Clinica Ortopedica e Traumatologica
Università degli Studi di Pavia

Fondazione IRCCS Policlinico San Matteo

Direttore: Prof. F. Benazzo

DIFFICULT PRIMARY TKR

Post HTO

F. Benazzo

Osteotomy of the knee

- Tibia:

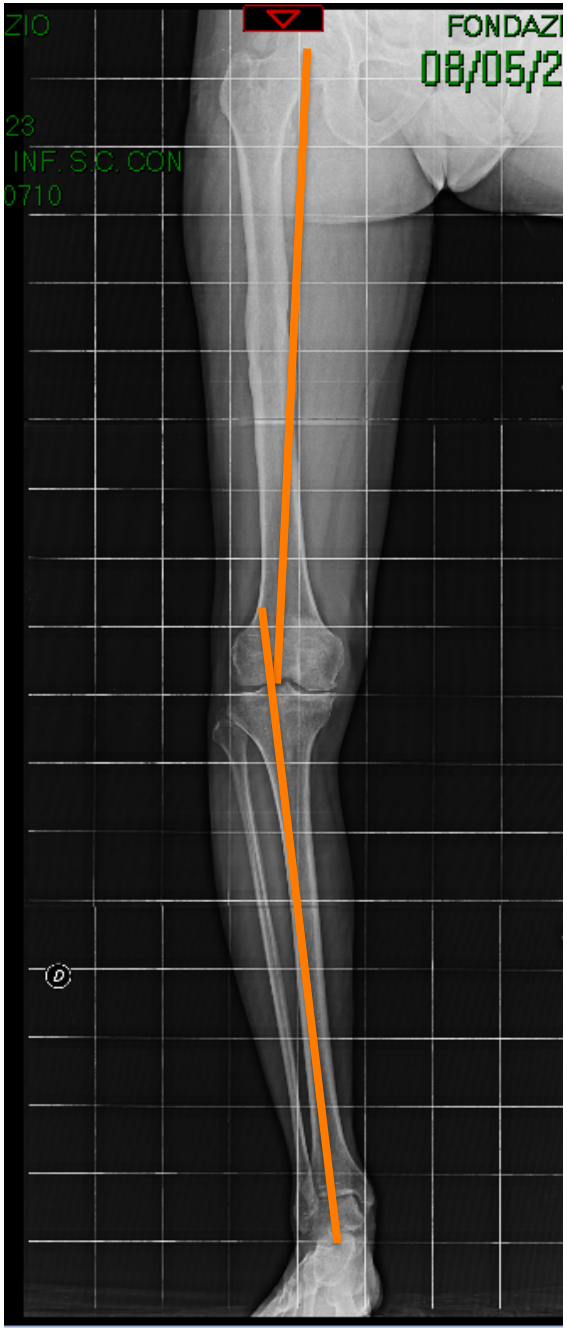
- Closing wedge
- Opening wedge

Other options

- Dome osteotomy, Chevron osteotomy, progressive callus distraction

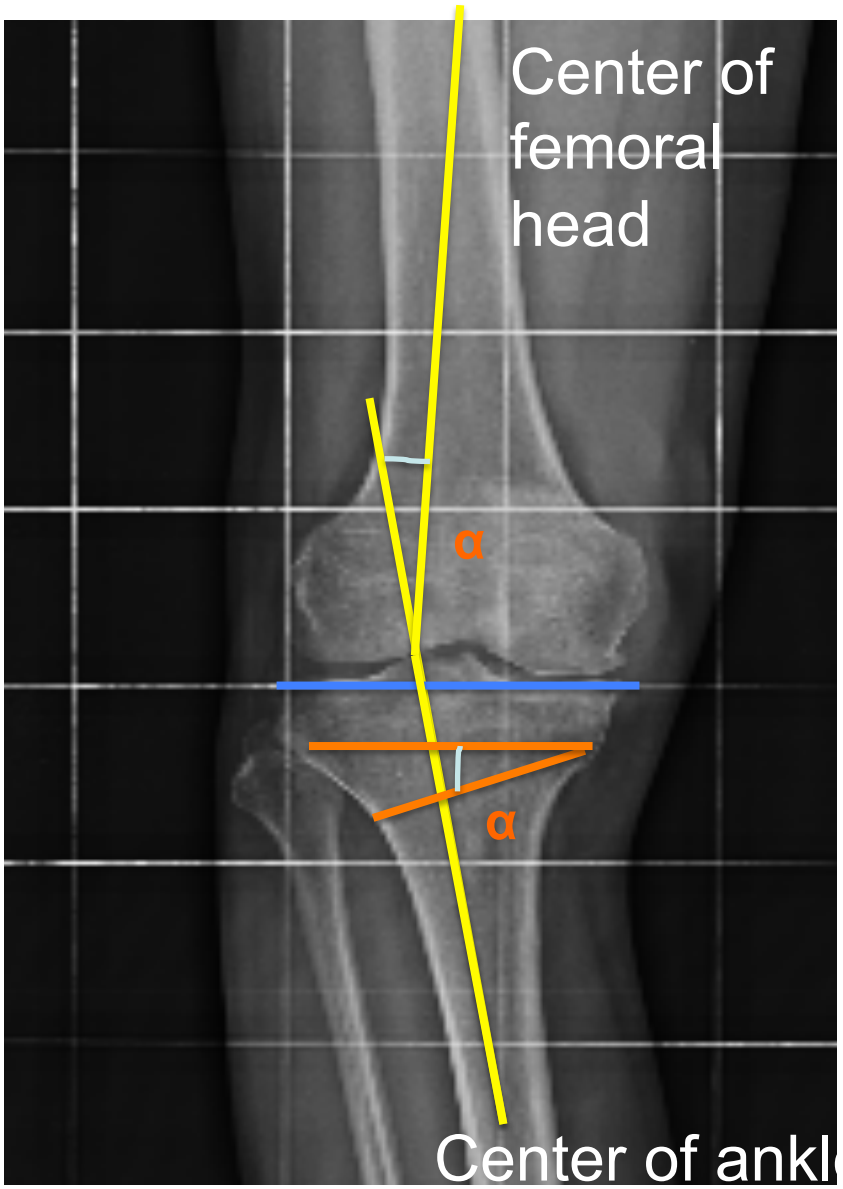
- (Femur)

Planning



Planning: closing wedge

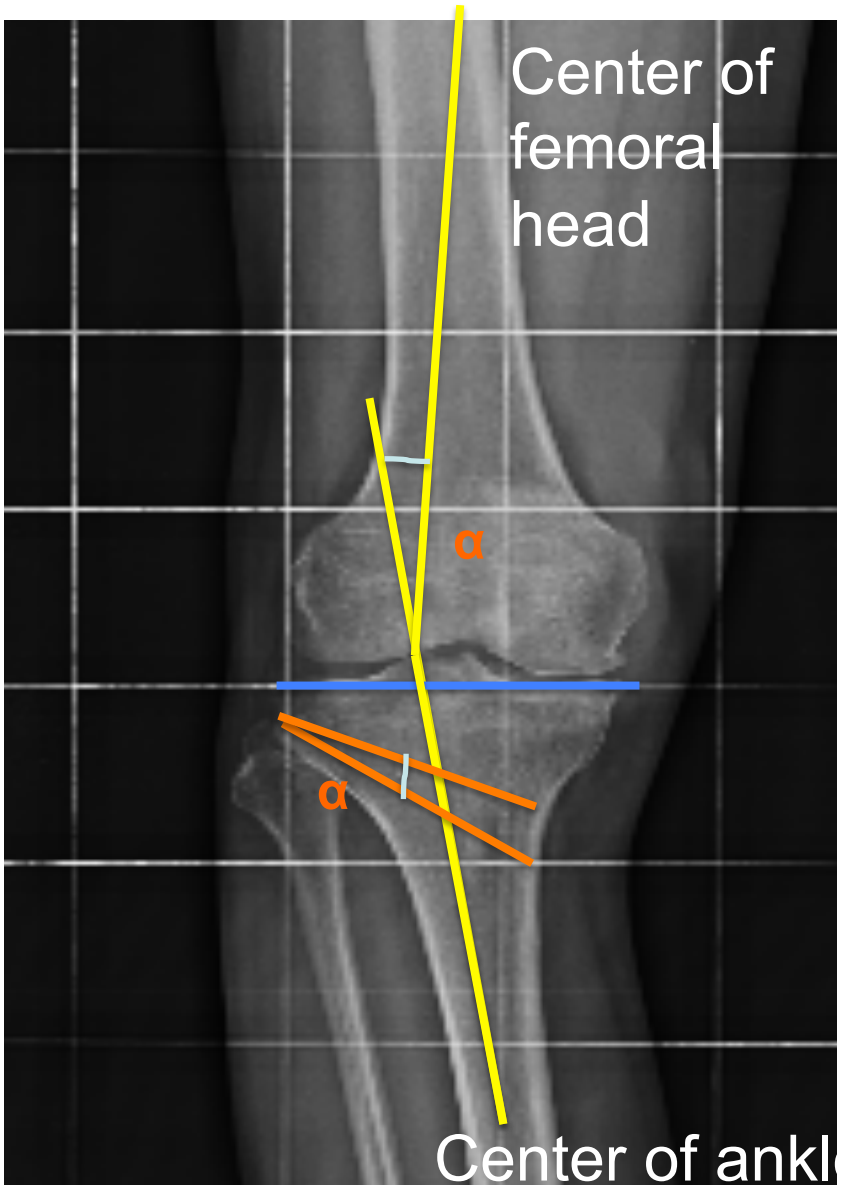
- Weight-bearing line is located at 62.5% of the width of the tibial plateau (3-5° valgus)
- The angle formed at the intersection of weight bearing lines lines (α angle) represents the angle of correction
- Proximal osteotomy line in parallel with the articular surface and 2.2,5 cm inferior to the joint line
- Distal osteotomy line determined referring to α angle



Dugdale et al, Pre-operative planning of HTO, CORR 1992.
DC Lee, High Tibial Osteotomy, KSSR, 2012.

Planning: opening wedge

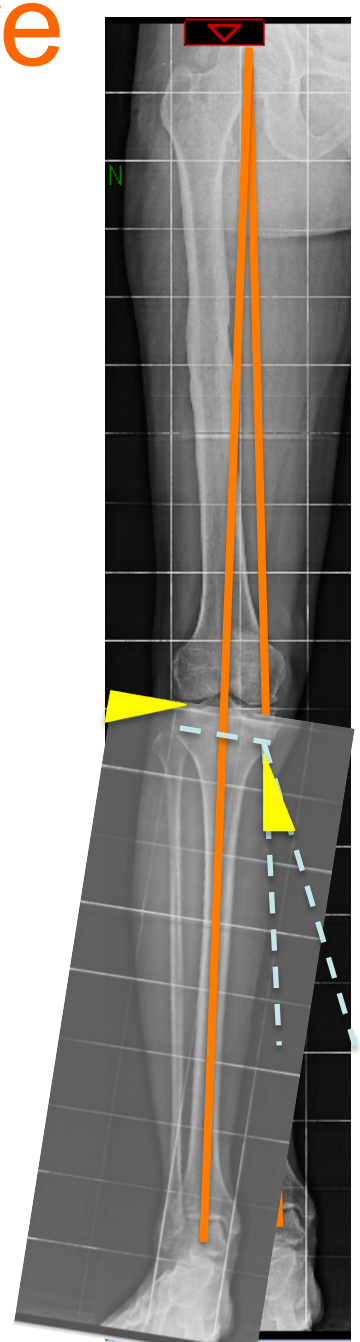
- Weight-bearing line is located at 62.5% of the width of the tibial plateau (3-5° valgus)
- α angle represents the angle of correction
- Proximal osteotomy line in parallel with the articular surface and 3,5-4 cm inferior to the medial joint line to the tip of fibular head
- Another same length line is drawn obliquely by the α angle



Dugdale et al, Pre-operative planning of HTO, CORR 1992.
DC Lee, High Tibial Osteotomy, KSSR, 2012.

Planning: “old” measure

- Radiograph or tracing is cut through the osteotomy site
- Rotate the distal tibia until the weight bearing line passes through the 62% coordinate
- The correction angle is the lateral overlap (for lateral closing wedge) or the medial opening (for medial opening wedge)



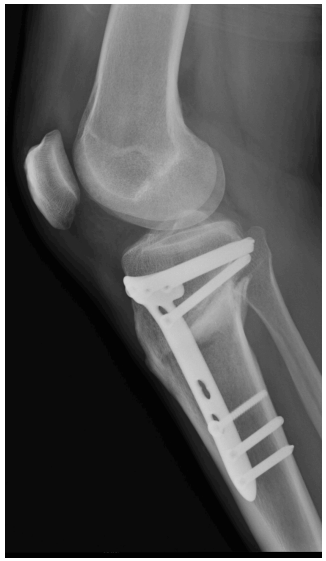
Dugdale et al, Pre-operative planning of HTO, CORR 1992.
Brown and Amendola, Radiographic evaluation and preoperative planing for HTO, Operative techniques in Sport Medicine, 2000.

Closing wedge

- Lateral closing osteotomy
- Rapid bone union (heavy smoking, diabetes)
- Early weight bearing
- Indication:
  - ✓ Normal MCL
  - ✓ patella baja

Opening wedge

- Medial opening osteotomy
- Few dissections
- No fibular osteotomy
- Tibial alignment and shape more respected
- Indication: MCL slack (re-tensioning)



Potential downsides

- ✓ Fibular osteotomy or release of the proximal tibio-fibular joint: potential neurovascular complications
- ✓ Decreased tibial slope and overload of PCL
- ✓ Shortening of the limb
- ✓ Difficult TKA

- ✓ Risk of increasing tibial slope and overload of ACL
- ✓ Tight in extension
- ✓ Potential changes of the position of the patella

HTO - TKA

- HTO postpones TKA
- Pain and function improvement in 80-90% of the patients, but:
  - ✓ After 10 years TKA is needed in 23% of patients
  - ✓ “more demanding” procedure
  - ✓ Disagreement in literature regarding the results
  - ✓ Satisfactory results on the whole, but…

TKA after HTO
Planning

- Previous scar: vascular supply
- Fixation devices: occult infections, surgical approach for removal

Approach dictated by the device to be removed

- Potential ligament imbalance
- Patellar heigth
- Bone quality (osteoporosis/bone sclerosis)

TKA after HTO
Planning

- Bone deformity, (potential violation of the bone with the keel; stems → offset)
- Ligaments competence (in literature inferior results with CR design)
- Patella and patellar tendon possible shortening

TKA after HTO

BMC Musculoskeletal Disorders

BioMed Central

Research article

Open Access

Total knee arthroplasty after high tibial osteotomy. A systematic review

Tom M van Raaij*[1,2], Max Reijman[1], Andrea D Furlan[3,4] and Jan AN Verhaar[1]

Published: 20 July 2009

BMC Musculoskeletal Disorders 2009, **10**:88 doi:10.1186/1471-2474-10-88

Received: 13 November 2008
Accepted: 20 July 2009

Conclusion: Our analysis suggests that osteotomy does not compromise subsequent knee replacement. However, the low quality of evidence precludes solid clinical conclusions.

- 9 studies: 371 TKA after HTO vs 369 “primary” TKA
- Mean follow-up 3 years
- No tibial stemmed revision implant
- All-cemented TKA in 94-100% of the cases

TKA after HTO

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No worsening of the results, but:

- Longer surgical time (26 minutes)
- More frequent need of lateral release
- More frequent need of TTO for the approach
- Postoperative ROM lower of 10° (range 4-14°)
- HSS and WOMAC scores less favourable

TKA after HTO

International Orthopaedics (SICOT) (2013) 37:427–431
DOI 10.1007/s00264-012-1765-5

ORIGINAL PAPER

Total knee arthroplasty after high tibial osteotomy: a comparison of opening and closing wedge osteotomy

Ricardo Bastos Filho · Robert A. Magnussen · Victoria Duthon · Guillaume Demey · Elvire Servien · José Mauro Granjeiro · Philippe Neyret

- 141TKA, 117 after closed-HTO and 24 after opening-HTO
- Lateral release in 55,3% of the cases on the whole
- Radiological alignment, PROMs and complications similiar in the two groups, but…

TKA after closed-HTO

Greater rate of:

- More aggressive lateral release (ilio-tibial band, popliteus tendon, LCL)
- TT osteotomy and quadriceps snip for the approach
- Low riding patella (patellar tendon shortening for previous scar)

TKA after opening-HTO

Greater rate of:

- Medial compartment release (scar after ligament re-tensioning of the osteotomy)
- Low height of the patella
- Faster evolution toward TKA

TKA after HTO

Arch Orthop Trauma Surg (2014) 134:73–77
DOI 10.1007/s00402-013-1897-0

KNEE ARTHROPLASTY

Total knee arthroplasty after high tibial osteotomy: a registry-based case–control study of 1,036 knees

Tuukka Niinimäki · Antti Eskelinen · Pasi Ohtonen · Ari-Pekka Puhto · Bhupinder S. Mann · Juhana Leppilahti

- Finnish Arthoplasty Register, 1036 TKA after HTO compared with primary TKA
- Slighty poorer survivorship in the group of TKA after HTO
- Greater number of constrained implants design
- Patellar resurfacing more common

TKA after HTO

Clin Orthop Relat Res
DOI 10.1007/s11999-014-3712-9

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

SYMPOSIUM: 2014 KNEE SOCIETY PROCEEDINGS

The Risk of Revision After TKA Is Affected by Previous HTO or UKA

Otto Robertsson MD, PhD, Annette W-Dahl RN, PhD

- Swedish Knee Arthoplasty Register, 838 TKA after HTO compared with primary TKA and TKA after previous UKA
- On the whole TKA after HTO 1,4 times higher risk of revision than the reference standard (1,7 times TKA after closing-HTO, 0 time TKA after opening-HTO)

TKA after HTO

Clin Orthop Relat Res
DOI 10.1007/s11999-014-3712-9

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SYMPOSIUM: 2014 KNEE SOCIETY PROCEEDINGS

The Risk of Revision After TKA Is Affected by Previous HTO or UKA

Otto Robertsson MD, PhD, Annette W-Dahl RN, PhD

- The risk of revision decreases with increasing age as well as later year of surgery
- HTO to TKA conversions 4,7 more likely to use a stemmed or revision implants

TKA after HTO

The Journal of Arthroplasty Vol. 27 No. 10 2012

Osteotomy and Unicompartmental Knee Arthroplasty Converted to Total Knee Arthroplasty

Data From the New Zealand Joint Registry

Andrew J. Pearse, MB, ChB, FRCS (Orth),*† Gary J. Hooper, FRACS,*
Alastair G. Rothwell, FRACS,*‡ and Chris Frampton, PhD*‡

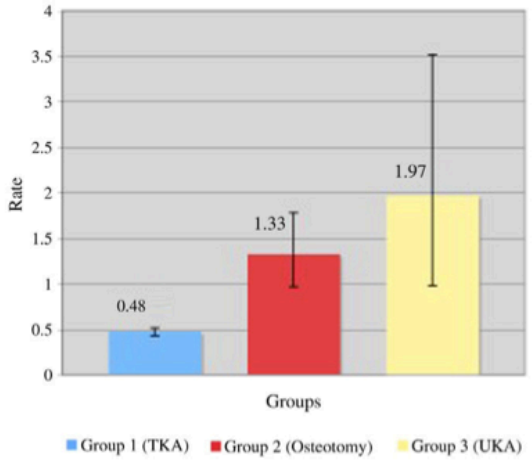

Fig. 1. Revision rates (rate per 100 component years).

- TKA after an osteotomy results in a significantly poorer survival than primary TKA with almost a 3-fold increase in the early revision rate ($P < .001$)
- The incidence of deep infection was high (1.7% in osteotomy and 1.95% in UKA), which compares poorly with the national revision rate for infection in primary TKA (0.48%).

TKA after HTO

The Journal of Arthroplasty 29 Suppl. 2 (2014) 229–231

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Revising an HTO or UKA to TKA: Is it More Like a Primary TKA or a Revision TKA?

Michael B. Cross, MD [a,b], Paul Y. Yi, BS [a,c], Mario Moric, MS [a], Scott M. Sporer, MD [a], Richard A. Berger, MD [a], Craig J. Della Valle, MD [a]

[a] *Rush University Medical Center, Chicago, Illinois*
[b] *Hospital for Special Surgery, New York, New York*
[c] *Boston University Medical School, Boston, Massachusetts*

- Single centre study
- TKA after HTO needs more surgical time (145 minutes) rather than “de novo” TKA (107 minutes), near to a revision TKA (163 minutes)
- Complication and reoperation rates were both greater (21%) than “de novo” TKA (11%)

TKA after HTO

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[a] *Rush University Medical Center, Chicago, Illinois*
[b] *Hospital for Special Surgery, New York, New York*
[c] *Boston University Medical School, Boston, Massachusetts*

- Revision components, including stems and constrained bearings, was used in 19% of cases
- Length of stay was significantly longer in TKA after HTO group than “de novo” TKA

TKA after femoral osteotomy

The Journal of Arthroplasty Vol. 26 No. 5 2011

Total Knee Arthroplasty After Failed Distal Femoral Varus Osteotomy Using Selectively Stemmed Posterior Stabilized Components

Yona Kosashvili, MD, Allan E. Gross, MD, Michael G. Zywiel, MD, Oleg Safir, MD, Dror Lakstein, MD, and David Backstein, MD

- 22 TKA in 21 patients
- PS design
- Good results
- But…

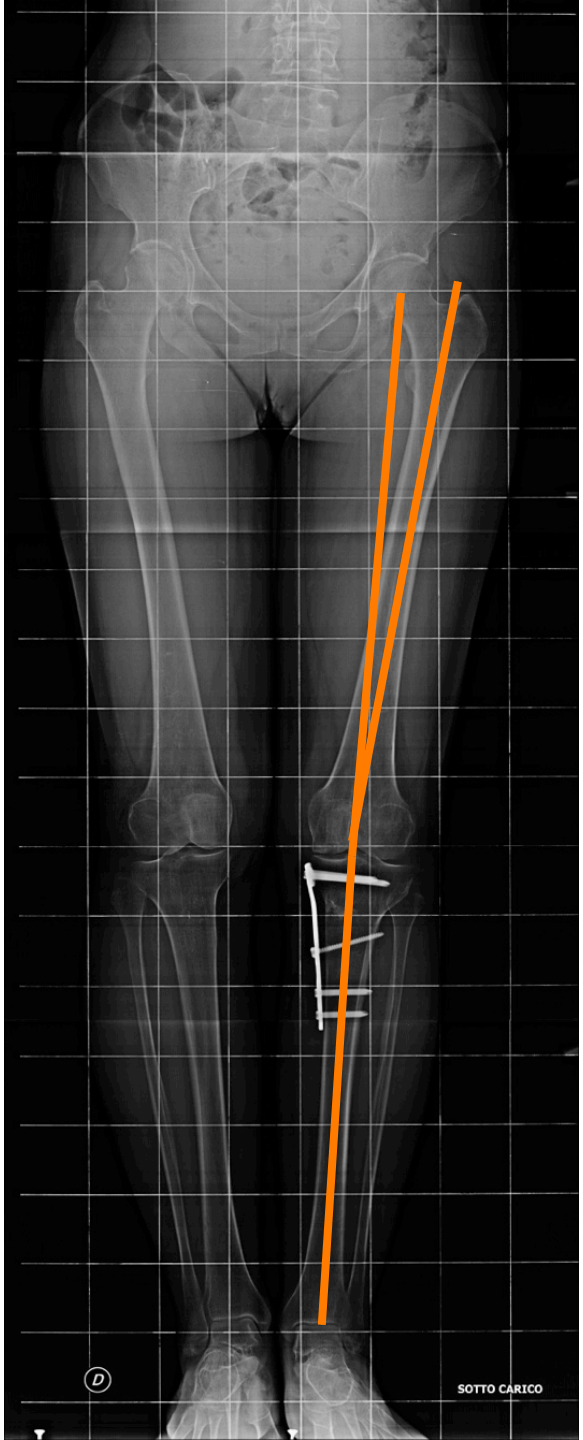
TKA after femoral osteotomy

After osteotomy:

- Adduction of the distal femur
- Proximal translation of the medial femoral condyle
- Intercondylar notch displacement

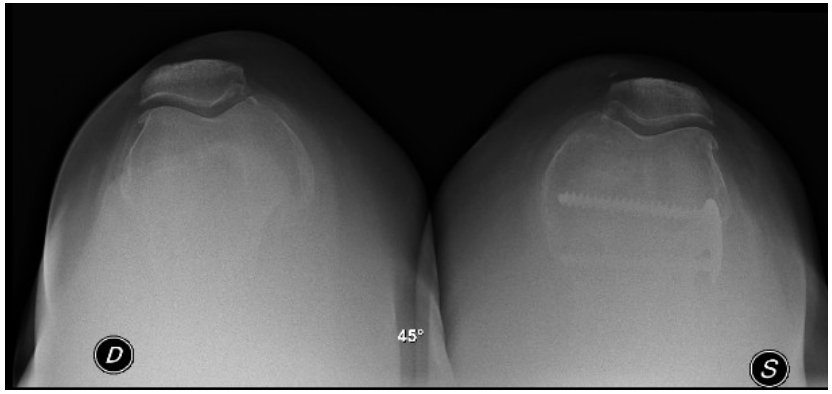
More medial entry-point!

Planning



Clinical case 1

- F, 56 years
- Osteotomy (2005) by plate and screws
- 157 cm
- 103 Kg

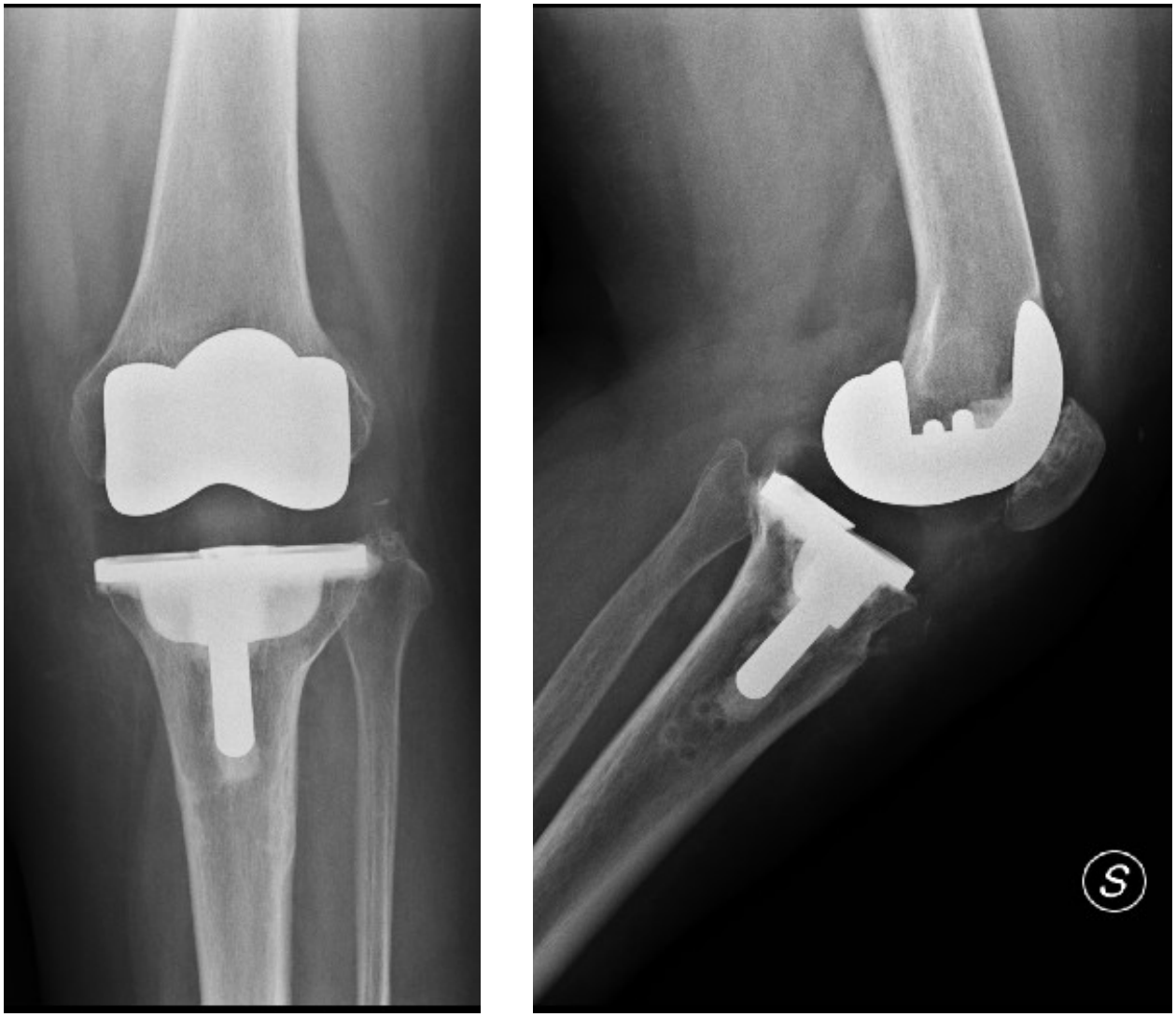


Clinical case 1

- Nex-Gen LPS Flex
- Median approach
- Mini-Trivector
- Liner 14 mm

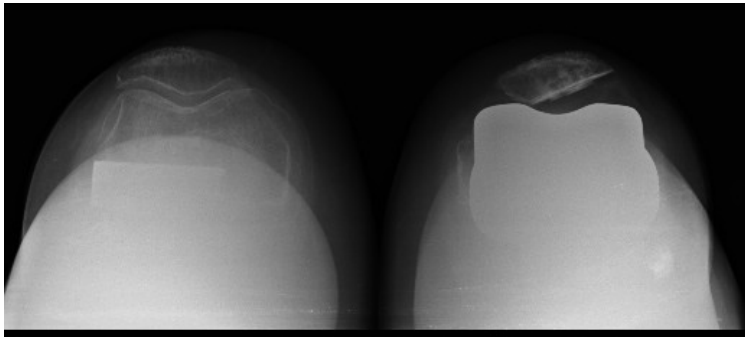
Clinical case 1

- Follow-up at 6 months



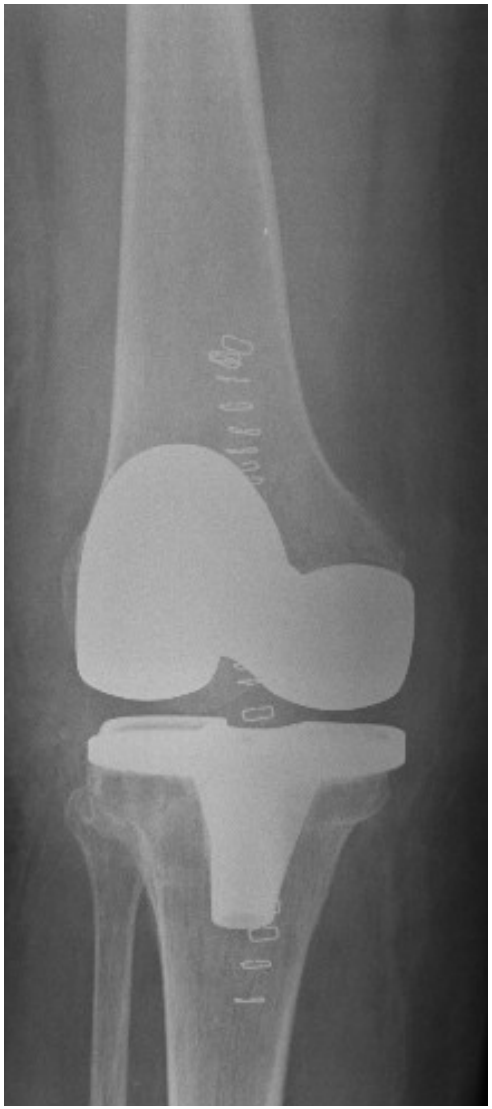
Clinical case 2

- F, 65 years
- Tibial osteotomy by staple
- 165 cm
- 80 Kg



Clinical case 2

- Persona
- Enlarged median approach
- Distal femoral cut – 1 mm
- Osteoporotic tibial bone
- Liner 13 mm
- Lateral release!

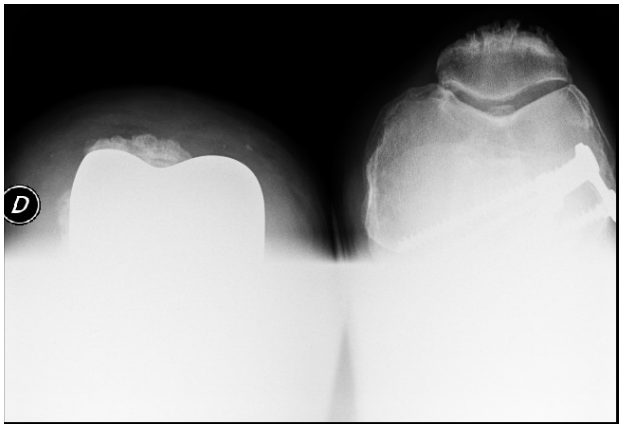


Clinical case 2

- Follow-up at 6 months

Clinical case 3

- M, 66 years
- Tibial osteotomy by plate
- RHK on the right side
- 190 cm
- 98 Kg

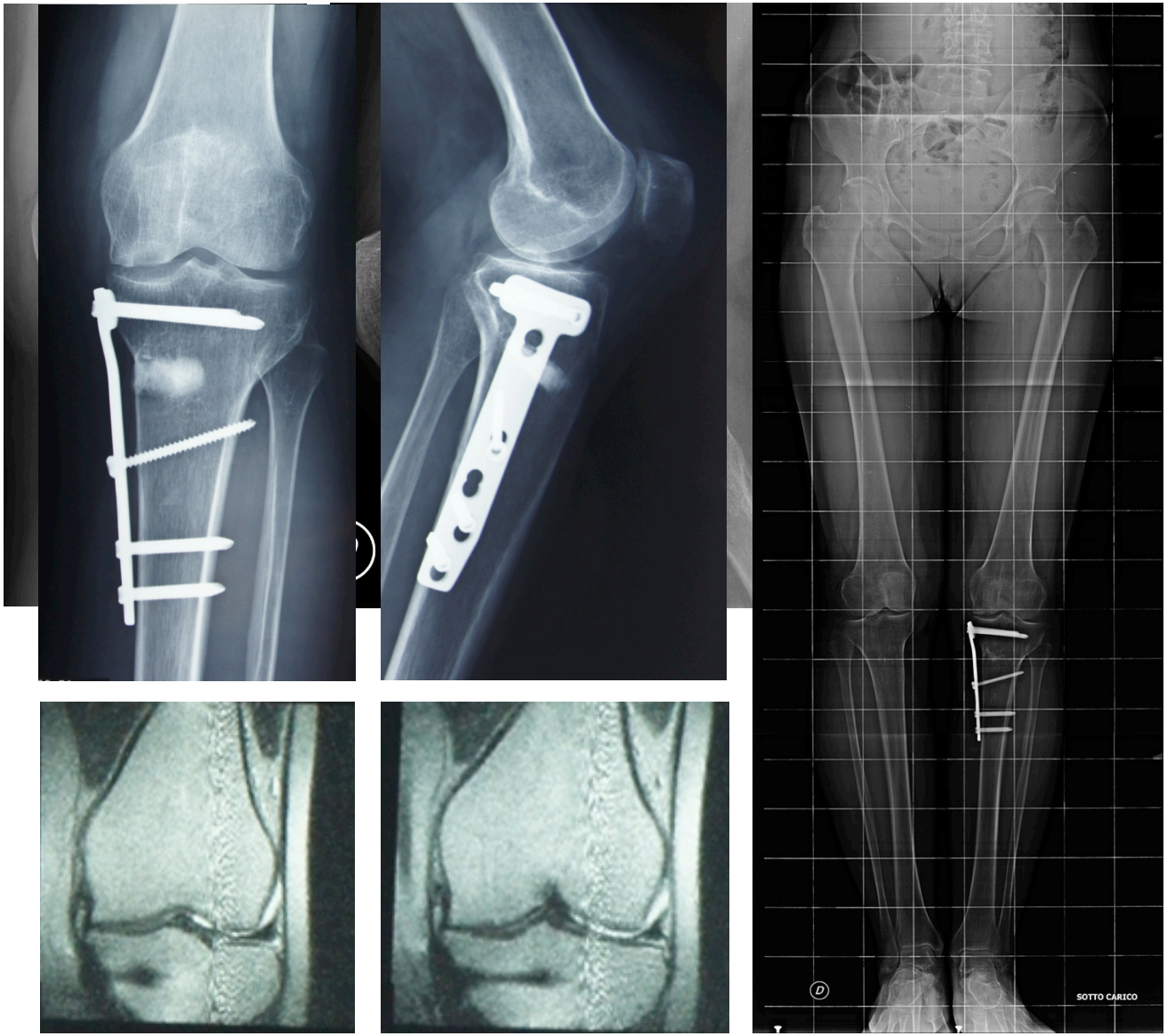


Clinical case 3

- Persona
- Median approach
- Mini-Trivector
- Liner 13 mm

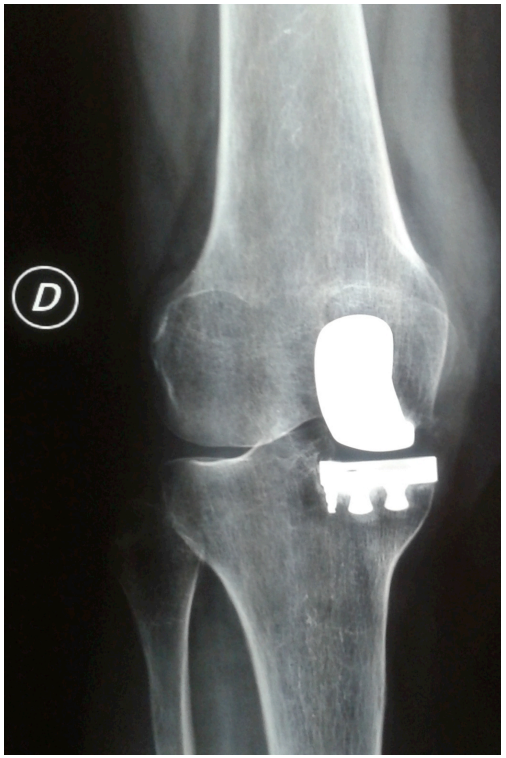
Clinical case 4

- F, 48 years
- HTO osteochondral graft
- After 4 years medial pain



Clinical case 4

- Final solution: left medial UNI (liner 8 mm)
- After 15 months medial pain on the right side:

Clinical case 4

- Follow-up at 3 months (right) and 18 months (left)

Conclusions

TKA after HTO:

- More demanding procedure
- Scores less favorable
- Patients expectation plays an important role
- Surgeon’s skill and expertise needed to improve the quality of the outcomes

Patella infera? It is not so true…