

Tibial slope and bone corrections



LYON KNEE
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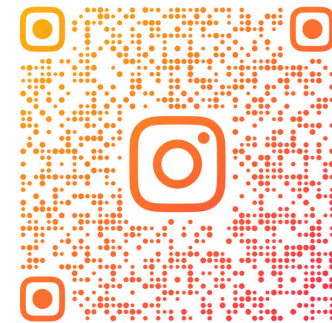
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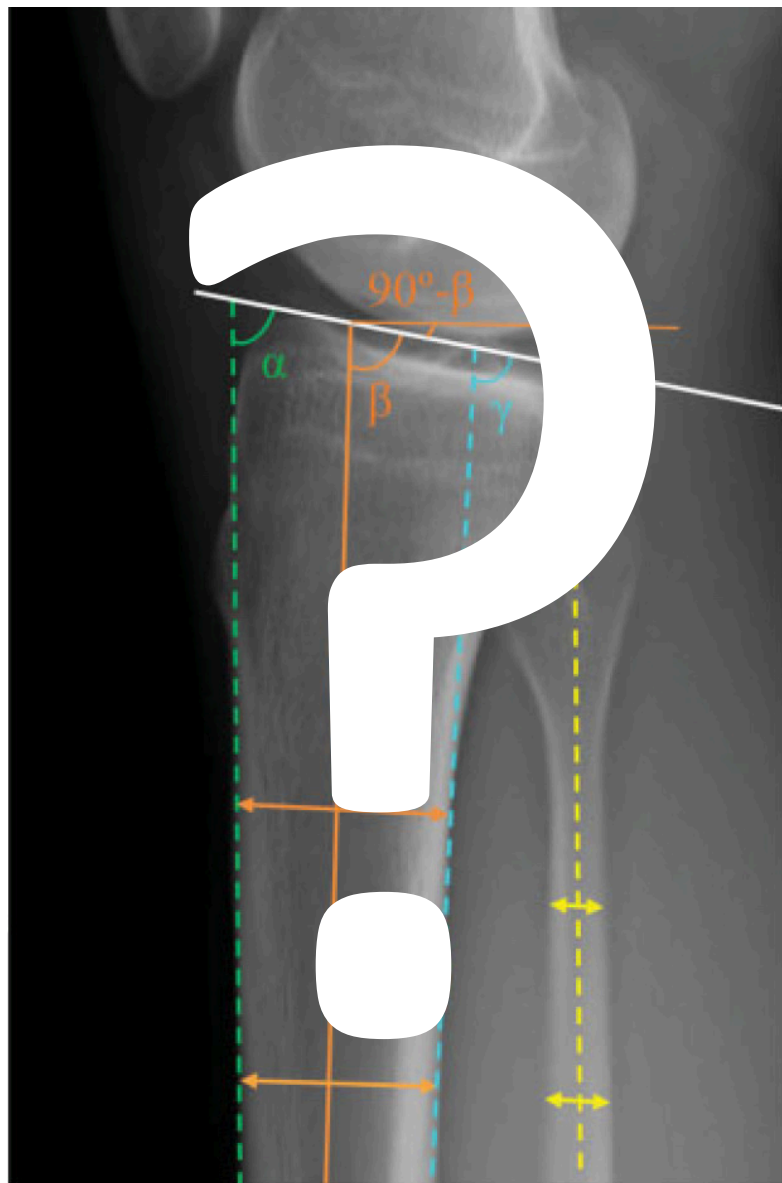


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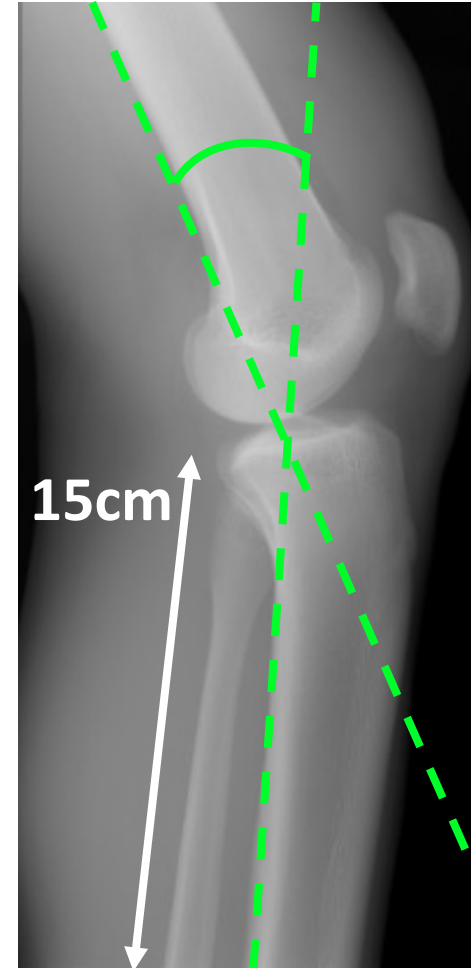
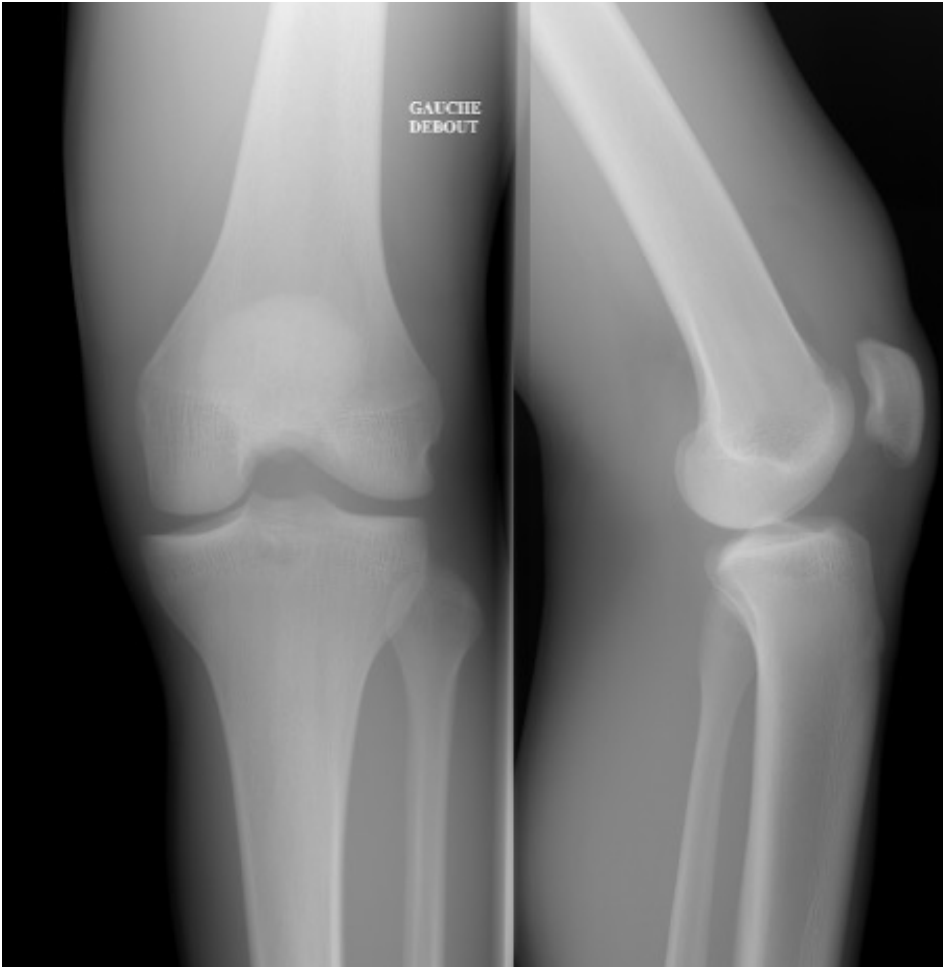


How to measure the tibial slope ?

Monopodal weightbearing lateral x-ray

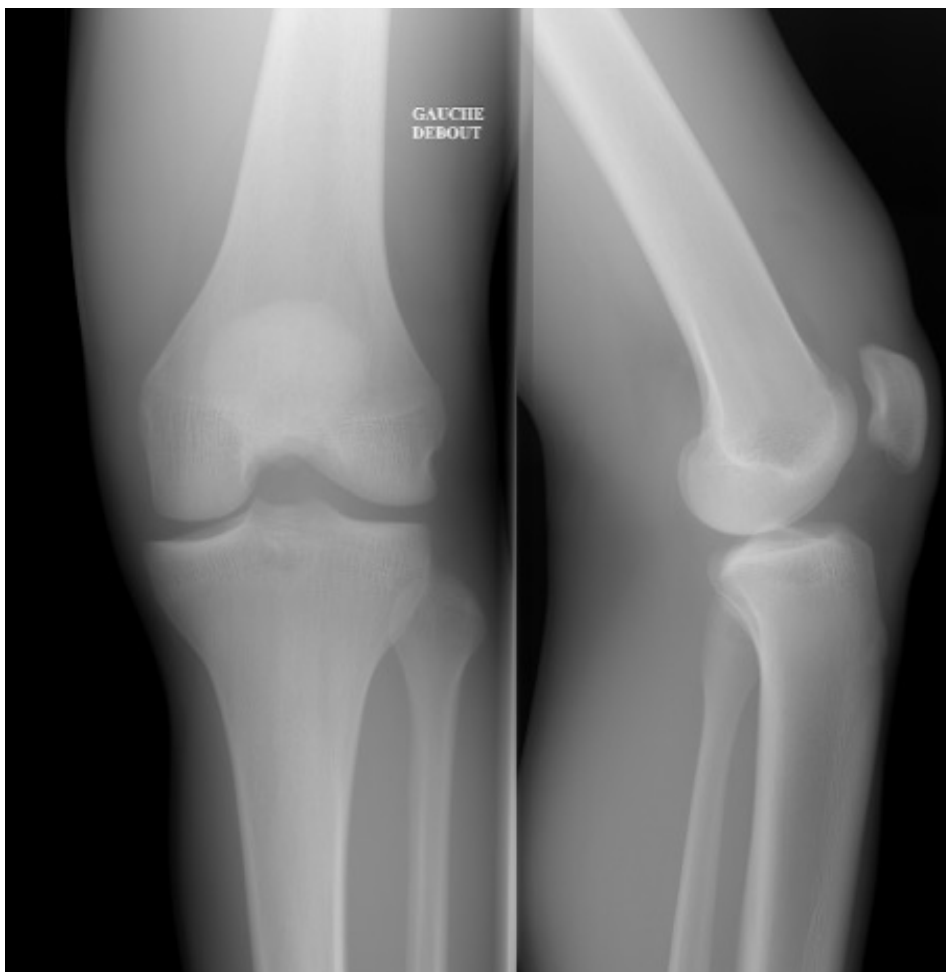


Monopodal weightbearing lateral x-ray



20-30°
flexion

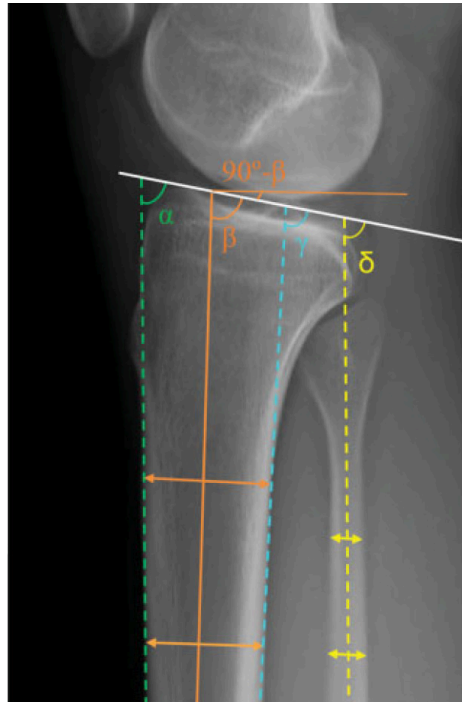
Monopodal weightbearing lateral x-ray



Posterior tibial slope



What is the normal value?



Method	Tibial Slope value
Anterior Tibial cortical	11.44 ± 3.61
Proximal Anatomical Axis (Dejour)	9.16 ± 3.71
Long Anatomical Axis	10.39 ± 3.72
Post cortical	6.96 ± 3.28
Fibula Short	9.54 ± 3.62
Fibula Long	8.23 ± 3.51

Comparative Study > Rev Chir Orthop Reparatrice Appar Mot. 1996;82(3):195-200.

[Evaluation of methods for radiographic measurement of the tibial slope. A study of 83 healthy knees]

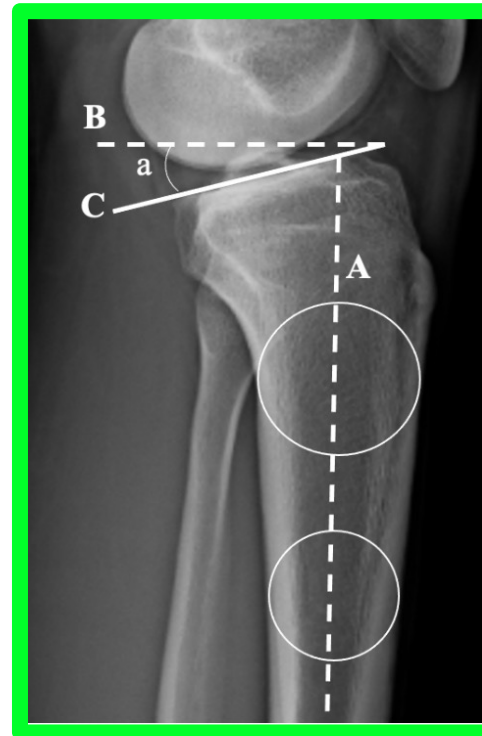
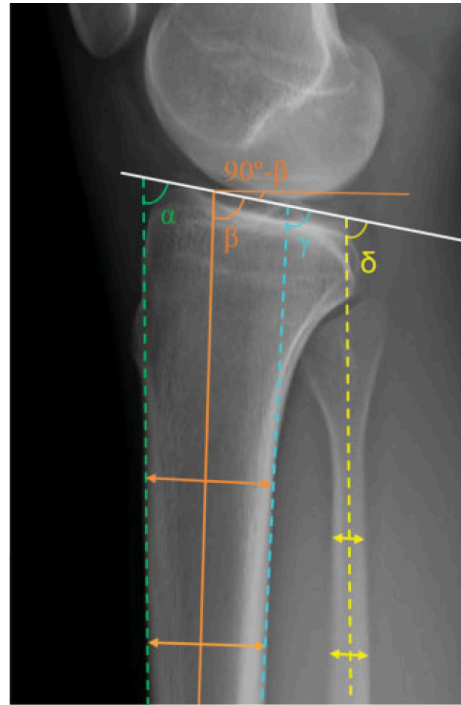
[Article in French]

J Brazier ¹, H Migaud, F Gougeon, A Cotten, C Fontaine, A Duquenois

What is the normal value?

Proximal anatomical axis

Normal value = 9°



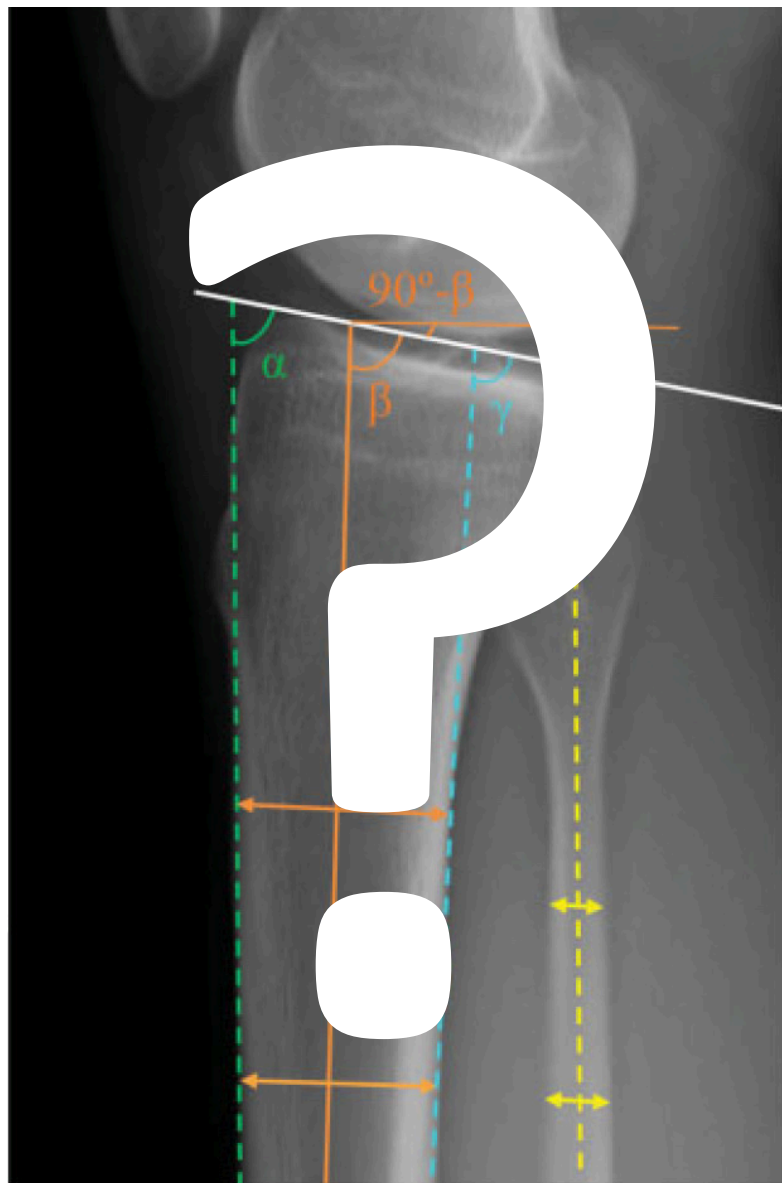
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[Evaluation of methods for radiographic measurement of the tibial slope. A study of 83 healthy knees]

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Why measure the tibial slope?

Intrinsic factor of failure after ACLr

> [Am J Sports Med.](#) 2013 Dec;41(12):2800-4. doi: 10.1177/0363546513503288.
Epub 2013 Sep 13.

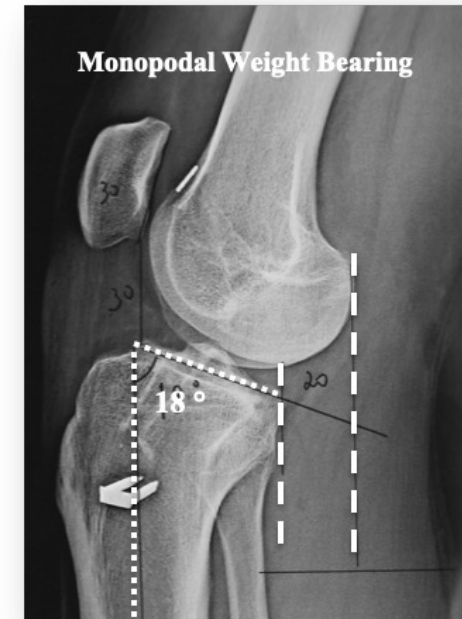
Posterior tibial slope and further anterior cruciate ligament injuries in the anterior cruciate ligament-reconstructed patient

Justin M Webb ¹, Lucy J Salmon, Etienne Leclerc, Leo A Pinczewski, Justin P Roe

Comparative Study > [Am J Sports Med.](#) 2018 Mar;46(3):531-543.
doi: 10.1177/0363546517741497. Epub 2017 Dec 15.

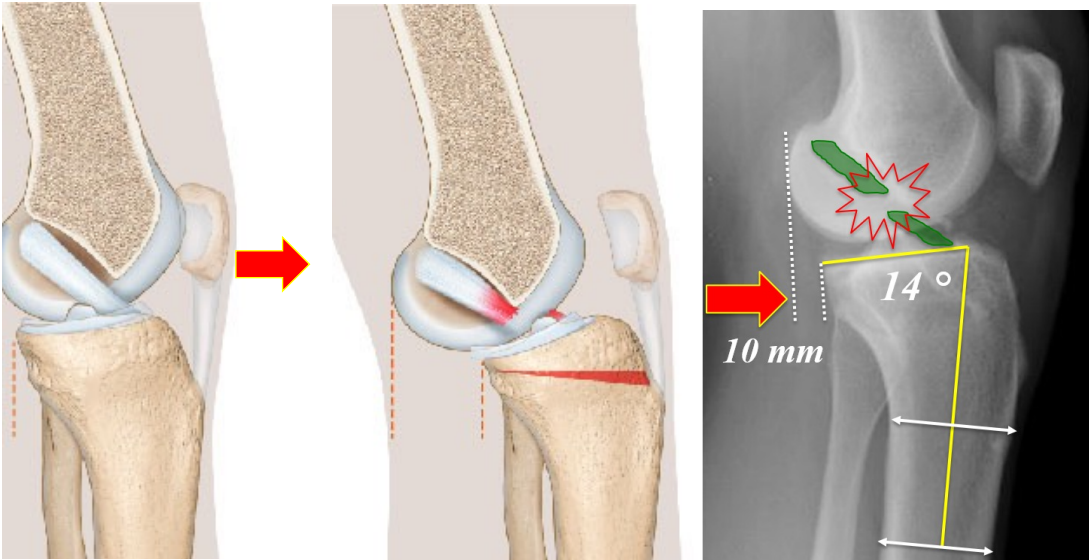
20-Year Outcomes of Anterior Cruciate Ligament Reconstruction With Hamstring Tendon Autograft: The Catastrophic Effect of Age and Posterior Tibial Slope

Lucy J Salmon ¹, Emma Heath ¹, Hawar Akrawi ¹, Justin P Roe ¹, James Linklater ²,
Leo A Pinczewski ^{1 3}



**Slope > 12°
= 22% failure rate @ 20y FU**

Intrinsic factor of failure after ACLr



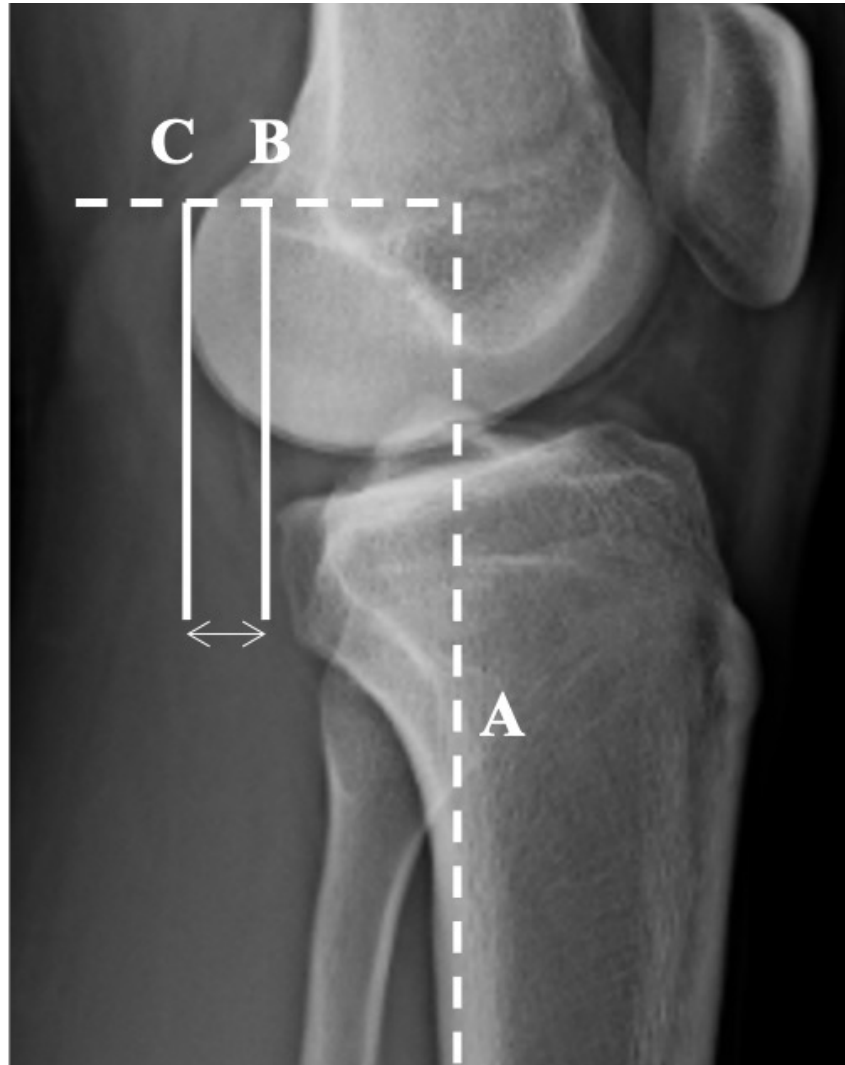
**“Graft failure due to fatigue”
Biological failure...**

Static Anterior Tibial Translation is larger and is more affected by slope in ACL patients compared to controls

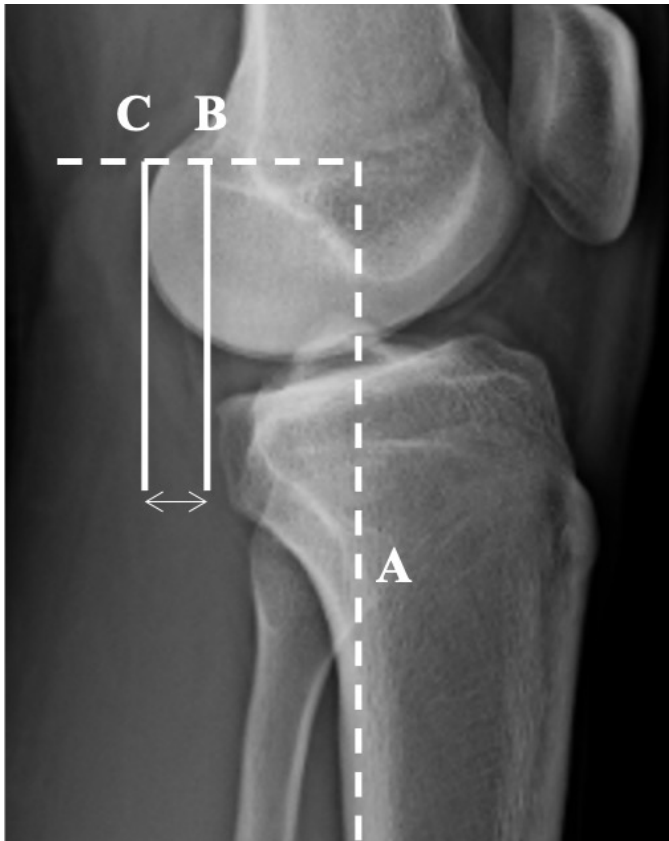
Cance N, Dan MJ, Pineda T, Demey G, Dejour DH



Static anterior tibial translation



Static anterior tibial translation



Normal value = 1.3mm



La translation tibiale antérieure statique est plus importante et plus affectée par la pente chez les patients atteints de rupture du LCA que chez les témoins

Static anterior tibial translation is larger and is more affected by slope in ACL patients compared to controls

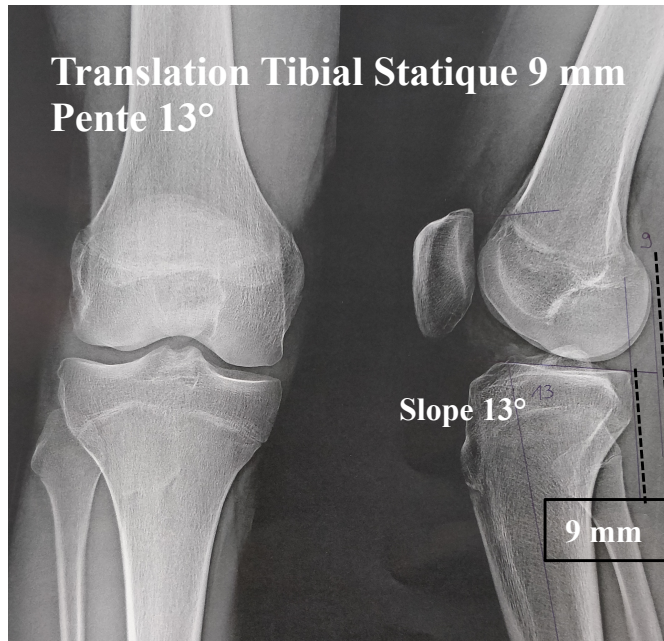
N. CANCE, M. J. Dan, T. Pineda, G. Demey, D. H. Dejour



Lyon – Ortho – Clinic
Clinique de la Sauvegarde, LYON

Static anterior tibial translation

 **With slope**



+10° slope = +2.4 to +6mm of translation

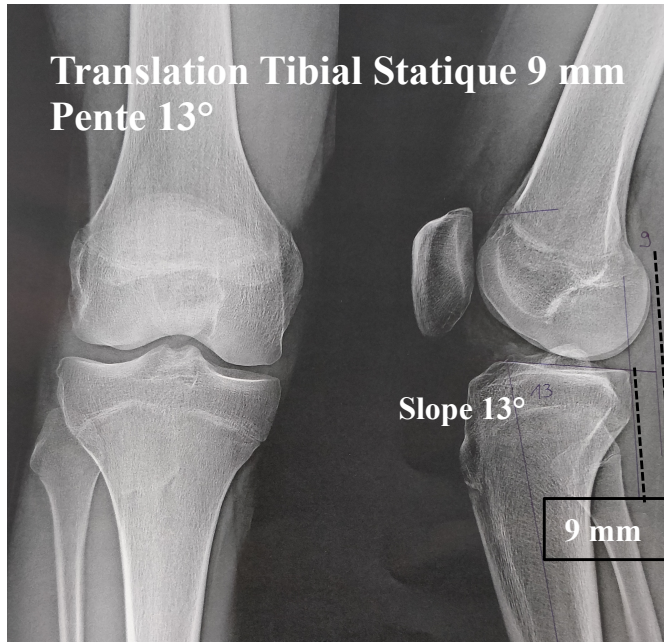
> [Knee Surg Sports Traumatol Arthrosc.](#) 2019 Nov;27(11):3481-3489.
doi: 10.1007/s00167-019-05435-0. Epub 2019 Feb 26.

Tibial slope and medial meniscectomy significantly influence short-term knee laxity following ACL reconstruction

David Dejour ¹, Marco Pungitore ¹, Jeremy Valluy ², Luca Nover ², Mo Saffarini ³,
Guillaume Demey ¹

Static anterior tibial translation

 **With slope**



Target slope = between 4° and 6°

Four to 6 Degrees Is the Target Posterior Tibial Slope After Tibial Deflection Osteotomy According to the Knee Static Anterior Tibial Translation

Michael J. Dan, M.B.B.S., Ph.D., F.R.A.C.S.(ortho) • Nicolas Cance, M.D. • Tomas Pineda, M.D. •
Guillaume Demey, M.D. • David H. Dejour, M.D.

Arthroscopy

The Journal of Arthroscopy and Related Surgery

Volume 30, Number 10, October 2020

ISSN: 1049-3969

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1049-3969(202010)30:10;1-0

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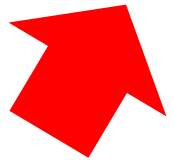
1049-3969(202010)30:10;1-0

1049-3969(202010)30:10;1-0

1049-3969(202010)30:10;1-0



Static anterior tibial translation



Risk of ACL rupture or meniscal injury

Cut-off value : > 5mm

> [Knee Surg Sports Traumatol Arthrosc.](#) 2019 Nov;27(11):3481-3489.
doi: 10.1007/s00167-019-05435-0. Epub 2019 Feb 26.

Tibial slope and medial meniscectomy significantly influence short-term knee laxity following ACL reconstruction

David Dejour ¹, Marco Pungitore ¹, Jeremy Valluy ², Luca Nover ², Mo Saffarini ³,
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> [Am J Sports Med.](#) 2020 Oct;48(12):2954-2961. doi: 10.1177/0363546520949212.
Epub 2020 Aug 31.

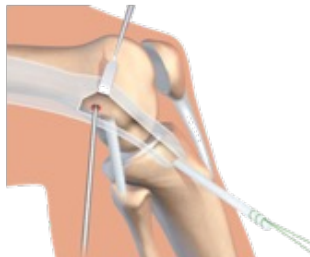
Steep Posterior Tibial Slope and Excessive Anterior Tibial Translation Are Predictive Risk Factors of Primary Anterior Cruciate Ligament Reconstruction Failure: A Case-Control Study With Prospectively Collected Data

Qian-Kun Ni ¹, Guan-Yang Song ¹, Zhi-Jun Zhang ¹, Tong Zheng ¹, Zheng Feng ¹,
Yan-Wei Cao ¹, Hua Feng ¹, Hui Zhang ¹

The static anterior tibial translation is not improved by the addition of a lateral tenodesis

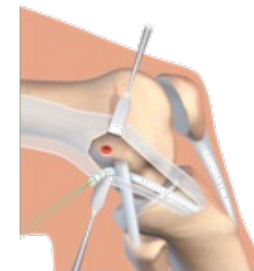


La ténodèse latérale extra-articulaire ne modifie pas la translation tibiale antérieure statique ou dynamique lors d'une reconstruction du LCA



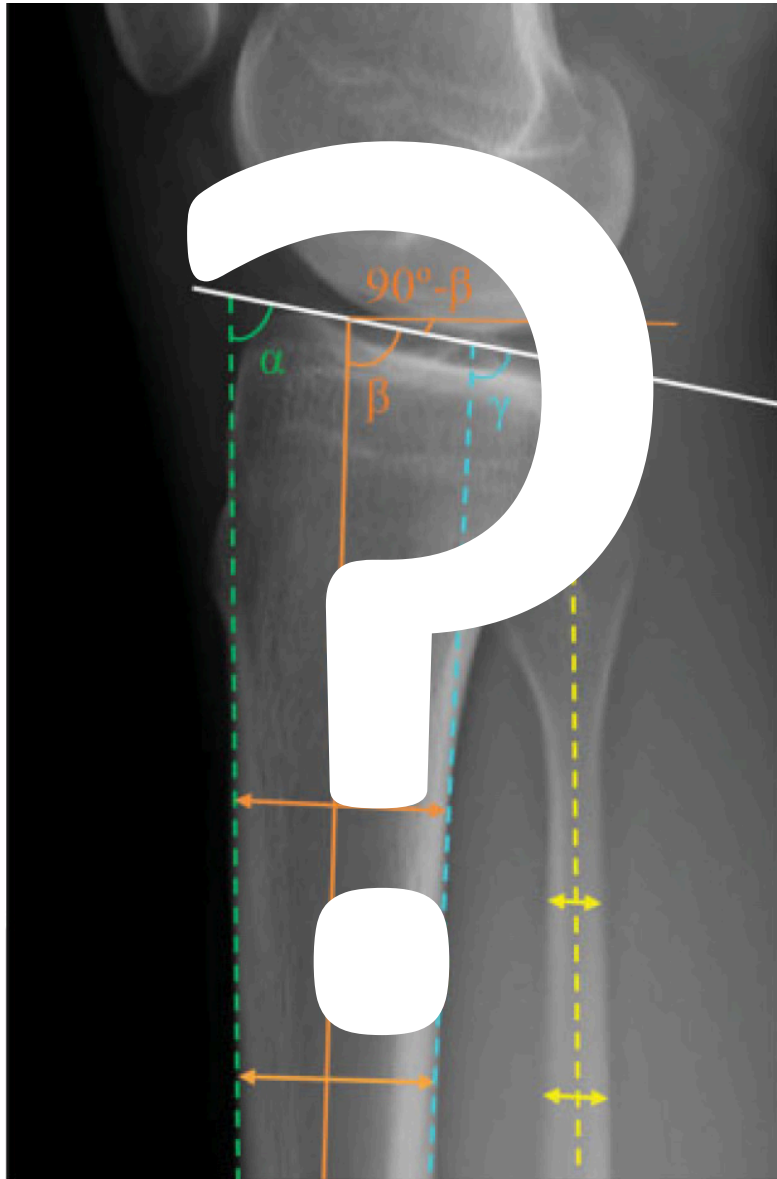
T. Pineda, N. Cance, M. J. Dan, G. Demey, D. H. Dejour

Lyon Ortho Clinic
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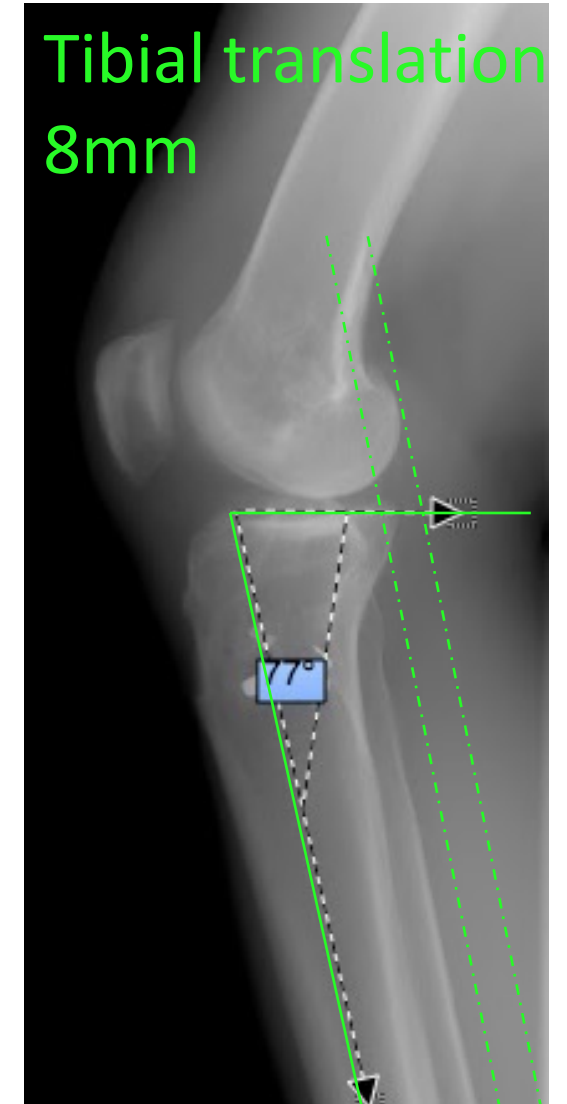
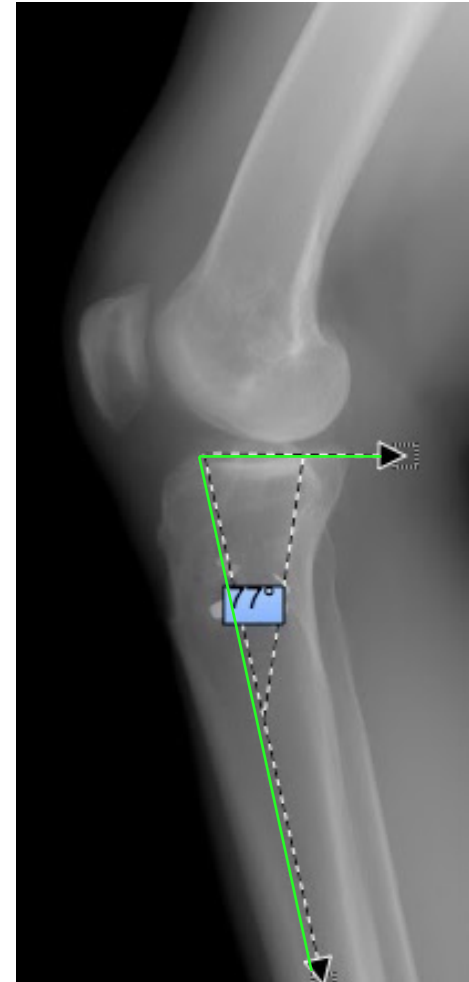
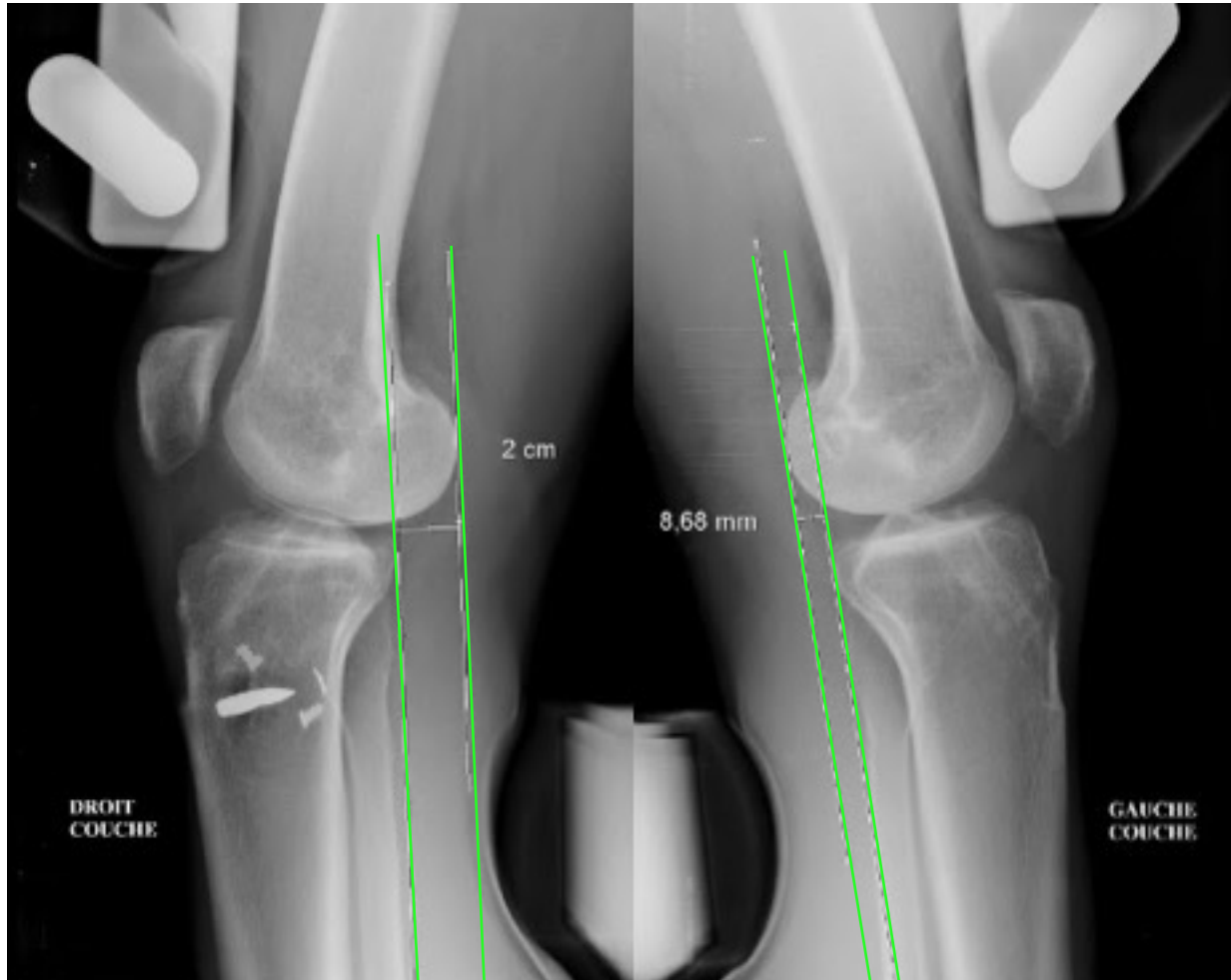
When should we correct the tibial slope?

Second revision of the ACL with a slope $>10^\circ$

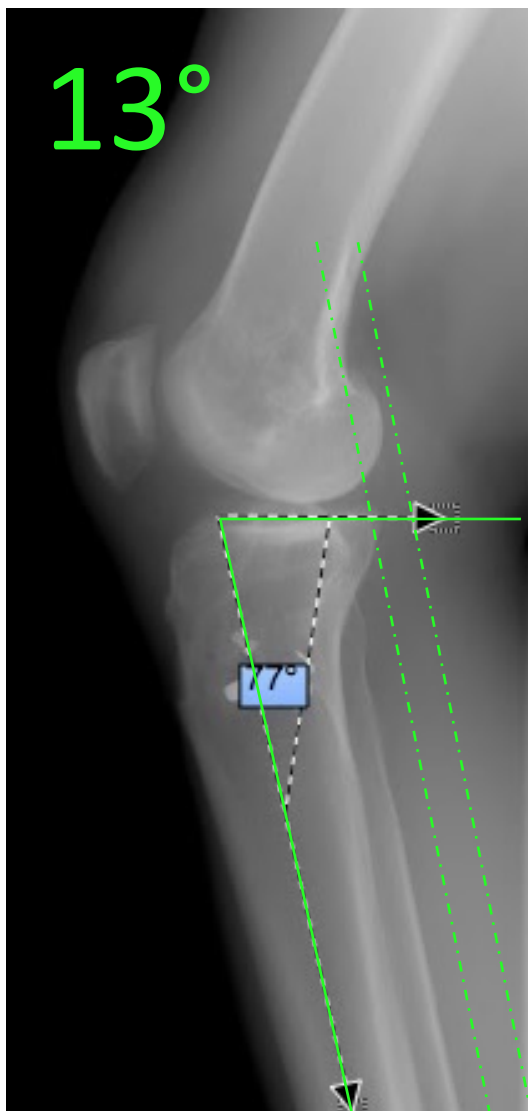




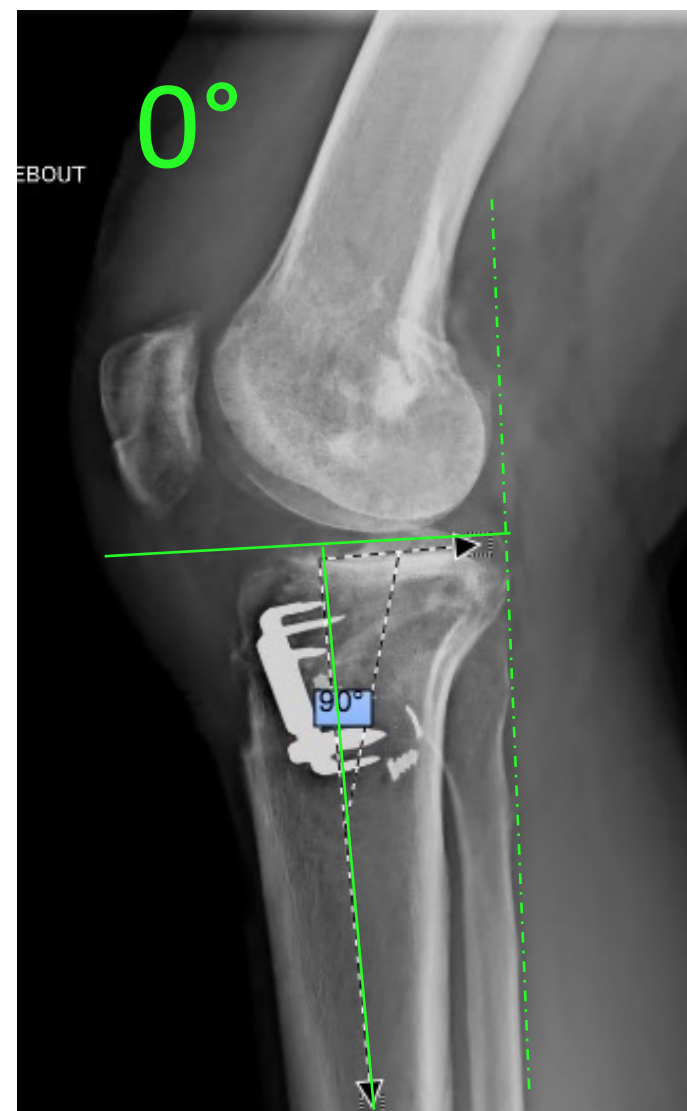
Differential anterior drawer (Telos®) = 12mm Tibial slope = 13°



Static anterior tibial translation 8mm



Static anterior tibial translation 0mm



First failure

If primary surgery was done well :
+ Posterior Tibial Slope $>10^{\circ}$
+ Anterior Tibial Translation $>5\text{mm}$

Knee Surgery, Sports Traumatology, Arthroscopy (2023) 31:4467–4473
<https://doi.org/10.1007/s00167-023-07493-x>

KNEE



First revision ACL reconstruction combined with tibial deflexion osteotomy improves clinical scores at 2 to 7 years follow-up

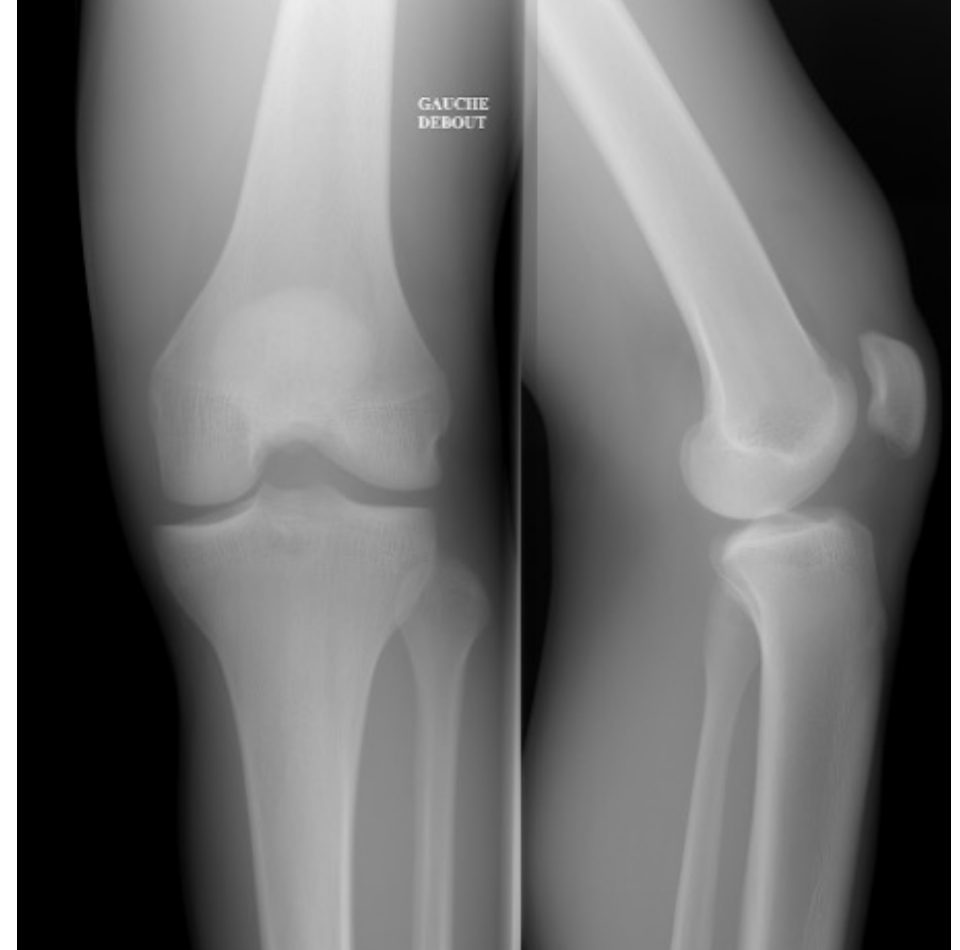
David Dejour¹ · Anouk Rozinthe¹ · Guillaume Demey¹ · ReSurg²

Received: 22 March 2023 / Accepted: 12 June 2023 / Published online: 29 July 2023

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Primary ACL reconstruction?

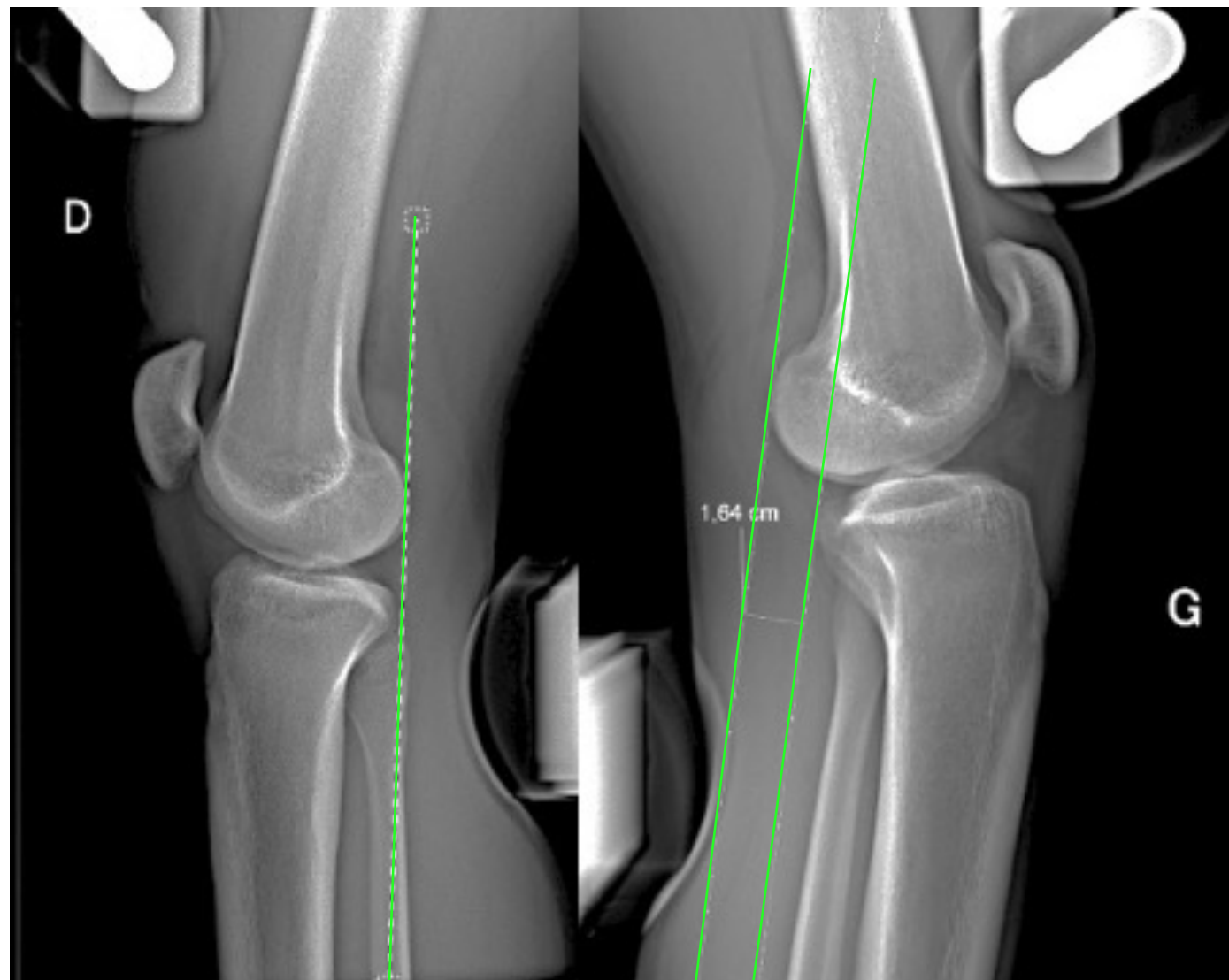
- Male 18 yo
- Soccer player
- ACL rupture 6 months ago
- Non-contact pivot injury
- Instability
- Clinical examination...

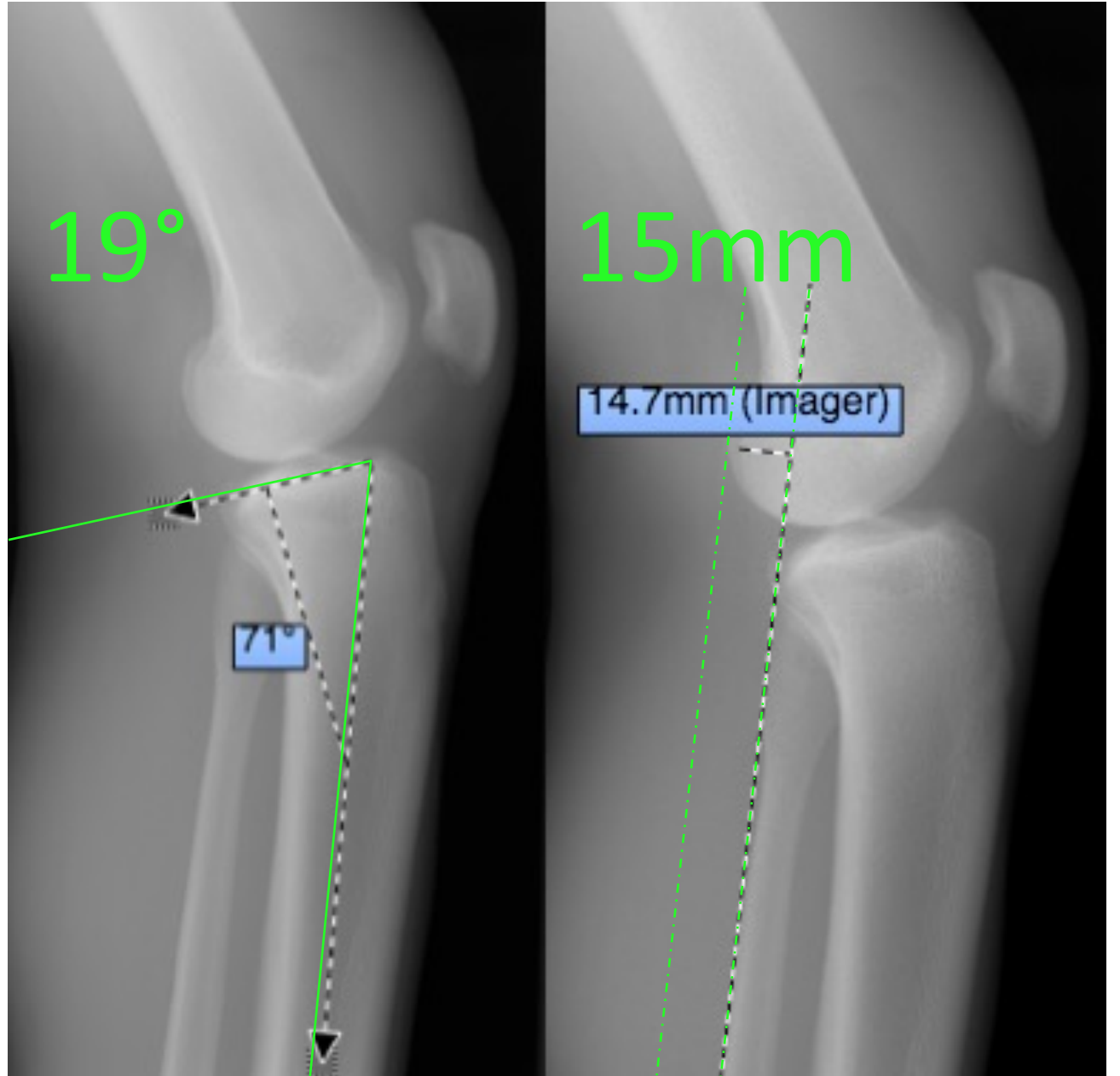
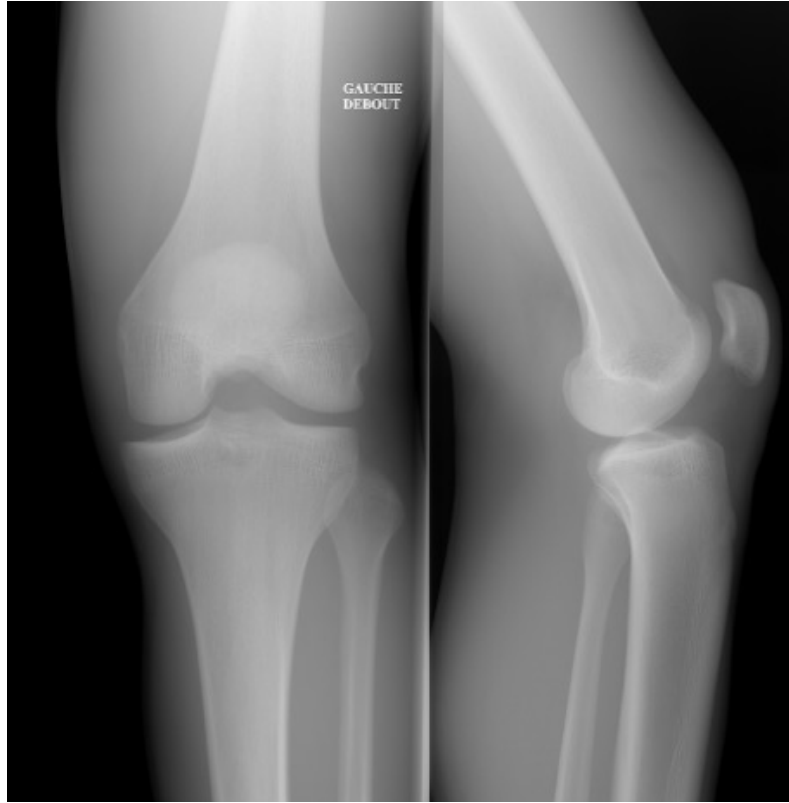


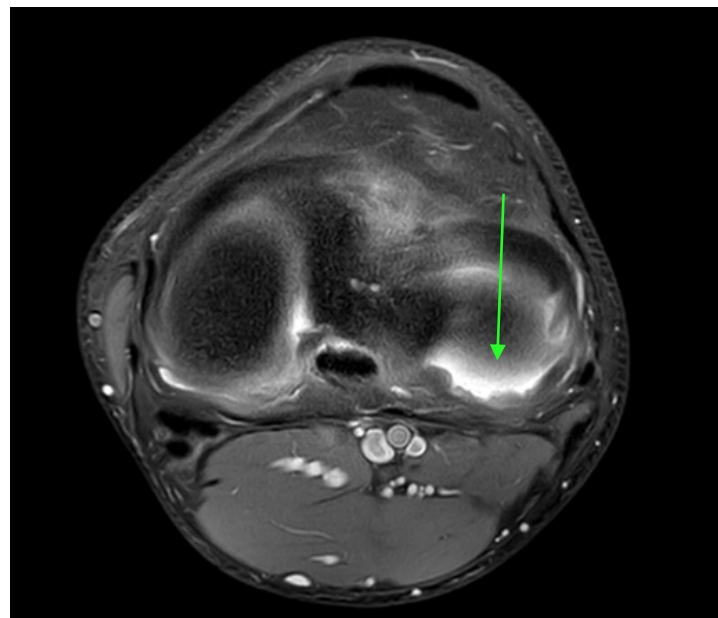
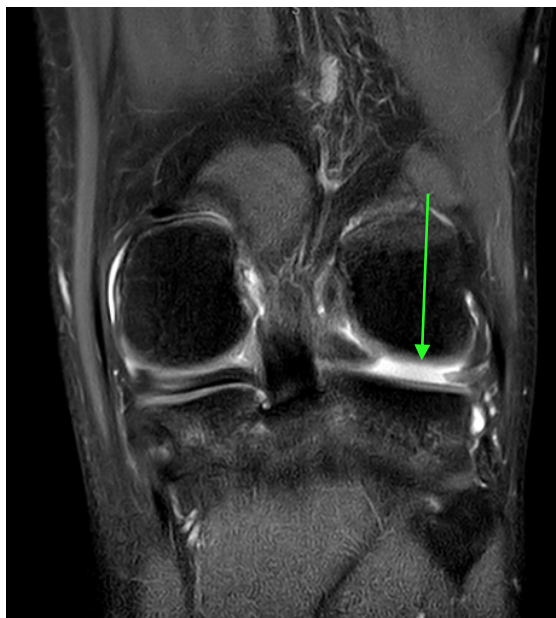
Primary ACL reconstruction

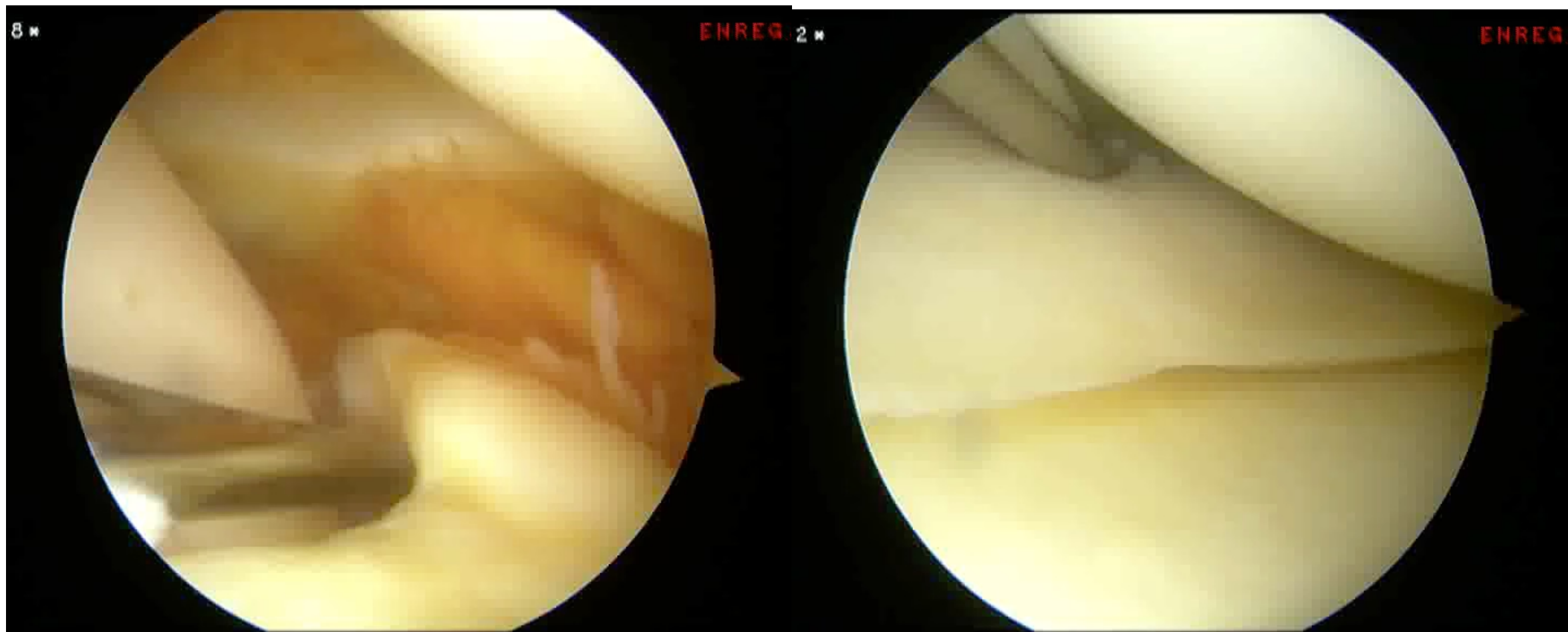


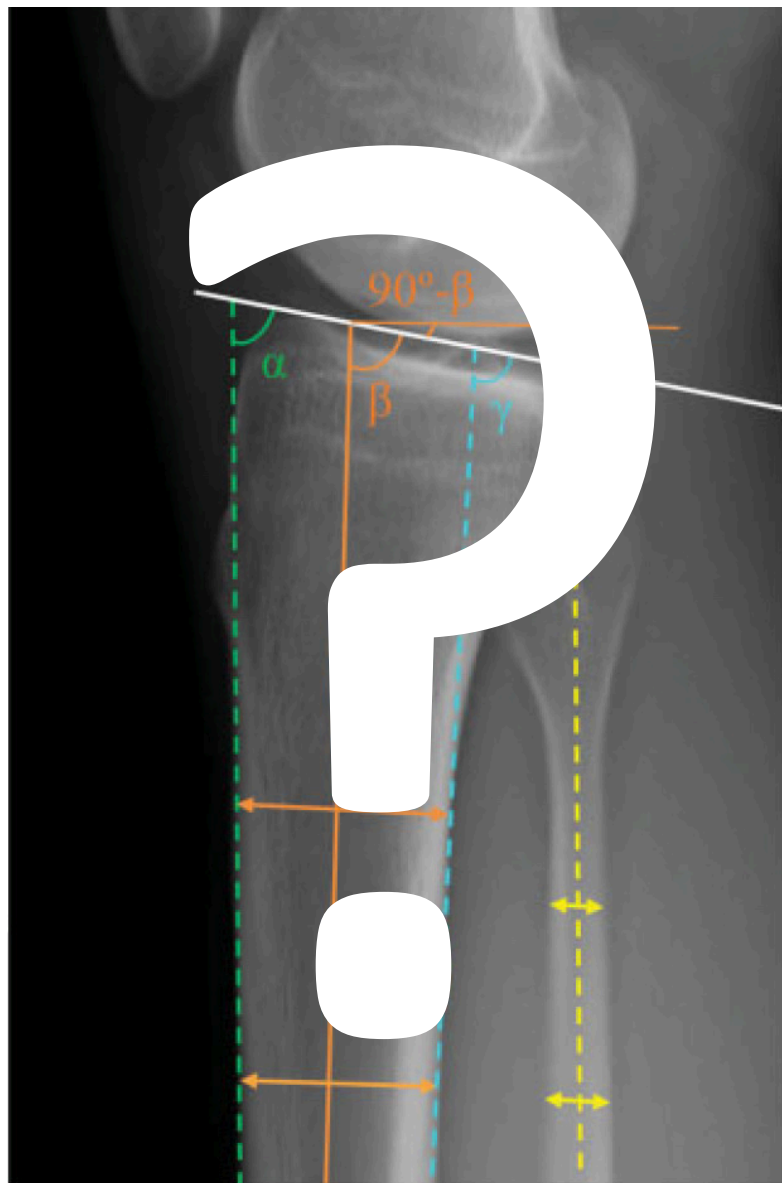
Anterior drawer (Telos®) side to side difference = 16mm









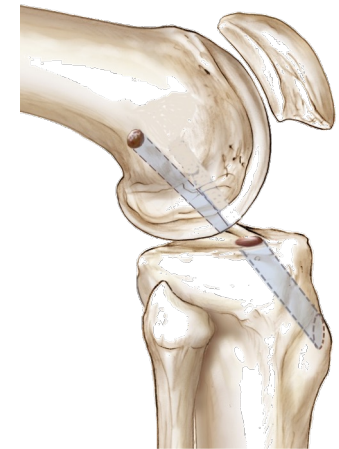
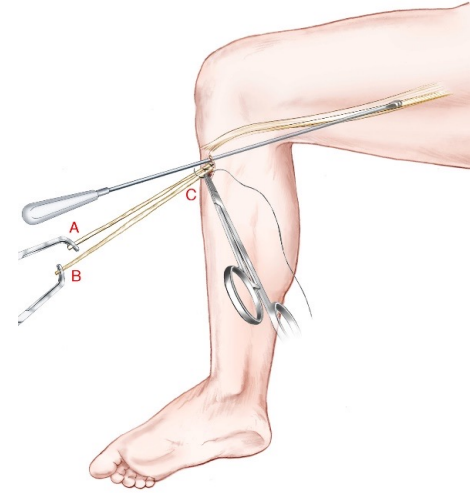


How to correct the tibial slope?

1st steps

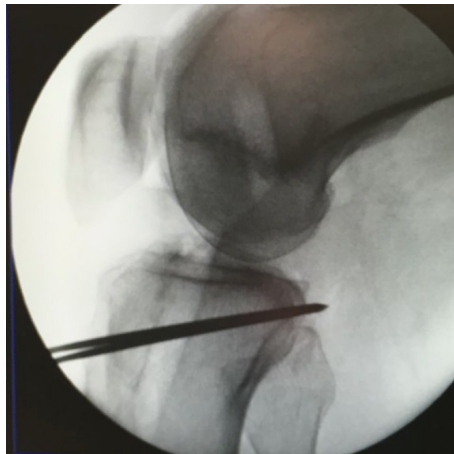
- ✓ Graft harvest
- ✓ Arthroscopy
 - Meniscal treatment
 - Creation of tunnels (positioning and reaming)

No graft passage: osteotomy is performed



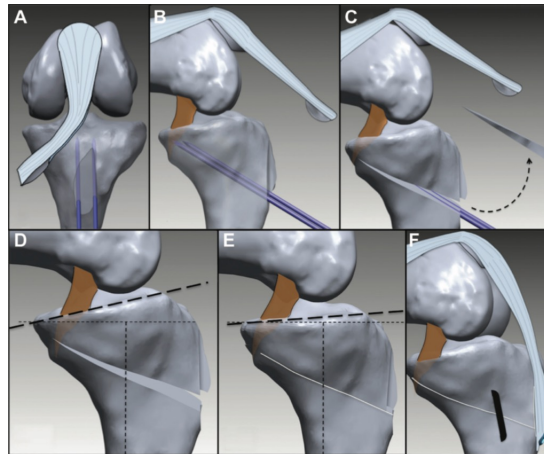
Slope correction osteotomy (anterior closing wedge)

Supra-tuberosity



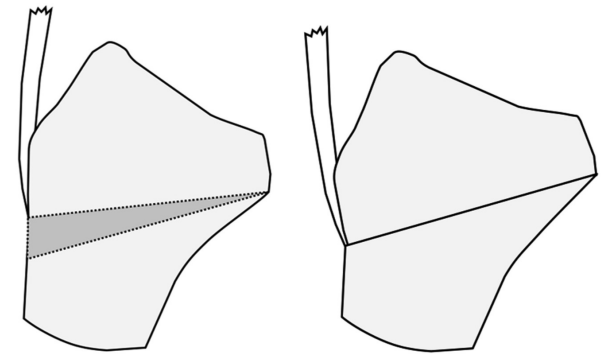
H Dejour Lyon knee meeting 1991
D Dejour RCO 1998
D Dejour et al, KSSTA 2015 2022

Trans-tuberosity



B Sonnery-Cottet et al, AJSM 2014

Infra-tuberosity



T Hees, W Petersen,
Arthrosc Tech 2018

" C L A S S I C "

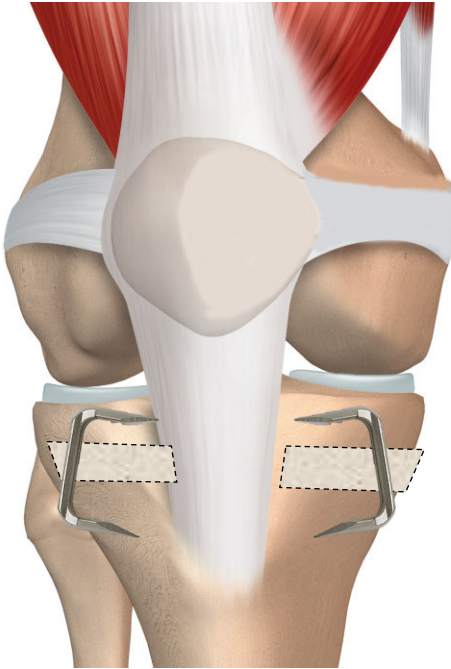
S L O P E

R E D U C I N G

T I B I A L

O S T E O T O M Y

Postoperative follow-up

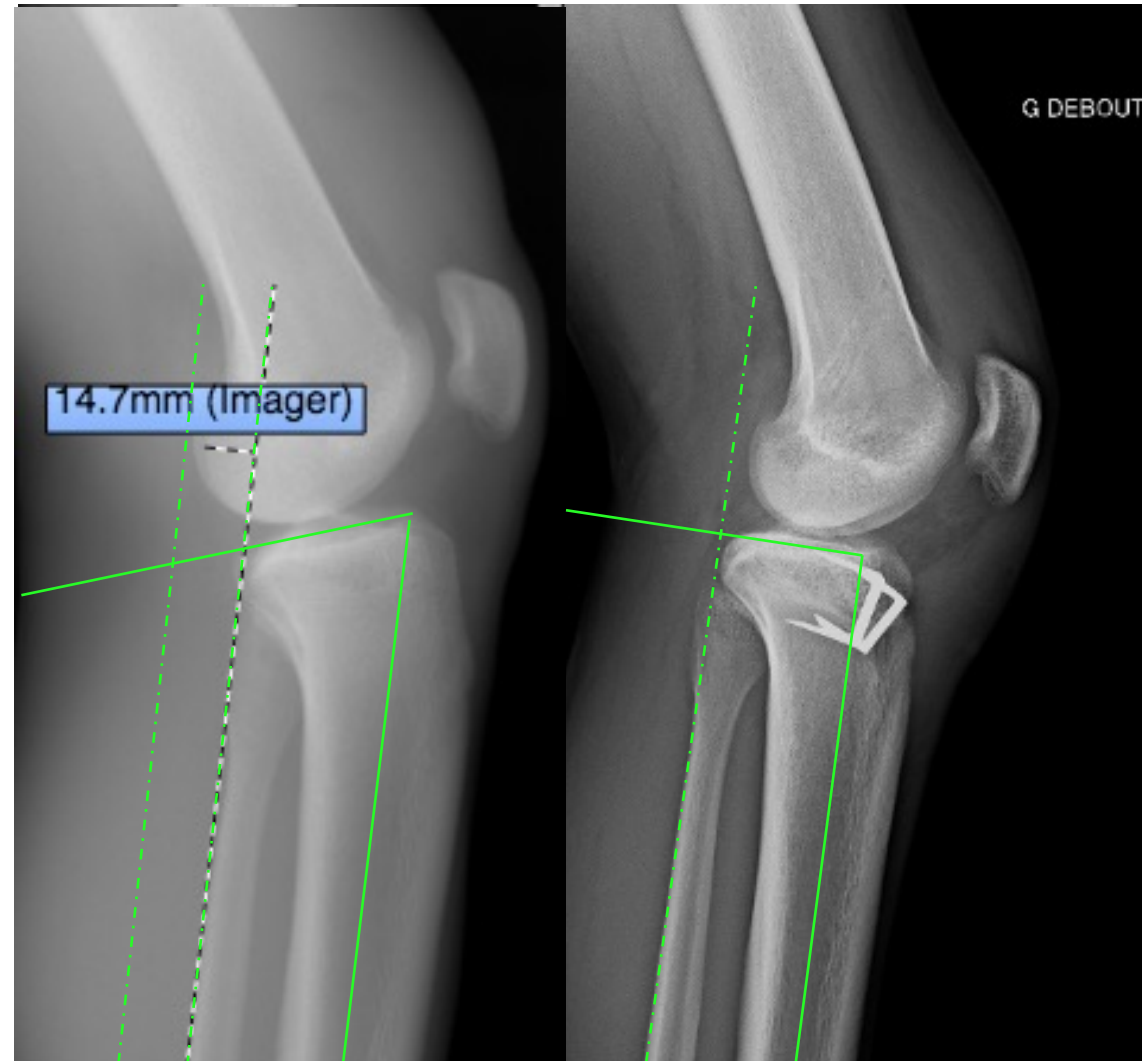


- Stable fixation
- Only compressive forces
- No weight-bearing for 3 weeks
- Partial weight-bearing between 3 and 6 weeks
- Full weight-bearing at 6 weeks



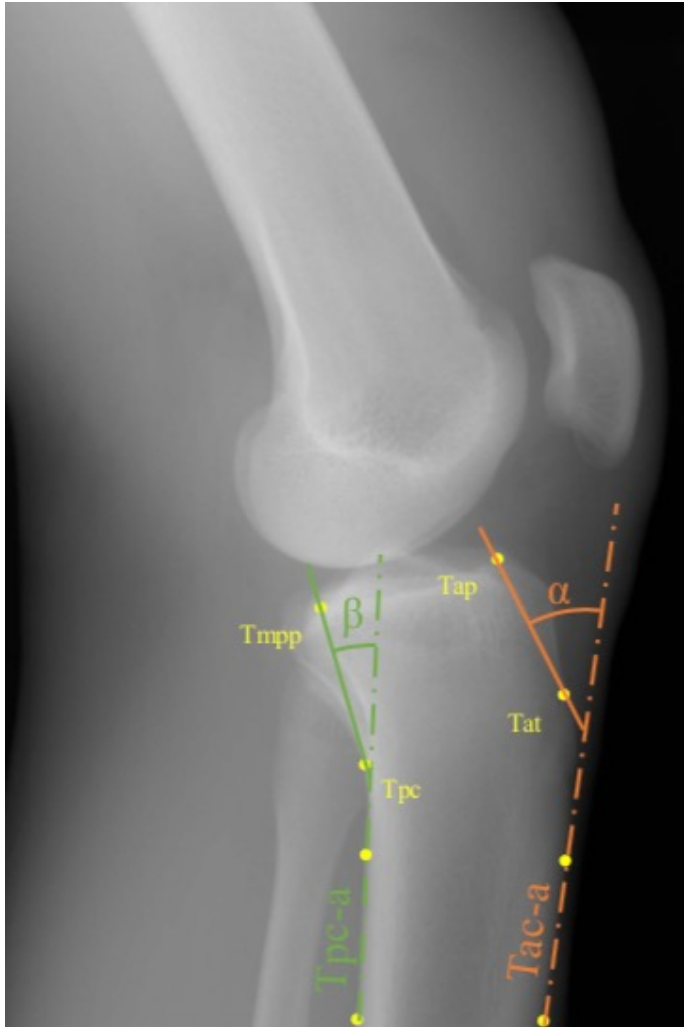
After 6 weeks: ACL rehabilitation program (phase 2)

4-year follow-up



Why a supratuberosity osteotomy?

To correct the deformity where it is!

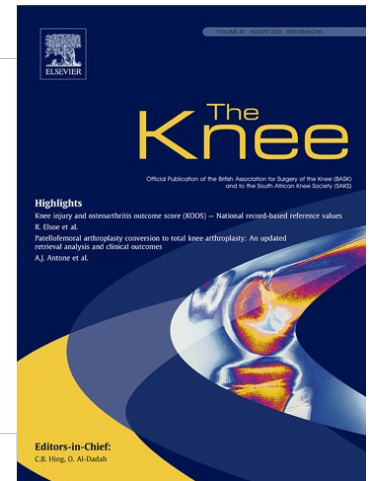


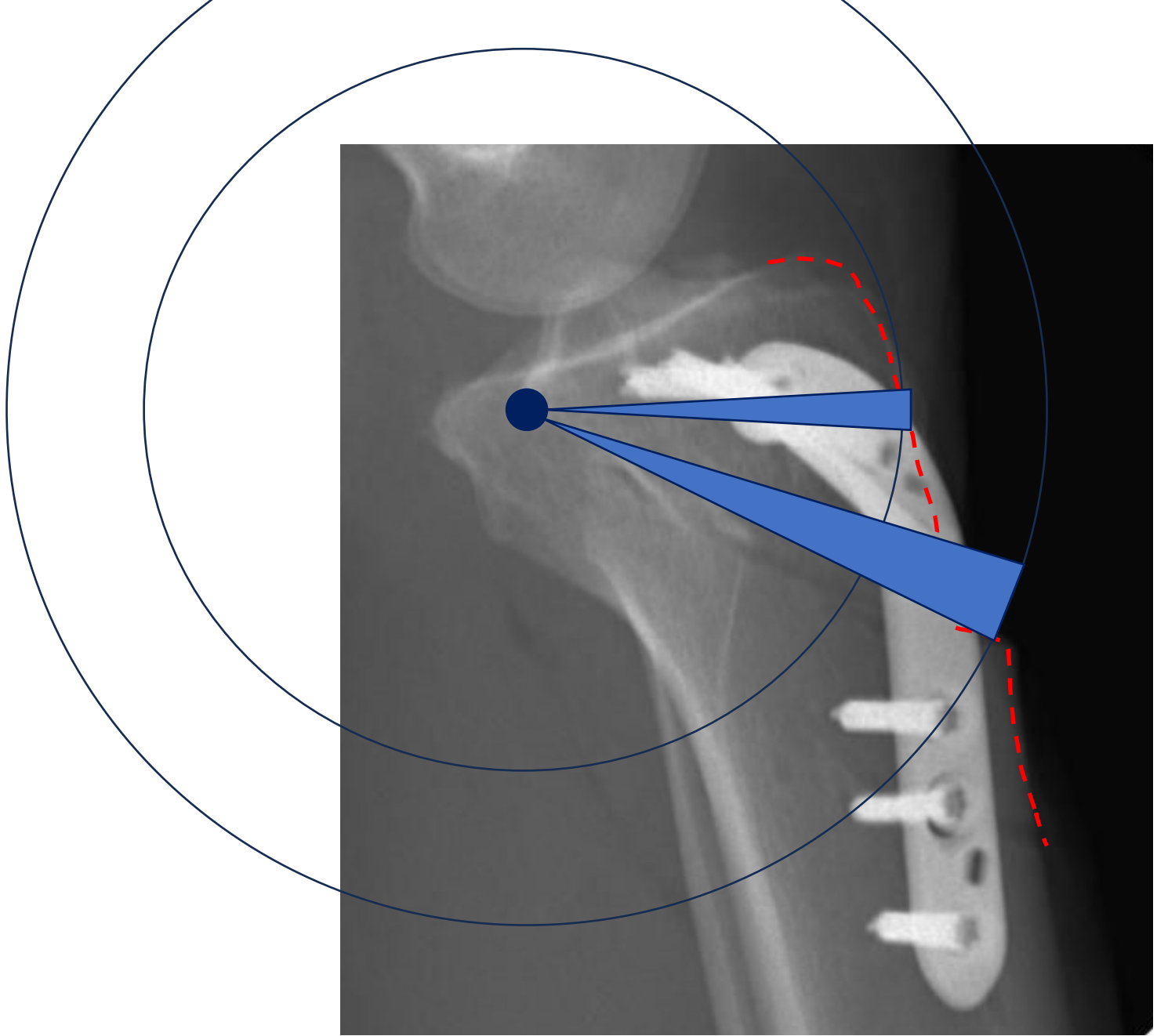
Posterior tibial slope correlated with metaphyseal inclination more than metaphyseal height

Guillaume Demey^{a,*}, Edoardo Giovannetti de Sanctis^a, Guillaume Mesnard^a, ReSurg^{b,†}, David H. Dejour^a

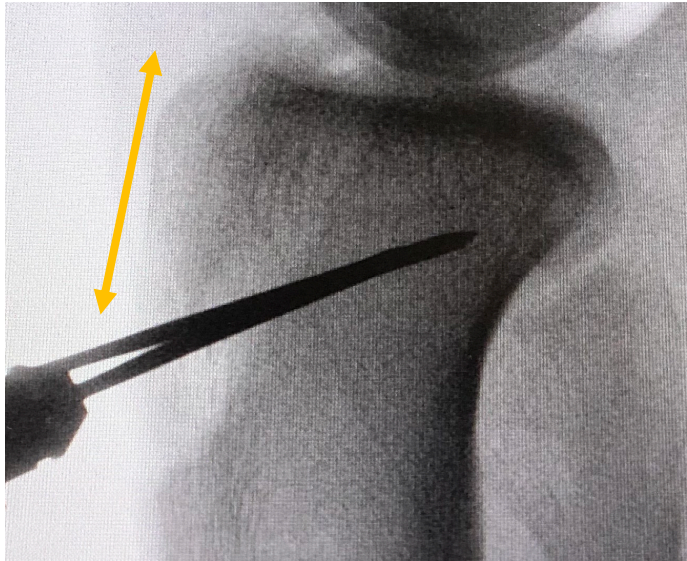
^a Lyon-Ortho-Clinic, Clinique de la Sauvegarde, Lyon, France

^b ReSurg SA, 1260 Nyon, Switzerland





Why a supratuberosity osteotomy?



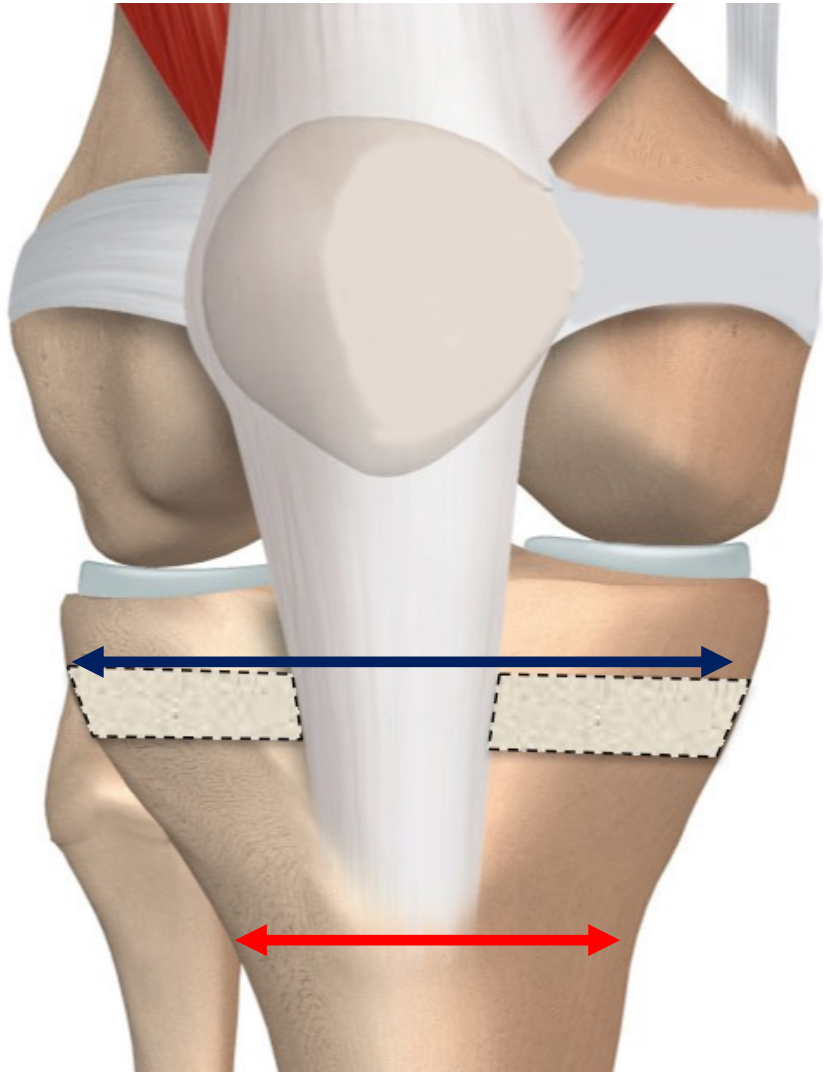
Because there is enough space!

Sufficient Metaphyseal Bone for Wedge Removal and Fixation Hardware During Supratuberosity Tibial Deflexion Osteotomy in Knees With Excessive Posterior Tibial Slope

Guillaume Demey,* MD, Edoardo Giovannetti de Sanctis,* MD, Guillaume Mesnard,* MD, Jacobus H. Müller,[†] MSc, PhD, Mo Saffarini,^{†‡} MSc, MBA, and David H. Dejour,* MD
Investigation performed at Lyon-Ortho-Clinic, Clinique de la Sauvegarde, Ramsay Santé, Lyon, France



Why a supratuberosity osteotomy?



Cancellous bone

Larger width (stability)

Control of the frontal plane



Restricted access

Research article

First published online January 29, 2024

Radiographic Investigation of Coronal Plane and Patellar Height and Changes Following Tibial Deflection Osteotomy for Correction of Tibial Slope in Combination With ACL Reconstruction

[Nicolas Cance, MD](#) ✉, [Michael J. Dan, MBBS, PhD, FRACS\(Orth\)](#), [...], and [David H. Dejour, MD](#) (+2) [View all authors and affiliations](#)

[Volume 52, Issue 3](#) | <https://doi.org/10.1177/03635465231222643>

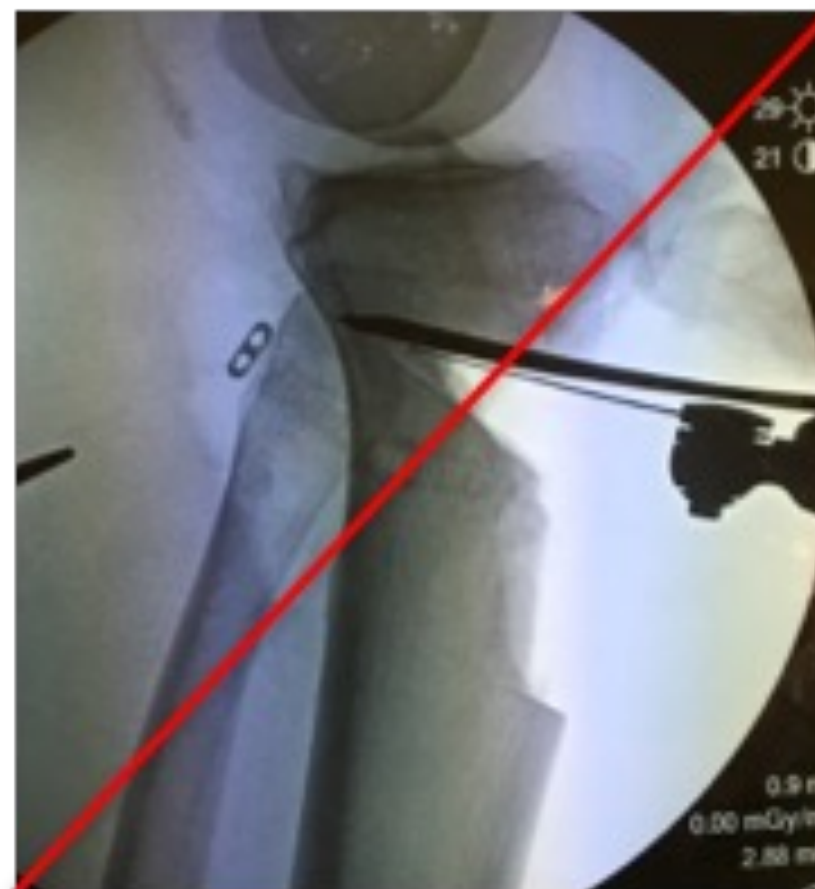
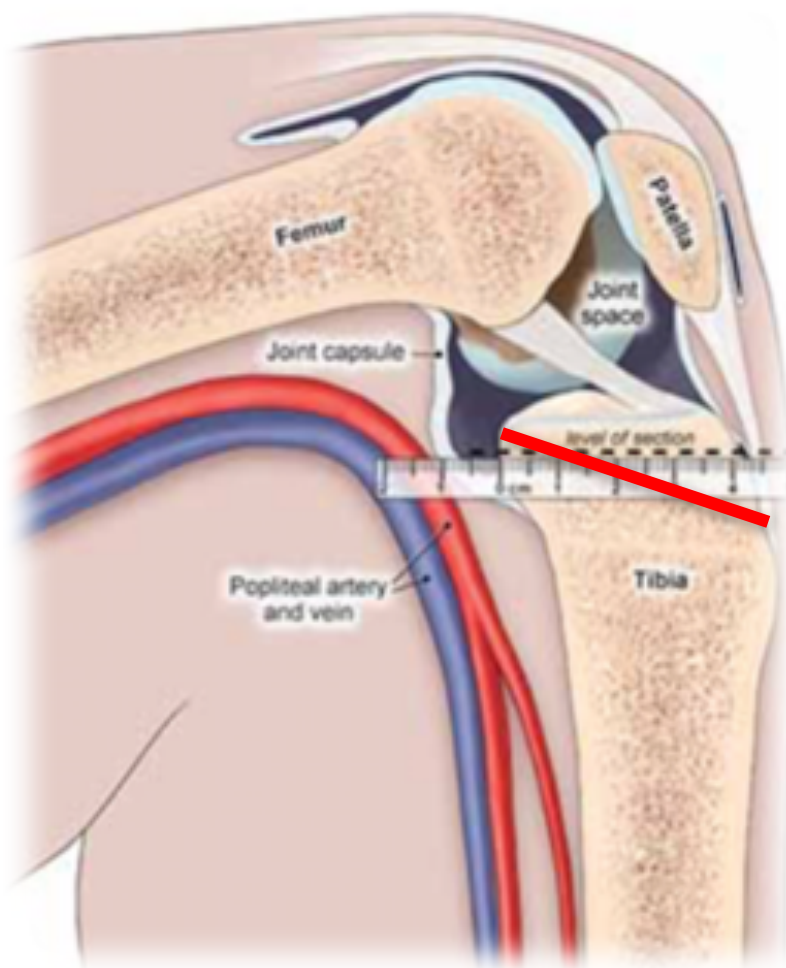
n=68

Consolidation rate 100%

Little to no iatrogenic effect on varus

Increase of Caton Deschamps Index by 0.1

Why a supratuberosity osteotomy?



Alternative : infratuberosity osteotomy



KNEE OSTEOTOMY

Infratuberositary slope-decreasing anterior closed wedge proximal tibial osteotomy is safe and shows rapid bone healing

Philipp Schuster ✉, Philipp Mayer, Ilona Schubert, Janina Leiprecht, Gregoire Micioi, Benoit Reuter, Jörg Richter, Jörg Dickschas

First published: 15 December 2024

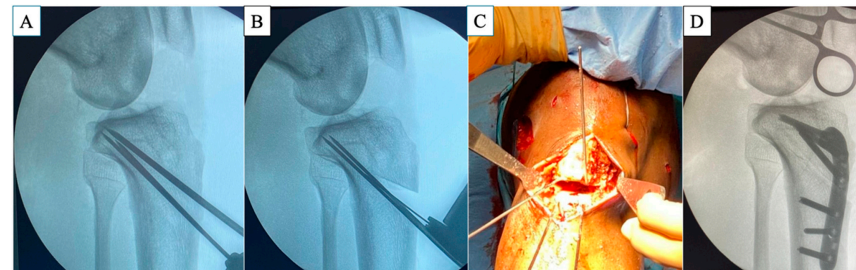
<https://doi.org/10.1002/ksa.12559>

>30% partial healing at 6 weeks

1 non-union

Secondary hardware removal ?

Effect on varus/valgus ?



Courtesy M Ollivier

+ = in favour of



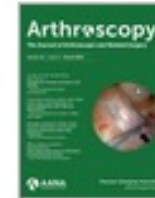
	SUPRA	INFRA
Fusion	+	
Hardware	+	
Correction of the deformity	+	
Alteration of patella height		+
Alteration of Varus/Valgus	+	
PSI	+	+
Risk of tunnel convergence		+

What is the target slope in 2025?



Arthroscopy: The Journal of Arthroscopic &
Related Surgery



Volume 40, Issue 3, March 2024, Pages 846-854



Original Article

Four to 6° Is the Target Posterior Tibial Slope After Tibial Deflection Osteotomy According to the Knee Static Anterior Tibial Translation

between 4 et 6°

Michael J. Dan M.B.B.S., Ph.D., F.R.A.C.S.(ortho)^{a b}, Nicolas Cance M.D.^a  ,
Tomas Pineda M.D.^{a c}, Guillaume Demey M.D.^a, David H. Dejour M.D.^a

https://lyon-knee-congress.com

21^{èmes}

Journées Lyonnaises de Chirurgie du Genou

LE LIGAMENT CROISÉ ANTÉRIEUR

3 - 5 OCTOBRE 2024

CENTRE DE CONGRÈS DE LYON

VENDREDI 4 OCTOBRE 2024

8h00-14h30

LE LCA PLUS

ANIMÉ PAR

Guillaume DEMEY

Bertrand SONNERY-COTTET

LE PROGRAMME

WEBCASTS

Voir la brochure

21èmes Journées Lyonnaises de Chirurgie du Genou

Ligament Croisé Antérieur

« La rupture du ligament croisé antérieur du genou est une entorse grave »

Les 21^{èmes} Journées Lyonnaises de Chirurgie du Genou ont été marquées par une conférence d'ouverture de grande envergure. C'est sous le haut patronage de la Société Française de Chirurgie du Genou (SFCG) que s'est déroulée la conférence d'ouverture de la 21^{ème} édition des Journées Lyonnaises de Chirurgie du Genou. Cette conférence a été animée par deux des plus grands experts du monde de la chirurgie du genou, le Dr Jean-Marie Fayard et le Dr David Dejour. Les deux intervenants ont abordé les dernières avancées de la chirurgie du ligament croisé antérieur (LCA) et les nouvelles techniques de reconstruction. Le Dr Fayard a souligné l'importance de la sélection du patient et de la planification chirurgicale, tandis que le Dr Dejour a insisté sur la maîtrise des gestes techniques et l'importance de la rééducation post-opératoire. Cette conférence a permis de partager les connaissances et les expériences de ces deux experts, offrant ainsi aux participants une vision d'ensemble de la prise en charge du LCA. Les deux intervenants ont également abordé les nouvelles techniques de reconstruction, telles que l'utilisation de greffes autogènes ou allogènes, et les nouvelles approches de la chirurgie mini-invasive. Cette conférence a été un succès et a permis de renforcer les liens entre les chirurgiens du genou de France et d'ailleurs. Les Journées Lyonnaises de Chirurgie du Genou sont une référence internationale en matière de chirurgie du genou et cette conférence en a été une parfaite illustration.

De 3 mois à 6 mois, une entorse grave du ligament croisé antérieur (LCA) peut entraîner une rupture complète du ligament. Cette rupture est une entorse grave qui se caractérise par une lésion complète du ligament croisé antérieur. Elle est souvent causée par un traumatisme direct ou indirect du genou, comme une chute ou un contact violent. Les symptômes de cette entorse sont une douleur intense, un gonflement du genou, une instabilité et une incapacité à marcher. Le traitement de cette entorse est complexe et nécessite une intervention chirurgicale. Les chirurgiens doivent évaluer soigneusement le patient et choisir la technique de reconstruction la plus adaptée à sa situation. Les nouvelles techniques de reconstruction, telles que l'utilisation de greffes autogènes ou allogènes, ont permis d'améliorer les résultats de la chirurgie. Cependant, la rééducation post-opératoire reste essentielle pour assurer une bonne récupération du patient. Cette conférence a permis de partager les connaissances et les expériences de ces deux experts, offrant ainsi aux participants une vision d'ensemble de la prise en charge du LCA.

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Jeu 03 Octobre 2024

Après-midi

Jean-Marie FAYARD

David DEJOUR

Moderateurs

Jean-Marie FAYARD, David DEJOUR

LE LCA POUR COMMENCER

La session portera sur la première rupture du Ligament Croisé Antérieur (LCA).

> OP : définir la sélection du patient à opérer ou non, la place des différentes techniques chirurgicales de reconstruction et de réparation du LCA ainsi que celle des plasties antérolatérales chez l'adulte, l'enfant et l'adolescent.

13:30-13:35 | Le mot des Présidents. JM. Fayard, C. Batailler, G. DemeY

13:35-14:40 | Bilan de la rupture du LCA

13:35-13:43 | Examen clinique (vidéo). C. Batailler

13:43-13:53 | Analyse de la laxité.

13:43-13:48 | - Analyse statique. D. Dejour