

PCL LESIONS : IMAGING AND LAXIMETRY

Philippe BOISRENOULT, M.D.
Department of Orthopaedic Surgery
Hospital of Versailles

INTRODUCTION:

- Clinical diagnosis : more difficult than for ACL lesion ?
- PCL lesion are frequently associated with other ligaments lesions
- In chronic cases: surgical indication are less precise than in ACL surgery
- So it could be important to :
 - be sure of the type of lesion: isolated or multiligament knee injuries
 - to obtain a precise measure of the laxity

PCL LESIONS GRADING

- Isolated PCL lesion:
 - Posterior laxity < 12 mm
 - No varus or valgus laxity, no rotational laxity at 30° of flexion
- Combined injury:
 - Posterior laxity > 12 mm
 - Varus or valgus, laxity in extension or at 30° of flexion
 - Increase external or internal rotation > 10°
- But in cadaver study, for isolated PCL lesion laxity remains < or = 10 mm !

Meneray J PCL/PLS reconstruction Isako Knee Committee 2002

IMAGING: WHAT DO YOU EXPECT ?

- Four questions:
 - Is there a PCL lesion?
 - PCL avulsion (tibial or femoral) or real rupture
 - In acute cases: anatomical localization?
 - In chronic cases : partial or total PCL rupture ?
 - Isolated or associated lesion:
 - ACL
 - Posterolateral or posteromedial corner
 - Extensor apparatus
 - Mensical lesion
 - Bony lesions

IMAGING: STANDARD X RAYS

- Standard Xrays: MUST ALWAYS BE DONE
- Without weight bearing in acute cases
- With weight bearing in chronic cases (with long legs Xrays)

IMAGING : MRI STUDY

- Could always be done (only few exceptions)
- PCL lesion AND POTENTIAL ASSOCIATED LESION +++

But more accurate in acute cases than in chronic cases « PCLhealing »

IMAGING: CT SCAN STUDY

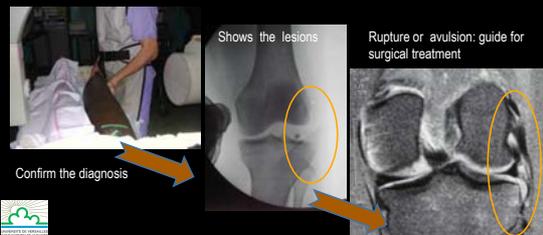
- In acute cases: Vascular assessment
 - Easy to obtain in emergency
 - Simple to do
 - Useful tool
- In chronic cases : no indication (?)



Boirenouf et al. OTSR, 2008

AND YOU, WHAT DO YOU DO ?

- IN ACUTE CASES
- STANDARD XRAYS ARE DONE IN EMERGENCY ROOM,
- In cases of multiligament knee injury : associated to an injected CT Scan Study
- In emergency or fews days after:



Shows the lesions Rupture or avulsion: guide for surgical treatment

Confirm the diagnosis

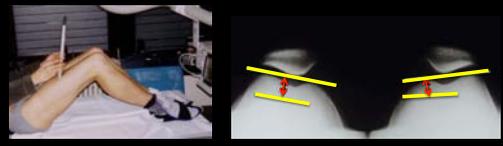
AND YOU , WHAT DO YOU DO ?

- In CHRONIC CASES:
- Clinical examination
- Standard XRAYS and LONG LEGS X RAYS +++
 - Arthrosis ?
 - Other articular lesion ?
 - Varus deformation: anatomical or post-traumatic (dynamic varus laxity)
- MRI Study:
 - Associated lesion
- Objective laxity evaluation



LAXITY EVALUATION : STANDARD XRAYS TOOLS

- Puddu -Chambat view**



Knee flexion 70°
Neutral rotation

Distance between tochlear groove and anterior tibia tubercule

Puddu GGE, Chambat P, Paulis F (2000) ; Arthroscopy 16:217-220

LAXITY EVALUATION: SPECIFIC VIEWS

- Standard X Rays in specific position: **Gravity View and Kneeling View**



Stress is gravity and leg weight
Initially described in acute cases

Stess on anterior tibial tubercule

Staubli HU, Jakob RP (1990) J Bone Joint Surg Br 2:225-230
Louisia S, Siebold R, Canty J, Bartlett RJ (2005) KSSTA 6 476-482

LAXITY EVALUATION: DYNAMIC STRESS VIEWS

- Subjective by patient: active hamstring contraction in 90° of knee flexion
- Objective instrumental evaluation: TELOS in 90° of knee flexion



Definited force:
150 N/m

Staubli HU, Noesberger B, Jakob RP (1992) Acta Orthop Scand Suppl 249:1-27
Chassaing VDF, Touzard R et al (1995) Rev Chir Orthop 61:35-38

LAXITY EVALUATION: TECHNIQUE

Posterior laxity is the the most posterior contours of the medial and lateral femoral and tibial condyles.

Uncorrect view
Distance is equal to the rotational error

HOW TO MAKE YOUR CHOICE?

« A comparison between five different techniques »

Technical parameter

	Telos	HST	Kneeling	Gravity
Time ± STD	305.2 ± 66.5	192.4 ± 34.2	232.8 ± 57.4	117.9 ± 20.5*
Pain ± STD	3.1 ± 2.5**	1.1 ± 0.4	3 ± 1.5	1.2 ± 0.7
Rotation ± STD	3.6 ± 2.9***	6.2 ± 3	4.8 ± 2.5	2.5 ± 3.4

Absolute posterior tibial displacement (mm)

Side displacement (mm)

Conclusion was in favour of:
1) TELOS
2) Kneeling view

Jung TM et al, KSSTA 2006; 14: 1116-1121

GRADING ISOLATED AND COMBINED POSTERIOR KNEE INJURIES WITH A LAXIMETRY TECHNIQUE?

- Aim: helps to determine treatment strategy.
- Experimentally, in a cadaver study using TELOS at 30° and at 80°:
 - TELOS appears superior to gravity sag view and PCL press
- Results: this study was able to determine cut-off points:

	Telos 30°	Telos 80°
Partial lesion	<3mm	<6mm
Complete lesion	4-9 mm	7-12mm
Associated lesions	>9 mm	>12mm

- Future : in vivo study?

Garavaglia et al, Am J Sports Med, 2007 Dec;35(12):2051-6

AND YOU, WHAT DO YOU DO?

- In acute cases: dynamic views, no specific laximetry :
 - Only gravity view could be used but not the other techniques
 - « We think, it's difficult, (mistake?) »
- In chronic cases: TELOS at 90°
 - With a lot of technical errors,
 - 150 and 250 N/m
 - Cut-off: 10mm

THANK YOU !