HTO or UKA : How to make the right decision

Jean-Noel Argenson,
Christophe Jacquet, Sebastien Parratte, Matthieu Ollivier,
Maxime Fabre-Aubrespy, Xavier Flecher

Institute for Locomotion, Sainte Marguerite Hospital, Marseille, France

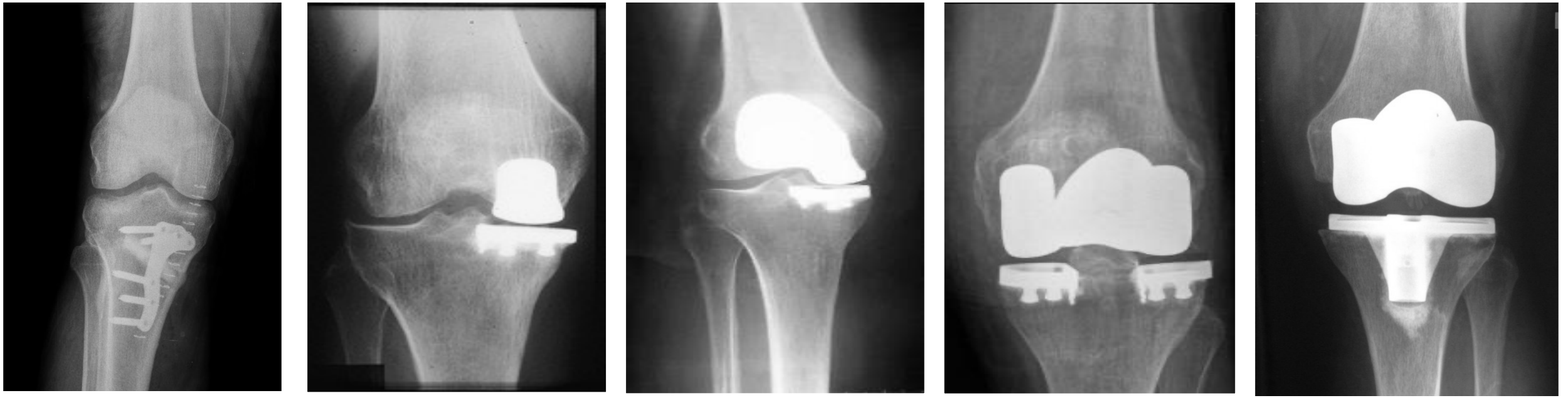
11th Advanced Course on Knee Surgery, January 19-23, 2025

IML
Institute for Locomotion

Aix*Marseille université

On the long road of arthritis

HTO UKA Bicomp TKA



Conservative, partial or total knee arthroplasty solutions

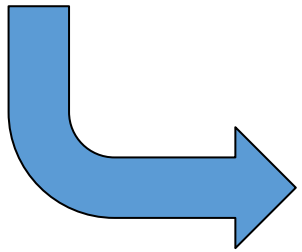
Unicompartmental Disease = Therapeutic Challenge

?

Unicompartmental Disease = Therapeutic Challenge

Goals :

1. Relieve pain
2. Restore knee function



Solutions :

1. Medical Treatment
2. Arthroscopy
3. **HTO**
4. **UKA**
5. TKA

Pagnano et al: Surgical treatment of the middle-aged patient with arthritic knees. Instr Course Lect. 2005

Preop Evaluation

Clinical Criteria

Age
Patient expectations
Activity
BMI
General health (vascular,diabetis)
Infection
Medication (plavix...)

Anatomical Criteria

OA stage
Deformity analysis and correctibility
Ligament Status
Mobility
Bilateral or not

Preop Evaluation

1. The patient
   - Age
   - Sex
   - BMI
   - Activity / Sport

J Bone Joint Surg Am. 2009;91 Suppl 5:43-8 • doi:10.2106/JBJS.I.00406

The New Arthritic Patient and Arthroplasty Treatment Options

By Jean-Noël A. Argenson, MD (moderator), Sebastien Parratte, MD, Antoine Bertani, MD, Jean-Manuel Aubaniac, MD, Adolph V. Lombardi Jr., MD, Keith R Berend, MD, Joanne B. Adams, BFA, Jess H. Lonner, MD, Ormonde M. Mahoney, MD, Tracy L. Kinsey, MSPH, Thomas K. John, MD, and Michael A. Conditt, PhD

Preop Evaluation

1. The patient
   - **Age**
   - Sex
   - BMI
   - Activity / Sport

TABLE 1. Coefficient of Cox Proportional Hazard Model Considering Any Revision as an Endpoint

Parameter	Value	Hazard Ratio	p Value	95% Confidence Interval
Gender	female	1.07	p = 0.8	0.59; 1.97
Operative age	> 50	2.1*	p = 0.014	1.16; 3.80
BMI	< 30	0.27*	p = 0.02	0.10; 0.70
Postoperative valgus angle	> 6°	0.46*	p = 0.02	
Ahlback	< 3	0.29*	p = 0.01	0.13; 0.65

*Statistically significant

A 12–28-Year Followup Study of Closing Wedge High Tibial Osteotomy

Xavier Flecher, MD; Sebastien Parratte, MD; Jean-Manuel Aubaniac, MD; and Jean-Noël A. Argenson, MD

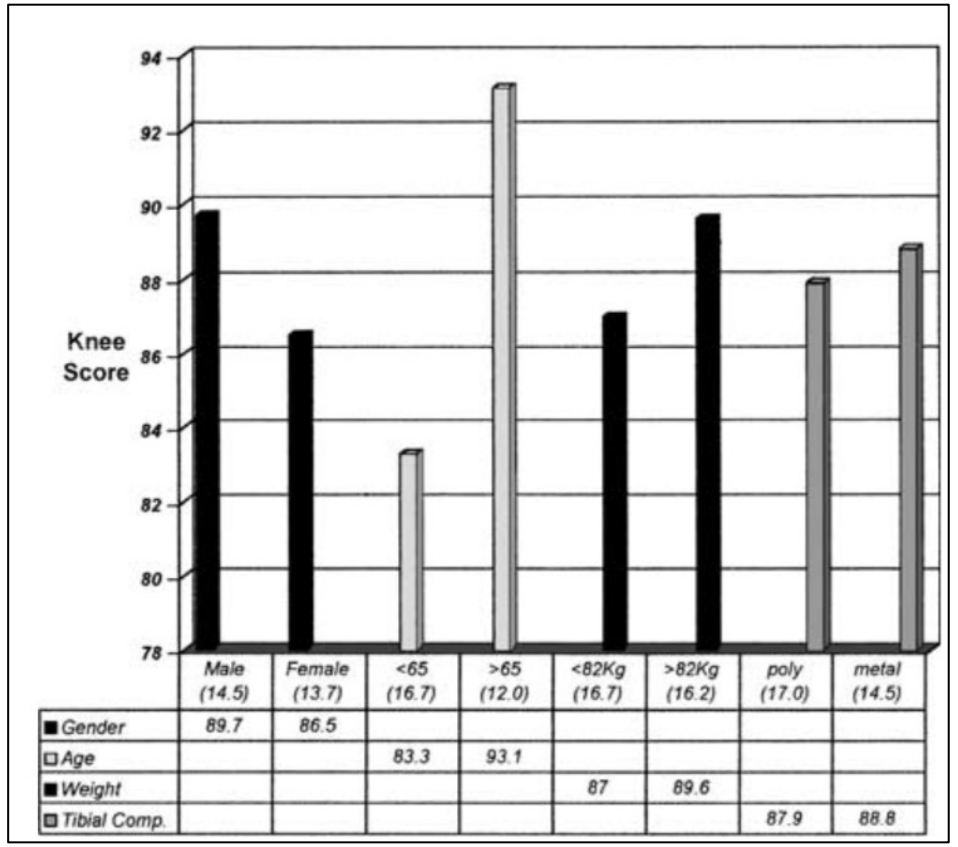
CORR 2006

Preop Evaluation

1. The patient

- **Age**
- Sex
- BMI
- Activity / Sport

⇒ *Higher functional scores*
⇒ *Similar survival*



Unicompartmental Knee Arthroplasty

3- to 10-Year Results in a Community Hospital Setting

Thomas R. Perkins, DO, and Wayne Gunckle, DO

JOA 2002

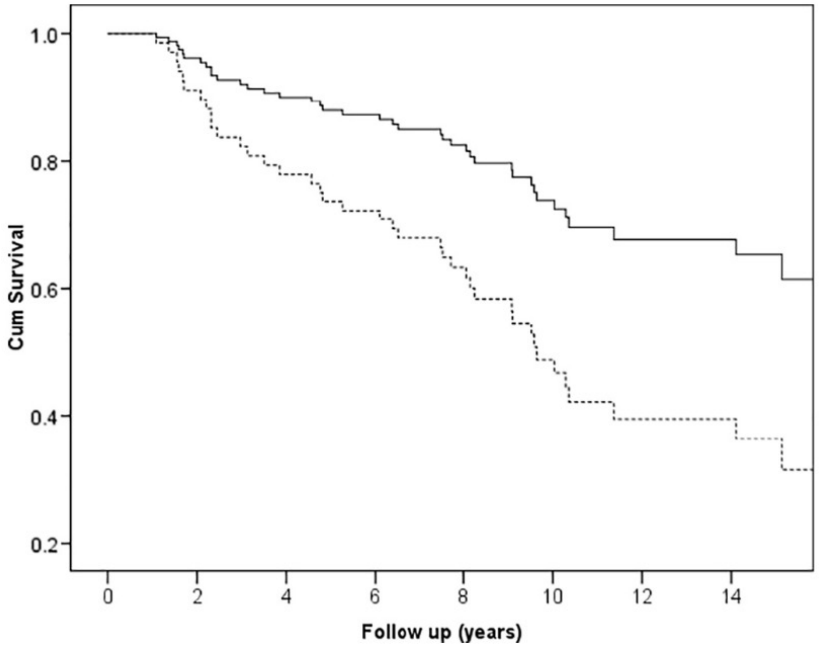
J Arthroplasty. 2016 Dec;31(12):2668-2671. doi: 10.1016/j.arth.2016.06.034. Epub 2016 Jun 29.

Unicompartmental Knee Arthroplasty in Patients Older Than 75 Results in Better Clinical Outcomes and Similar Survivorship Compared to Total Knee Arthroplasty. A Matched Controlled Study.

Fabre-Aubrespy M[1], Ollivier M[1], Pesenti S[1], Parratte S[1], Argenson JN[1].

Preop Evaluation

1. The patient
   - Age
   - **Sex**
   - BMI
   - Activity / Sport



Older age and female gender are independent predictors of early conversion to total knee arthroplasty after high tibial osteotomy

O.J.F. Keenan *, N.D. Clement, R. Nutton, J.F. Keating

Department of Orthopaedics and Trauma, Royal Infirmary of Edinburgh, 51 Little France Crescent, Edinburgh EH16 4SA, UK

Knee 2018

Preop Evaluation

1. The patient

- Age
- Sex
- **BMI**
- Activity / Sport

⇒ *ROM*
⇒ *Recovery*
⇒ *Revision rate at 10 years*

Bone Joint J. 2019 Feb;101-B(2):213-220. doi: 10.1302/0301-620X.101B2.BJJ-2018-0969.R2.

The influence of obesity on clinical outcomes of fixed-bearing unicompartmental knee arthroplasty.

Xu S[1], Lim WJ[1], Chen JY[1], Lo NN[1], Chia SL[1], Tay DKJ[1], Hao Y[2], Yeo SJ[1].

Survival at 10 years :

- 98.6% BMI < 30
- 88.1% BMI > 30 *p=0.012*

CLINICAL ORTHOPAEDICS AND RELATED RESEARCH
Number 452, pp. 91–96

TABLE 1. Coefficient of Cox Proportional Hazard Model Considering Any Revision as an Endpoint

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A 12–28-Year Followup Study of Closing Wedge High Tibial Osteotomy

Xavier Flecher, MD; Sebastien Parratte, MD; Jean-Manuel Aubaniac, MD; and Jean-Noël A. Argenson, MD

Preop Evaluation

1. The patient
   - Age
   - Sex
   - BMI
   - **Activity / Sport**

⇒ *Sport 70-80%*
⇒ *Hiking / Cycling / Swimming*

Knee Surg Sports Traumatol Arthrosc. 2017 Mar;25(3):717-728. doi: 10.1007/s00167-016-4167-1. Epub 2016 May 21.

Sport and physical activity following unicompartmental knee arthroplasty: a systematic review.

Waldstein W[1], Kolbitsch P[2], Koller U[2], Boettner F[3], Windhager R[2].

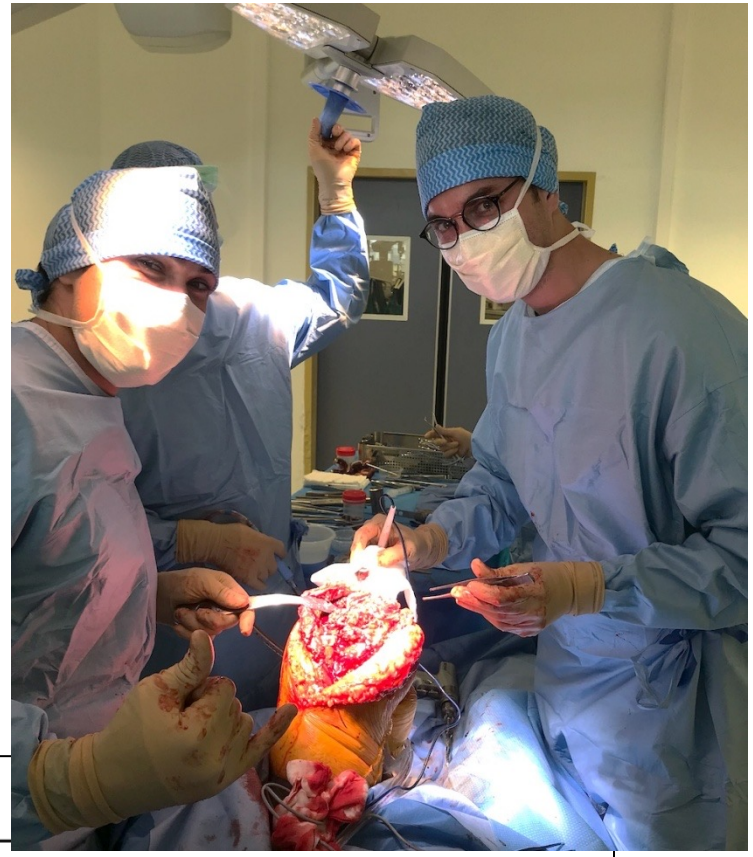
⇒ *Sport 87.2%*
⇒ *Work 84.5%*

J Bone Joint Surg Am. 2016 Sep 21;98(18):1568-77. doi: 10.2106/JBJS.16.00036.

Return to Work and Sport Following High Tibial Osteotomy: A Systematic Review.

Ekhtiari S[1], Haldane CE[1], de Sa D[1], Simunovic N[1], Musahl V[2], Ayeni OR[1].

Preop Evaluation



1. The patient
   - Age
   - Sex
   - BMI
   - **Activity / Sport**

Knee Surgery, Sports Traumatology, Arthroscopy
https://doi.org/10.1007/s00167-020-05857-1

KNEE

Check for updates

Opening wedge high tibial osteotomy allows better outcomes than unicompartmental knee arthroplasty in patients expecting to return to impact sports

Christophe Jacquet[1] · Firat Gulagaci[1] · Axel Schmidt[1] · Aniruddha Pendse[1] · Sebastien Parratte[2] · Jean-Noel Argenson[1] · Matthieu Ollivier[1]

Received: 17 October 2019 / Accepted: 13 January 2020

Preop Evaluation

1. The patient
   - Age
   - Sex
   - BMI
   - **Activity / Sport**

Parameters	HTO ± SD [range]	UKA ± SD [range]	*p* value
Mean time to return to previous professional occupation (months)	3 ± 3.0 [2–7]	4 ± 3.0 [2–13]	0.006*
Mean time to return to sport activities (months)	4.9 ± 2.2 [2–9]	5.8 ± 4.2 [2–13]	0.006*
Mean postoperative UCLA score	8.4 ± 1.6 [6–10]	6.5 ± 2 [3–10]	< 0.0001*°
Mean KSS symptom at 24 months	19 ± 5.4 [4–25]	20 ± 6.8 [4–25]	0.3
Mean KSS satisfaction at 24 months	33 ± 6 [10–40]	30 ± 8 [2–40]	0.04*
Mean KSS expectation at 24 months	8 ± 1.7 [3–14]	9 ± 2.4 [3–14]	0.3
Mean KSS activity at 24 months	84 ± 8 [62–100]	75 ± 9 [46–96]	0.006*°
Mean KSS subtotal at 24 months	61 ± 7 [44–78]	60 ± 9 [40–78]	0.6

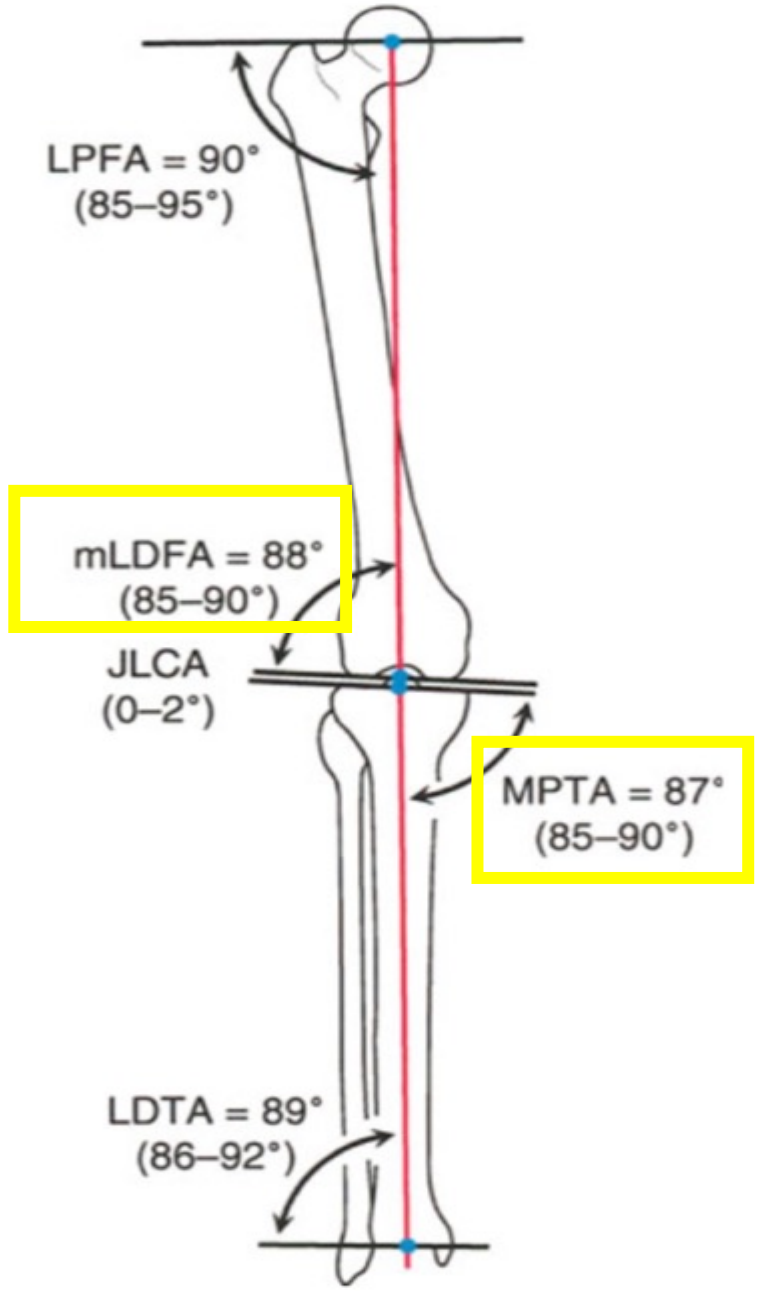
Table 4 Patient reported outcome scores at 3, 6, 12 and 24 months

Parameters	Time (months)	HTO	UKA	*p* value
KOOS				
QOL	3	63 ± 6	60 ± 7	0.3
Sports		47 ± 7	47 ± 8	0.8
ADL		67 ± 6	67 ± 9	0.5
Symptom		68 ± 9	67 ± 8	0.6
Pain		72 ± 7	71 ± 9	0.3
VAS		2.9 ± 2	2.9 ± 3	0.9
KOOS				
QOL	6	72 ± 6	69 ± 8	0.5
Sports		67 ± 6	56 ± 7	0.03*°
ADL		76 ± 7	77 ± 8	0.5
Symptom		76.8 ± 9	76.3 ± 7	0.6
Pain		81.1 ± 6	80.5 ± 7	0.4
VAS		2.3 ± 2	1.9 ± 3	0.2
KOOS				
QOL	12	79 ± 8	76 ± 7	0.5
Sports		74 ± 7	63 ± 6	0.01*°
ADL		84 ± 8	84 ± 7	0.4
Symptom		84 ± 7	83 ± 8	0.8
Pain		88 ± 8	87 ± 7	0.8
VAS		1.7 ± 1.2	1.5 ± 0.8	0.2
KOOS				
QOL	24	81 ± 7	78 ± 7	0.5
Sports		76 ± 6	65 ± 7	0.009*°
ADL		84 ± 7	84 ± 6	0.9
Symptom		86 ± 8	86 ± 9	0.6
Pain		91 ± 9	91 ± 10	0.7
VAS		1.0 ± 0.5	0.9 ± 0.4	0.5

Preop Evaluation

2. Radiographic Analysis

- **LOCATION of deformity**
- **IMPORTANCE of deformity**

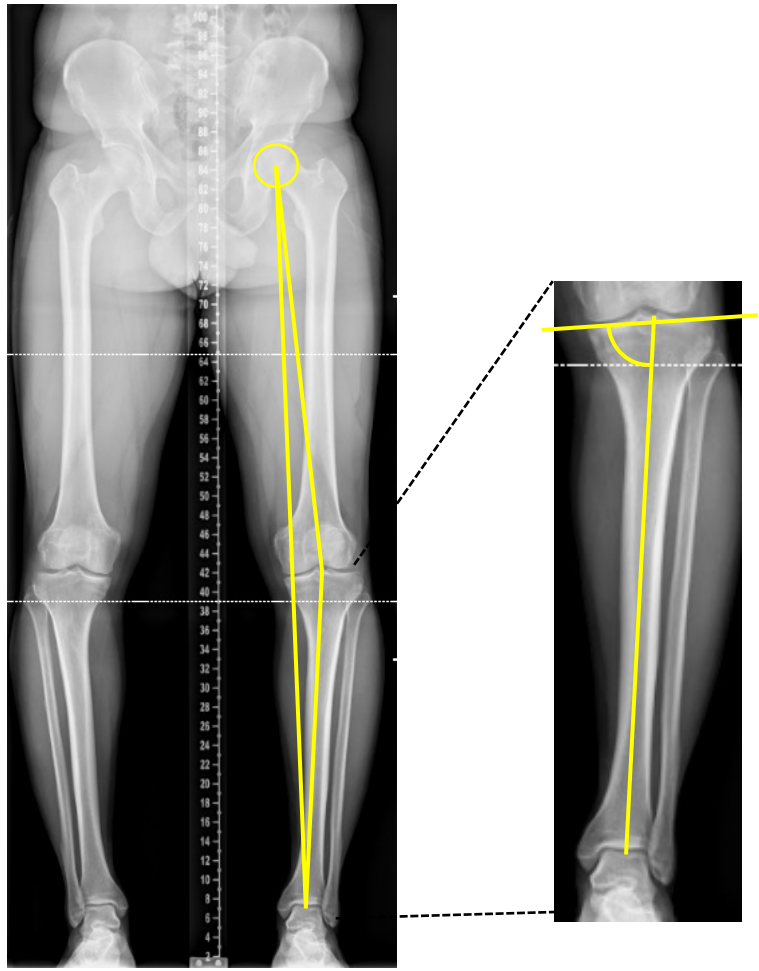


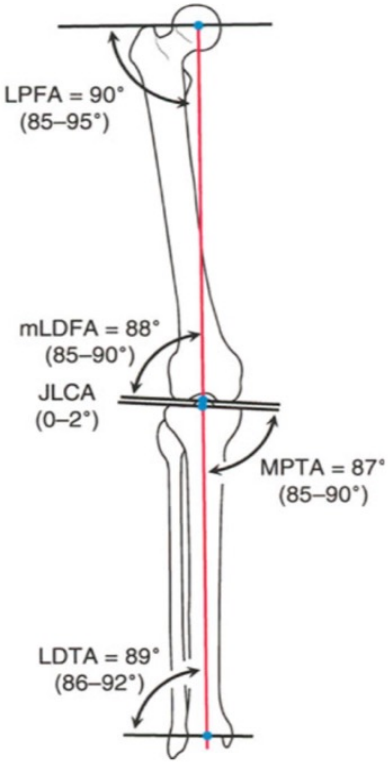
Preop Evaluation

2. Radiographic Analysis

- **Deformity**
- OA Stage

Long leg Film

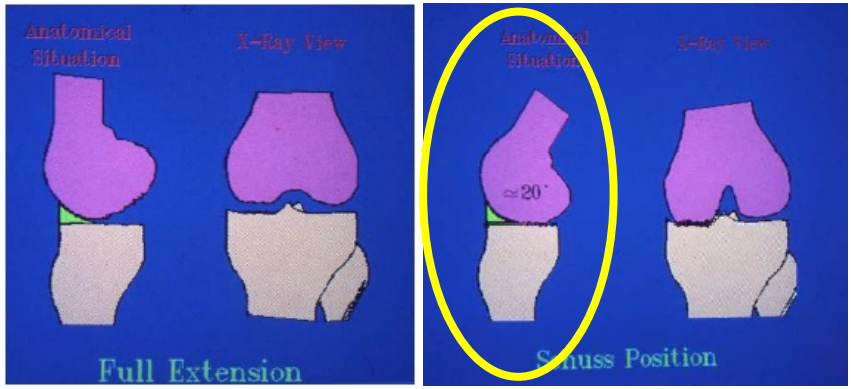




Preop Evaluation

2. Radiographic Analysis

   - Deformity
   - **OA stage**



Stress Views

Schuss

Preop Evaluation

2. Radiographic Analysis

- Deformity
- **OA Stage**

A 12–28-Year Followup Study of Closing Wedge High Tibial Osteotomy

Xavier Flecher, MD; Sebastien Parratte, MD; Jean-Manuel Aubaniac, MD; and Jean-Noël A. Argenson, MD

Parameter	Value	Hazard Ratio	p Value
Gender	female	1.07	p = 0.8
Operative age	> 50	2.1*	p = 0.014
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Postoperative valgus angle	> 6°	0.46*	p = 0.02
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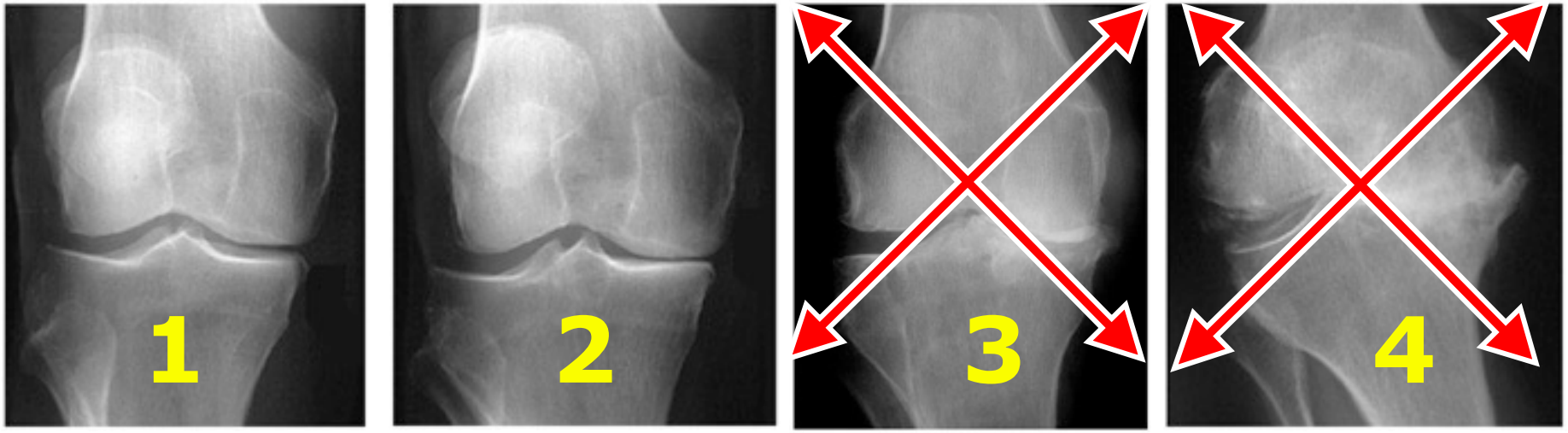


The ‘ideal’ Patient for **OSTEOTOMY**

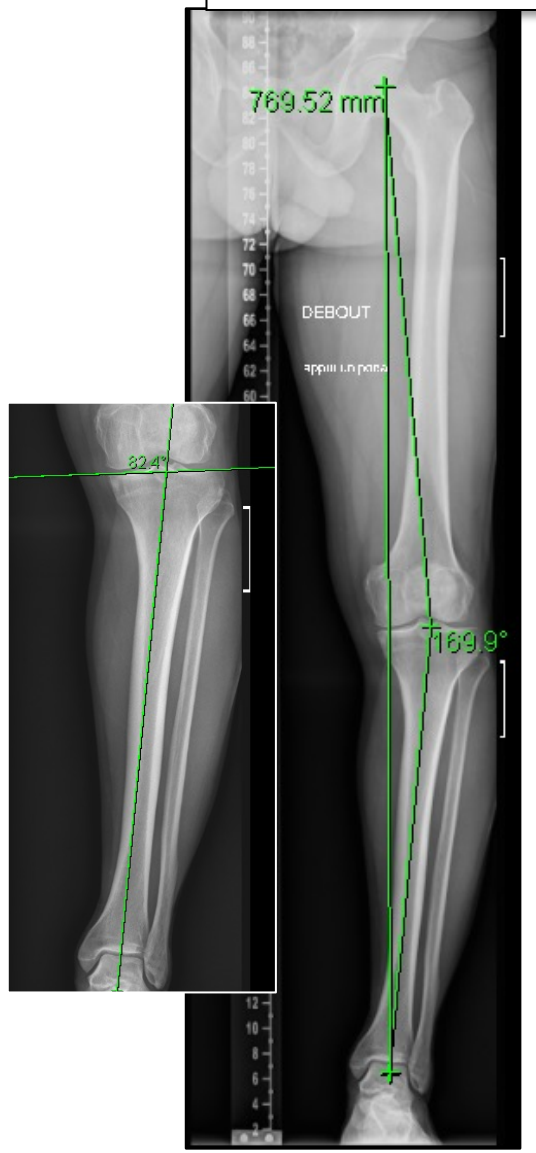
- < 55 yrs
- Man
- BMI < 30 $kg.m^{-2}$
- Active / Sports

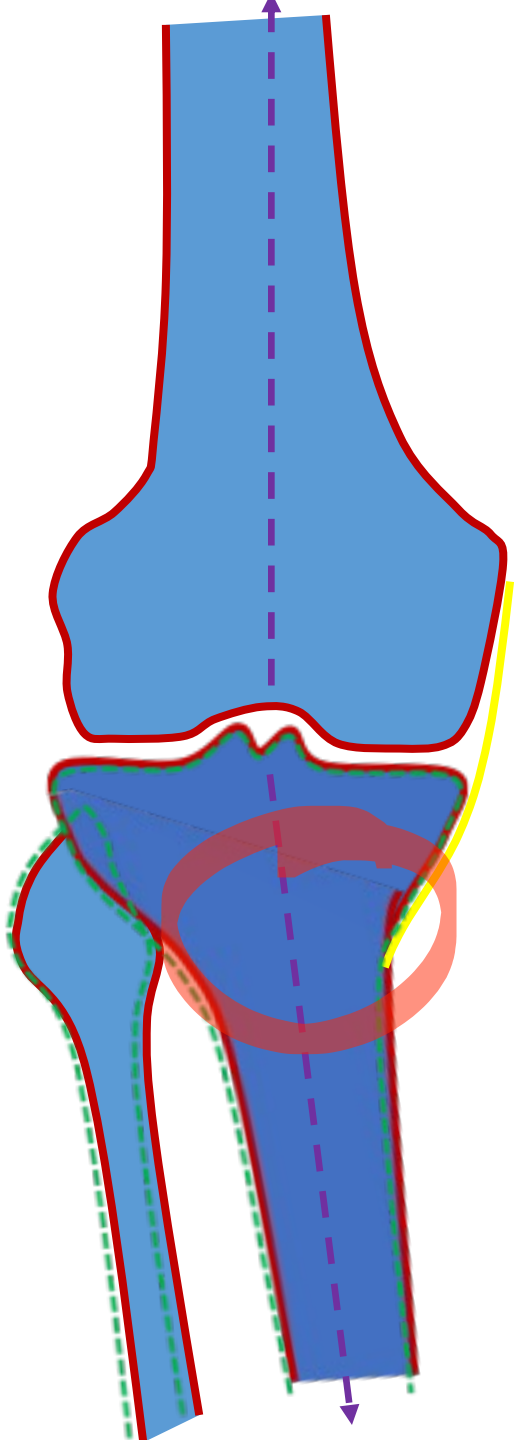
- Metaphysal Varus
- Ahlback ≤ 2

Stress Views

Schuss

Long leg Film

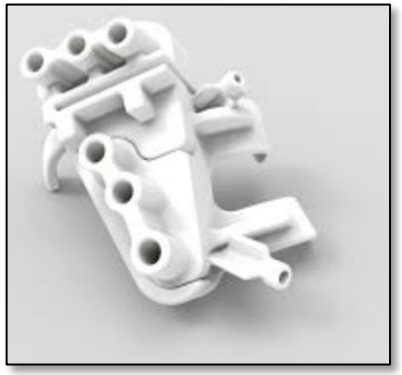




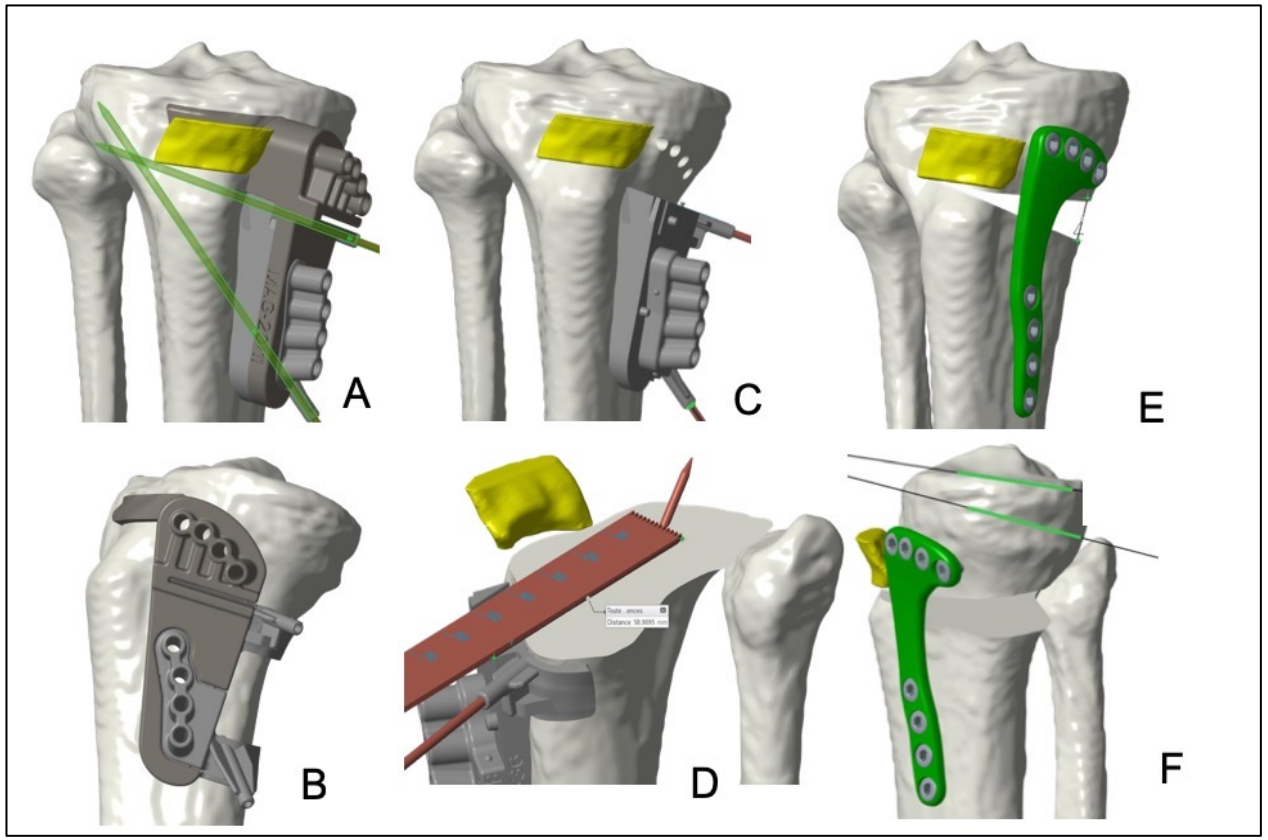
Metaphyseal deformity

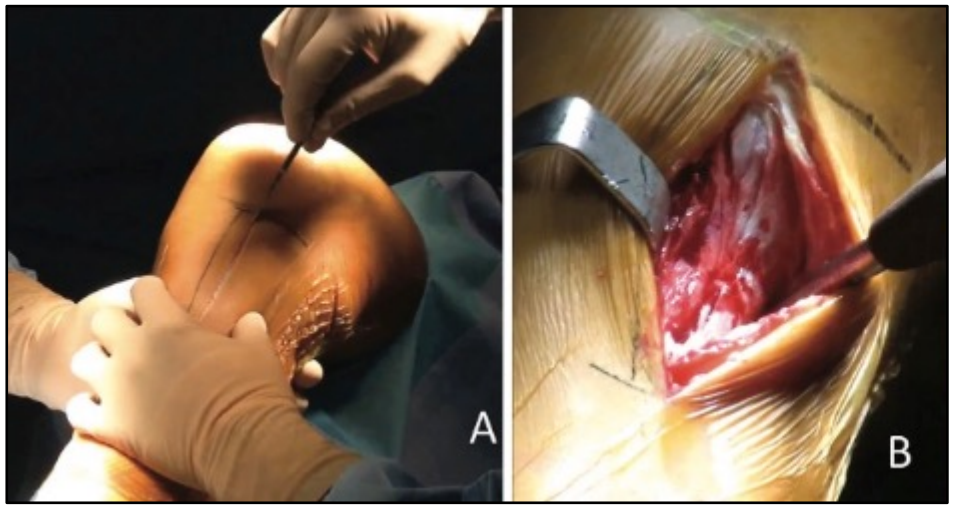
Is THE indication for osteotomy

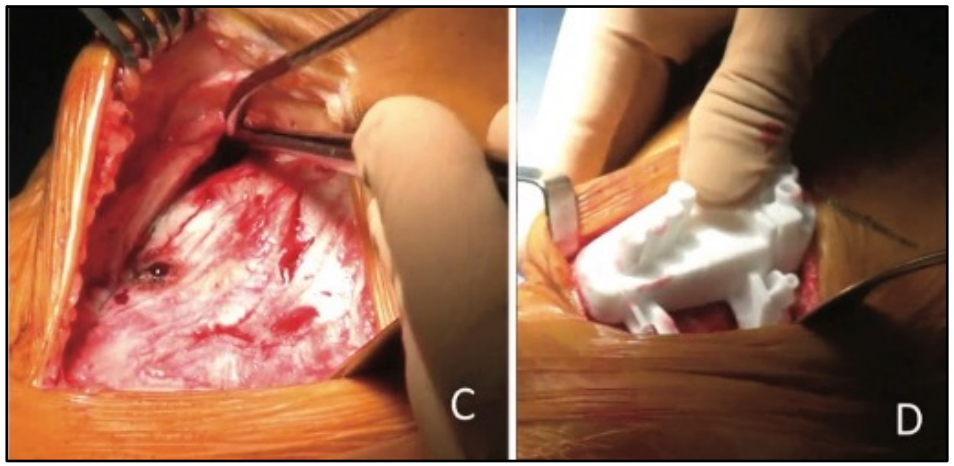
ABNORMALITY <83° >90°



« Customized » OSTEOTOMY



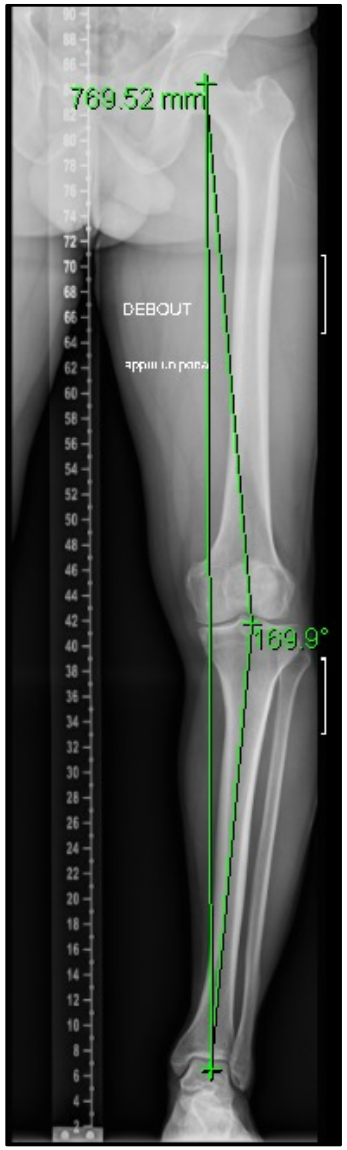




Can three-dimensional patient-specific cutting guides be used to achieve optimal correction for high tibial osteotomy? Pilot study.

Munier M[1], Donnez M[2], Ollivier M[1], Flecher X[1], Chabrand P[1], Argenson JN[1], Parratte S[3].

The ‘ideal’ Patient for **OSTEOTOMY**



The ‘ideal’ Patient for **UKA**

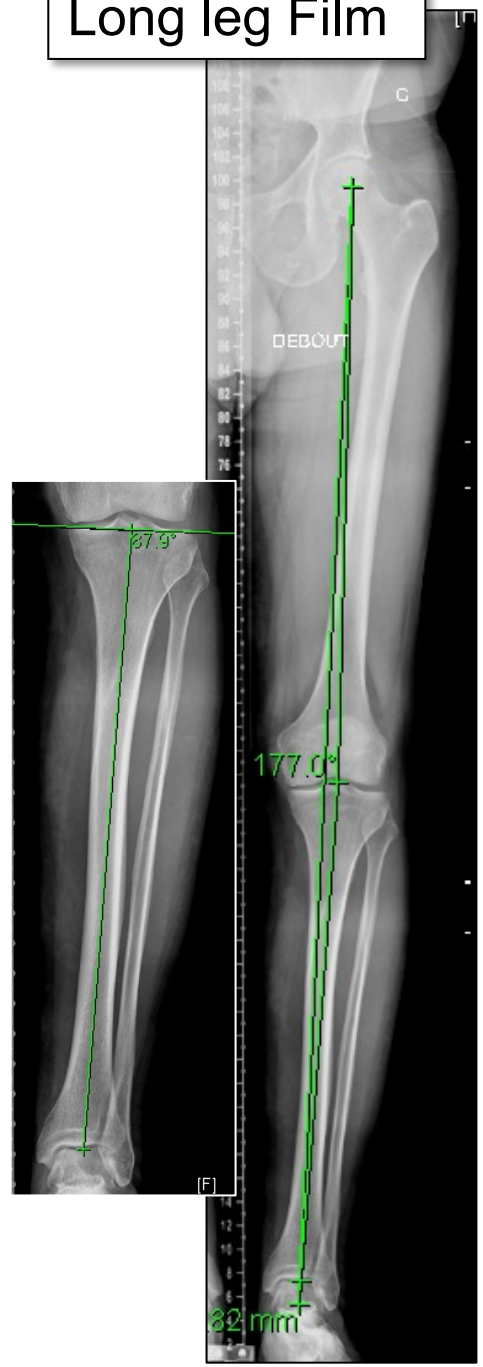
- > 65 yrs
- Man / Woman
- BMI < 40 kg.m^{-2}
- Sedentary
- Stable

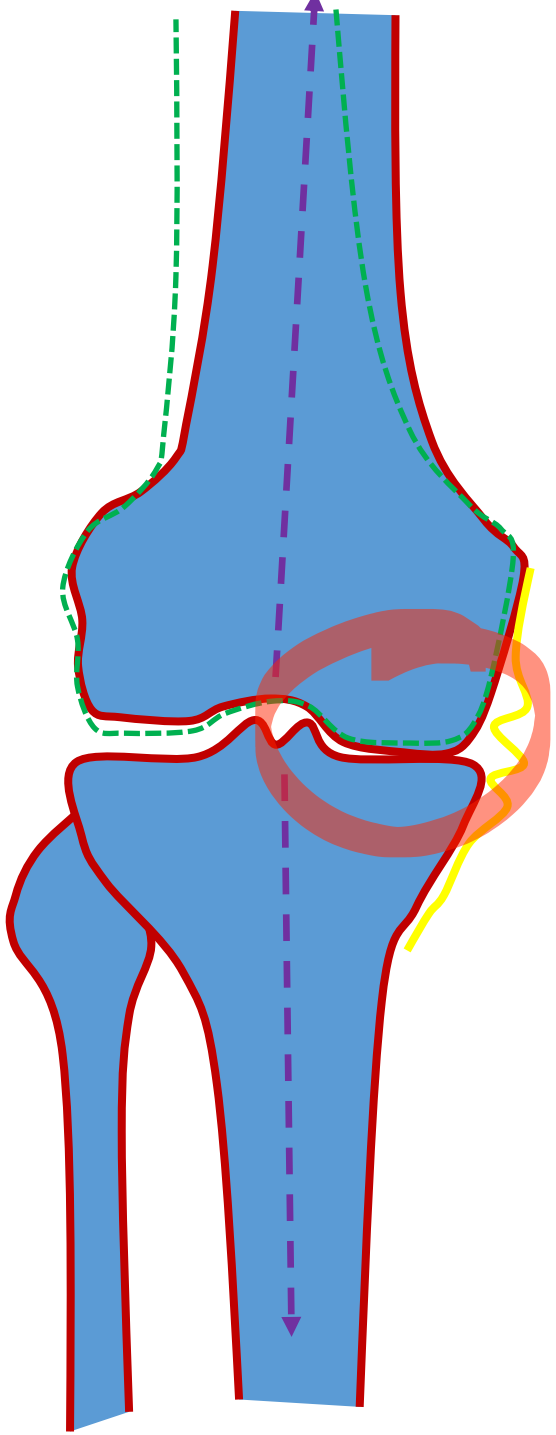
- Degenerative VAR <10°
- No metaphysal varus
- Ahlback > 2

Stress Views

Schuss

Long leg Film

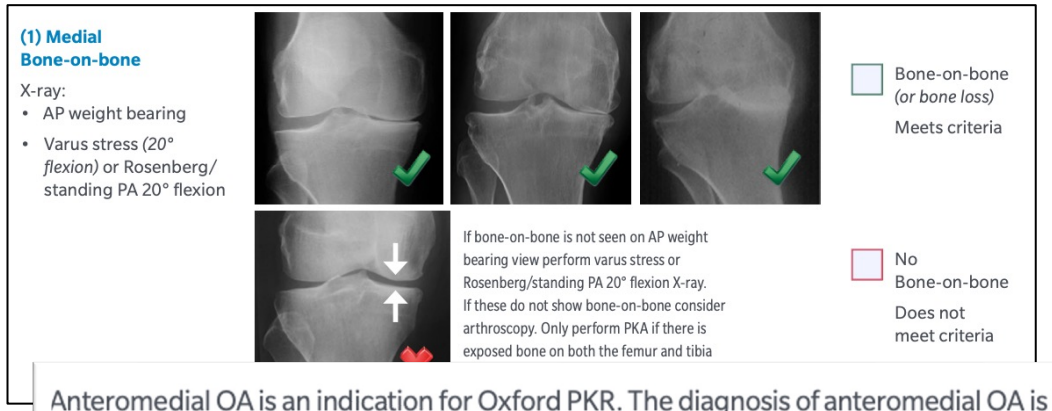


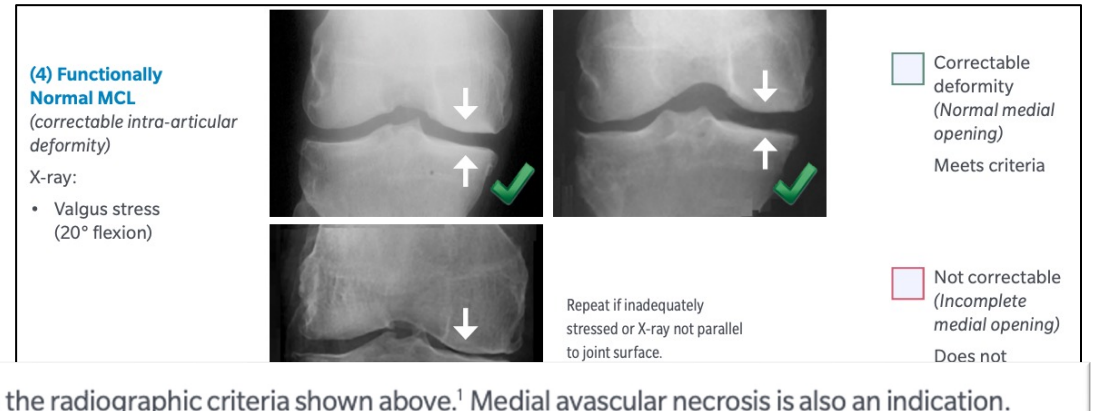


Anteromedial full thickness cartilage loss

Is THE indication for PKR

Indication UKA (Oxford criteria)





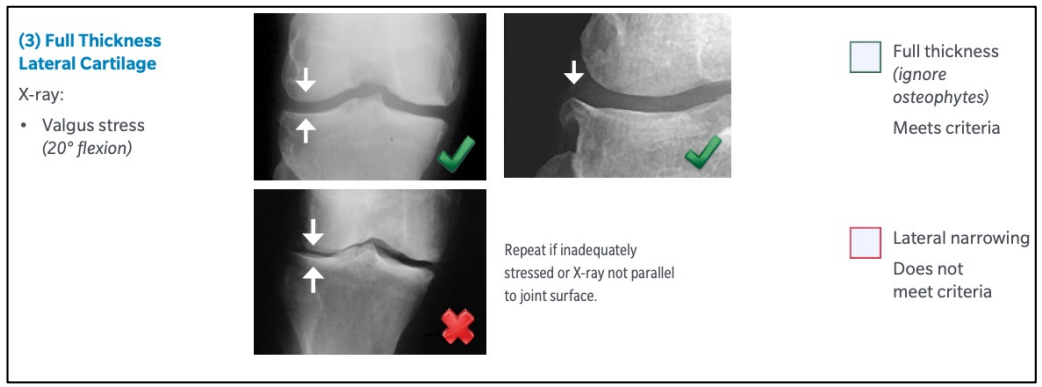
Anteromedial OA is an indication for Oxford PKR. The diagnosis of anteromedial OA is based on the radiographic criteria shown above.[1] Medial avascular necrosis is also an indication.

If all criteria are met, the following factors do not preclude Oxford PKR:

- Isolated medial pain is not a requirement. Pre-operative anterior knee pain has been reported to not compromise the outcome* [2,3]
- Patient's age, weight and activity level[+4-6]
- Chondrocalcinosis (cartilage calcification on X-ray), lateral marginal osteophytes or medial tibial subluxation (which should correct when the PKR is implanted if the ACL is intact)[6-8]

The final decision on whether to perform PKA is made when the knee has been opened and directly inspected. The following factors do not preclude Oxford PKR if all other criteria are met

- Full thickness cartilage loss on the non-weight bearing medial side of the lateral femoral[#9]
- Full thickness cartilage loss in the patellofemoral joint* provided there is no severe damage to the lateral part of the PFJ with bone loss, grooving or subluxation.



Consensus Statement

Journal of Surgical Orthopaedic Advances

Consensus Statement on Indications and Contraindications for Medial Unicompartmental Knee Arthroplasty

Keith R. Berend, MD[1]; Michael E. Berend, MD[2]; David F. Dalury, MD[3]; Jean-Noel Argenson, MD[4]; Chris A. Dodd, MD[5]; and Richard D. Scott, MD[6]

Previous work, now nearly 30 years dated, is frequently cited as the "gold standard" for the indications and contraindications for medial unicompartmental knee arthroplasty (UKA). The purpose of this article is to review current literature on the indications and contraindications to UKA and develop a consensus statement based on those data. Six surgeons with a combined experience of performing more than 8,000 partial knee arthroplasties were surveyed. Surgeons then participated in a discussion, emerging proposal, collaborative modification, and final consensus phase. The final consensus on primary indications and contraindications is presented. Notably, the authors provide consensus on previous contraindications, which are no longer considered to be contraindications. The authors provide an updated and concise review of the current indications and contraindications for medial UKA using scientifically based consensus-building methodology. (Journal of Surgical Orthopaedic Advances 24(4):252–256, 2015)

Similar Functional Results in Patients outside the Classical Criteria for Medial Unicompartmental Knee Arthroplasty

European Knee Society

- Similar functional results:
  Scores KSS, UCLA, EQ 5D, Satisfaction
- Age > 75 ans
- BMI > 30
- Deformity > 8°

JB&JS

Indication UKA (Oxford criteria)

Knee Surgery, Sports Traumatology, Arthroscopy
https://doi.org/10.1007/s00167-019-05544-w

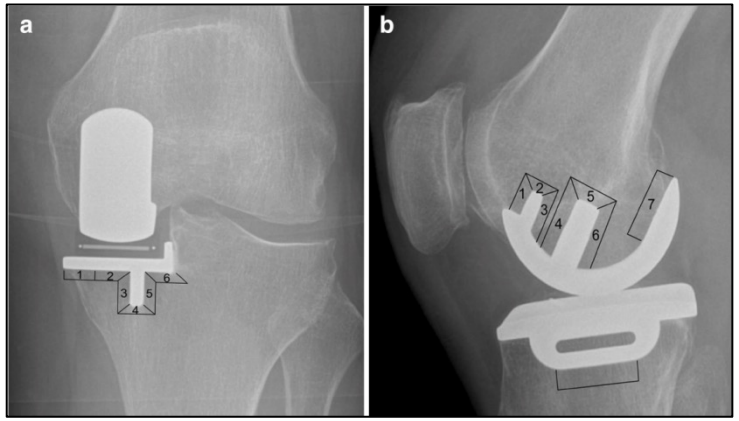
KNEE

Check for updates

Ten-year clinical and radiographic results of 1000 cementless Oxford unicompartmental knee replacements

Hasan R. Mohammad[1,2] · James A. Kennedy[1,2] · Stephen J. Mellon[1] · Andrew Judge[1] · Christopher A. Dodd[2] · David W. Murray[1,2]

Received: 20 March 2019 / Accepted: 16 May 2019



SURVIVAL = 99% at 5 years

Implants

Better Implant Positioning and Clinical Outcomes With a Morphometric Unicompartmental Knee Arthroplasty. Results of a Retrospective, Matched-Controlled Study

Jean-Charles Escudier, MD [a, b], Christophe Jacquet, MD [b], Xavier Flecher, MD, PhD [a, b], Sebastien Parratte, MD, PhD [a, b], Matthieu Ollivier, MD, PhD [a, b], Jean-Noel Argenson, MD, PhD [a, b, *]

[a] *Department of Orthopaedic Surgery, APHM, Institut du Mouvement et de l'appareil Locomoteur, Sainte-Marguerite Hospital, Marseille, France*
[b] *Aix-Marseille University, CNRS, Marseille, France*

Table 3
Postoperative Radiological Results.

Variables	Symmetric (N = 53)	Morphometric (N = 53)	*P*
HKA	176.4 ± 1.69	176.8 ± 2.39	.72
Rotation of tibial implant (°)	6.3 ± 4.02	4.6 ± 3.59	.049[a]
Tibial bone coverage (%)	97.3 ± 11.35	94.7 ± 10.89	.42
Medial overhang			
Average (mm)	1.5 ± 2.02	−0.3 ± 1.84	<.0001[a]
>3 mm (%)	35%	0	<.0001[a]
Posterior overhang			
Average (mm)	−0.5 ± 3.61	−1.6 ± 2.10	.081
>3 mm	22%	0	.0015[a]

Values are mean ± SD.
HKA, hip-knee-ankle angle; SD, standard deviation.
[a] Statistical difference.

Table 4
Postoperative Clinical Results.

Variables	Symmetric (N = 53)	Morphometric (N = 53)	*P*
Flexion (°)	117.1 ± 8.2	119.2 ± 4.5	.134
KSS			
Pain	47.1 ± 6	48.7 ± 2.4	.076
Knee	85.1 ± 10.8	91.2 ± 4.3	<.001[a]
Function	94.0 ± 9.2	97.3 ± 4.6	.02[a]
Global	175.2 ± 31.7	188.6 ± 6.6	<.01[a,b]
KOOS SF	22.5 ± 11.8	16.9 ± 6.1	.003[a]
EQ5D3L	0.9 ± 0.2	1 ± 0.1	<.001[a]

KSS, Knee Society Score; KOOS SF, Knee injury and Osteoarthritis Outcome Score Short Form; EQ5D3L, EuroQoL 5-Dimensions 3-Levels.
[a] Statistical difference.
[b] Differences reaching published minimal clinically important differences.

Surgical Technique

Revue de chirurgie orthopédique
2006, *92*, 193-199

Implantation mini-invasive d'une prothèse unicompartimentale médiale du genou

J.-N. Argenson, X. Flecher, S. Parratte

Service de Chirurgie Orthopédique et de Traumatologie, CHU Sud, Hôpital Sainte-Marguerite, 270, boulevard Sainte-Marguerite, 13009, Marseille.

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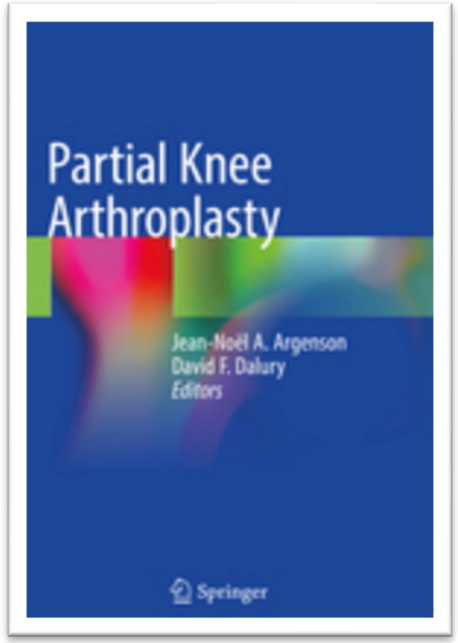
Unicompartmental Knee Arthroplasty

Technique Through a Mini-incision

Jean-Noel A. Argenson, MD; Sebastien Parratte, MD; Xavier Flecher, MD; and Jean-Manuel Aubaniac, MD

Surgical Technique

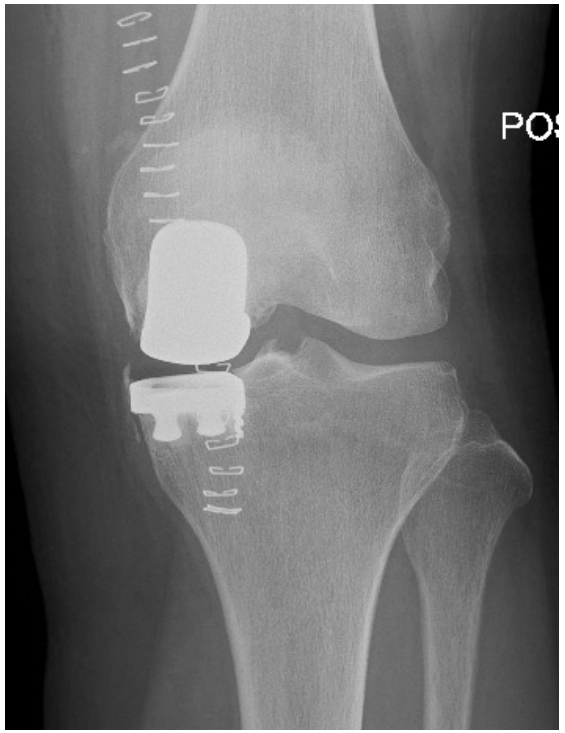
1) Under correction of deformity
2) Conservative bone cuts
3) Restoration of soft-tissue tension
4) Tibial slope
5) Implant shape and size

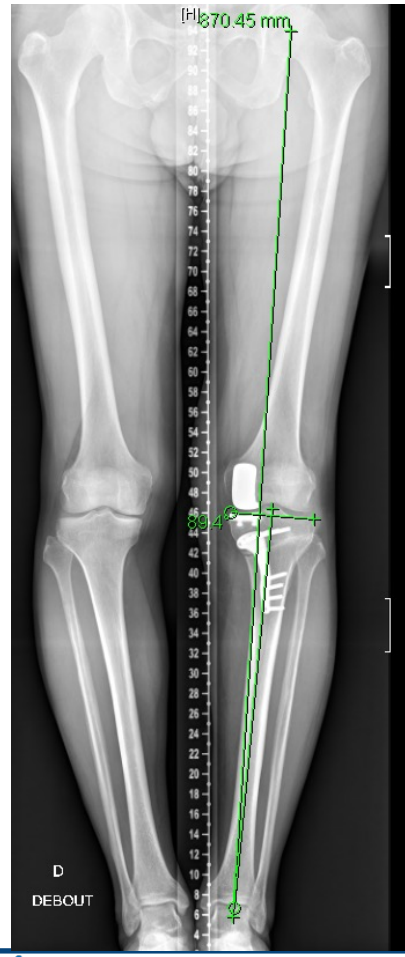


- Argenson JN, Dalury D - Partial Knee Arthroplasty 2019

The ‘ideal’ Patient for **UKA**

Osteotomy or/and UKA





Take Home Message

1. **INDICATION** =>
   - The patient
   - Radiographic Analysis

HTO

- < 50 yrs
- Man
- BMI < 30 $kg.m^{-2}$
- Active / Sport
- Metaphysal Varus
- Ahlback ≤ 2

PUC

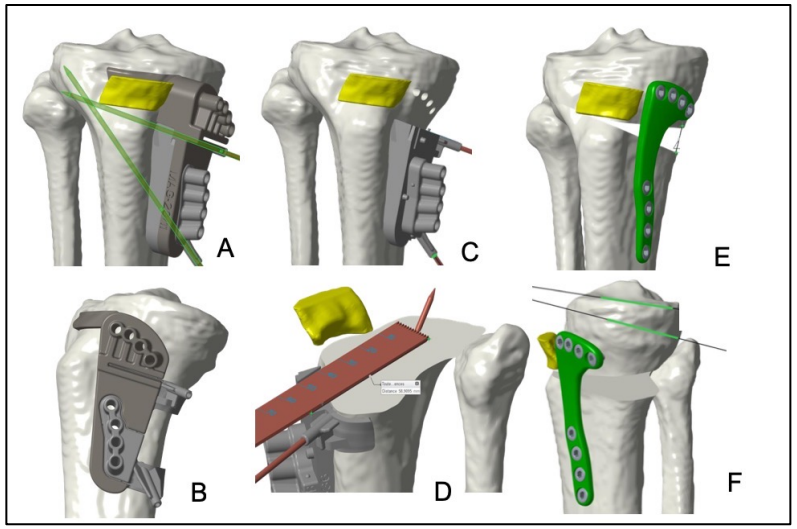
- > 60 yrs
- Man / Woman
- BMI< 40 $kg.m^{-2}$
- Sedentary
- Degenerative Varus
- Ahlback > 2

Take Home Message

2. SURGICAL TECHNIQUE =>

- Reliable
- Reproducible

HTO



UKA

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Thank you for your attention

IML

Institut du Mouvement et de l'appareil Locomoteur