



# Acute lateral ligament injury – Pearls and Pitfalls



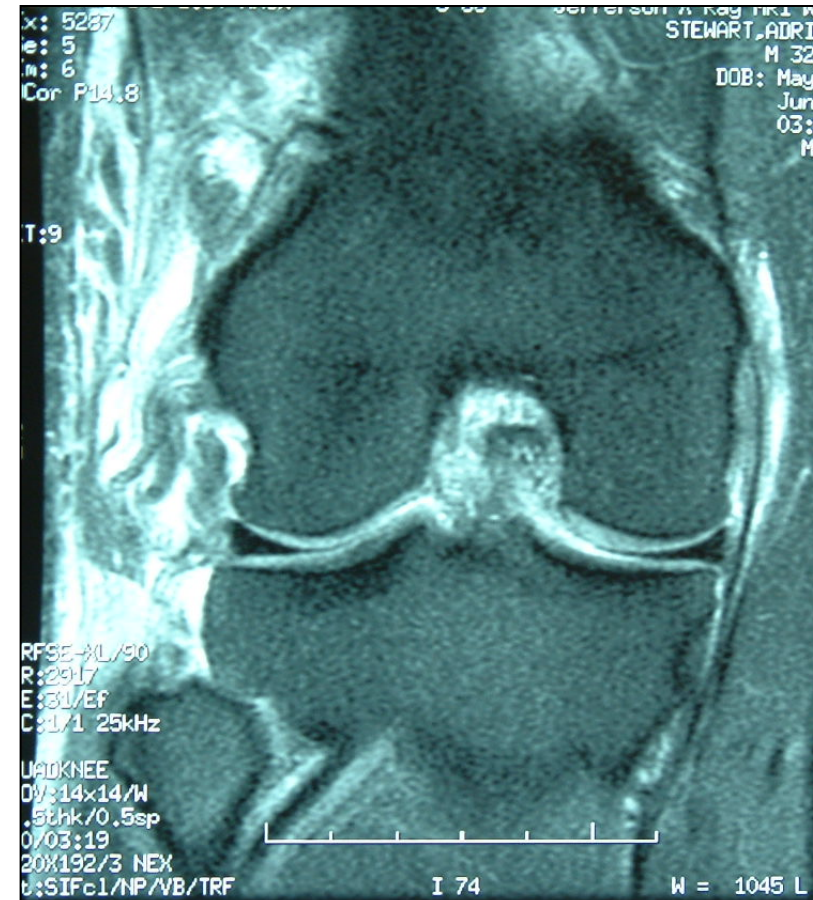
DUBAI

Lateral collateral ligament (LCL)  
and  
Posterolateral corner (PLC)  
are often involved together

Diagnosis is very difficult:

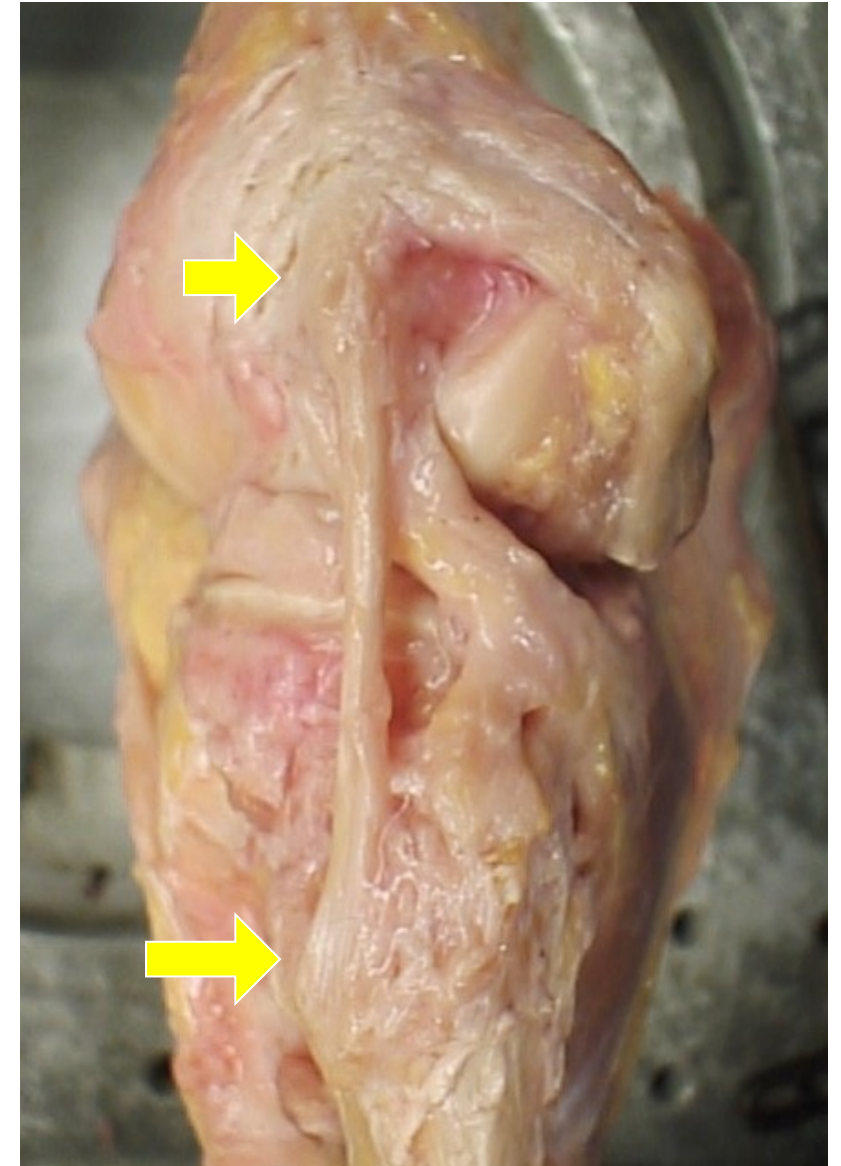
- Clinical exam
- MRI
- Arthroscopy

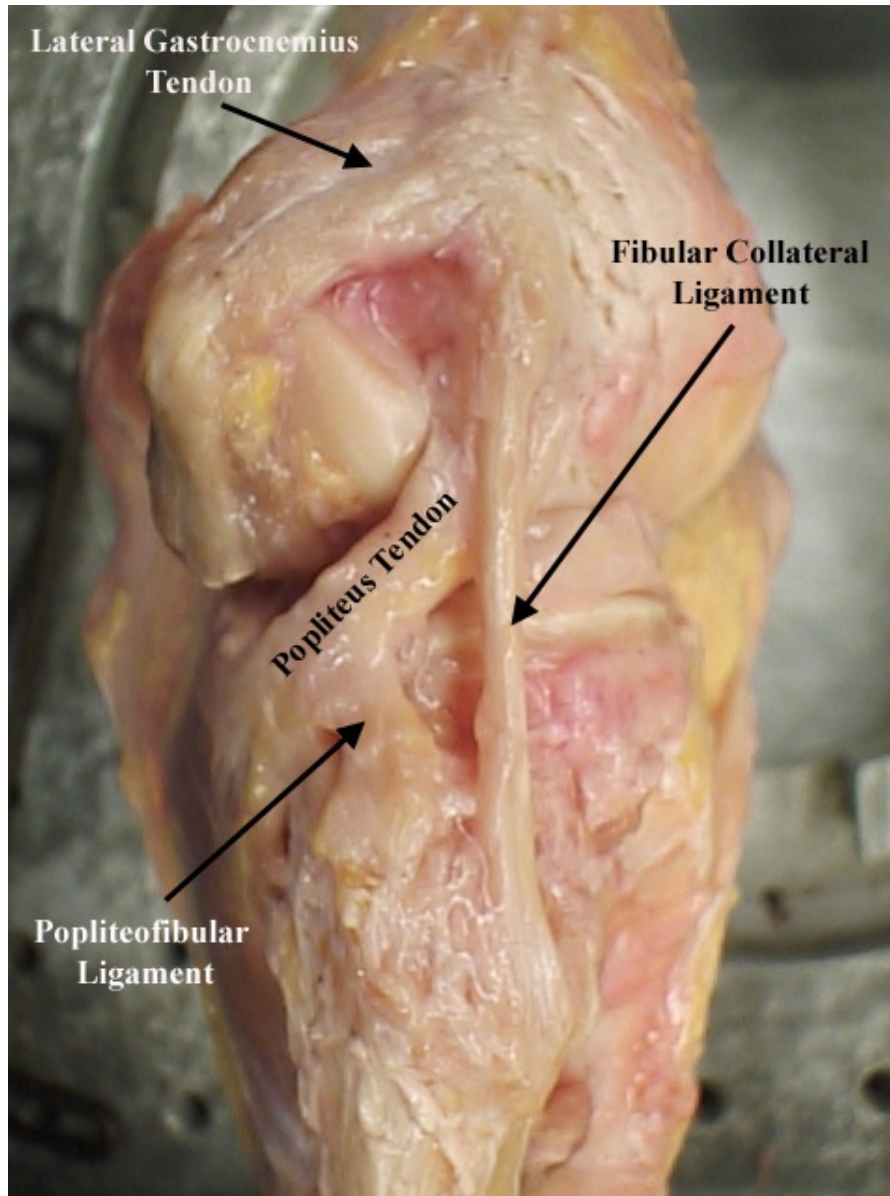
(lateral joint opening  $> 1\text{cm}$  /  
drive through sign)



## LCL

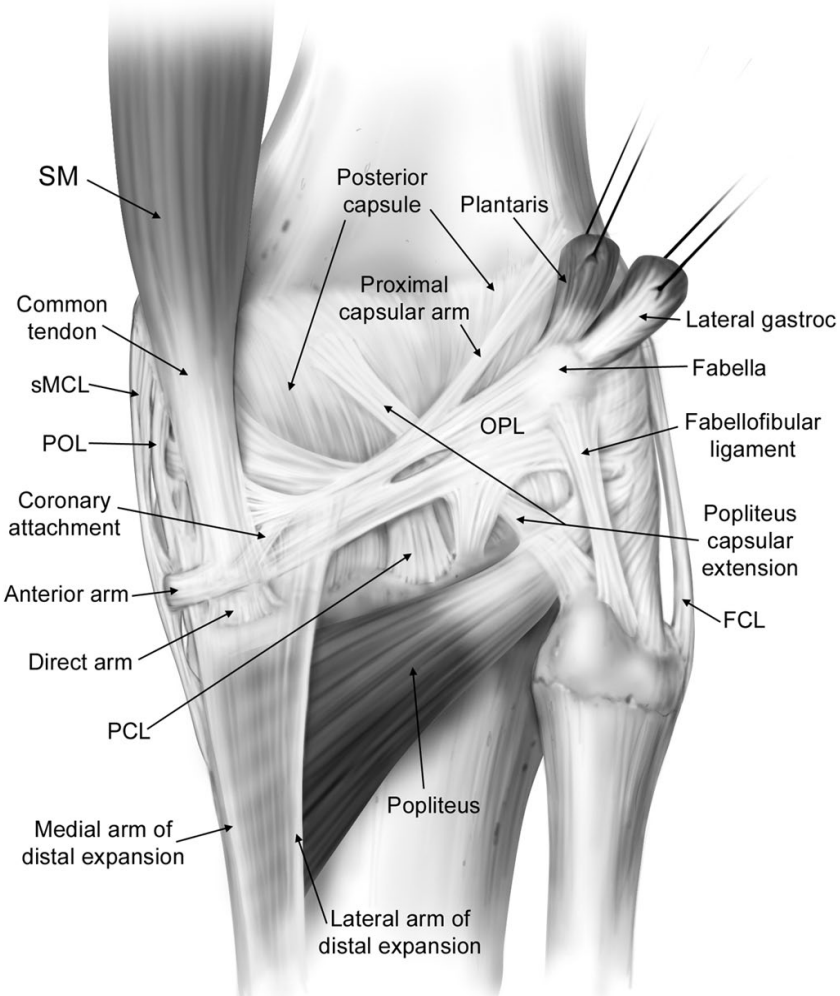
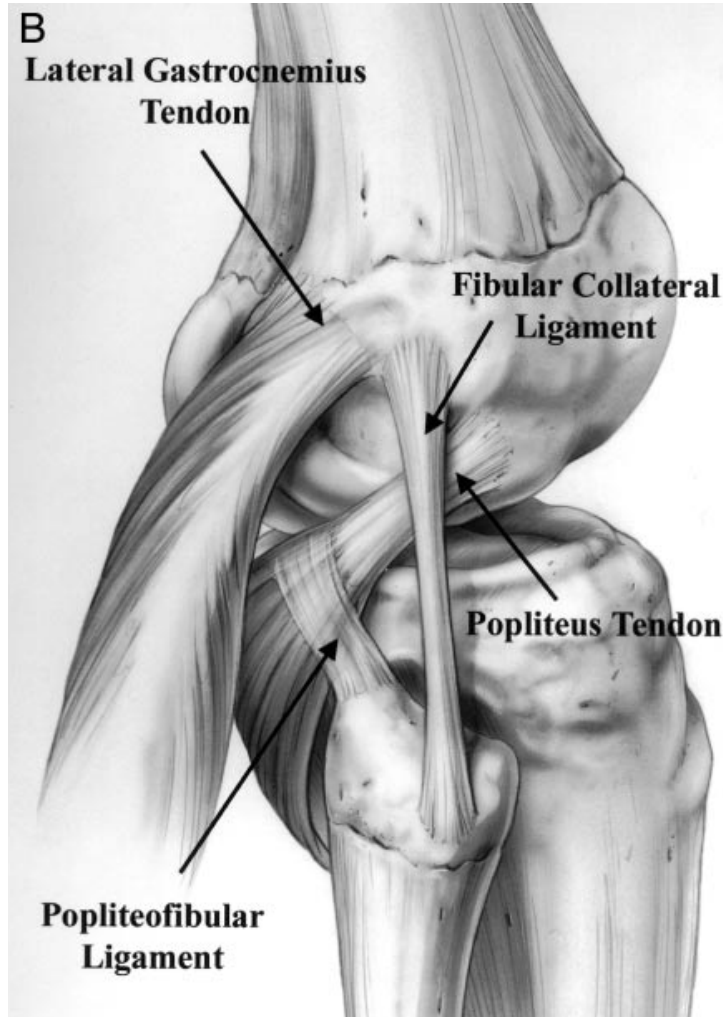
- #1 varus stabilizer
- Origin proximal / posterior to lateral epicondyle
- Midway along fibular head

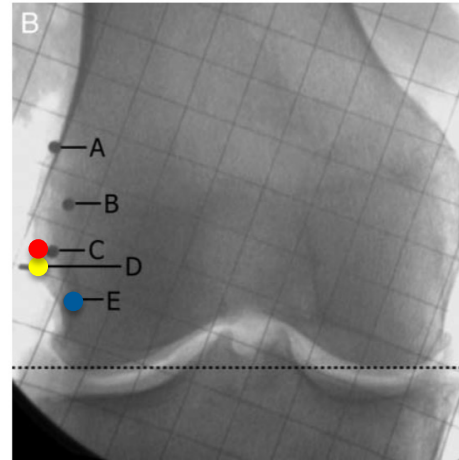
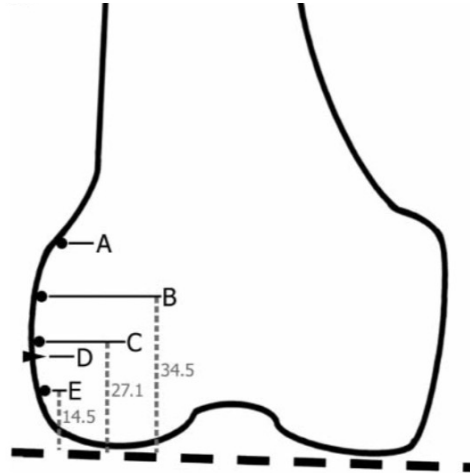




Stabilizer to posterolateral rotation

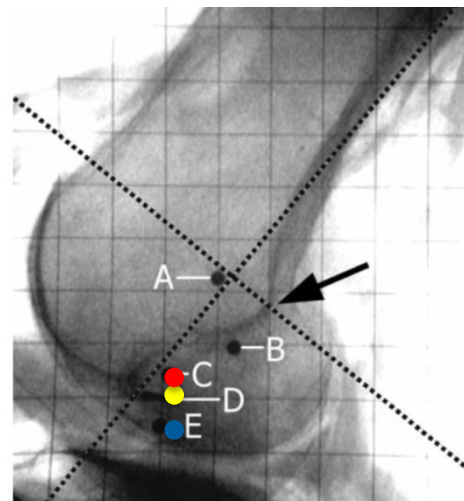
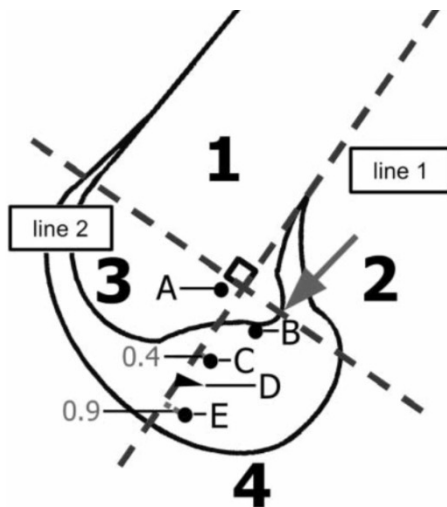
- Popliteus femoral attachment
- Popliteomeniscal fascicles
- Popliteofibular ligament
- Popliteal aponeurosis to lateral meniscus

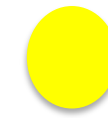
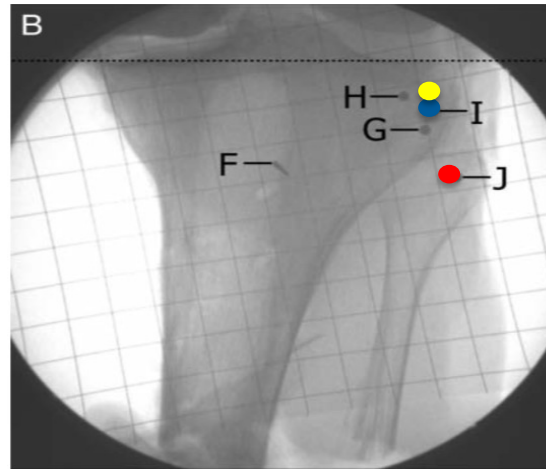
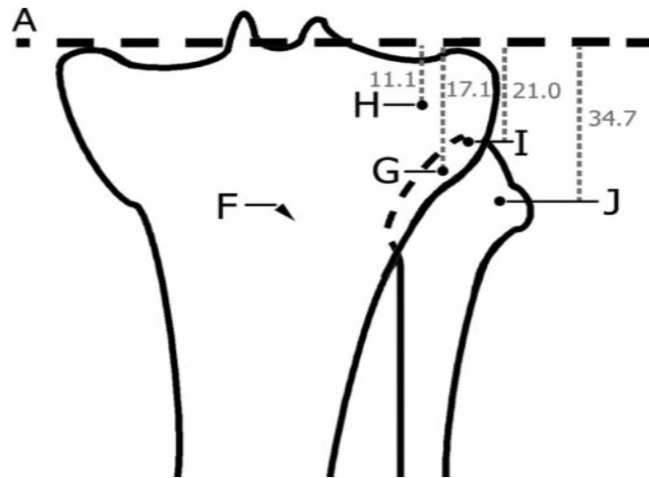




## Lateral femoral epicondyle as reference

- Epicondyle
- LCL
- Popliteus tendon (lower and anterior)





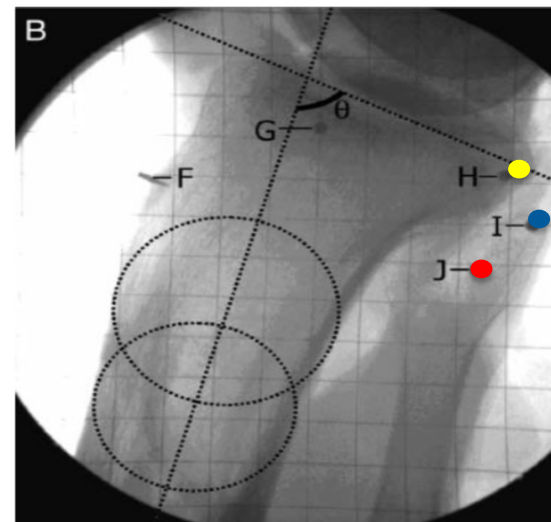
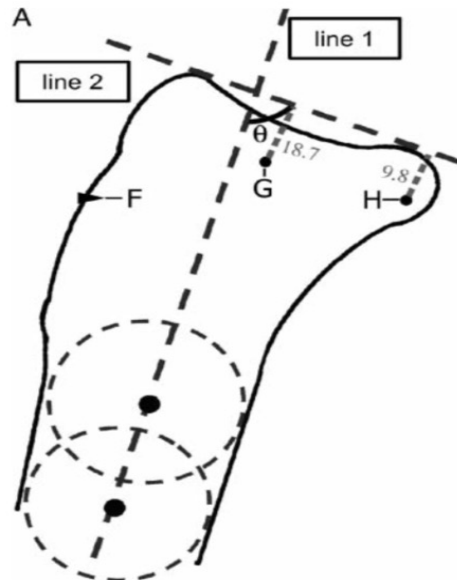
Musculotendinous junction (popliteus)



LCL



Popliteofibular lig.

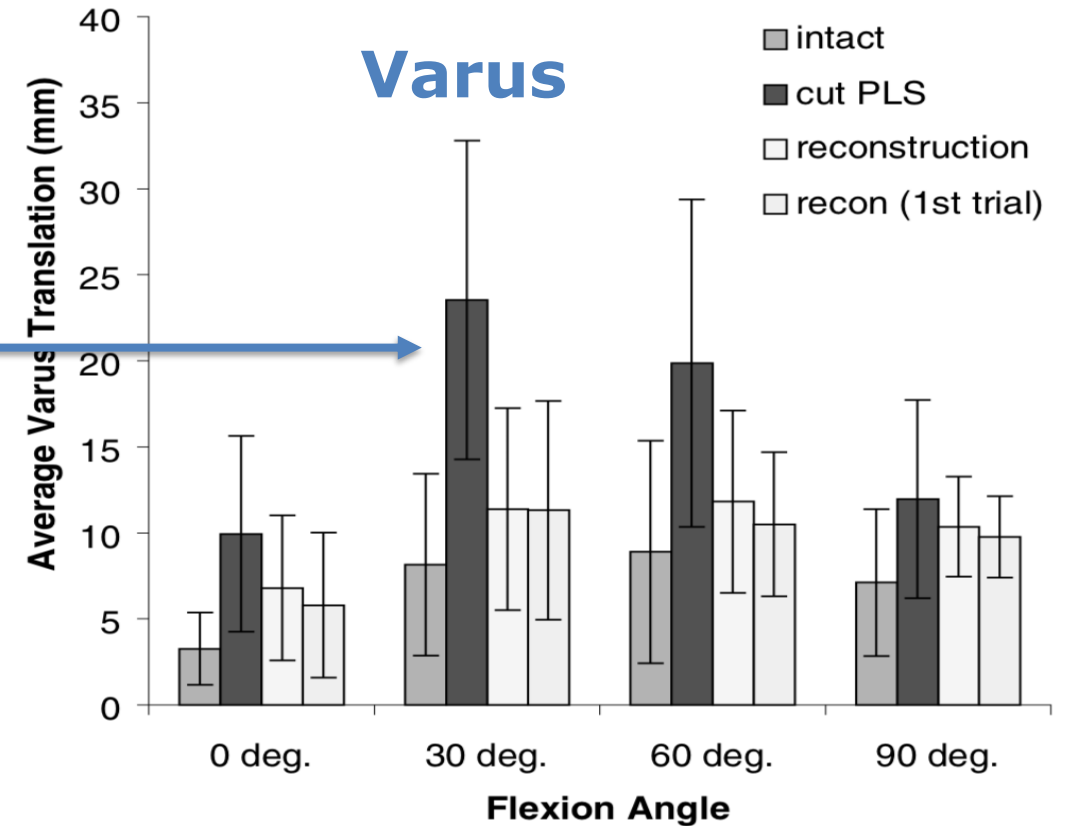
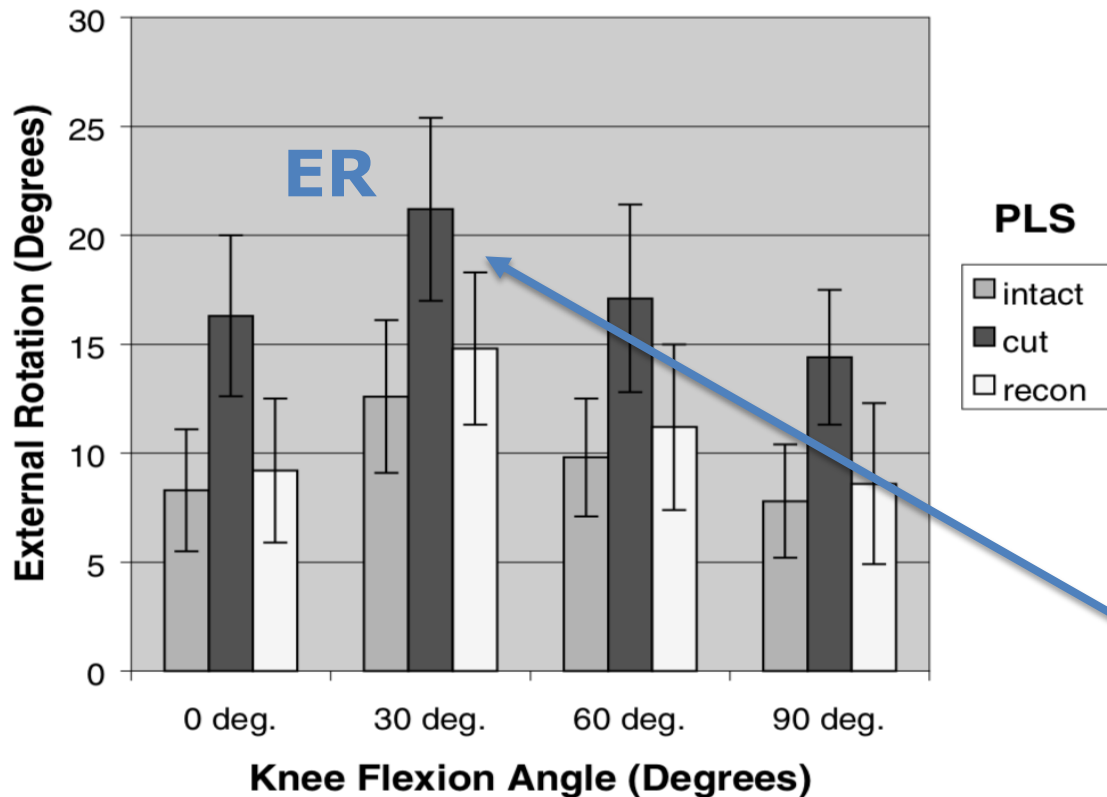




# Biomechanics

## LCL

- Varus stress ( $> 30-60^\circ$  flexion)
- Anterolateral rotation (with flexion)



## Popliteus/popliteofibular ligament

- Posterolateral rotation
- External tibial rotation

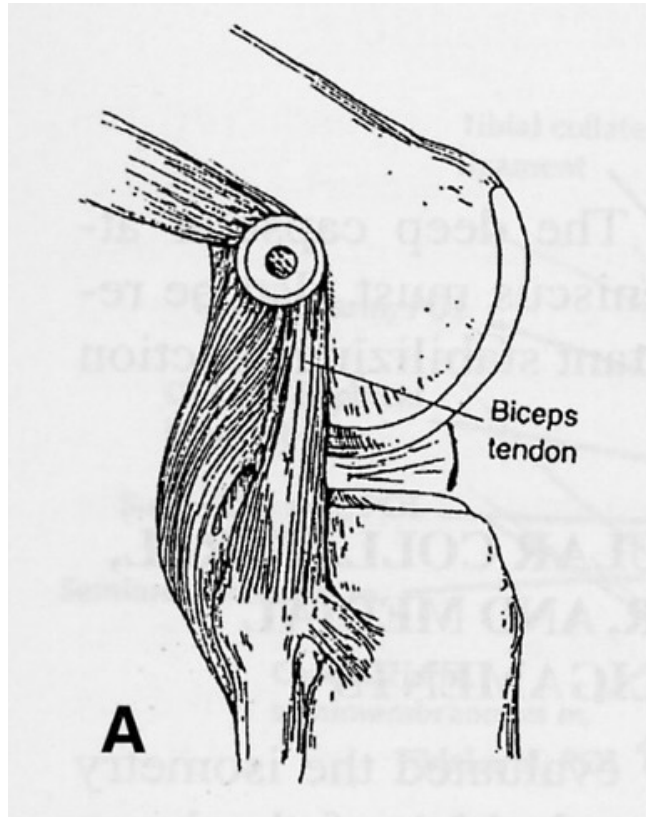


- Varus/valgus opening @30 deg: LCL / MCL
- Varus/valgus opening @0 deg: LCL/MCL+PCL/ACL
- Increased ER of tibia @30 deg:  
PCL alone (rare)
- Increased ER of tibia @90 deg:  
PCL +PLC





# Technique Pearls + Pitfalls



Biceps tenodesis

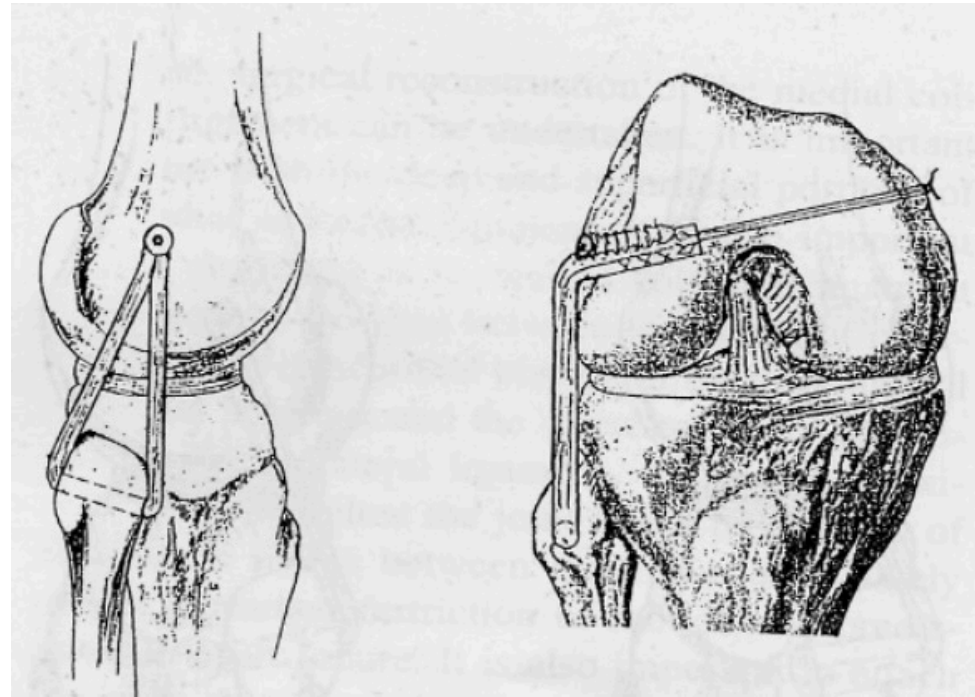
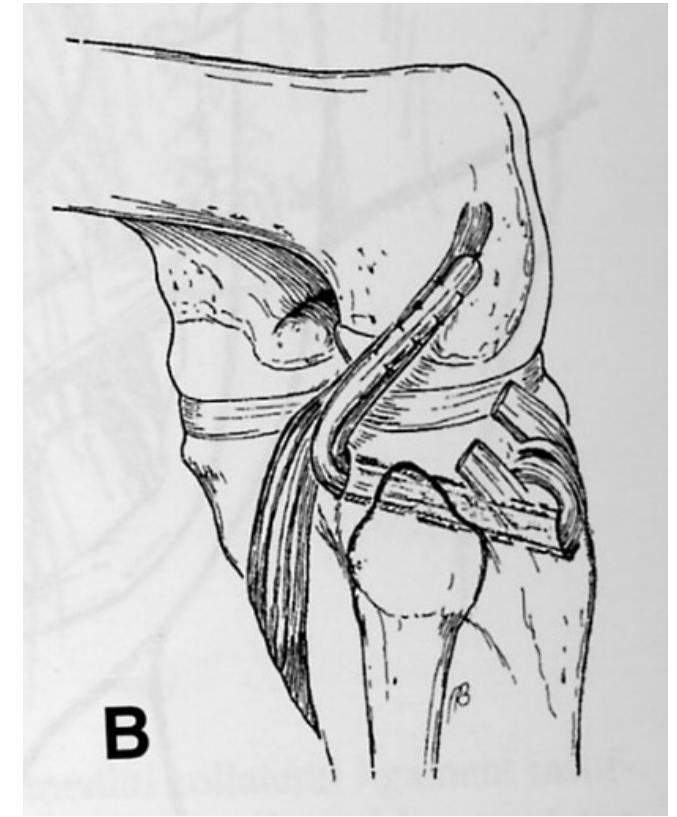


Fig. of 8 (Larson)



Popliteus bypass (WeMüller)



Modified Larson

vs.

Arciero

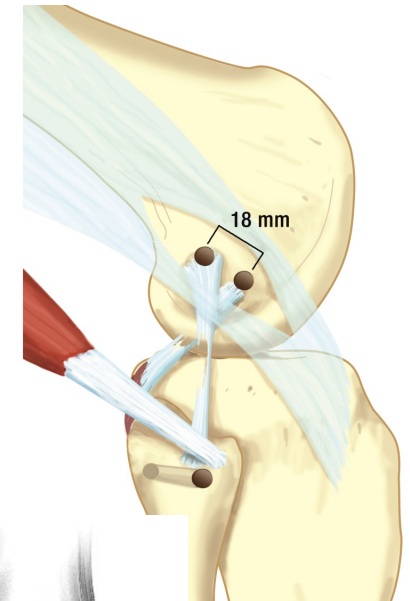
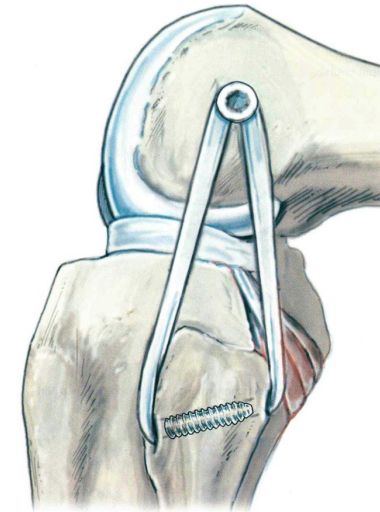
vs.

LaPrade

Biomechanically „no difference“ ?

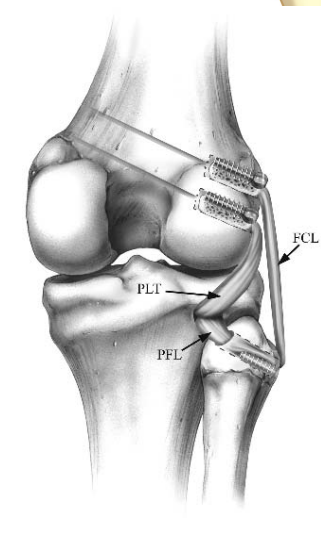
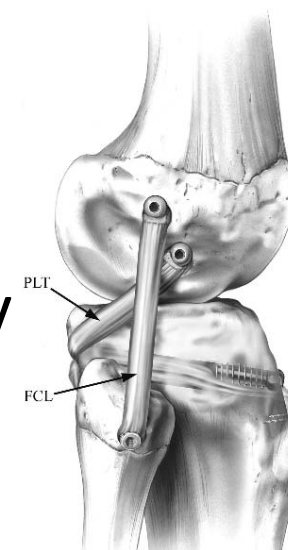
## Modified Larson / Arciero

- Augmentation of an acute repair with Fibertape
- **Primarily varus instability** with little posterolateral rotation



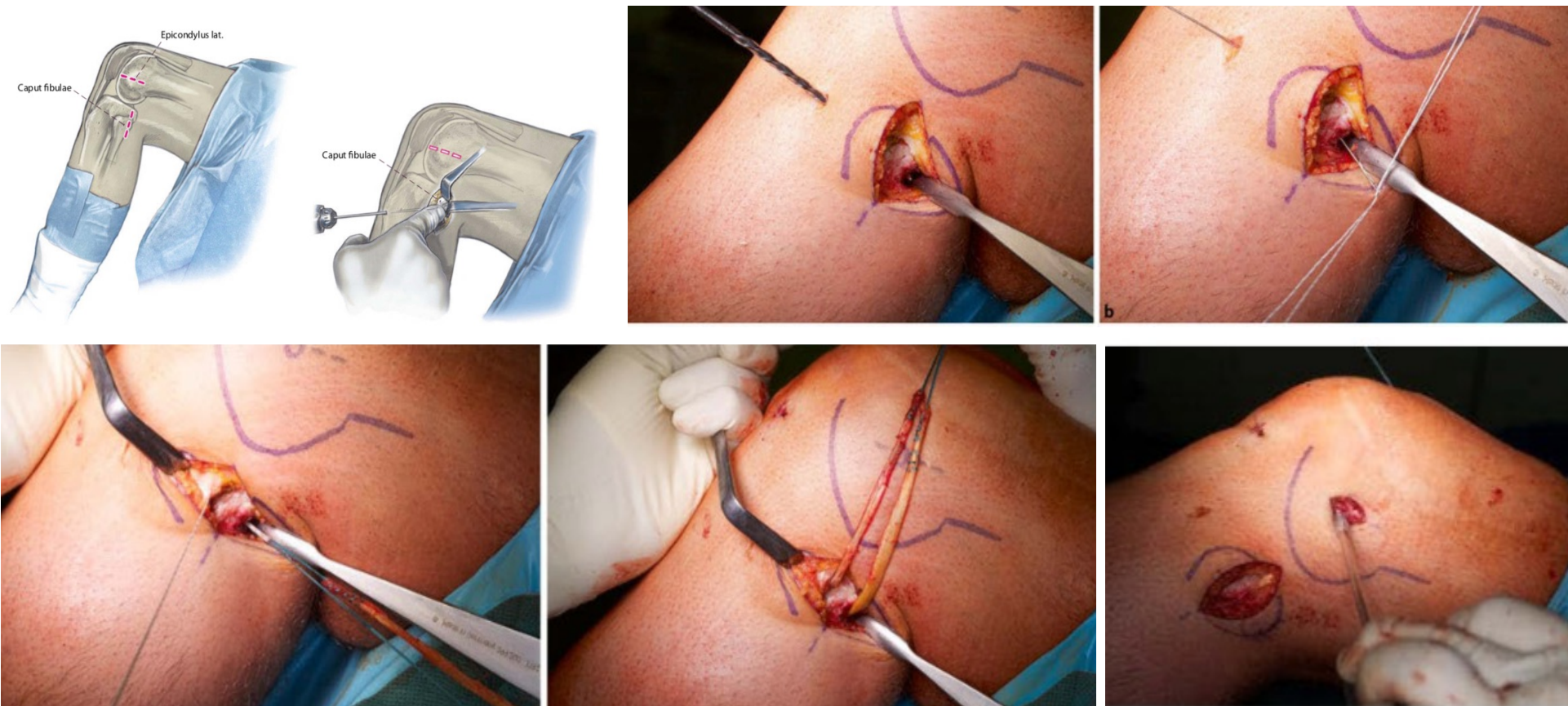
## LaPrade or Popliteus bypass

- If **significant posterolateral** rotatory instability

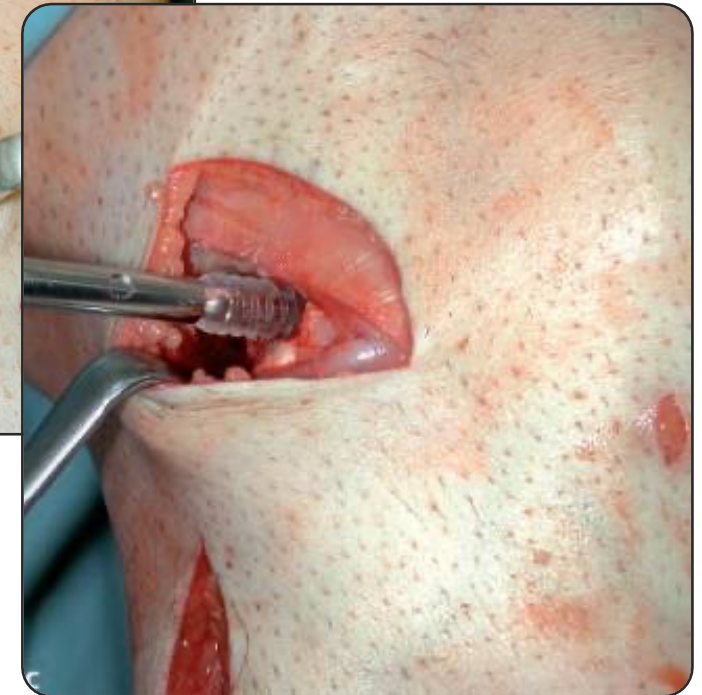
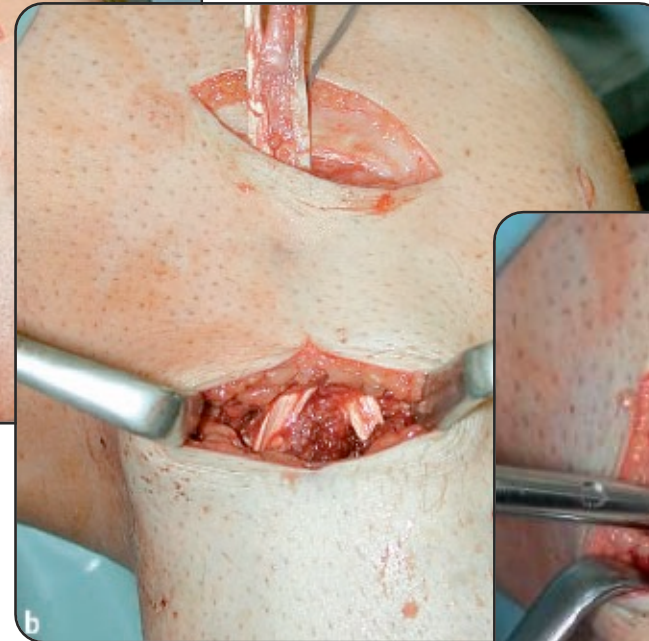
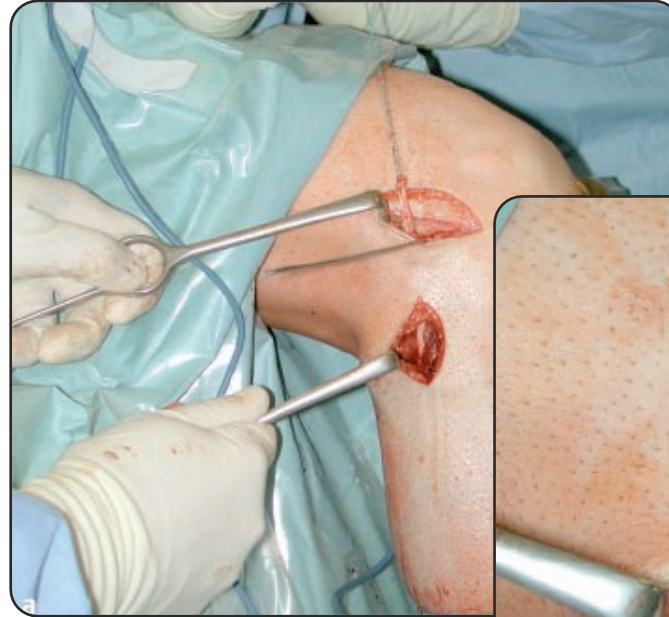
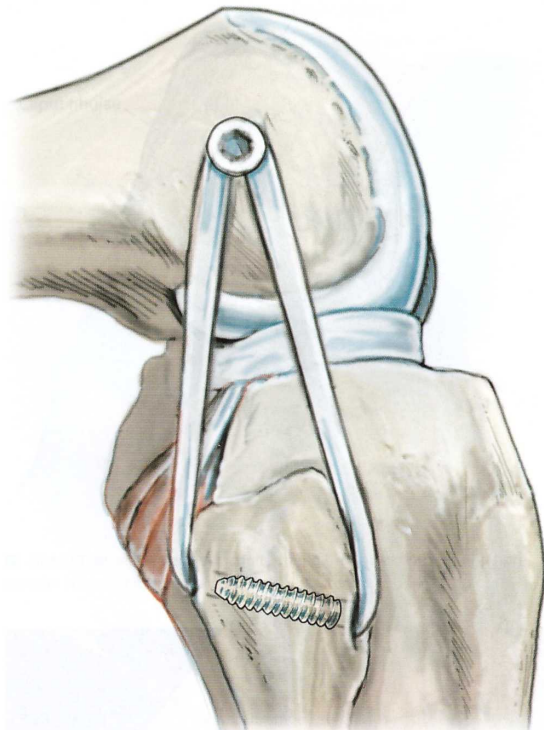


# LCL augmented repair– Modified Larson/Arciero

Isometric fixation at 30° with internal rotation and valgus with fibertape and swivelock

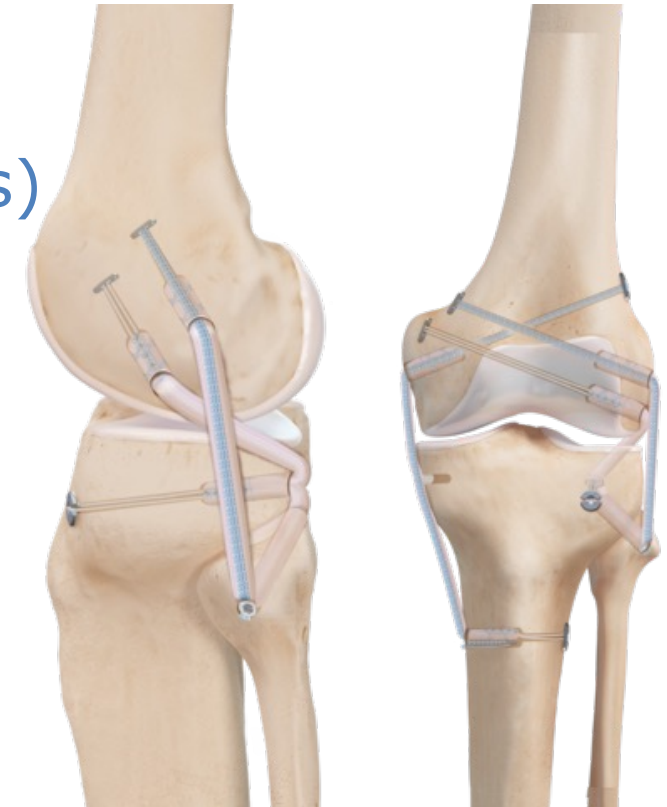
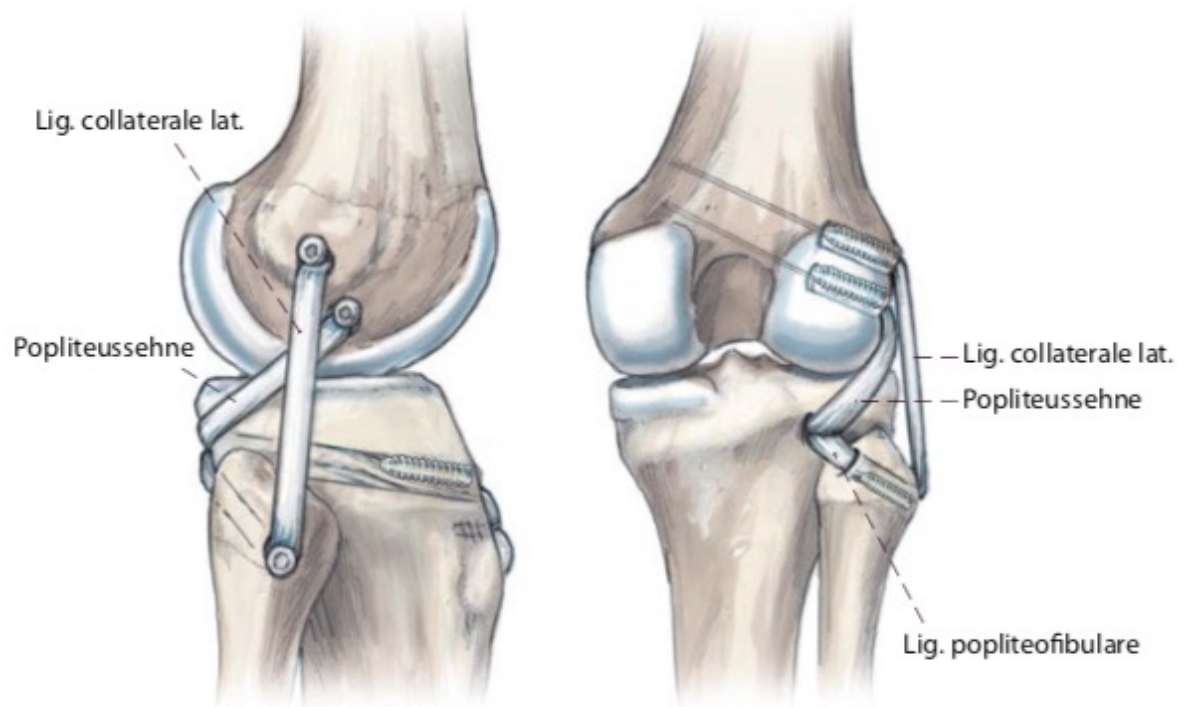


# Rekonstruktion of PLC (mod. Larson)



## Anatomic

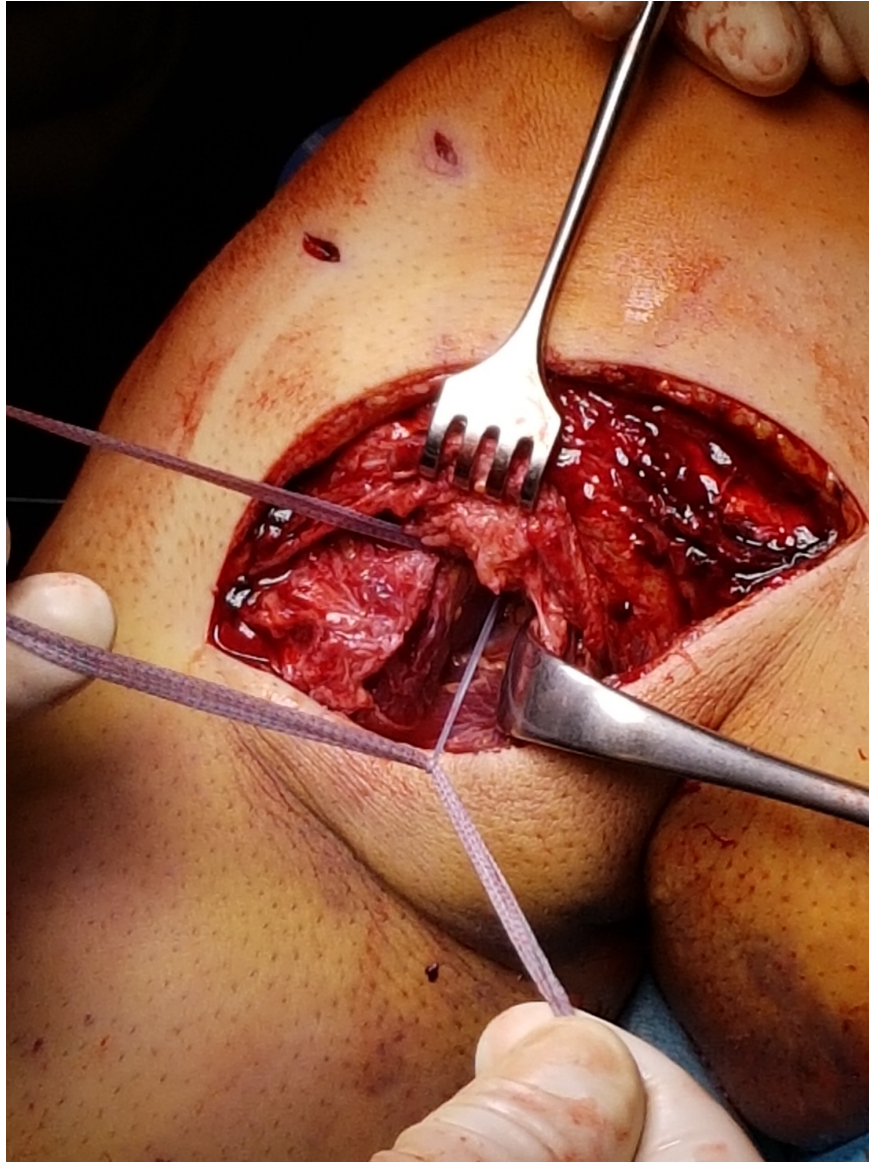
- LCL fixation at 20° (neutral rotation and valgus)
- Popliteus bypass fixation at 60°



Imhoff, Feucht, Springer, 2017  
LaPrade et al., Am J Sports Med, 2004



# Posterolateral Corner (used as additional portal)





# Postoperative Care

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- Brace in extension
- prevent posterior sag
- Much slower
- Restrict WB 6-8 weeks
- Start flexion 3-4 weeks
- Avoid Hamstring for 3 mos.

90% success rate

## A Systematic Review of the Outcomes of Posterolateral Corner Knee Injuries, Part 2 CME

### Surgical Treatment of Chronic Injuries

Samuel G. Moulton,\* BA, Andrew G. Geeslin,† MD, and Robert F. LaPrade,\*\*§ MD, PhD  
Investigation performed at the Steadman Philippon Research Institute, Vail, Colorado, USA

Postoperative Mean Subjective Lysholm and IKDC Scores and Objective Classification of Success vs Failure<sup>a</sup>

Author (Year)	Subjective Scoring		Objective Classification		
	Lysholm	IKDC	Criteria <sup>b</sup>	Success, n	Failure, n
Fanelli et al <sup>8</sup> (2014)	91.8		Examination	33	1
Kim et al <sup>20</sup> (2013)	86.3		Radiograph	53	12
Zorzi et al <sup>38</sup> (2013)		86.0	Examination	17	2
Kim et al <sup>18</sup> (2012)	90.1		Radiograph	21	2
Noyes and Barber-Westin <sup>31</sup> (2011)			Radiograph	10	3
Yoon et al <sup>37</sup> (2011)	86.4	75.3	Examination	31	1
Kim et al <sup>21</sup> (2011)	85.6		Radiograph	36	10
Kim et al <sup>19</sup> (2011)	86.6		Radiograph	40	2
Jakobsen et al <sup>16</sup> (2010)			Examination	26	1
LaPrade et al <sup>23</sup> (2010) <sup>c</sup>		62.6	Examination	50	4
Schechinger et al <sup>34</sup> (2009)	89.9	81.3	Examination	9	0
Noyes and Barber-Westin <sup>32</sup> (2007)			Examination	13	1
Fanelli and Edson <sup>7</sup> (2004)	91.7		Examination	41	0
Harner et al <sup>12</sup> (2004)	65.5		Examination	1	1
Wang et al <sup>35</sup> (2002)	86.0		Examination	21	4

<sup>a</sup>IKDC, International Knee Documentation Committee.



# Alignment and collateral ligament reconstruction DIE



## The Impact of Osseous Malalignment and Realignment Procedures in Knee Ligament Surgery

### A Systematic Review of the Clinical Evidence

Thomas Tischer,<sup>\*,††</sup> MD, Jochen Paul,<sup>†§</sup> MD, Dietrich Pape,<sup>†||</sup> MD, Michael T. Hirschmann,<sup>†¶</sup> MD, Andreas B. Imhoff,<sup>†#</sup> MD, Stefan Hinterwimmer,<sup>†\*\*</sup> MD, and Matthias J. Feucht,<sup>†††</sup> MD

**Conclusion:** In cases of complex knee instability, the 3-dimensional osseous alignment of the knee should be considered (eg, mechanical weightbearing line and tibial slope). In cases of failed ACL reconstruction, the tibial slope should be considered, and slope-reducing osteotomies are often helpful in the patient revised multiple times. In cases of chronic PCL and/or PLC instability, osseous correction of the varus alignment may reduce the failure rate and is often the first step in treatment. Changes in the mechanical axis should be considered in all cases of instability accompanied by early unicompartmental osteoarthritis.

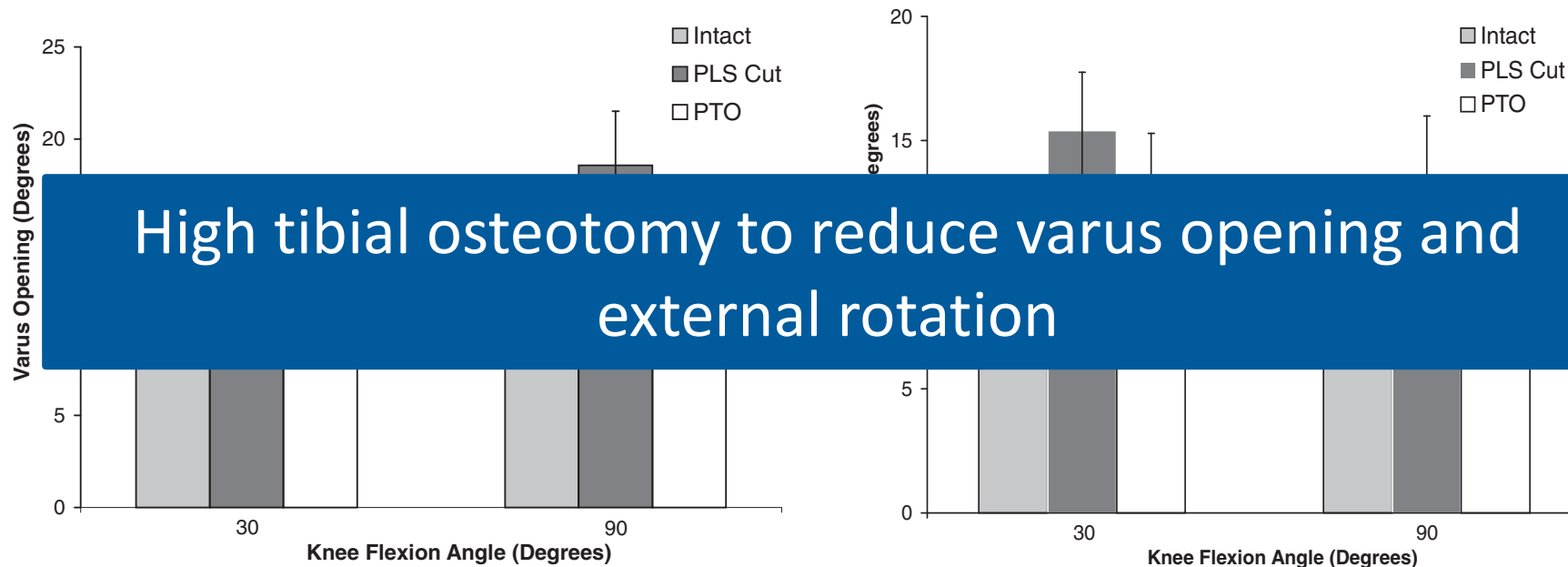
Little evidence

**Osseous alignment should be considered, especially in chronic cases to reduce the failure rate**

*Tischer, Imhoff et al., OJSM, 2017*

## An Analysis of the Causes of Failure in 57 Consecutive Posterolateral Operative Procedures

Factor	Acute Subgroup		Chronic Subgroup	
	Index PL Procedure <sup>a</sup> No. of Knees	Revision PL Procedures <sup>b</sup> No. of Procedures	Index PL Procedure <sup>c</sup> No. of Knees	Revision PL Procedures <sup>d</sup> No. of Procedures
<b>Varus malalignment as a reason for failure in 37%</b>				
Primary repair chronically deficient tissues	0	0	8	1
Traumatic reinjury	1	0	1	0
Unknown	0	1	0	1
ACL rupture <sup>e</sup>	6	2	9	14
PCL rupture <sup>e</sup>	2	1	3	0
ACL and PCL ruptures <sup>e</sup>	4	0	3	2





# HTO for PLC Injuries and Varus Malalignment

UNIVERSITÄRE  
SPORTORTHOPÄDIE



21 patients, isolated HTO (to 57%) without PLC surgery

**32% with good** clinical result after 37 months

**In 62% secondary PLC reconstruction** due to symptomatic posterolateral instability

# The concept of „Internal Bracing“

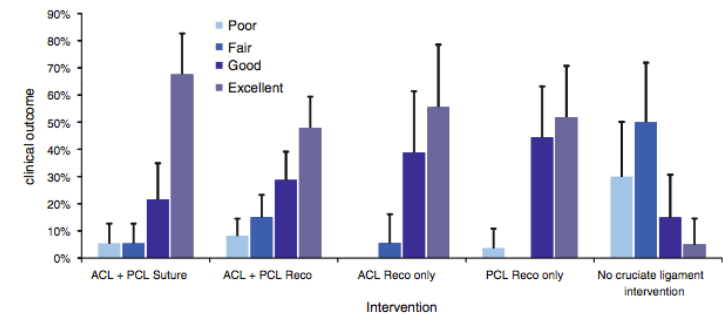
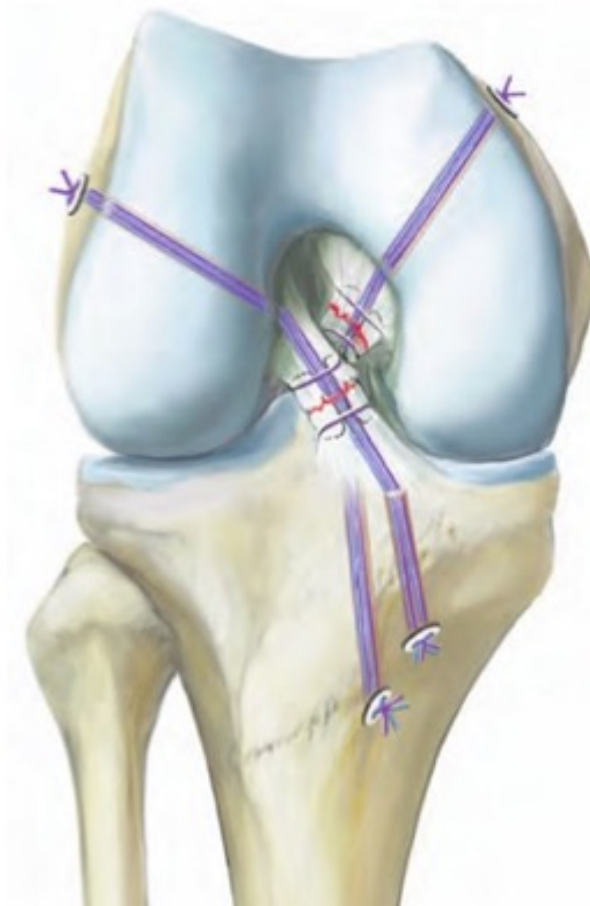
Reconstruction of knee stability by primary ligament sutures and additional augmentation after knee dislocation.

### Methods

- Meta-Analysis of 9 studies including 195 patients (200 knees) with a mean age of 31.4 ( $\pm 13$ ) years

### Conclusion

- Conservative treatment yields poor clinical response.
- Suture repair of cruciate ligaments can still be an alternative treatment option for type III and IV knee dislocations, (Schenck's classification) and can achieve good clinical results, which are comparable to that of ligament reconstructions.





# Case: 1 year after bilateral PCL brace / LCL / posterolateral reconstruction



Imhoff · Feucht Eds.

# Surgical Atlas of Sports Orthopaedics and Sports Traumatology



Surgical Atlas of Sports Orthopaedics  
and Sports Traumatology

Andreas B. Imhoff  
Matthias Feucht  
*Editors*

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