

MRI & X-Rays: What should be screened?

Guillaume DEMEY - David DEJOUR

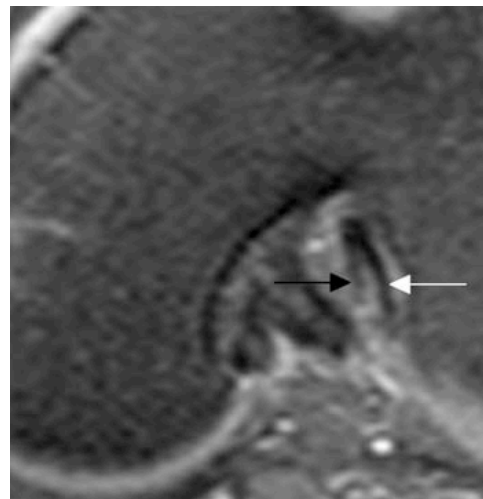
Lyon Ortho Clinic, Lyon, France

LYON **ORTHO** CLINIC





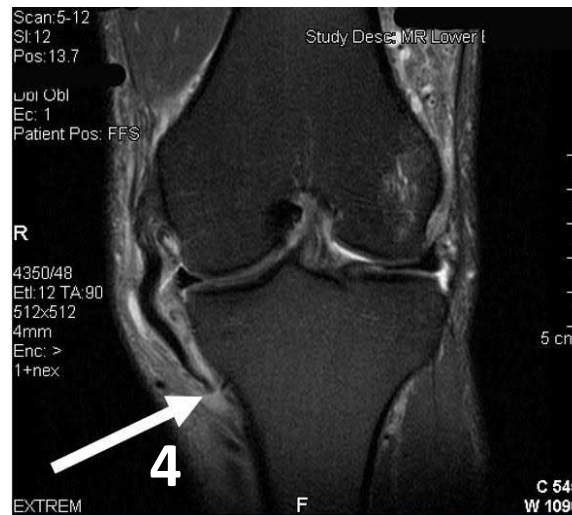
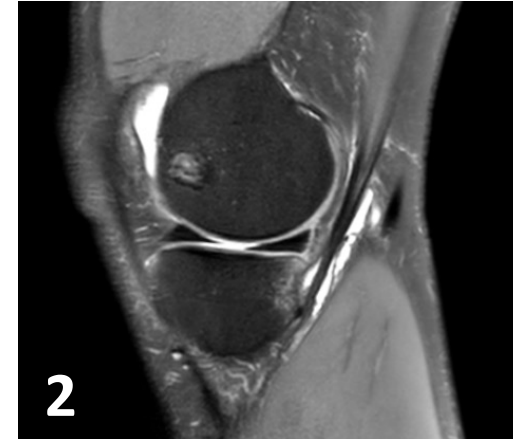
MRI : ACL analysis

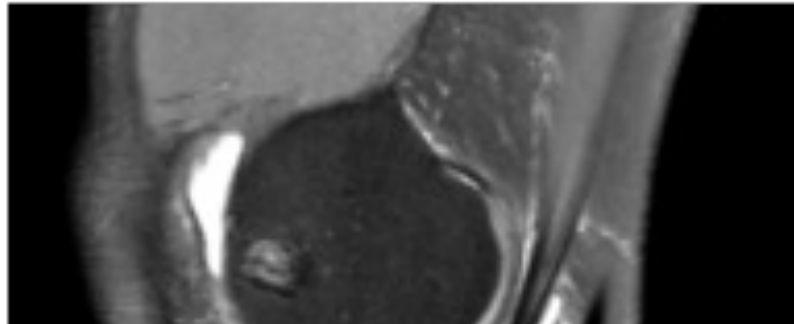
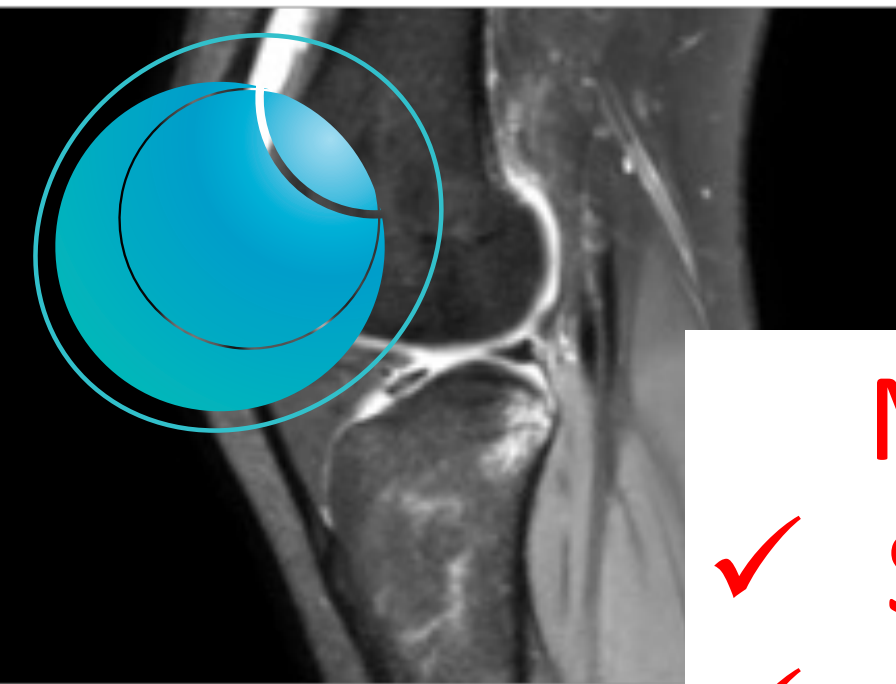
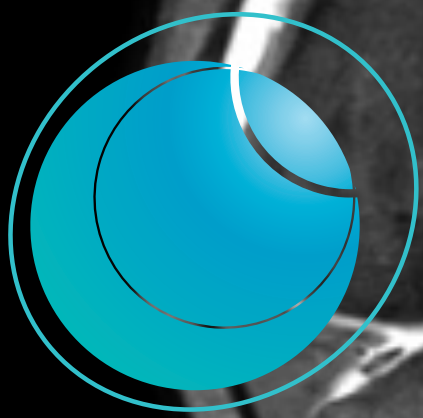




Associated lesions

1. Cartilage and bone
2. Medial meniscus
3. Lateral meniscus
4. Ligaments
 - ✓ Anterior tibial drawer
 - ✓ PCL orientation
5. Indirect signs





MRI Weaknesses :

- ✓ **Static analysis**
- ✓ **Unloaded analysis**

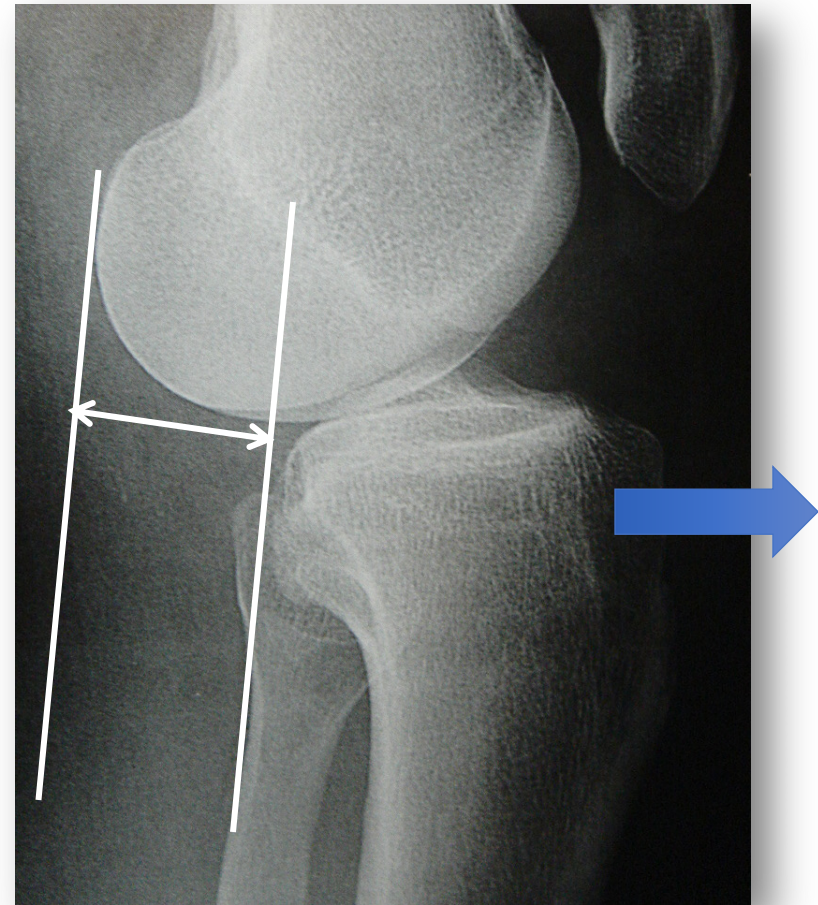


X-Ray Strength



Dynamic analysis

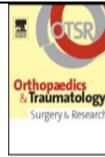
Stress radiography : Telos®





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www.sciencedirect.com

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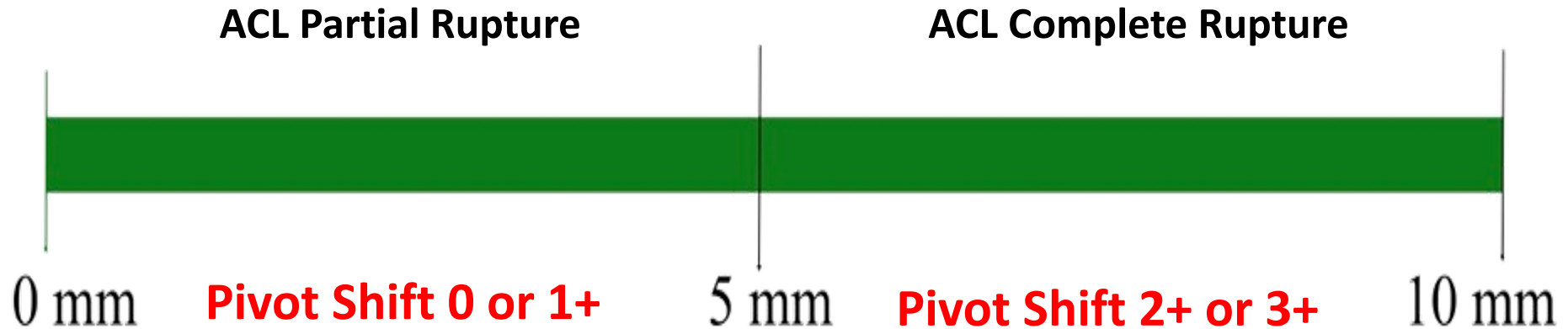
Orthopaedics
& Traumatology
Surgery & Research

ORIGINAL ARTICLE

A comparison of Telos™ stress radiography versus Rolimeter™ in the diagnosis of different patterns of anterior cruciate ligament tears

J.-C. Panisset^a, P.-G. Ntagiopoulos^b, P.R. Saggin^c, D. Dejour^{b,*}

Clinical + Stress Radiography Analysis



88% sensibility and 94,6% specificity

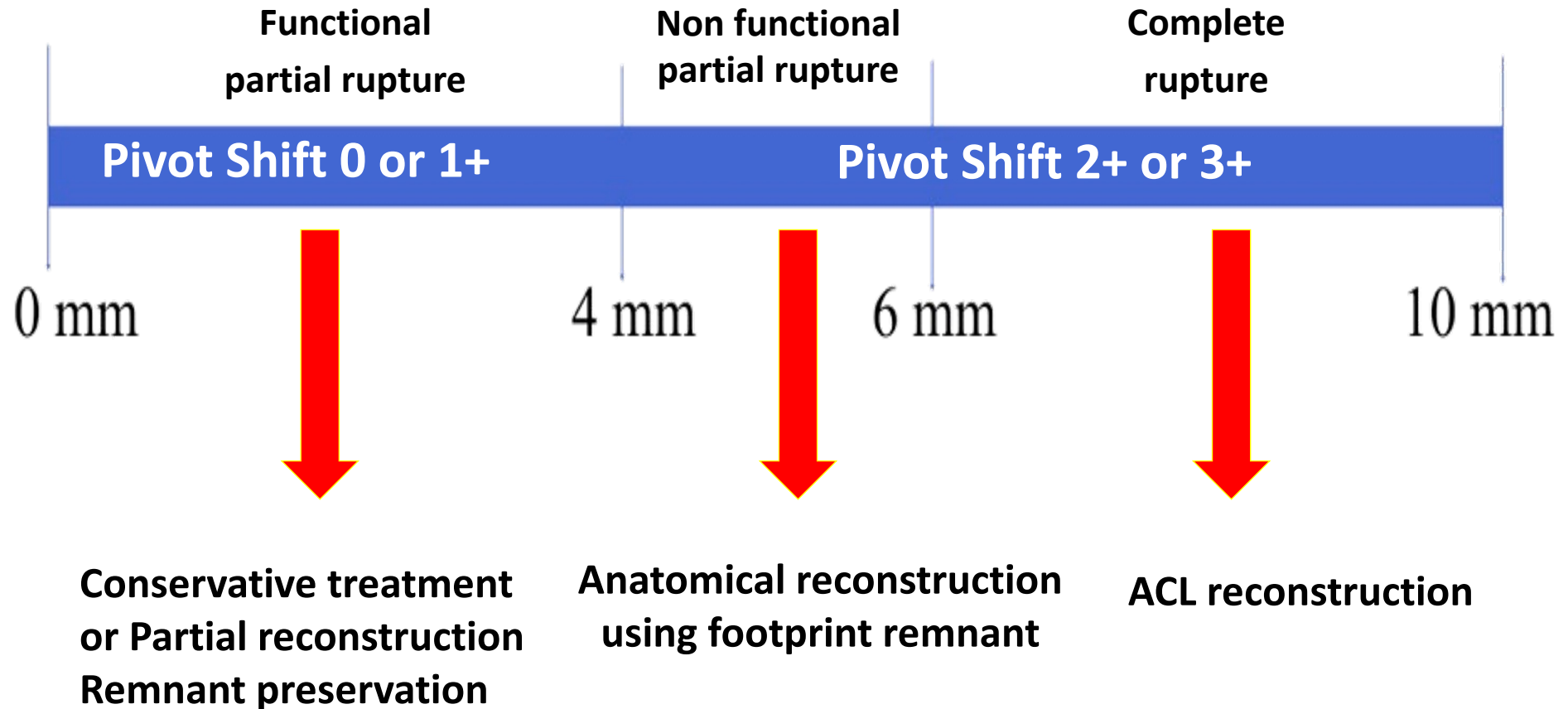
ARTHROSCOPY
THE JOURNAL OF ARTHROSCOPIC
AND RELATED SURGERY

The Diagnostic Value of Clinical Tests, Magnetic Resonance Imaging, and Instrumented Laxity in the Differentiation of Complete Versus Partial Anterior Cruciate Ligament Tears

David Dejour, M.D., Panagiotis G. Ntangiopoulos, M.D., Ph.D., Paulo R. Saggin, M.D., and Jean-Claude Panisset, M.D.

Clinical + Stress Radiography Analysis

Sensibility 0.88, specificity 0.96





ACL Laxity Grading



HHS Public Access

Author manuscript

Am J Sports Med. Author manuscript; available in PMC 2018 January 16.

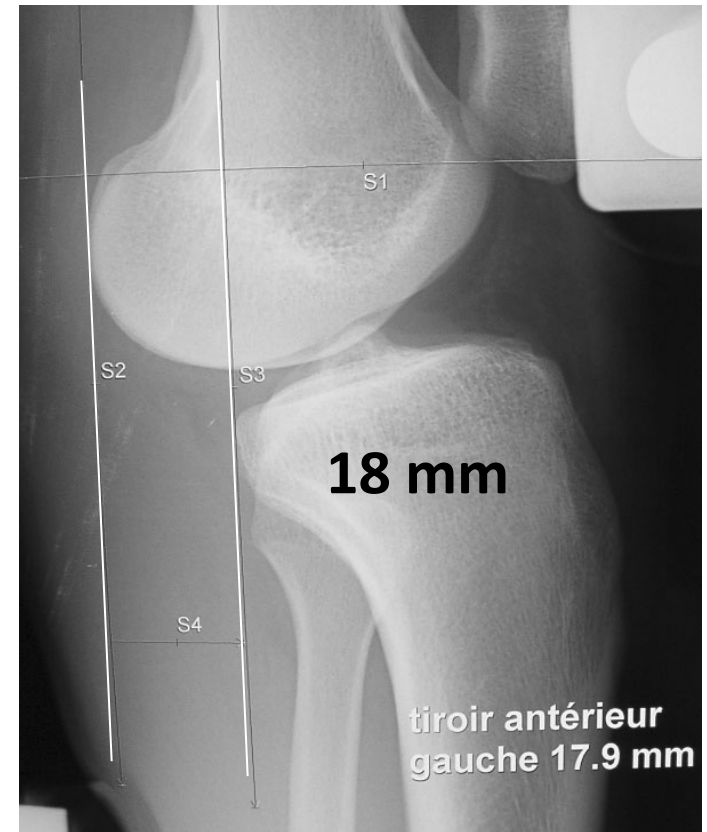
Published in final edited form as:

Am J Sports Med. 2016 December ; 44(12): 3077–3082. doi:10.1177/0363546516656835.

Effect of High-Grade Pre-operative Knee Laxity on Outcomes of ACL Reconstruction

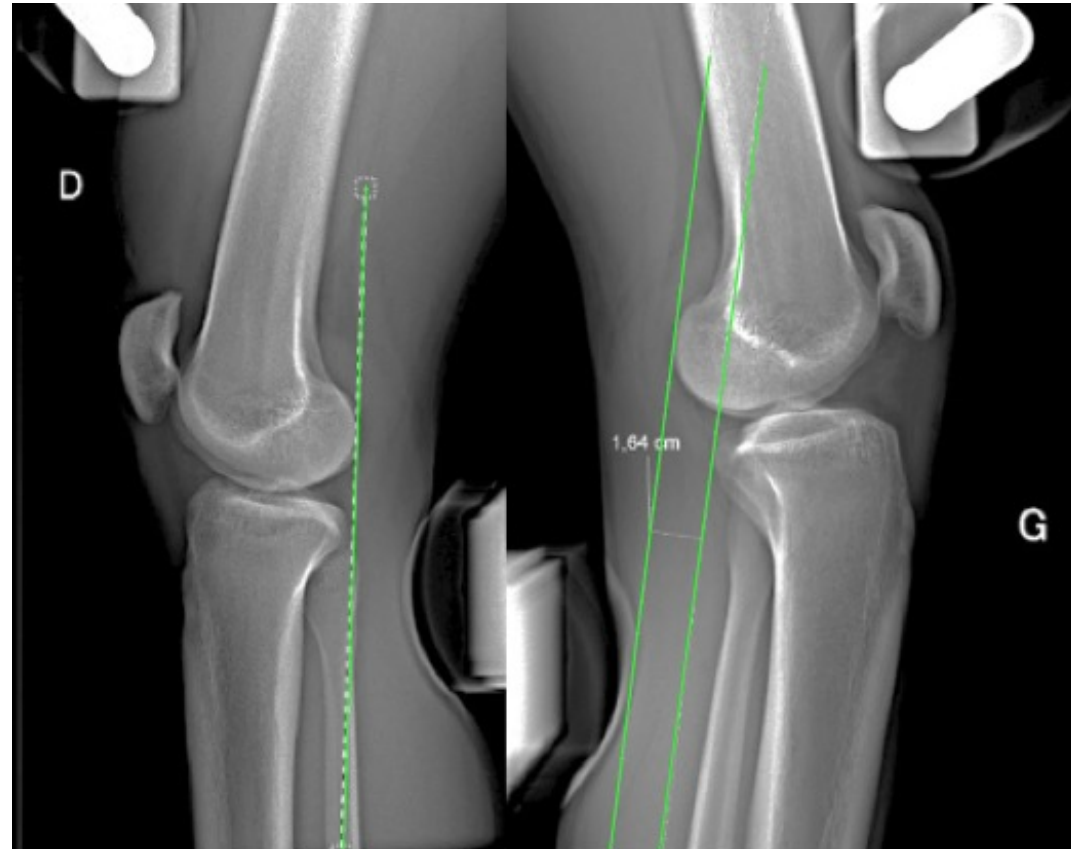
Robert A. Magnussen, MD, MPH^{1,2}, Emily K. Reinke, PhD³, Laura J. Huston, MS³, MOON Group⁷, Timothy E. Hewett, PhD^{4,5}, and Kurt P. Spindler, MD⁶

« The presence of high-grade pre-reconstruction knee laxity is associated with significantly increased odds of revision ACL surgery »





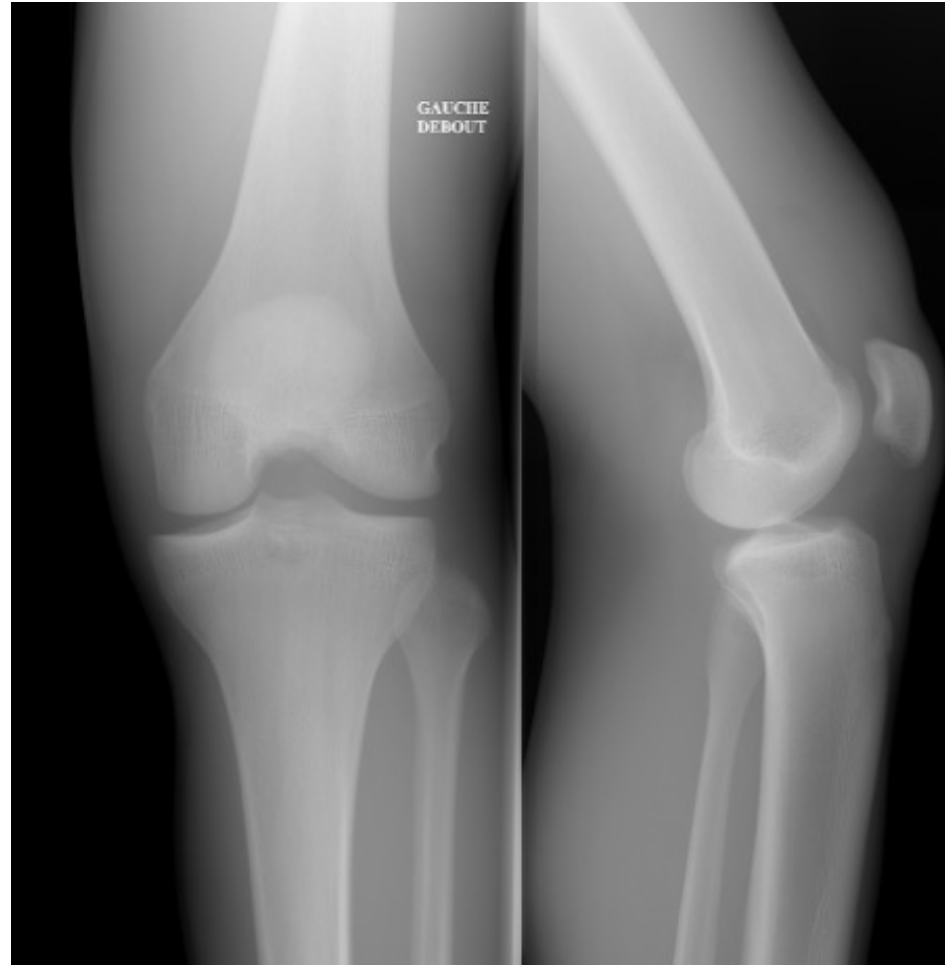
ACL Laxity Grading



Side to side +++

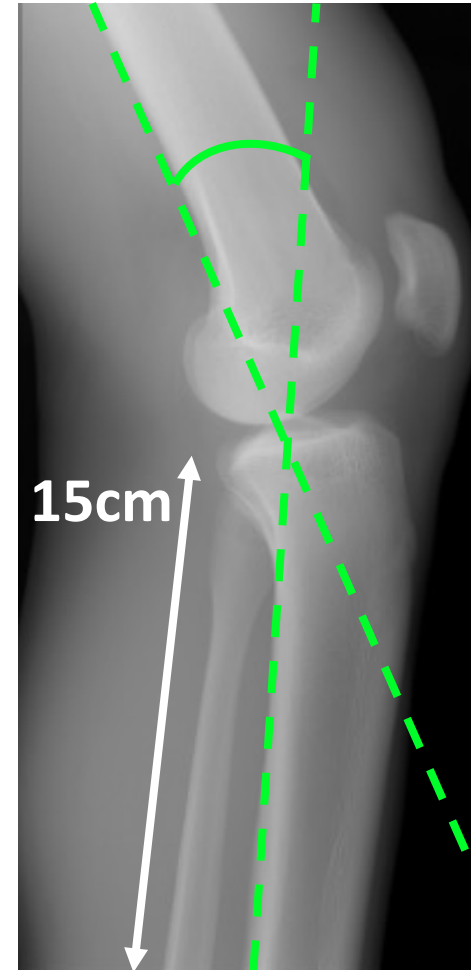
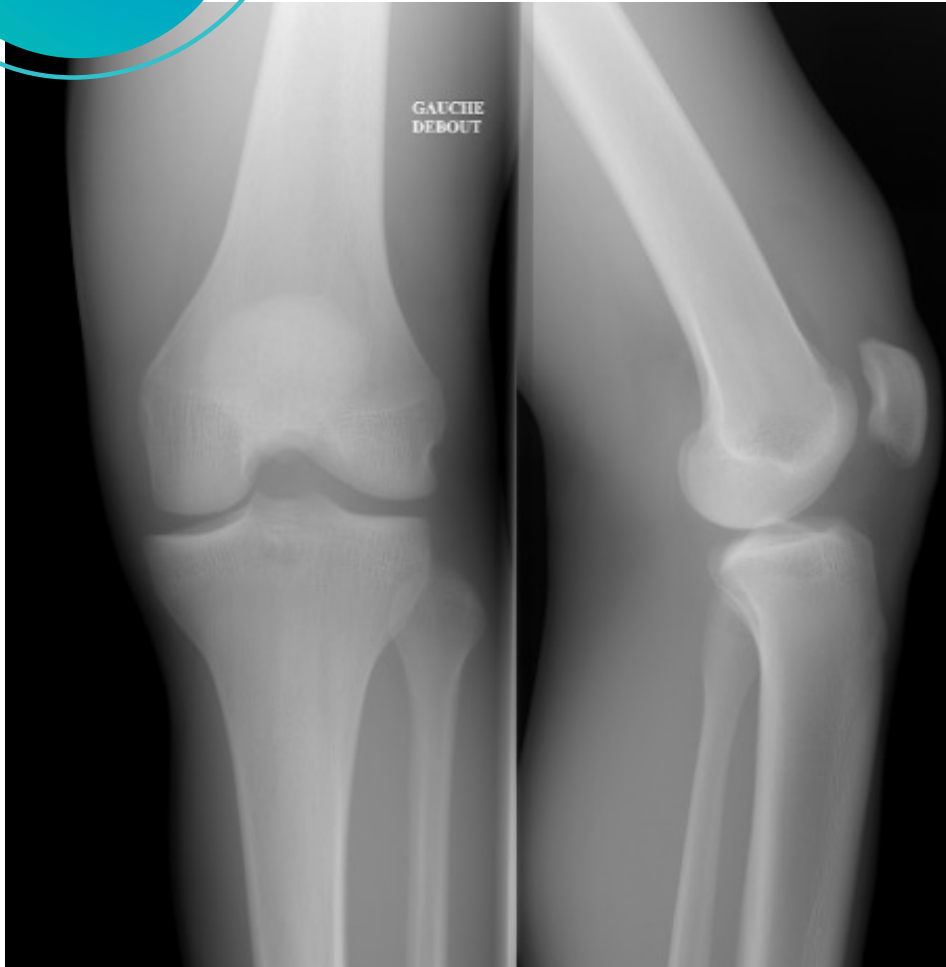


Monopodal weightbearing X-Rays





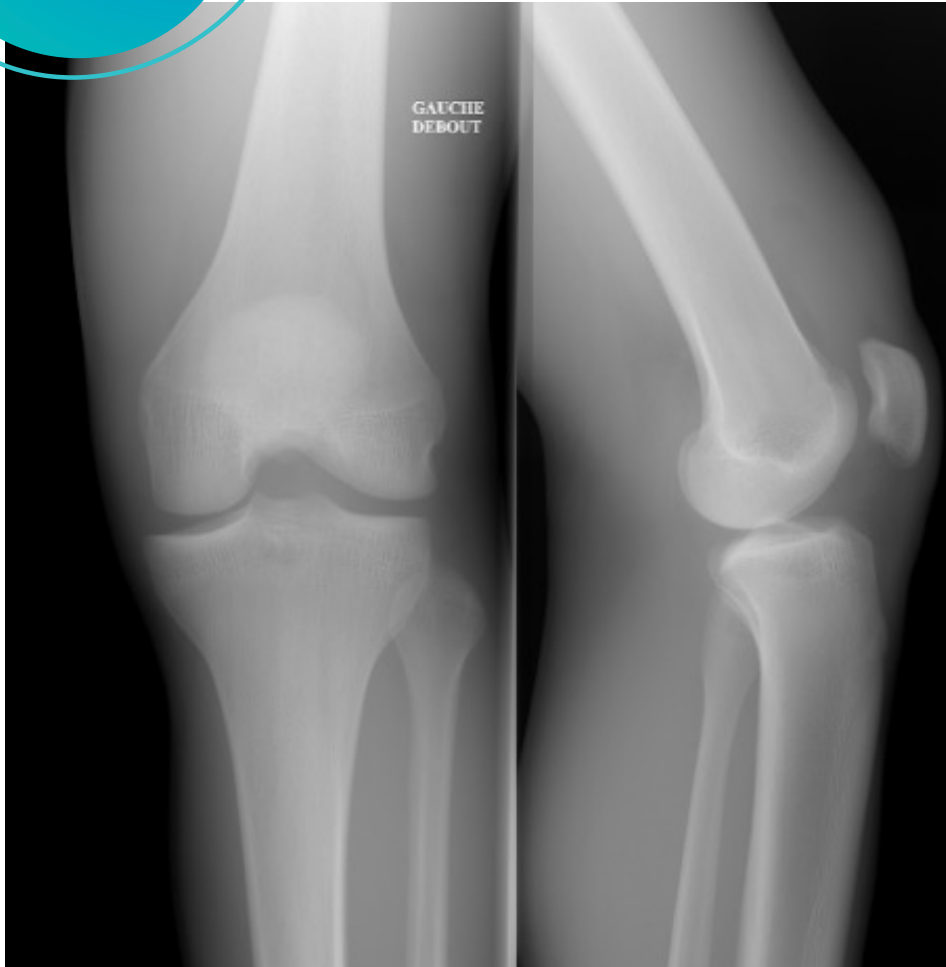
Monopodal weightbearing X-Rays



20-30°
flexion



Monopodal weightbearing X-Rays



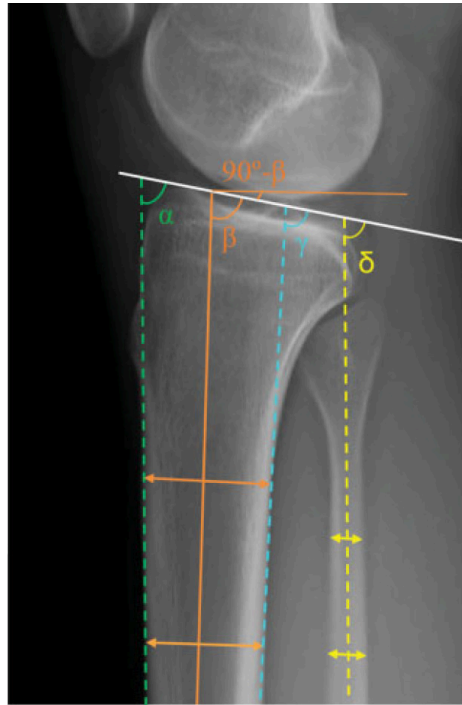


Posterior Tibial Slope





Which method?



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]

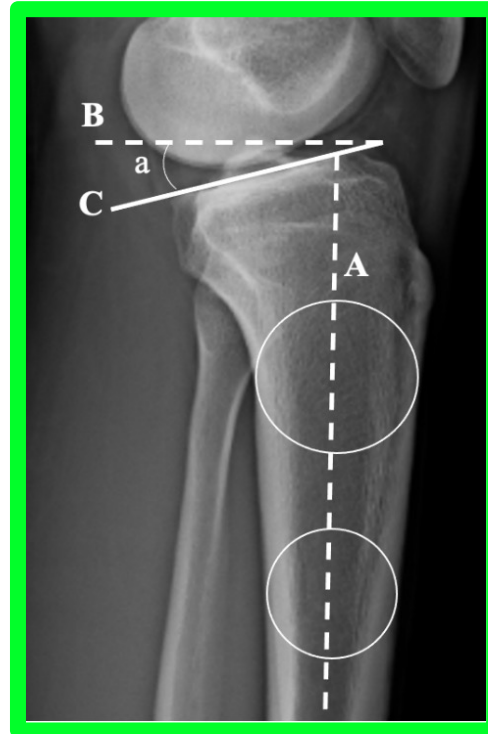
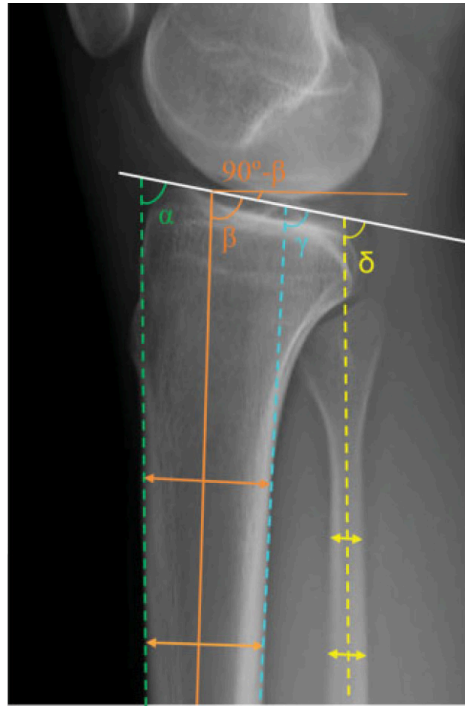
[Article in French]

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



Which method?

Proximal anatomical axis
normal value = 9mm



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

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J Brazier¹, H Migaud, F Gougeon, A Cotten, C Fontaine, A Duquenois



Tibial Slope = intrinsic risk factor for failure

> [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 @ 20y**

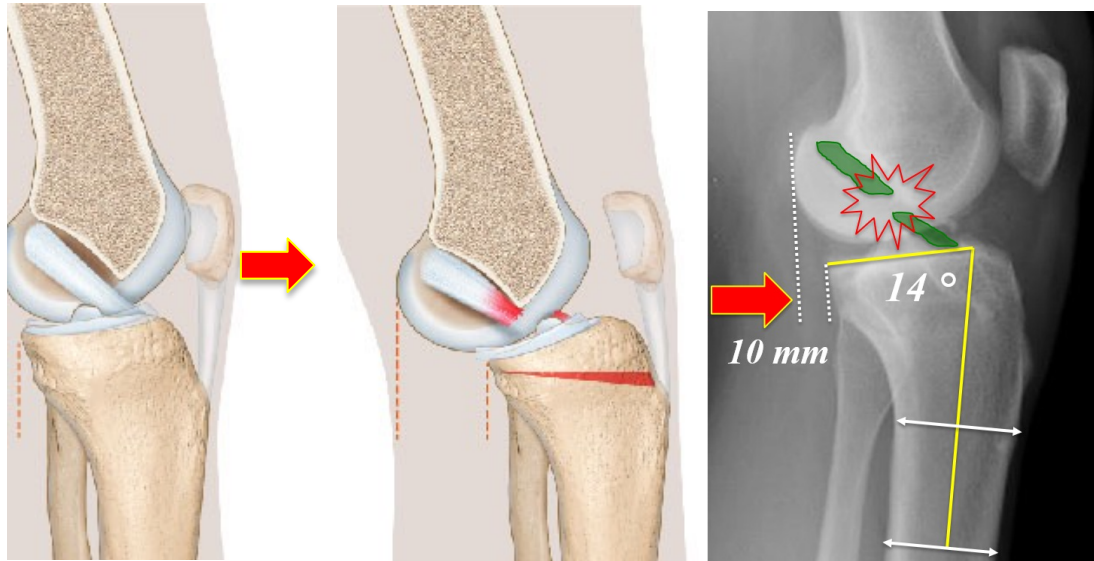


Tibial Slope = intrinsic risk factor for failure

**Constraints on ACL
during walking !!!**



**“Fatigue rupture of the ACL graft”
Biologic failure ...**



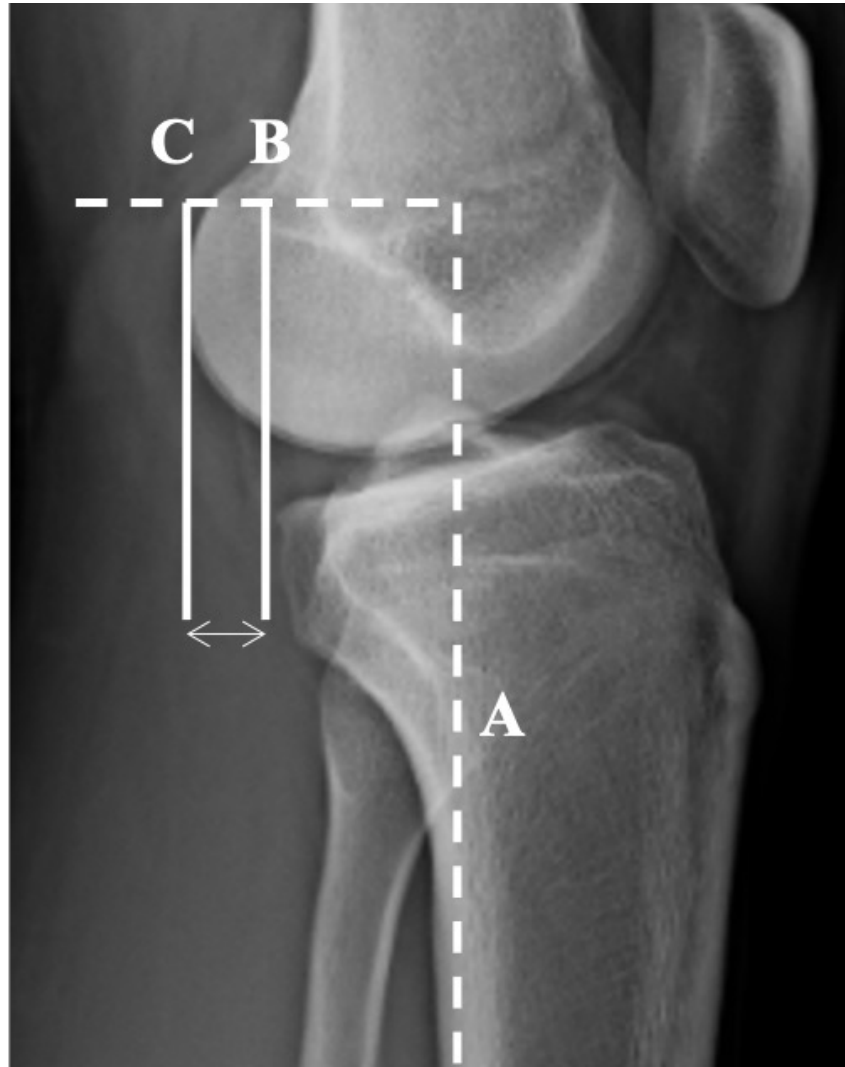
Static Anterior Tibial Translation is larger and is more affected by slope in ACL patients compared to controls

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





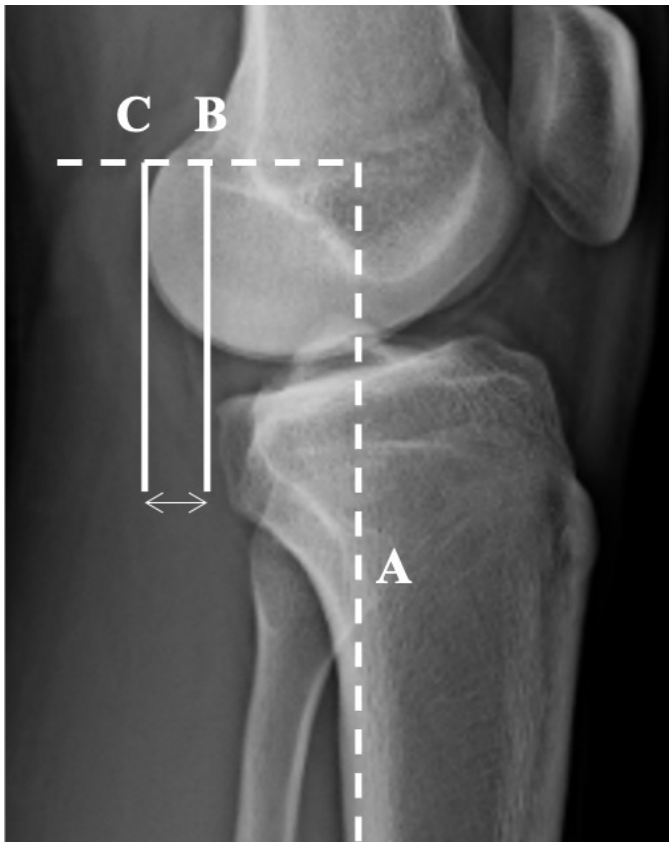
Anterior Tibial Translation





Anterior Tibial Translation

Normal Value = 1.3mm



 **SFA2023 LYON** 
Société Francophone d'Arthroscopie CENTRE DES CONGRÈS

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

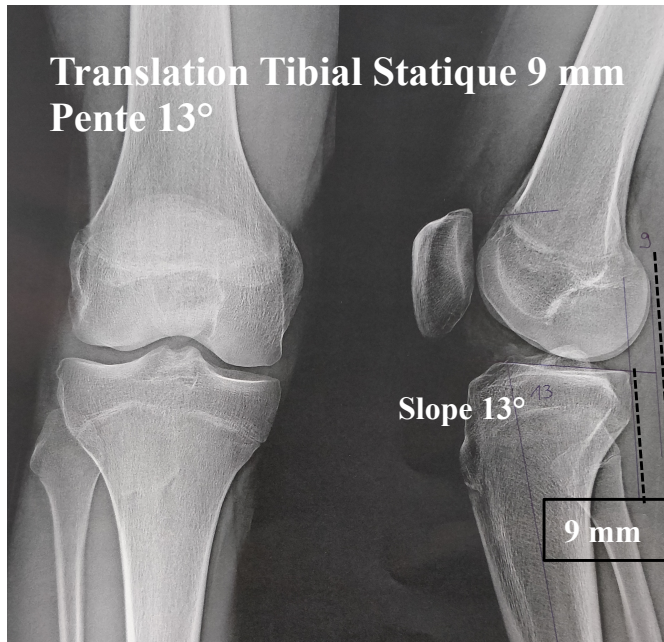

a#ssm

 LYON ORTHOCLINIC **Lyon – Ortho – Clinic**
Clinique de la Sauvegarde, LYON  LYON KNEE SCHOOL OF SURGERY



Anterior Tibial Translation

 **With slope**



+10° slope = +2.4 to +6mm Static ATT

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

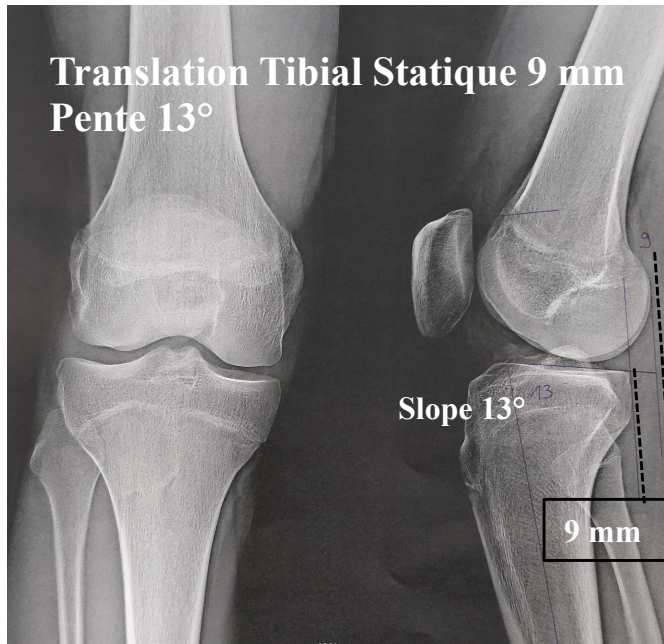
Tibial slope and medial meniscectomy significantly influence short-term knee laxity following ACL reconstruction

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





Anterior Tibial Translation

 **With slope**



Will normalize between 4° & 6° slope

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, Issue 8, August 2021

ISSN: 1049-3813

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Anterior Tibial Translation

 **Risk of ACL rupture or meniscal lesion**

Cut-off : $ATT > 5\text{mm}$

> [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

> [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



Anterior Tibial Translation is not affected by a lateral extra-articular 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
Clinique de la Sauvegarde, LYON



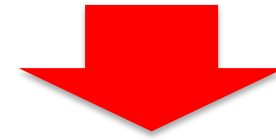
LYON ORTHO CLINIC



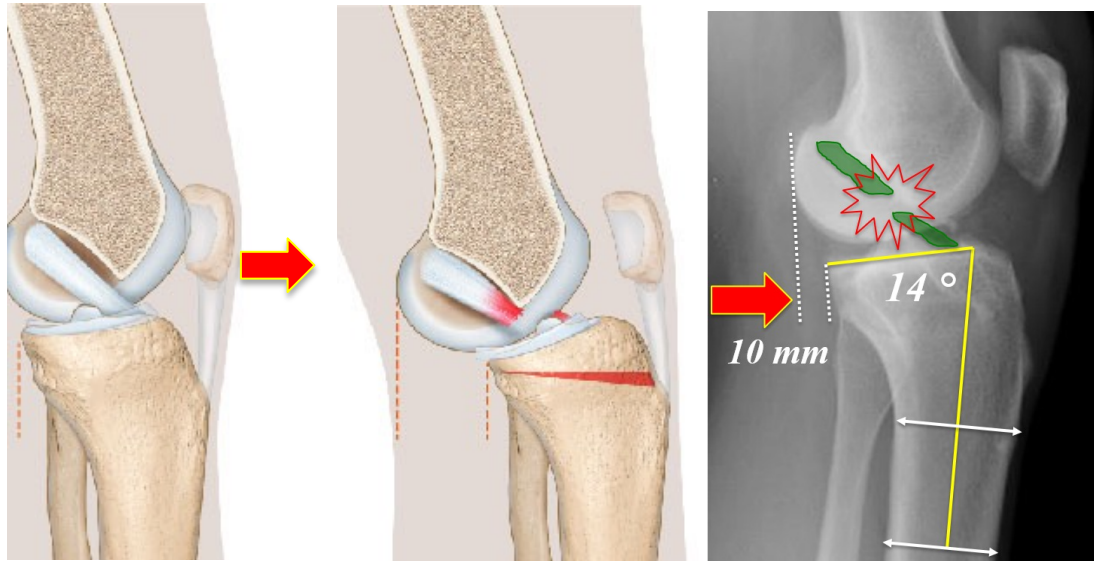


ATT = intrinsic risk factor for failure

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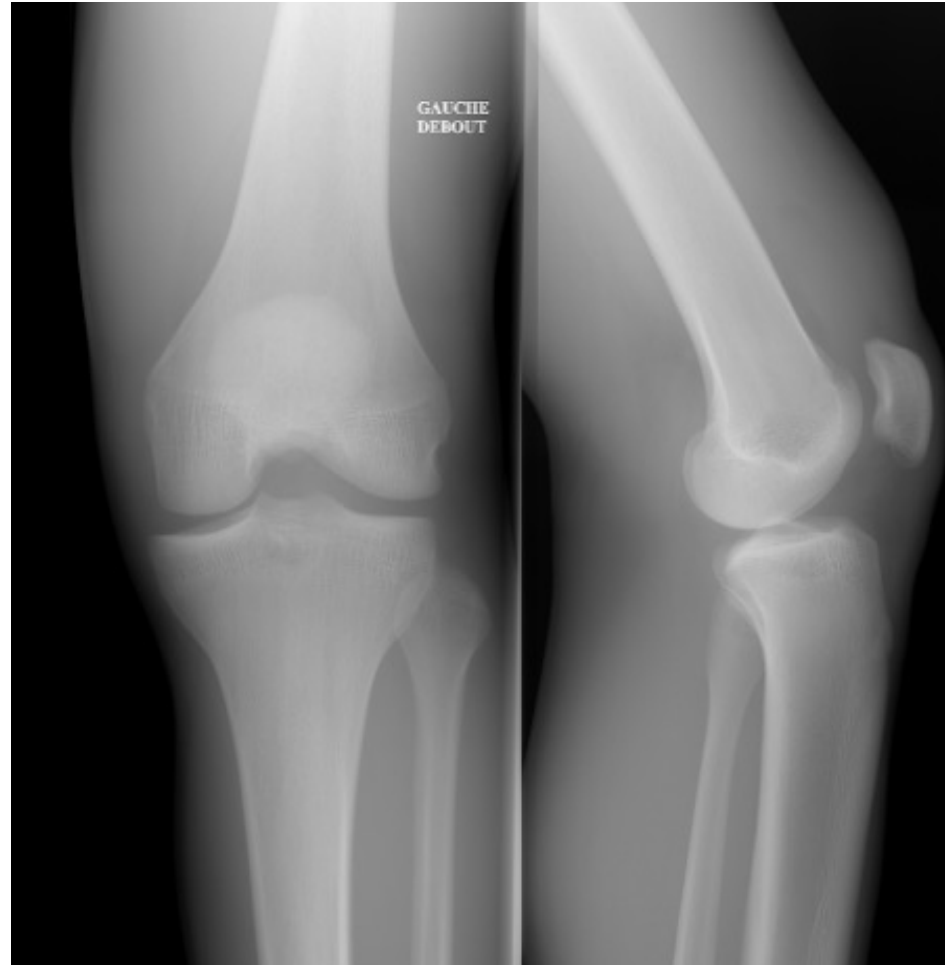


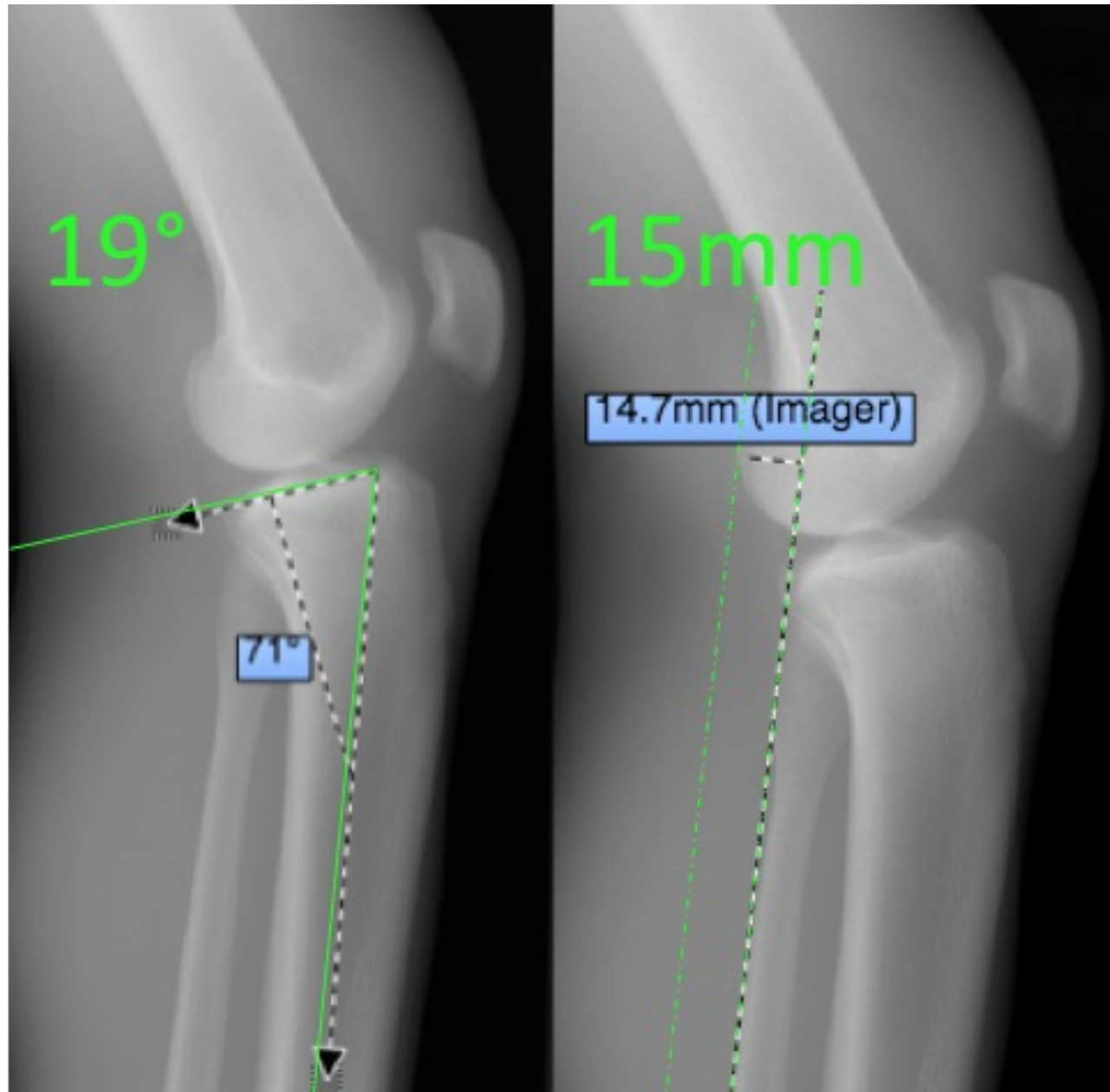
Static Anterior Tibial Translation is larger and is more affected by slope in ACL patients compared to controls
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Clinical case : 18yo, ACL rupture



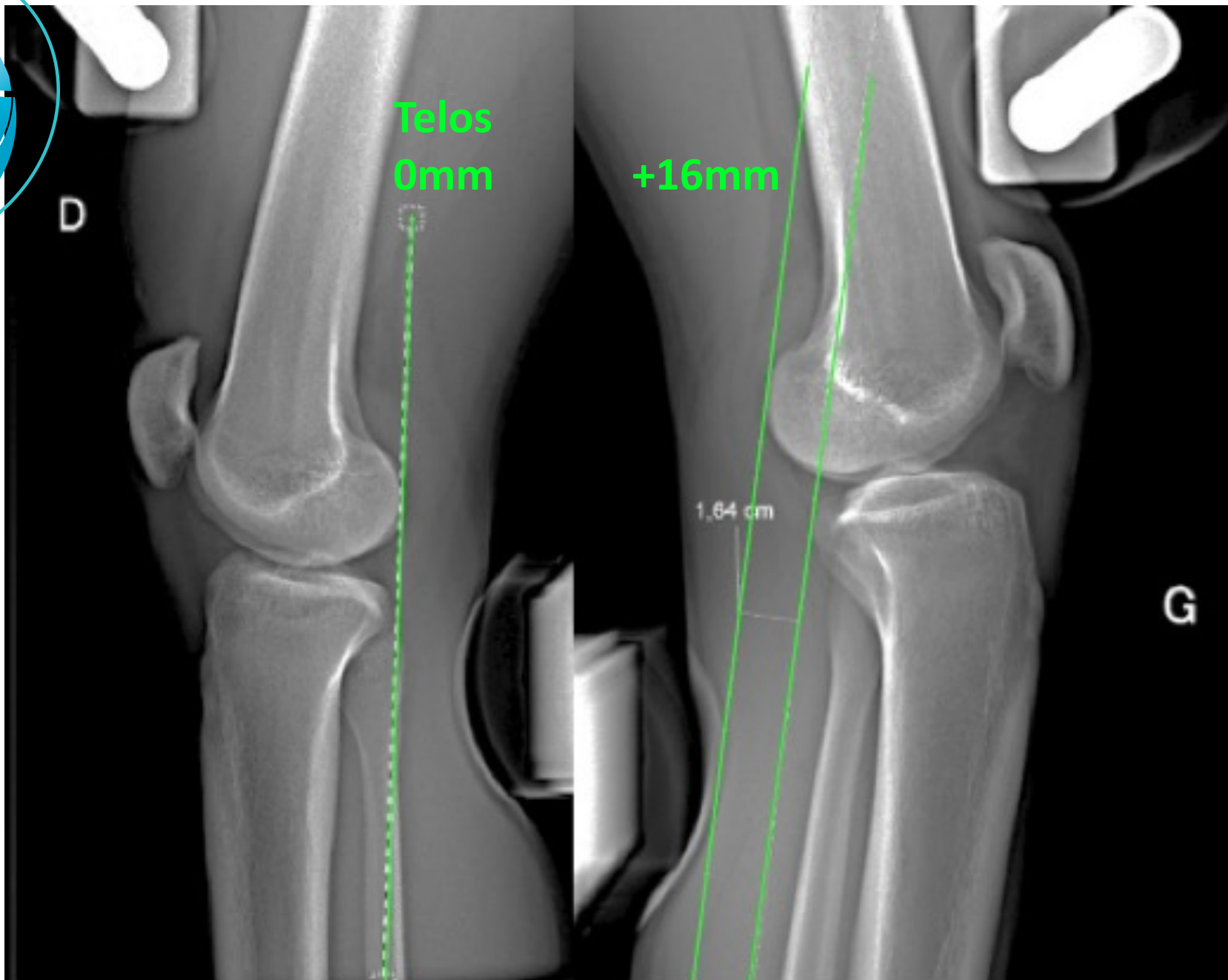


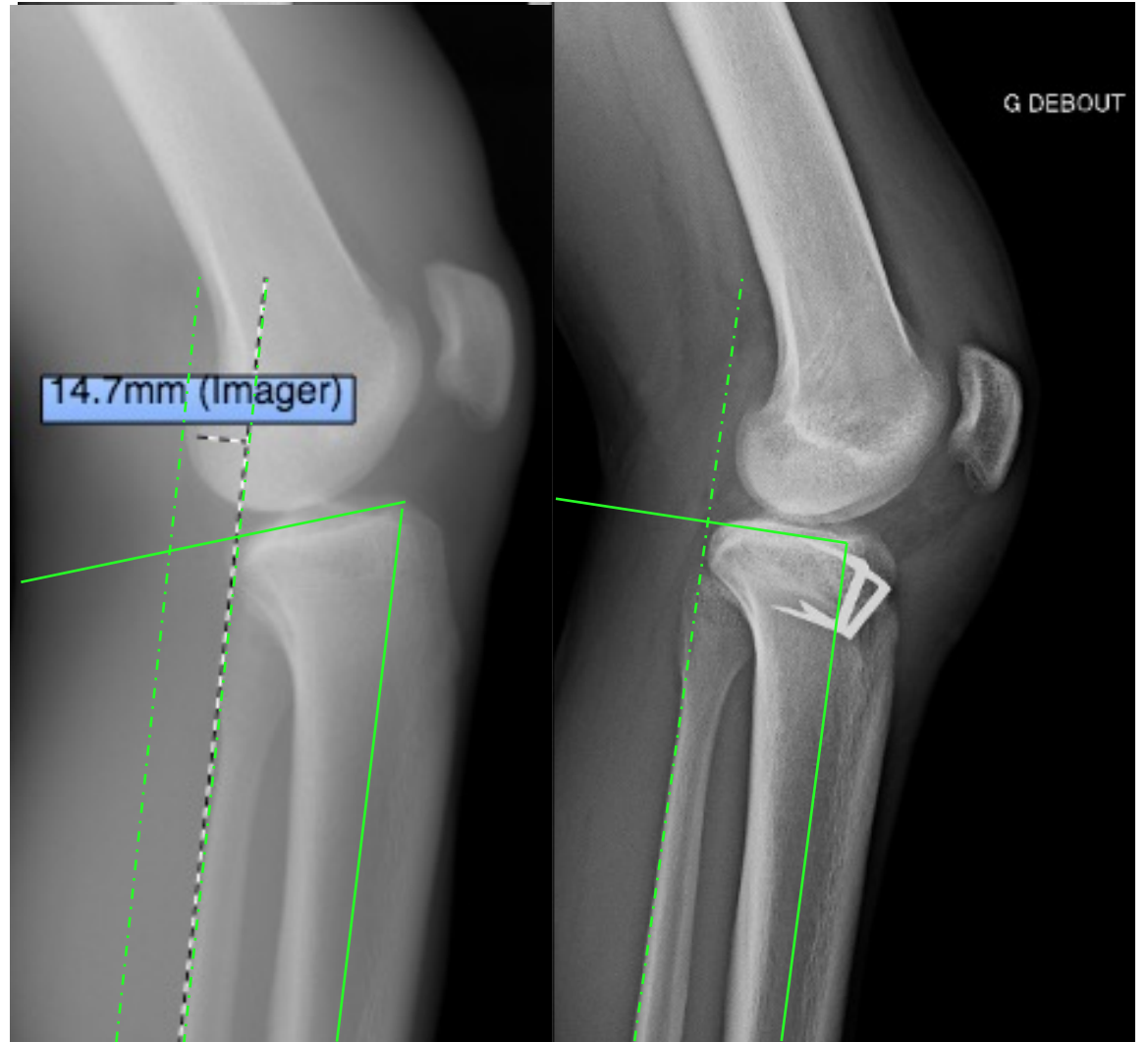
19°

71°

15mm

14.7mm (Imager)

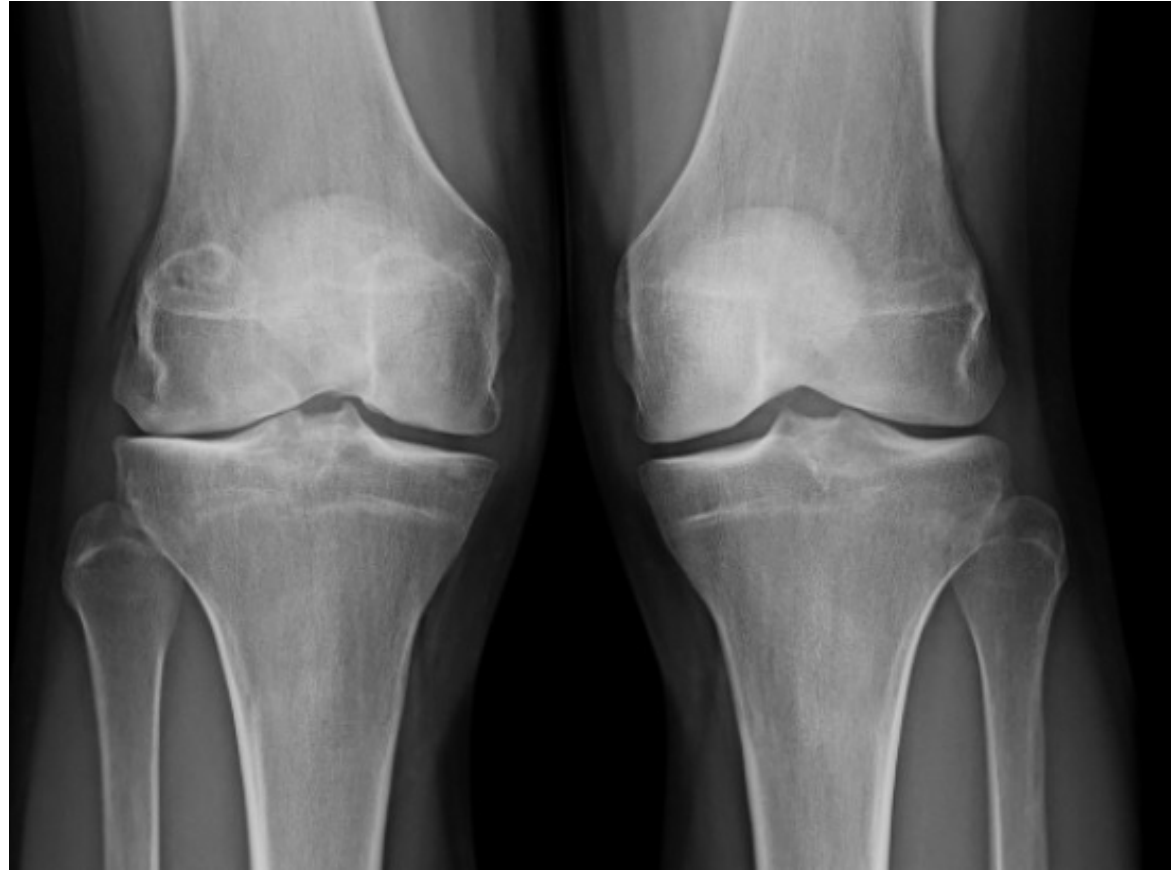






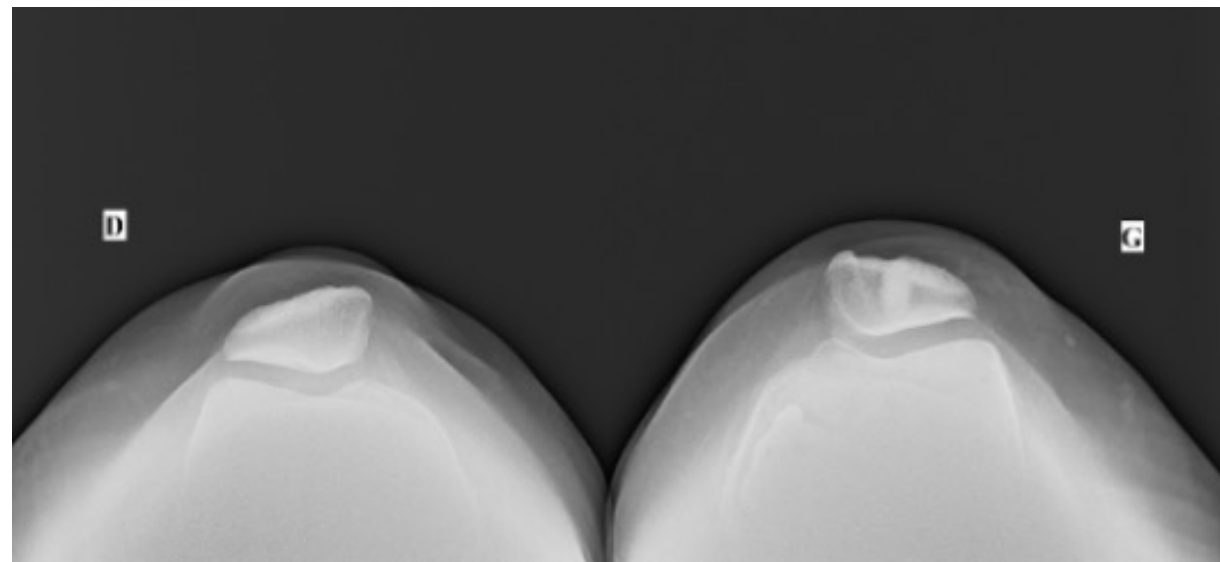
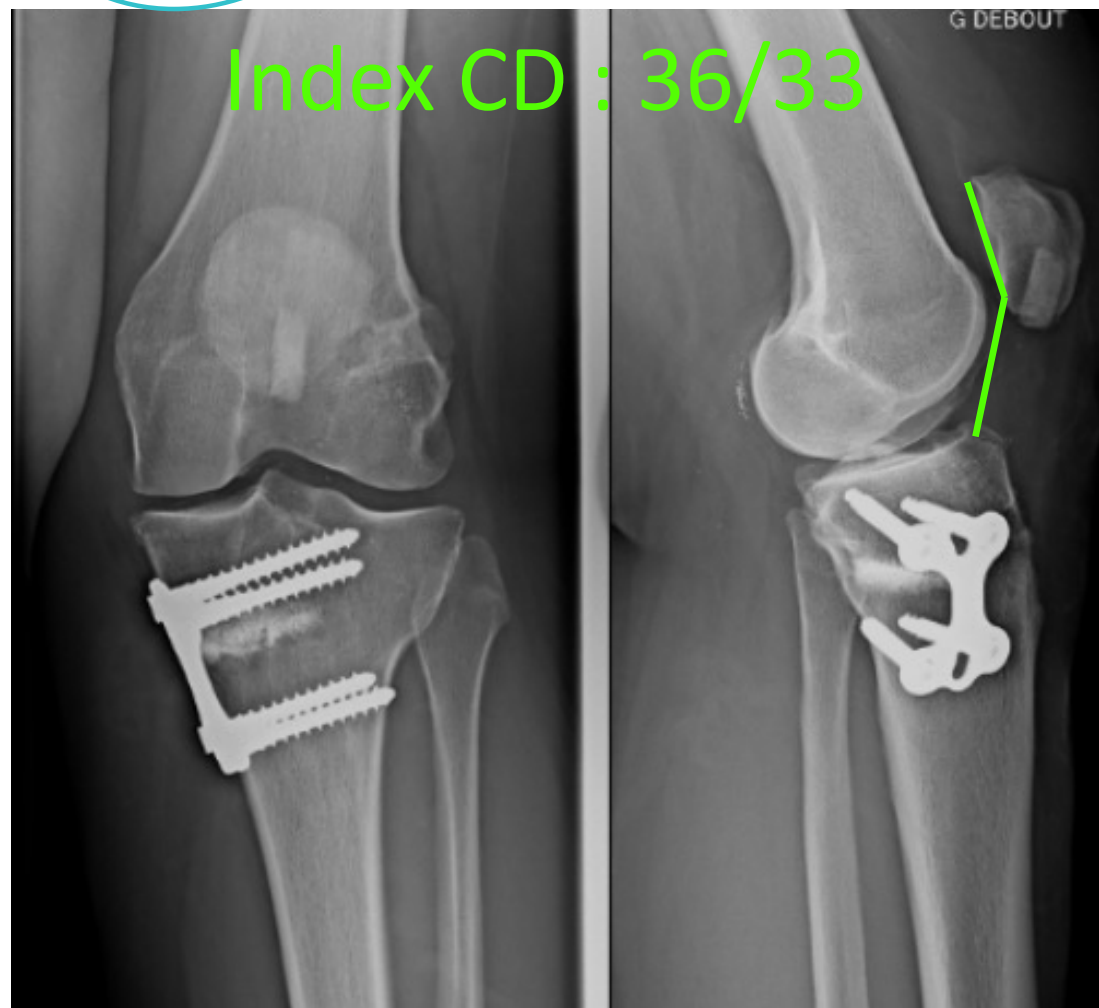
Other parameters

Schuss view (30°)





Other parameters





Other parameters



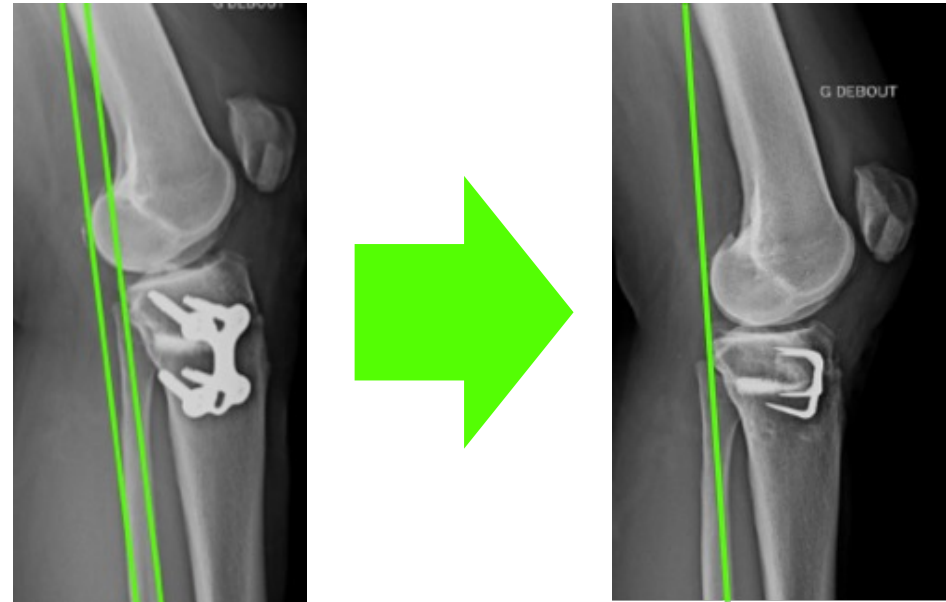
AFTm 187°
MPTA 92°
LDFA 85°
JLCA 0°



Preop



Postop



TAKE HOME MESSAGE

- ✓ Sagittal analysis
- ✓ Loaded analysis
- ✓ **Posterior Tibial Slope**
- ✓ **Anterior Tibial Translation in monopodal weightbearing x-rays**

