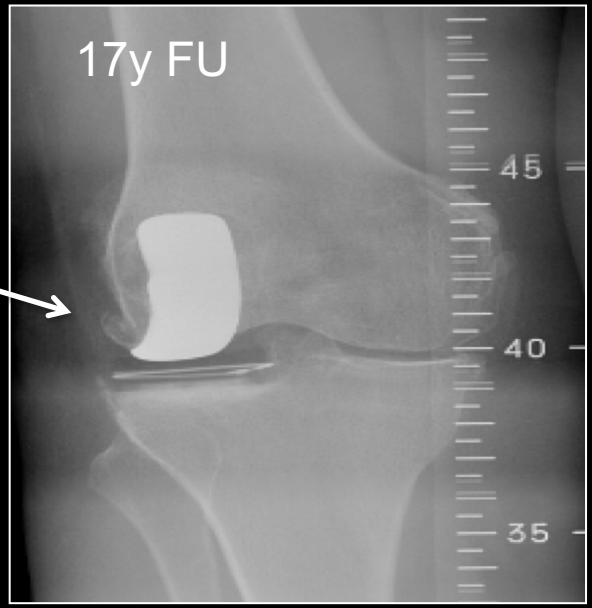
# Contact Point

## Lateral UKA

- As lateral as possible
- Keep the osteophytes

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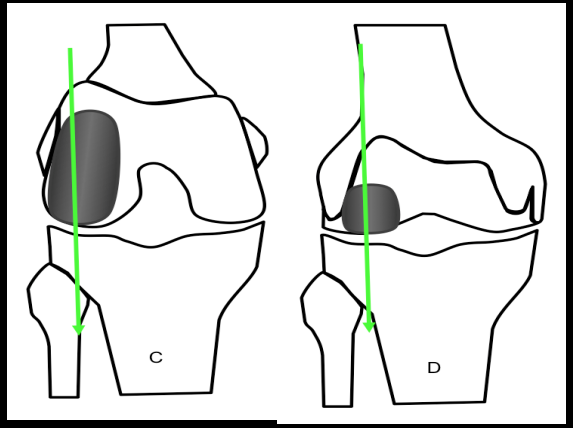
# *Ph cartier*

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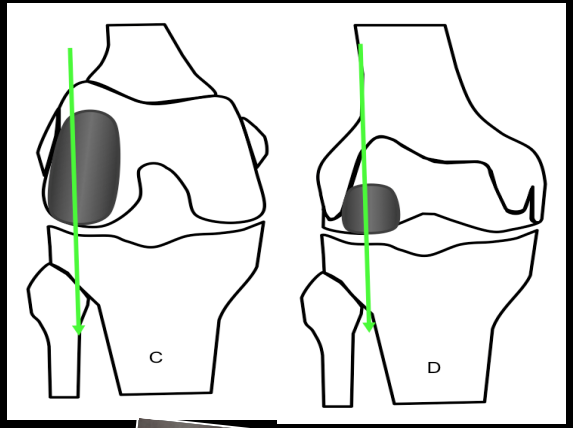


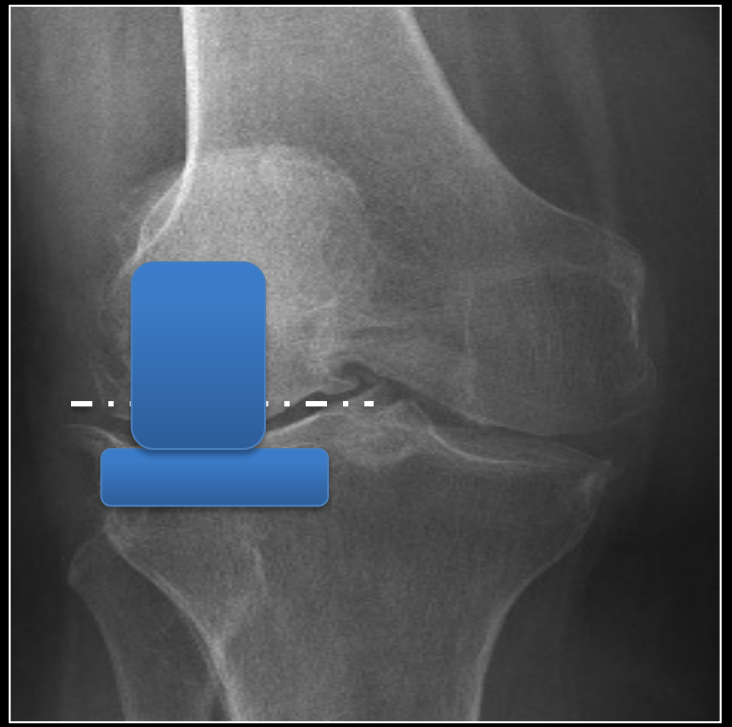

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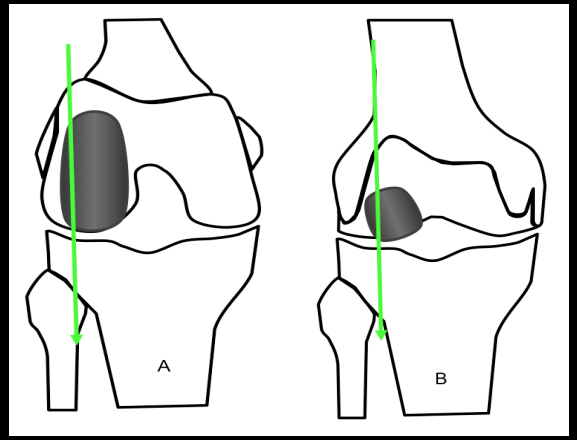


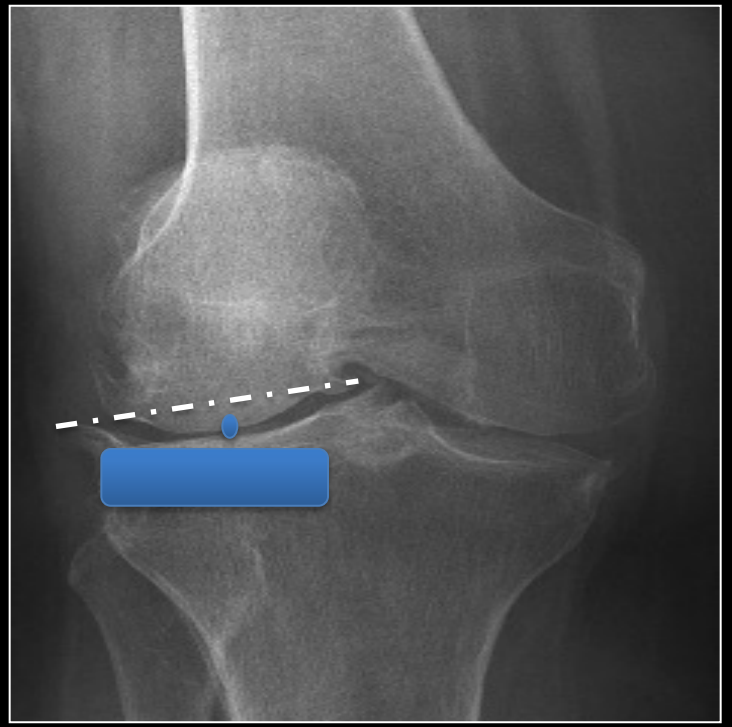

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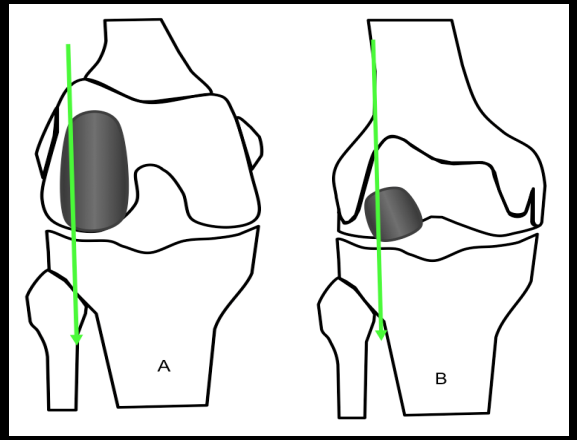
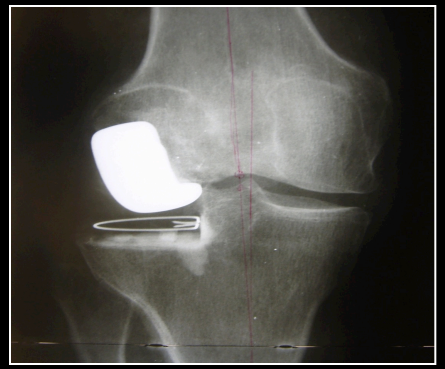
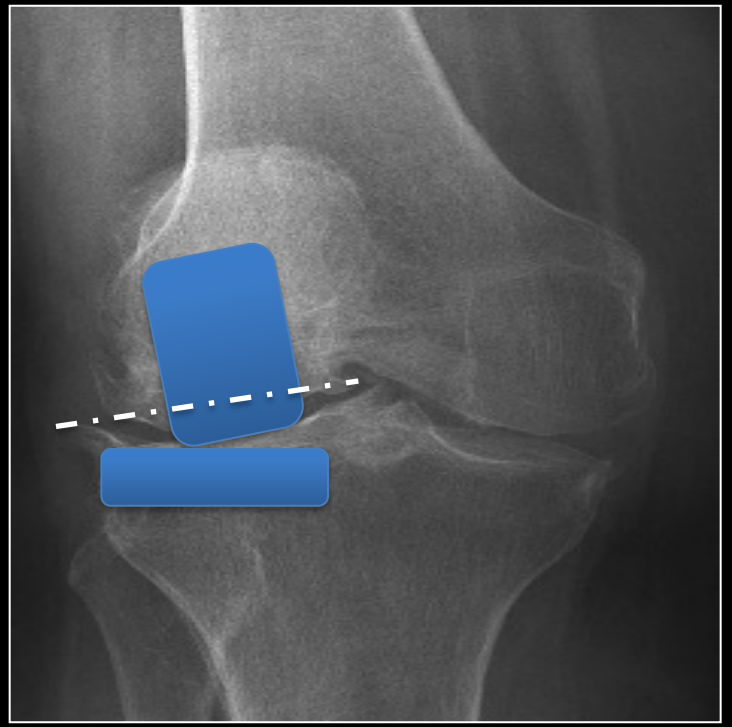
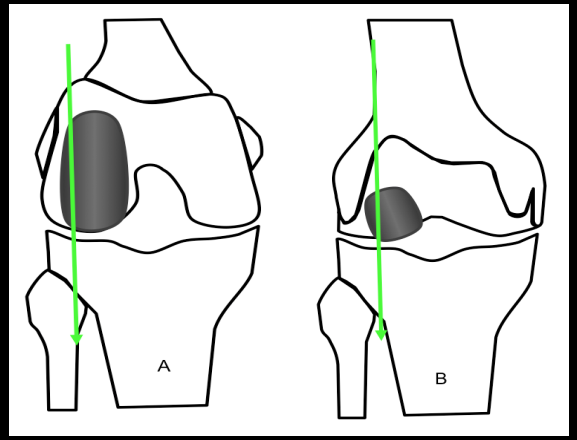
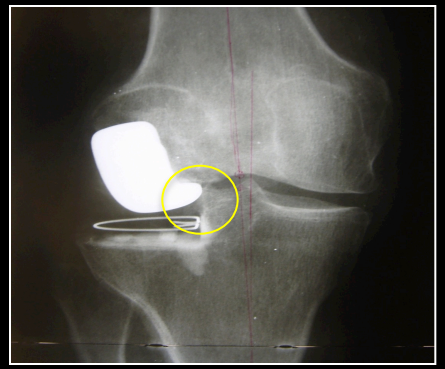


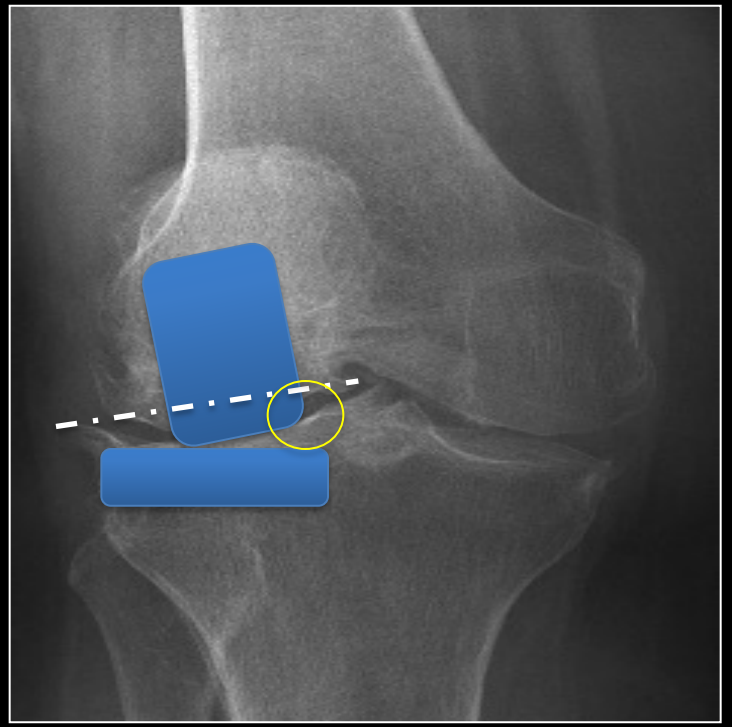





# *Ph cartier*



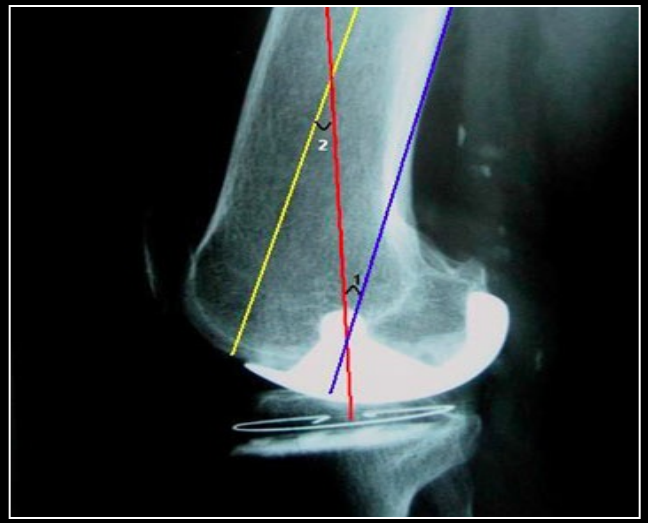


# Sagittal positioning

KNEE

**Sagittal flexion angle of the femoral component in unicompartmental knee arthroplasty: is it same for both medial and lateral UKAs?**

Elcil Kaya Bicer · Elvire Servien · Sebastien Lustig · Guillaume Demey · Tarik Ait Si Selmi · Philippe Neyret




« … » The femoral components of the medial UKAs were found to be inserted more flexed « … » related to the anatomical differences of the medial and lateral femoral condlyes « … »

# Sagittal positioning

KNEE

**Sagittal flexion angle of the femoral component in unicompartmental knee arthroplasty: is it same for both medial and lateral UKAs?**

Elcil Kaya Bicer · Elvire Servien · Sebastien Lustig · Guillaume Demey · Tarik Ait Si Selmi · Philippe Neyret



# Tibial slope

Ryan M. Nunley, MD, Denis Nam, MD, Staci R. Johnson, M. Ed., C. Lowry Barnes, MD

**Extreme Variability in Posterior Slope of the Proximal Tibia: Measurements on 2395 CT Scans of Patients Undergoing UKA**

According to the authors, their study is the first, large CT-based review of posterior slope variation of the proximal tibia in patients undergoing UKA.

By The Journal of Arthrop

Knee Surg Sports Traumatol Arthrosc (2008) 16:1141–1145
DOI 10.1007/s00167-008-0620-0

KNEE

**Lateral versus medial tibial plateau: morphometric analysis and adaptability with current tibial component design**

E. Servien · M. Saffarini · S. Lustig · S. Chomel · Ph. Neyret

# Robotic surgery ?

*ROBOTIC SURGERY : EXPERIENCE WITH UNICONDYLAR KNEE ARTHROPLASTY*

*S. LUSTIG, P. NEYRET*

Surgical robotics has been shown to improve the accuracy of bone preparation and soft tissue balance in unicondylar knee arthroplasty (UKA). However, although extensive data have emerged with regard to a CT scanbased haptically constrained robotic arm [1], little is known about the accuracy of a newer alternative, an imageless robotic system.

The Navio™ Precision Freehand Sculpting system (Navio™ ; Blue Belt Technologies Inc., Plymouth, MN, USA) is an imageless handheld robotic tool (fig. 1). Implant planning and development of the cutting zone take place entirely intraoperatively without the need for a preoperative CTscan. The system continuously tracks the position of the patient's lower limb and the handheld robotic device using an infrared navigation system. The system is imageless in so much as it does not use a CT or MRI to map the femoral and tibial condylar surface. It therefore relies on accurate registration of intraoperative knee kinematic assessment, anatomic landmarks, and surface mapping of the knee using a calibrated optical probe designed for use with this robotic system.

After percutaneous insertion of bicortical partially threaded pins into the proximal tibia and distal femur and attachment of optical tracking arrays (fig. 2), mechanical and

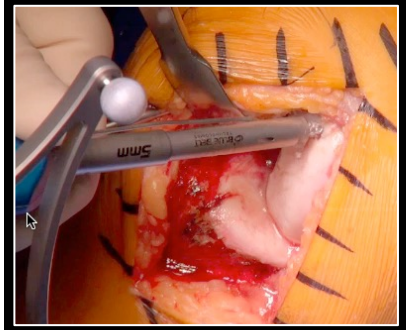
## Navio

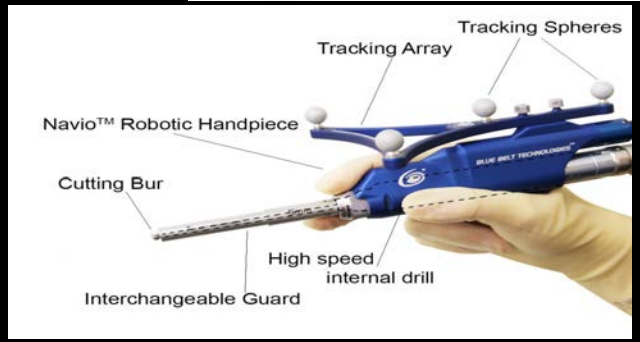
Sports Med Arthrosc. 2014 Dec;22(4):223-8. doi: 10.1097/JSA.0000000000000053.

**Lateral robotic unicompartmental knee arthroplasty.**

Thein R[1], Khamaisy S, Zuiderbaan HA, Nawabi DH, Pearle AD.

## Mako RIO





The Journal of Arthroplasty Vol. 27 No. 5

**Accuracy of Dynamic Tactile-Guided Unicompartmental Knee Arthroplasty**

holas J. Dunbar, BSc,* Martin W. Roche, MD,† Brian H. Park, BSc,*
H. Branch, BSc,‡ Michael A. Conditt, PhD,‡ and Scott A. Banks, PhD*

# Timeline


2013 2015 2017 2019 2021 2022

*n= 50*
*Image free*
*Robotic TKA*

ORTHOPÉDIE
Lyon Croix Rousse

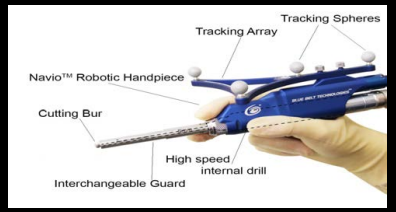
*n= 400*
*Image free*
*Robotic UKA*

*Image based*
*Robotic UKA/TKA*

# *Retrospective study*

*2 groups*
*Side*
*Age - sexe - BMI*
*Etiology*

N=80
57 med UKA- 23 Lat
Min FU : 1y
66y




## *Control Group*

## *Robot*

| | Robotic | Mechanical | p |
|---|---|---|---|
| IKS score - function | 93 ±13 | 92 ±13 | NS |
| IKS score - knee | 90 ±11 | 88 ±15 | NS |

- No specific complication of the robot
- Early functional results Robotic = Mechanical
- Revisions rate Robotic > Mechanical (Lateral)
- Implants positioning Robotic > Mechanical (Lateral and Medial)

| | | | |
|---|---|---|---|
| Tot | | | |
| Pro | | | |
| | Lateral UKA | 182° ±4 | 181° ±3 | NS |
| HKA (°) | | | ±3 | NS |
| Outliers | | | 1%) | 0.006 |
| | | | 2%) | 0.039 |

Knee Surgery, Sports Traumatology, Arthroscopy
https://doi.org/10.1007/s00167-018-5081-5

KNEE

CrossMark

Improved implant position and lower revision rate with robotic-assisted unicompartmental knee arthroplasty

Cécile Batailler[1] · Nathan White[1] · Filippo Maria Ranaldi[1] · Philippe Neyret[1] · Elvire Servien[1] · Sébastien Lustig[1]

# « Return to sports after lateral UKA: Robotic-assisted vs conventional technique »

28 Lateral UKA
- Uni Evo
- Robotic vs conventional
- UCLA > 4

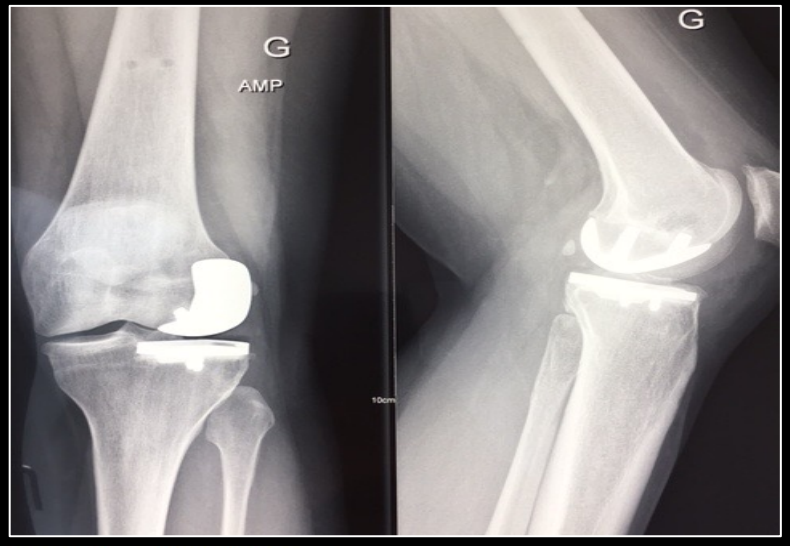
**Return to sports**
- Robotic 4 months

vs conventional 10 months ($p < 0,01$)
- Post-operative *IKS-Ojbective* better for robotic (97,2 vs 91,2; $p < 0,05$)

| | Number of sports practiced before surgery | Number of sports practiced after surgery | *p* value |
|---|---|---|---|
| Hiking | 25 | 23 | NS |
| Cycling | 13 | 14 | NS |
| Swimming | 4 | 4 | NS |
| Running | 1 | 0 | NS |
| Skiing | 5 | 5 | NS |
| Fitness/yoga | 7 | 11 | NS |

*NS* non-significant

# 2 months FU




Archives of Orthopaedic and Trauma Surgery (2018) 138:1765–1771
https://doi.org/10.1007/s00402-018-3042-6

KNEE ARTHROPLASTY

## Faster return to sport after robotic-assisted lateral unicompartmental knee arthroplasty: a comparative study

R. Canetti[1] · C. Batailler[1] · C. Bankhead[2] · P. Neyret[1] · E. Servien[1] · S. Lustig[1]

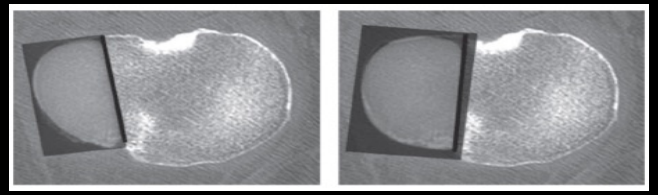
# Robotic Arm-Assisted Lateral Unicompartmental Knee Arthroplasty: How Are Components Aligned?

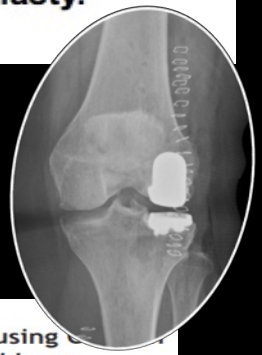
Francesco Zambianchi, MD[1] Giorgio Franceschi, MD[2] Federico Banchelli, PhD[3]
Andrea Marcovigi, MD[1] Andrea Ensini, MD[1] Fabio Catani, MD[1]

Sports Med Arthrosc. 2014 Dec;22(4):223-8. doi: 10.1097/JSA.0000000000000053.

**Lateral robotic unicompartmental knee arthroplasty.**

Thein R[1], Khamaisy S, Zuiderbaan HA, Nawabi DH, Pearle AD.

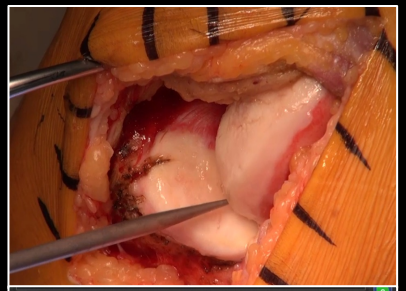


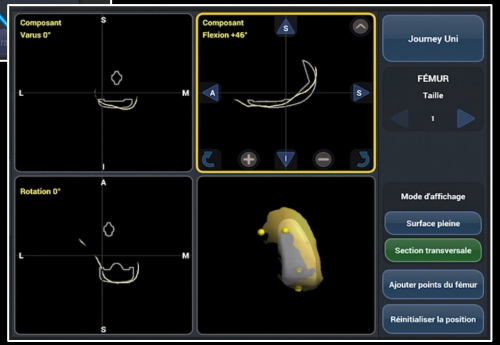


ORIGINAL ARTICLE

**Tibial component rotation assessment using C… in medial and lateral unicompartmental knee arthroplasty**

E. Servien[a,*], C. Fary[d], S. Lustig[a], G. Demey[a], M. Saffarini[b], S. Chomel[c], P. Neyret[a]




THE BONE & JOINT JOURNAL EST. 1948

■ KNEE

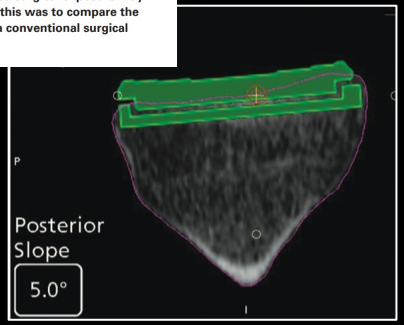
# Improved sizing with image-based robotic-assisted system compared to image-free and conventional techniques in medial unicompartmental knee arthroplasty

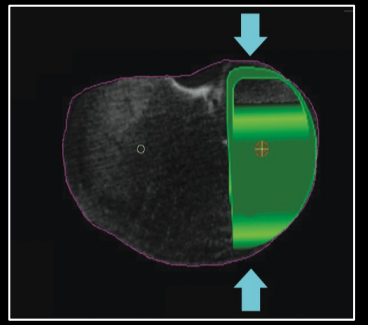
A CASE CONTROL STUDY

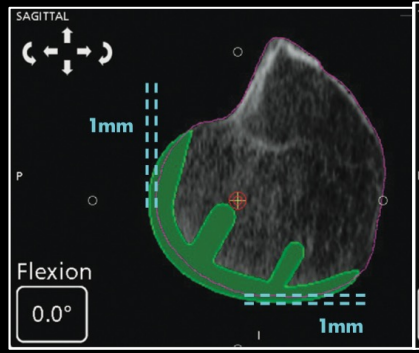
C. Batailler,
M. Bordes,
T. Lording,
A. Nigues,
E. Servien,
T. Calliess,
S. Lustig

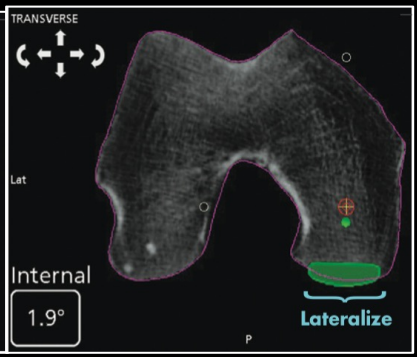
**Aims**

Ideal component sizing may be difficult to achieve in unicompartmental knee arthroplasty (UKA). Anatomic variants, incremental implant size, and a reduced surgical exposure may lead to over- or under-sizing of the components. The purpose of this was to compare the accuracy of UKA sizing with robotic-assisted techniques versus a conventional surgical technique.

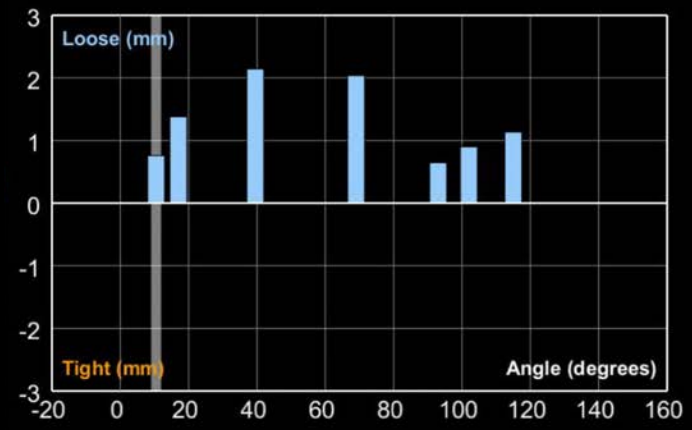



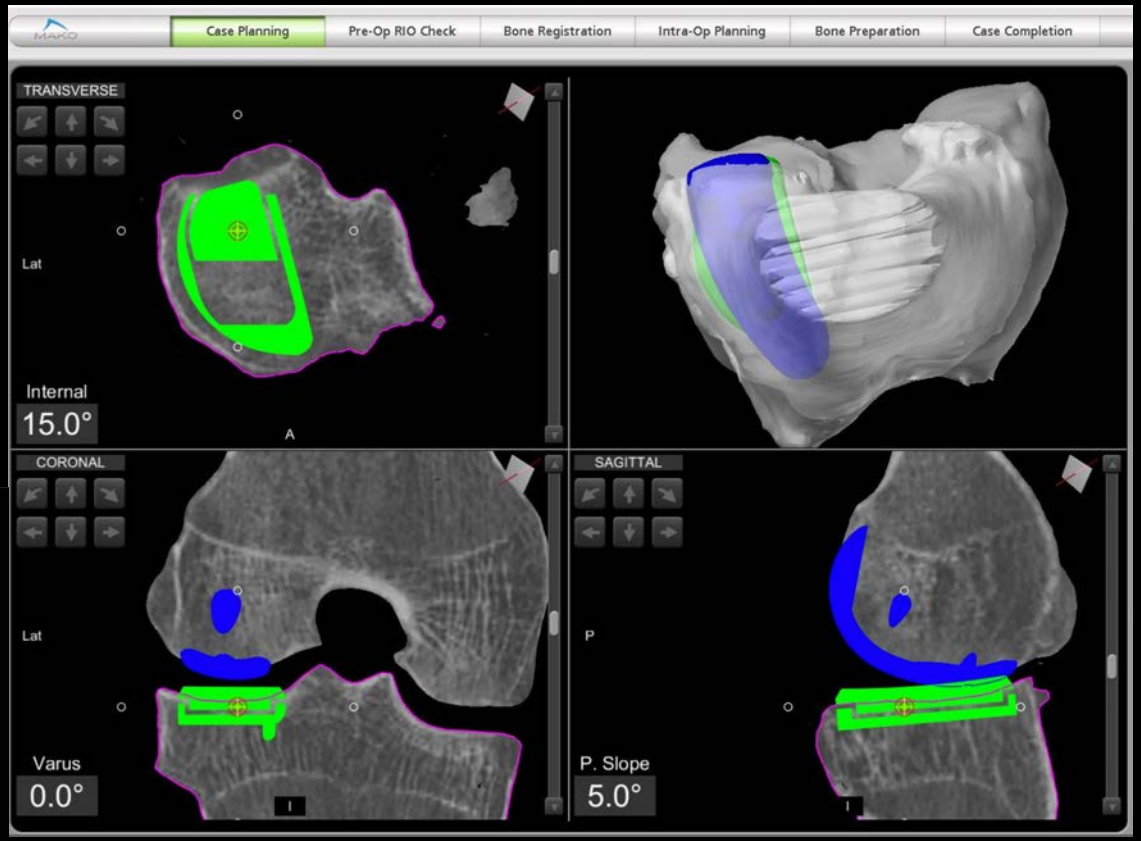






stryker
Mako


Loose (mm)
Tight (mm)
Angle (degrees)
3
2
1
0
-1
-2
-3
-20
0
20
40
60
80
100
120
140
160


MAKO
Case Planning
Pre-Op RIO Check
Bone Registration
Intra-Op Planning
Bone Preparation
Case Completion
TRANSVERSE
Lat
Internal
15.0°
A
CORONAL
Lat
Varus
0.0°
I
SAGITTAL
P
P. Slope
5.0°
I

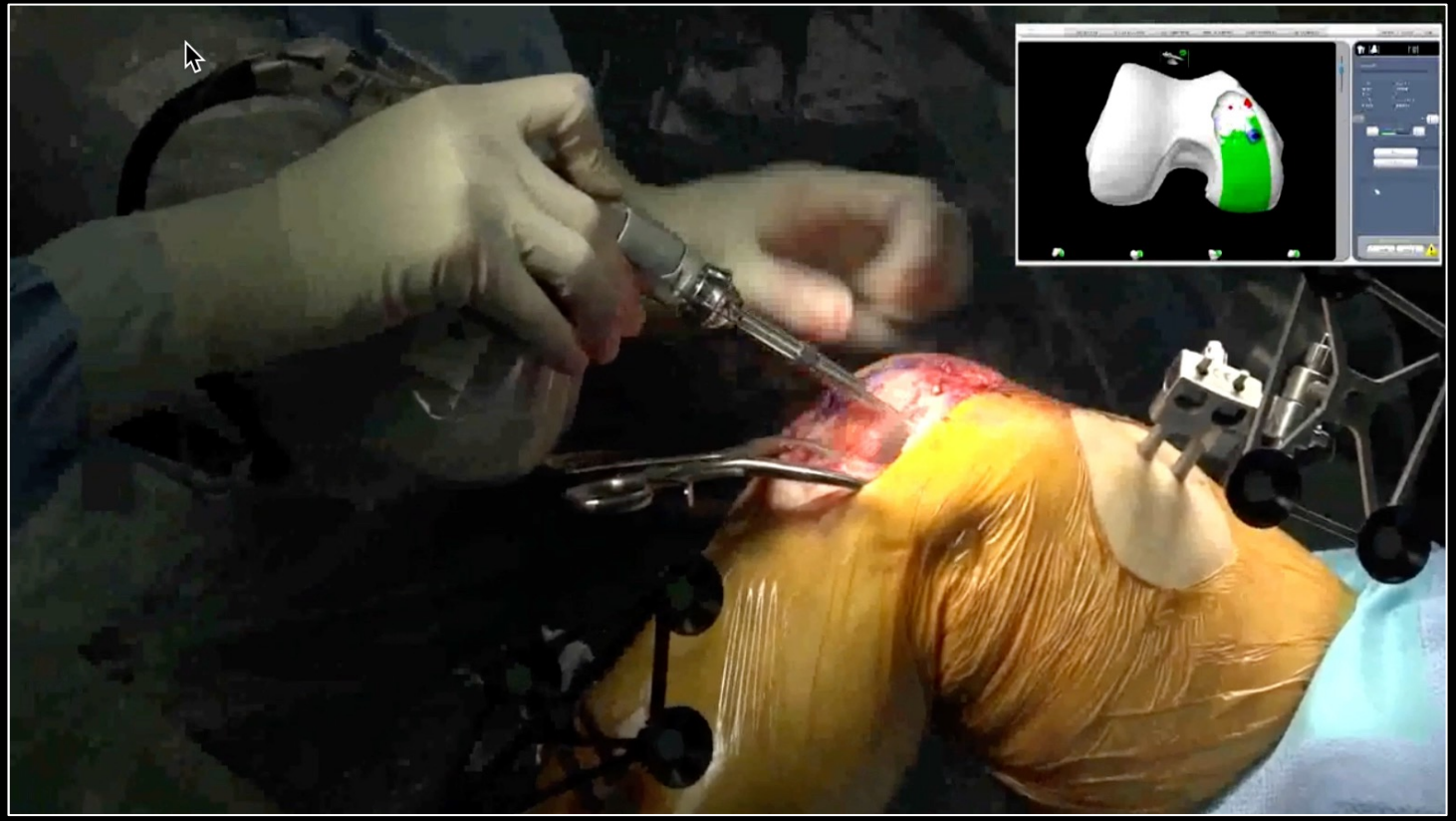
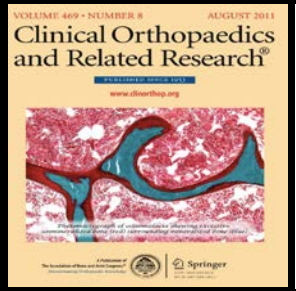


Image Based


D

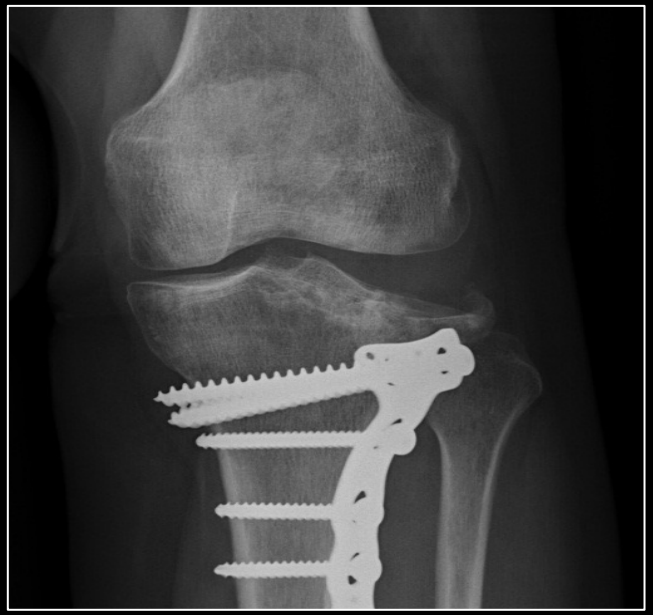


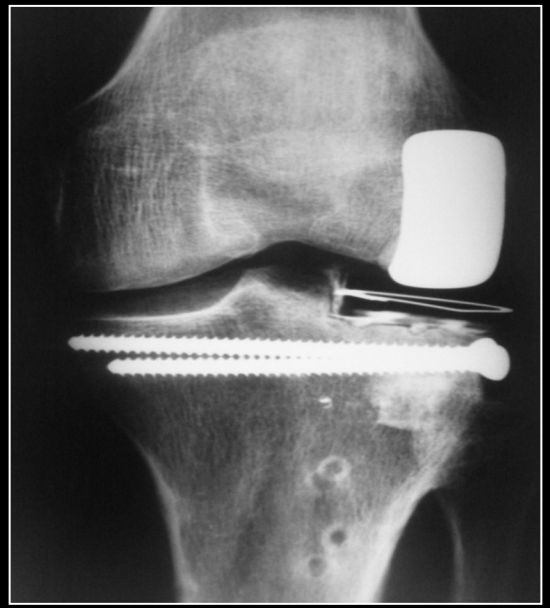

Clin Orthop Relat Res
DOI 10.1007/s11999-011-1963-2

SYMPOSIUM: PAPERS PRESENTED AT THE ANNUAL MEETINGS OF THE KNEE SOCIETY

# Lateral Unicompartmental Knee Arthroplasty Relieves Pain and Improves Function in Posttraumatic Osteoarthritis

Sebastien Lustig MD, PhD, Sebastien Parratte MD, PhD,
Robert A. Magnussen MD, Jean-Noel Argenson MD,
Philippe Neyret MD





**11ys FU**

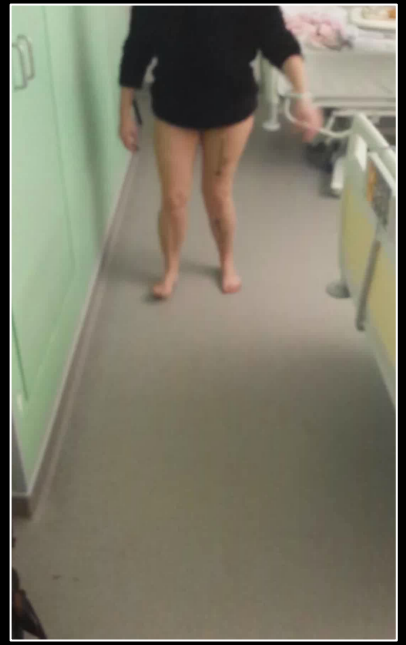
Knee Surgery, Sports Traumatology, Arthroscopy
https://doi.org/10.1007/s00167-020-06359-w

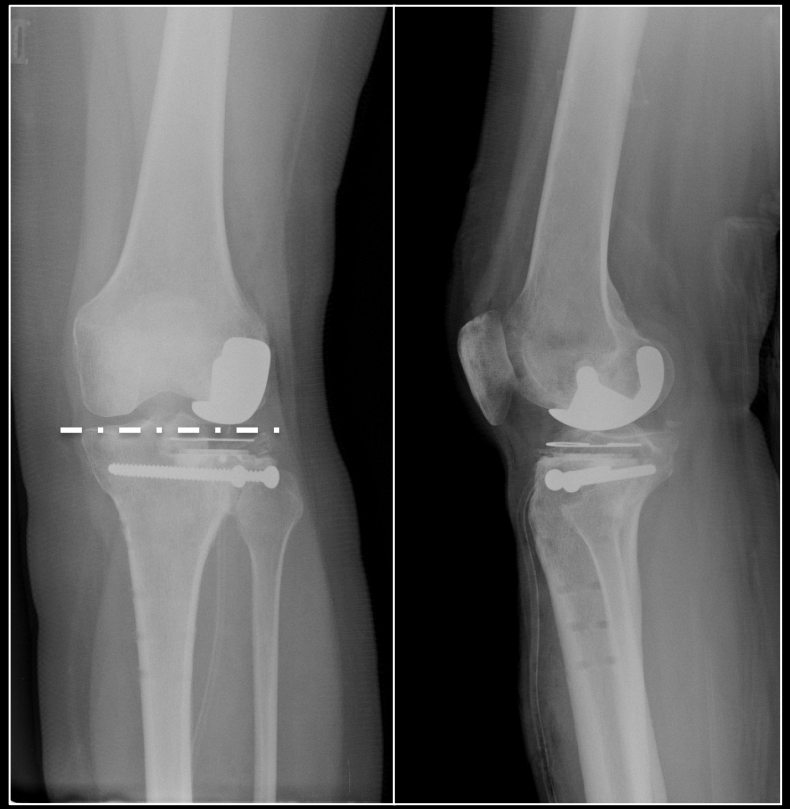
KNEE

# Lateral unicompartmental knee arthroplasty is a safe procedure for post-traumatic osteoarthritis after lateral tibial plateau fracture: a case–control study at 10-year follow-up

Axel Schmidt[1] · Thomas Barnavon[1] · Timothy Lording[2] · Elliot Sappey-Marinier[1] · Cécile Batailler[1] · Elvire Servien[1,3] · Sébastien Lustig[1,4]







# Post trauma

YOU WILL NEVER KNOW YOUR LIMITS UNLESS YOU PUSH YOURSELF TO THEM


# Take home message

- Understand anatomy/biomechanics
- Selection criteria : crucial
- Surgical technique :
  - Tibia : internal rotation
  - Slope
  - Lateral position femoral component
- Excellent long term results
- Robotic +++
- Post traumatic OA

Bilateral Lat UKR
2 hours after
surgery


# *Thank You*

sebastien.lustig@gmail.com