



ROLE OF OSTEOTOMY IN ACL DEFICIENT PATIENTS

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Outline

- ⦿ Natural history of ACL deficient patients
- ⦿ Principles of osteotomy in management of knee instability and malalignment
- ⦿ Management of combined knee instability and malalignment

Natural History of ACL Deficient Knee

- ⦿ Literature somewhat difficult to interpret
 - Variety of factors influence natural history
 - Meniscal tears
 - Chondral damage from original injury
 - Heterogeneous population
 - Types of conservative treatments
 - Outcome measures often difficult to measure
 - "return to sport"
 - "return to previous function"

Natural History of ACL Deficient Knee

- ⊙ Generally agreed upon principles
 - Gait altered
 - "quadriceps avoidance"
 - Repeated episodes of instability
 - Meniscal and chondral damage
 - Degenerative changes present in most patients within 20- 25 years of injury
 - Worst in subset of patients with meniscal injury
 - Medial compartment > lateral compartment

Natural History of ACL Deficient Knee

- H.Dejour - from Fu Knee Surgery

“...osteophyte and superficial destruction of cartilage are likely to develop within 10 years in knees with ACL rupture”

Significant arthrosis develops after longer periods (20-30 years).

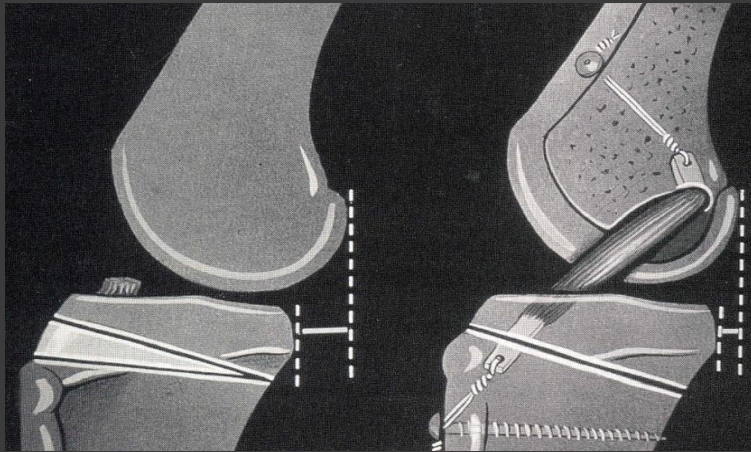
An additional meniscal lesion or meniscectomy constitutes a turning point in the evolution of arthrosis.

The meniscal factor is not the main factor; it is a contributory factor in the evolution of arthrosis in the ACL deficient knee.”

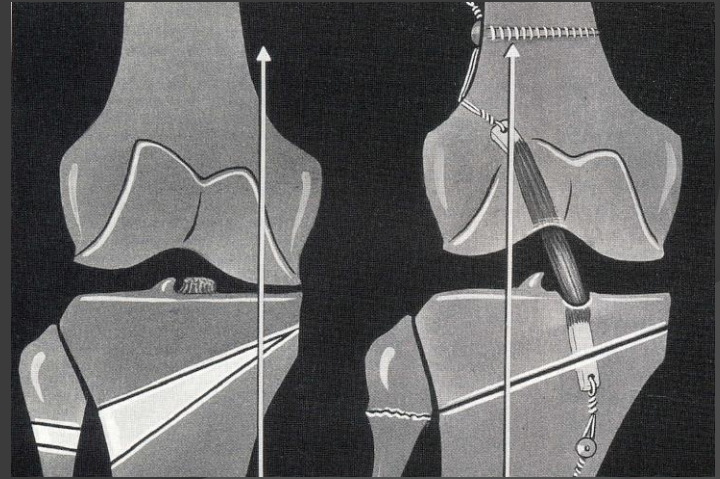
Principles of Tibial Osteotomy

- Type of osteotomy

Extension



Valgus



OSTEOTOMIES AND ACL DEFICIENT KNEES

INDICATIONS

- ① 1. **Unicompartmental arthrosis associated with ACL deficiency**
- ② 2. **ACL + lateral & postero lateral associated tears**

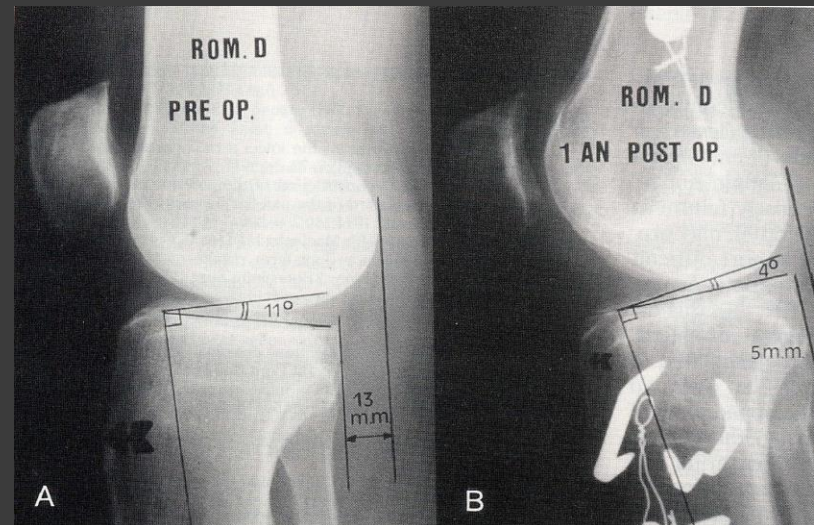
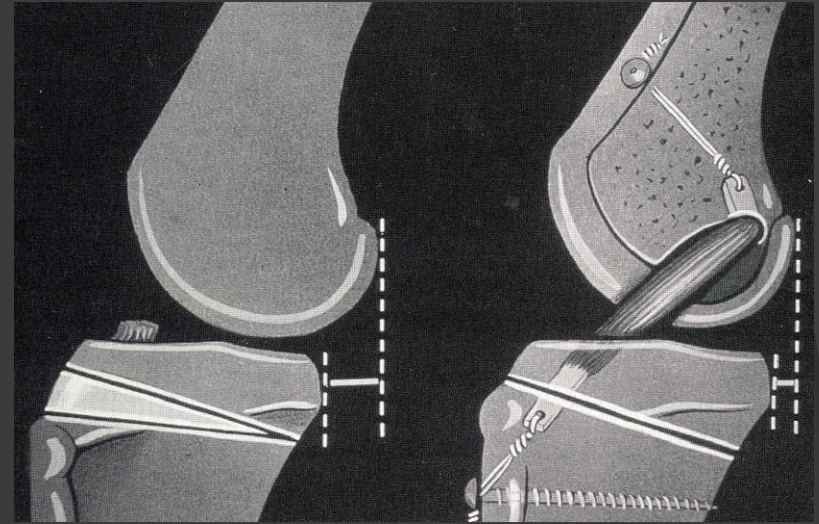
1. Osteotomy and ACL Deficient Knees

- Valgus osteotomy described in treatment of unicompartmental arthrosis associated with ACL deficiency
 - Shift mechanical axis laterally and decrease force through diseased medial compartment



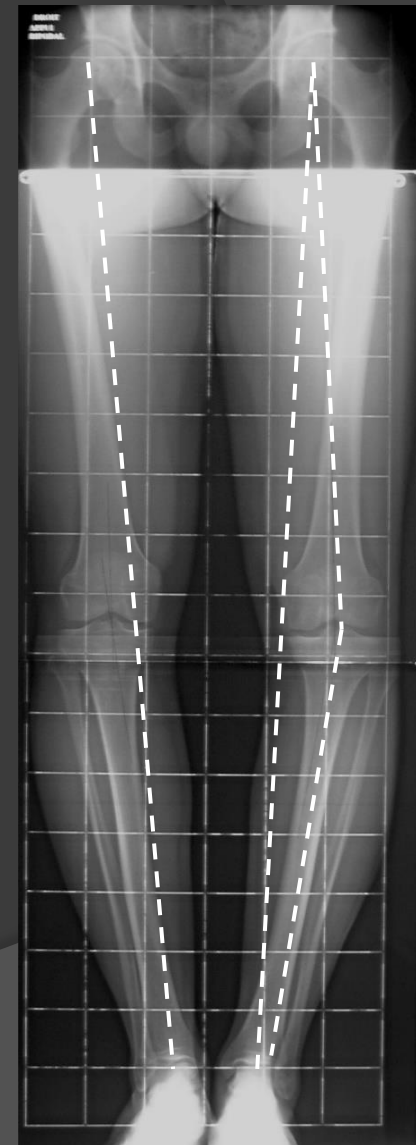
Osteotomy and ACL Deficient Knees

- Osteotomy has been used in treatment of instability
 - Extension type to decrease tibial slope and anterior tibial translation





1. ACL + arthritis



2: ACL + Postero lateral tears?

Under-estimated

10 à 15% of ACL ruptures



Neglected posterolateral lesions

ACL + Posterolateral tears

Residual lateral laxity



Increased forces on the graft



Re-Rupture of the ACL Graft

- **15% Schepsis** (AANA 1995)
- **24% Noyes** (AJSM 1996)



*Hughston CORR 1980, JBJs 1985, Kannus AJSM 1987,
Noyes AJSM 1995, Rubman C Orthop 1999, LaPrade AJSM 1999*

Posterolateral Laxity: Place of HTO

« *HTO is the best LCL reconstruction* »

A. Trillat

Alignement

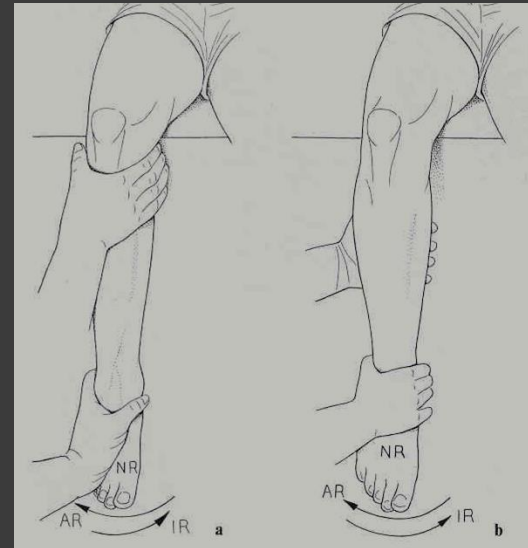


Lift-Off

Monopodal stance



Clinical Exam



LCL ± PLC

Biomechanical studies

- ⦿ Am J Sports Med. 2004 Mar;32(2):376-82.
- ⦿ Ten cadaveric knees were studied using a robotic testing system using three loading conditions:
 - (1) 200 N axial compression
 - (2) 134 N A-P tibial load
 - (3) combined 200 N axial and 134 N A-P loads
- ⦿ Tibial slope was increased from 8.8 +/- 1.8 deg. to 13.2 +/- 2.1 degrees,
 - anterior shift of tibia relative to femur (3.6 +/- 1.4 mm).
 - Under axial compression, the osteotomy caused a significant anterior tibial translation up to 1.9 +/- 2.5 mm (90 degrees).
 - Under A-P and combined loads, no differences were detected in A-P translation or in situ forces in the cruciates (intact versus osteotomy)

Biomechanical studies

- Results suggest that small increases in tibial slope do not affect A-P translations or in situ forces in the cruciate ligaments.
- However, increasing slope causes an anterior shift in tibial resting position that is accentuated under axial loads.
- This suggests that increasing tibial slope may be beneficial in reducing tibial sag in a PCL-deficient knee, whereas decreasing slope may be protective in an ACL-deficient knee.

Biomechanical studies

- Am J Sports Med. 2006 Jun;34(6):961-7.
- 10 cadaveric knees: valgus HTO + anatomic double bundle ACL reconstruction
- Anterior tibial translation and internal rotation decreased by 2mm and 2 degrees at low flexion angles vs. ACL intact knees
- In-situ forces in posterolateral graft became 56-200% higher than those in the posterolateral bundle of the intact ACL
- N.B. - may overconstrain knee and result in high forces in posterolateral graft, predisposing to graft failure

Clinical studies

- J Knee Surg. 2003 Jan;16(1):9-16
- 26 Patients with ACL insufficiency, symptomatic medial OA, varus
 - 14/26 recreational athletes - minimum 2 year follow-up
- 12 valgus HTO alone vs. 14 valgus HTO + ACLR
- No change in instability vs. grade 1 lachman 11/13
negative pivot 12/13
- No ROM deficit same
- OA progression OA progression
- Overall 23/26 patients able to play recreational sports
- Good or excellent results seen more often in HTO + ACLR group

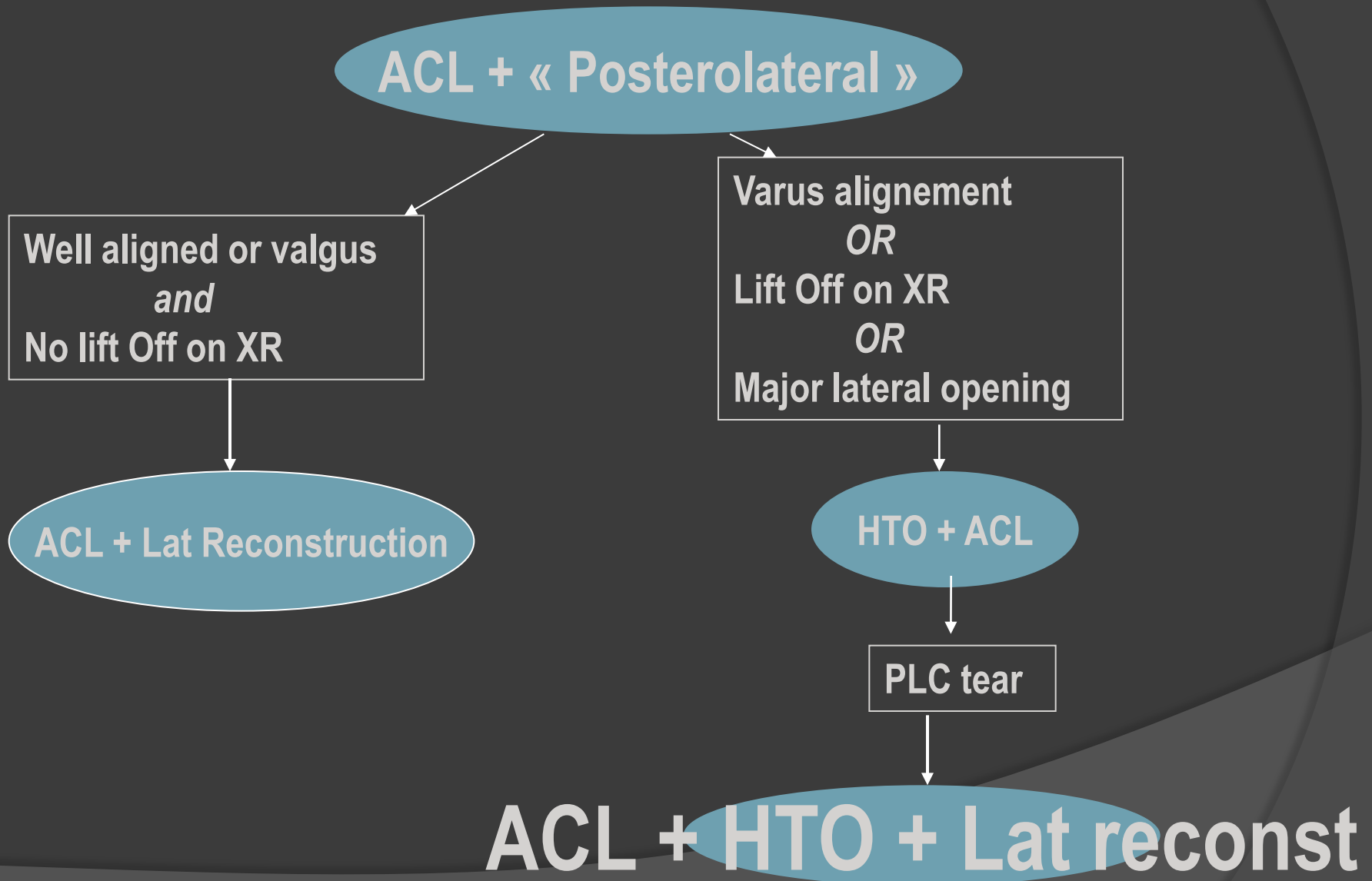
Clinical studies

- ⦿ Knee 2004 Dec; 11(6):431-7
- ⦿ 29 patients (30 knees) retrospectively reviewed
- ⦿ Previous single-stage ACLR + valgus HTO
- ⦿ 19/30 had previous medial meniscectomy
- ⦿ 2/30 major complications --> stiffness
- ⦿ 12yr f/u (6-16)
 - 5/30 had progressed one arthritis grade
 - 14/30 returned to intensive sports
 - 11/30 played moderate sports
 - Avg. difference in anterior tibial translation (vs. Normal side) was 3mm

Take Home message

- Active patients with ACL deficiency and unicompartamental arthritis may benefit from ACL reconstruction and osteotomy with improved pain and return to recreational activities
- Radiographic (& clinical) progression of OA may be delayed or may be unchanged.
- Good clinical results in case of ACL and PLC deficiency

Posterolateral Laxity: Place of HTO



Thank you for your attention