

Varus - Guidelines

Sébastien LUSTIG, Cécile BATAILLER, Elvire SERVIEN

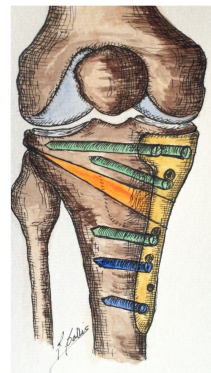
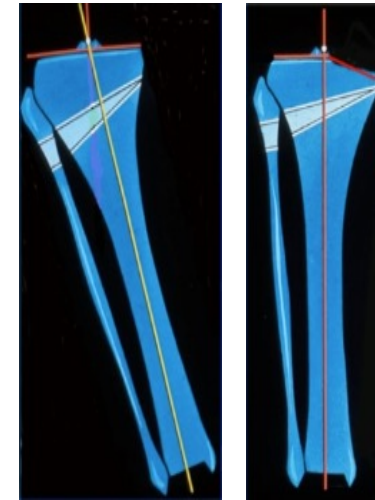
*T. Gicquel, P. Mertl, N. Bouguennec, N. Tardy, G. Mergenthaler, R. Pailhé, JL. Cartier, C. Steltzlen,
G. Rochcongar, JM. Fayard.*

Orthopaedic surgery and sport medicine department

Lyon University Hospital, France

How do we make the right decision?

- Correct assessment of the **pathology**:
 - Patient related factors
 - Anatomical factors
 - Ligamentous status
- Understand patient **expectations**
- Good knowledge of **therapeutic options** (and limits)



Dogmatic approach – Ideal candidate

- **Ideal Age : 40 - 55 yo**

Risk of early failure: 5 times higher if > 56yo

Medial Opening Wedge High Tibial Osteotomy for Medial Compartment Overload/Arthritis in the Varus Knee: Prognostic Factors
Davide Edoardo Bonasia, Federico Dettoni, Gabriele Sito, Davide Blonna, Antongiulio Marmotti, Matteo Bruzzone, Filippo Castoldi and Roberto Rossi
Am J Sports Med published online January 21, 2014
DOI: 10.1177/0363546513516577

- **Obesity (BMI>25-30) = risk factor of failure**

**Survival rate of 56% at 10y for obese patients
vs 91%**

- **High-demand activity**

Proximal Tibial Osteotomy in Patients Who Are Fifty Years Old or Less

A LONG-TERM FOLLOW-UP STUDY*

BY DAVID L. HOLDEN, M.D.†, OKLAHOMA CITY, OKLAHOMA, STANLEY L. JAMES, M.D.‡, ROBERT L. LARSON, M.D.‡,
AND DONALD B. SLOCUM, M.D.§, EUGENE, OREGON

Acta Orthop Scand 1989;60(5):527-31

Function after tibial osteotomy for medial gonarthrosis below aged 50 years

Sten Odenbring¹, Björn Tjörnstrand², Niels Egund³, Bengt Hagstedt⁴, Lennart Hovelius⁵, Anders Lindstrand¹, Torben Luxhøj⁵ and Anders Svanström⁵

Proximal Tibial Osteotomy

A CRITICAL LONG-TERM STUDY OF EIGHTY-SEVEN CASES*

BY MARK B. COVENTRY, M.D.†, DUANE M. ILSTRUP, M.S.†, AND STEVEN L. WALLRICHS, B.S.†, ROCHESTER, MINNESOTA

The Insall Award

Survivorship of the High Tibial Valgus Osteotomy

A 10- to 22-Year Followup Study

Douglas Naudie, MD; Robert B. Bourne, MD;
Cecil H. Rorabeck, MD; and Timothy J. Bourne

Dogmatic approach – Ideal candidate

- Ideal and possible patients for HTO – ISAKOS 2005

Ideal*	Possible†	Not suited
Isolated medial joint line pain	Flexion contracture < 15°	Bi-compartmental (medial and lateral) OA‡
Age (yrs) 40 to 60	Previous infection	Fixed flexion contracture > 25°
BMI < 30	Age 60 to 70 or < 40	Obese patients
High-demand activity but no running or jumping	ACL, PCL or PLC insufficiency	Meniscectomy in the compartment to be loaded by the osteotomy
Malalignment < 15°	Moderate patellofemoral arthritis	
Metaphyseal varus, i.e. TBVA > 5°	Wish to continue all sports	
Full range of movement		
Normal lateral and patellofemoral components		
IKDC (A) B, C, D/AhIback I to IV ⁸⁰		
No cupula		
Normal ligament balance		
Non-smoker		
Some level of pain tolerance		

* BMI, body mass index; TBVA, tibial bone varus angle; IKDC, International Knee Documentation Committee osteoarthritis classification

† ACL, anterior cruciate ligament; PCL, posterior cruciate ligament; PLC, posterolateral corner

‡ OA, osteoarthritis

Rand JA, Neyret P. ISAKOS meeting on the management of osteoarthritis of the knee prior to total knee arthroplasty. *ISAKOS Congress, 2005.*

Dogmatic approach – Ideal candidate

- **Clinical examination**

- Age < 65 y
- No obesity
- No smoker
- Pain at the joint line
- ROM almost normal
- Ligament status OK
- No reducibility of deformity
- No inflammatory history



■ **ASPECTS OF CURRENT MANAGEMENT**

Osteotomies around the knee

PATIENT SELECTION, STABILITY OF FIXATION AND BONE HEALING IN HIGH TIBIAL OSTEOTOMIES

J.-M. Brinkman,
P. Lobenhoffer,
J. D. Agneskirchner,
A. E. Staubli,
A. B. Wymenga,
R. J. van
Heerwaarden

Rand JA, Neyret P. ISAKOS meeting on the management of osteoarthritis of the knee prior to total knee arthroplasty. *ISAKOS Congress, 2005.*

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Proximal Tibial Osteotomy

*A CRITICAL LONG-TERM STUDY OF EIGHTY-SEVEN CASES**

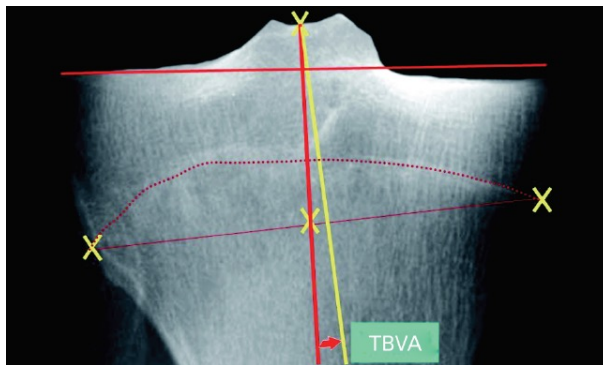
BY MARK B. COVENTRY, M.D.†, DUANE M. ILSTRUP, M.S.†, AND STEVEN L. WALLRICHS, B.S.†, ROCHESTER, MINNESOTA

High Tibial Osteotomy: A Systematic Review and Current Concept

Soheil Sabzevari, MD; Adel Ebrahimpour, MD; Mostafa Khalilipour Roudi, MD; Amir R. Kachooei, MD

Dogmatic approach – Ideal candidate

- Radiological exam
 - Ahlbäck 1 or 2
 - Normal contralateral and PF compartment
 - Extra-articular deformity $>5^\circ$ (Constitutional)



[Clin Orthop Relat Res.](#) 2006 Nov;452:91-6.

A 12-28-year followup study of closing wedge high tibial osteotomy.

[Flecher X¹](#), [Parratte S](#), [Aubaniac JM](#), [Argenson JN](#).

[Am J Sports Med.](#) 2014 Mar;42(3):690-8. doi: 10.1177/0363546513516577. Epub 2014 Jan 21.

Medial opening wedge high tibial osteotomy for medial compartment overload/arthritis in the varus knee: prognostic factors.

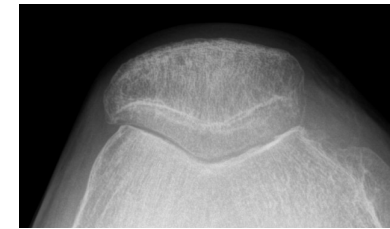
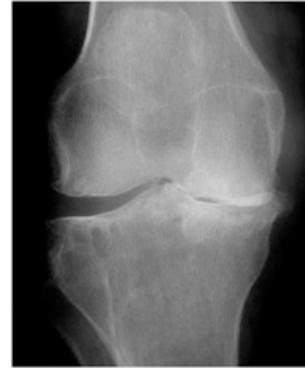
[Bonasia DE¹](#), [Dettoni F](#), [Sito G](#), [Blonna D](#), [Marmotti A](#), [Bruzzone M](#), [Castoldi F](#), [Rossi R](#).

Tibial bone varus angle $>5^\circ$

Bonnin M, Chambat P. Current status of valgus angle, tibial head closing wedge osteotomy in medial gonarthrosis. *Orthopade* 2004;33:135-42 (in German).

“Borderline” candidate

- Young patient with severe OA, in order to delay the arthroplasty



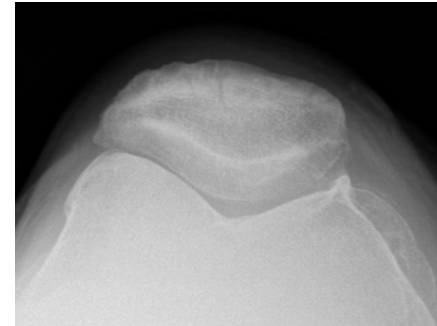
- Old patient in good health with highly demanding sport activities



-

55 yo – BMI: 22 – Male.
Tennis player

2013



Surgical Option ?



Retrospective study of SFA 2019



- Multicentric (10 orthopaedic departments)
- 481 included HTO between January 2004 and December 2015
- Only isolated HTO without anterior laxity

⇒ Survival rate?

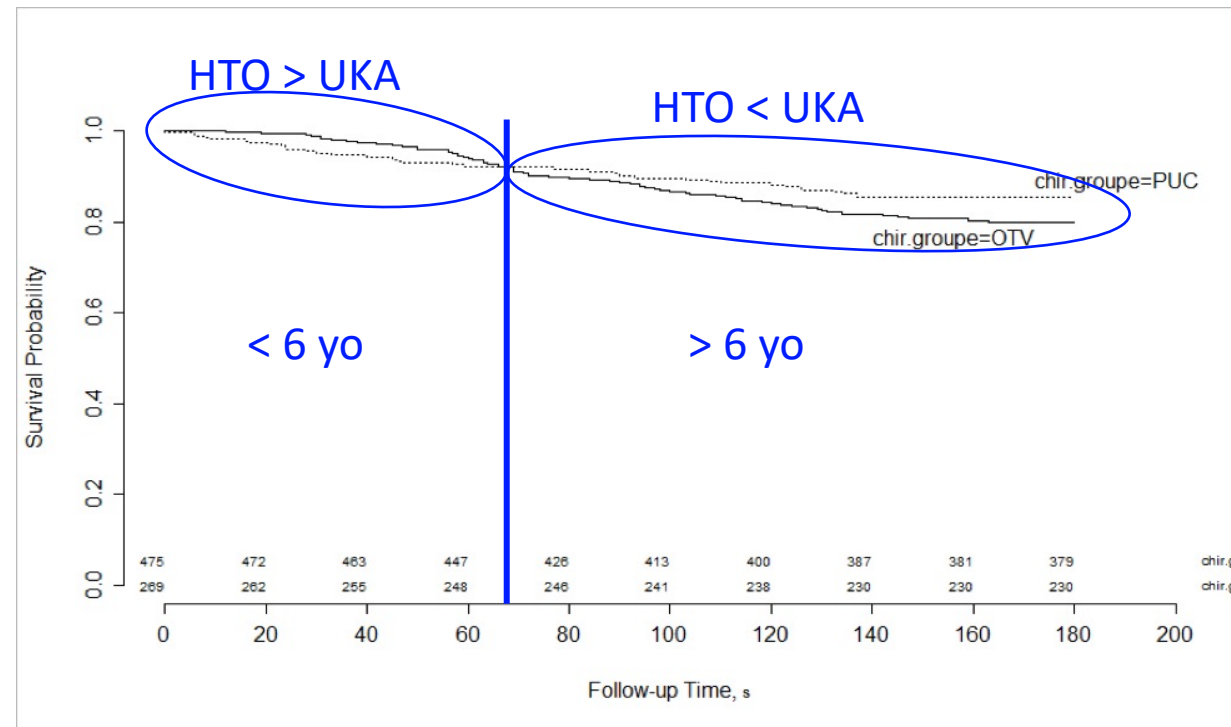
⇒ Risk factors of failure and revisions?

⇒ Ideal candidate?



Risk factors of HTO survival

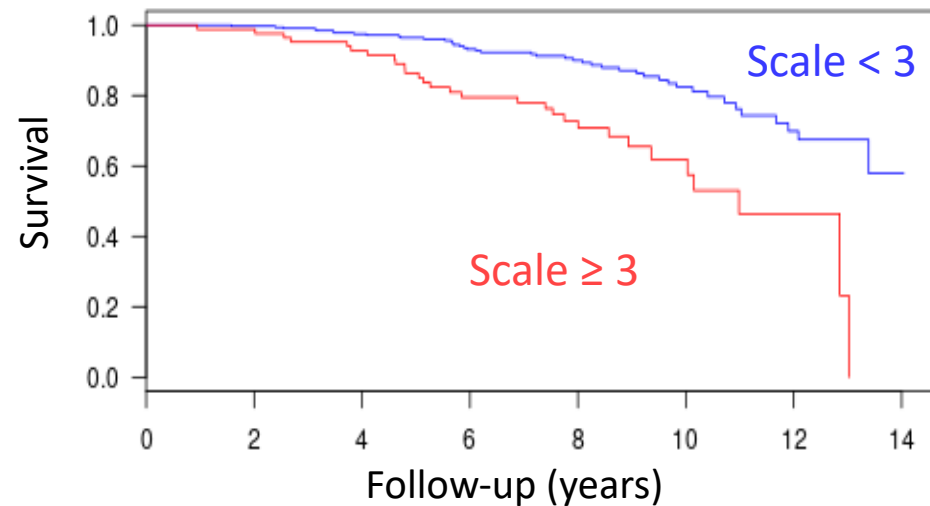
	Protective factors	Risk factors	
Gender	Female	Male	p = 0.01
Age	< 54 yo	> 54 yo	p < 0.01
BMI	< 25	> 25	p < 0.01
BMI	< 35	> 35	p < 0.01
Ahlback	1 or 2	3 (or 4)	p < 0.01
Intra articular varus	< 0.9°	≥ 0.9°	p = 0.047
HKA correction	≥ 8°	< 8°	p < 0.01
Post op HKA	> 180°	< 180°	p < 0.01
Hinge	Safe	Fracture	p < 0.01





Predictive HTO Scale

	0 point	1 point	2 points
Age	< 55 yo	≥ 55 yo	
BMI	< 25	25-35	≥ 35
Ahlback	1 or 2	3 or 4	



411 patients	Scale < 3	Scale ≥ 3	Series
Number of patients	326	85	481
Survival at 5 years	97%	86%	93%
Survival at 7.5 years	92%	76%	85%
Survival at 10 years	83%	57%	74%

$\chi^2 : 23.12$
 $p = 0.000002$

$p = 0.003$

$p = 0.008$

When HTO scale is ≥ 3 , HTO survival is low!

Tennis player ... 2014



3 months

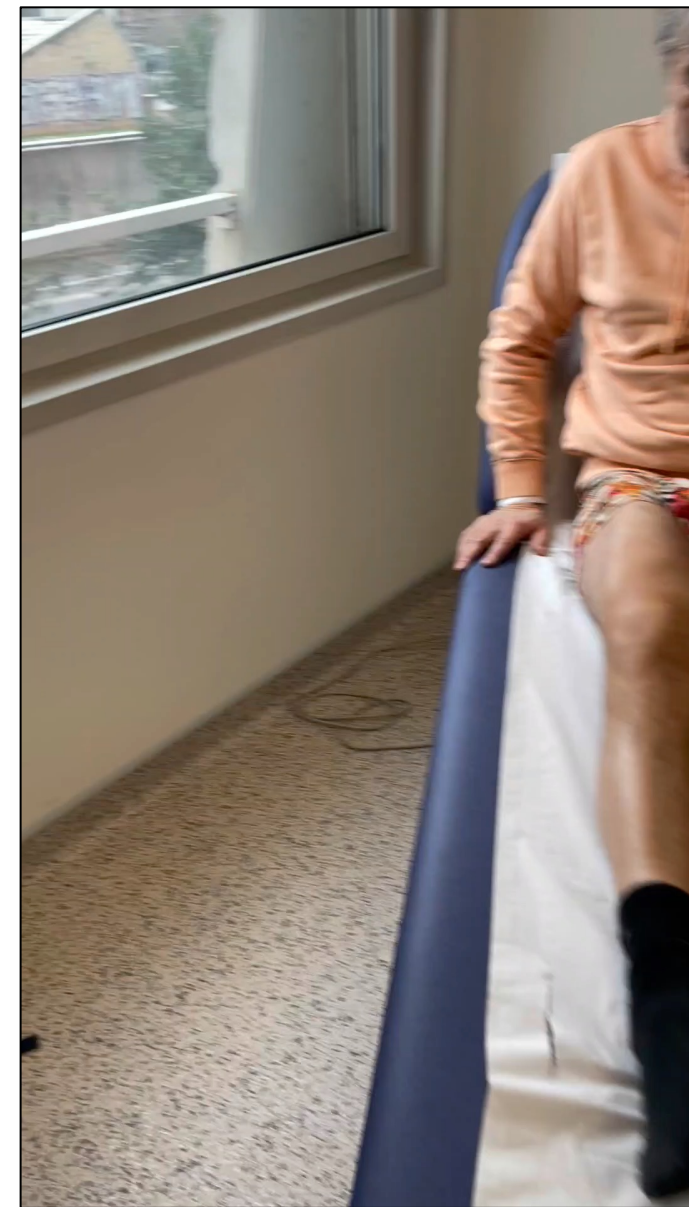
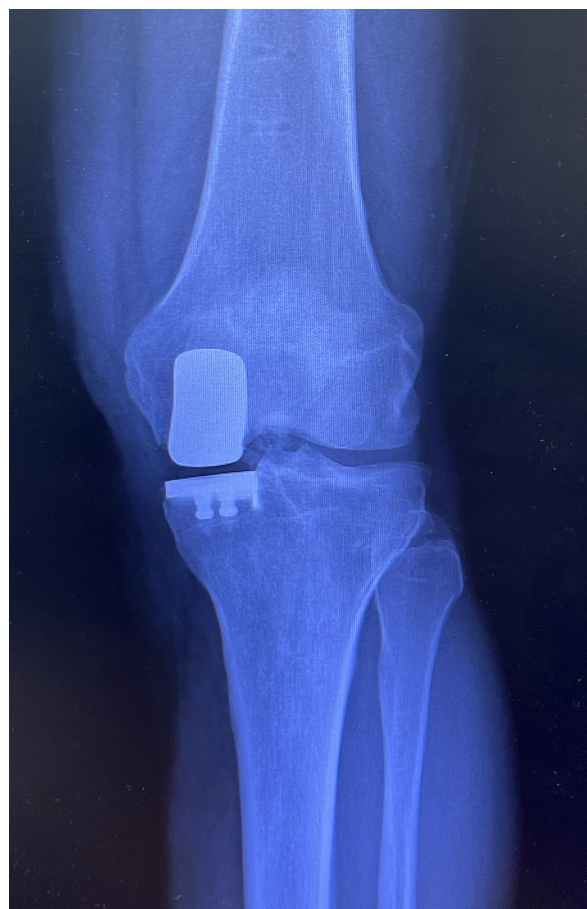
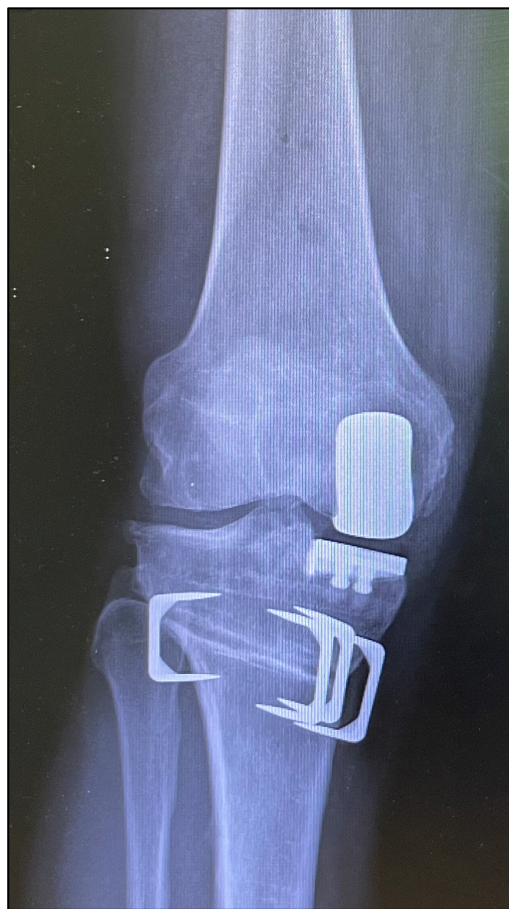
1 year



10ys later ...
2023



2024



Conclusion

- Some indications are obvious = ideal candidate
- Some borderline indications
- Predictive HTO scale (SFA 2019)
 - ➔ helpful tool for surgical decision



	0 point	1 point	2 points
Age	< 55 yo	≥ 55 yo	
BMI	< 25	[25-35[≥ 35
Ahlback	1 or 2	3 or 4	

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