



17<sup>th</sup> European Congress of  
Trauma & Emergency Surgery

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OGU Österreichische  
Gesellschaft für  
Unfallchirurgie

# Focal lesions in knee surgery

## Burt KLOS MD PhD

### Netherlands



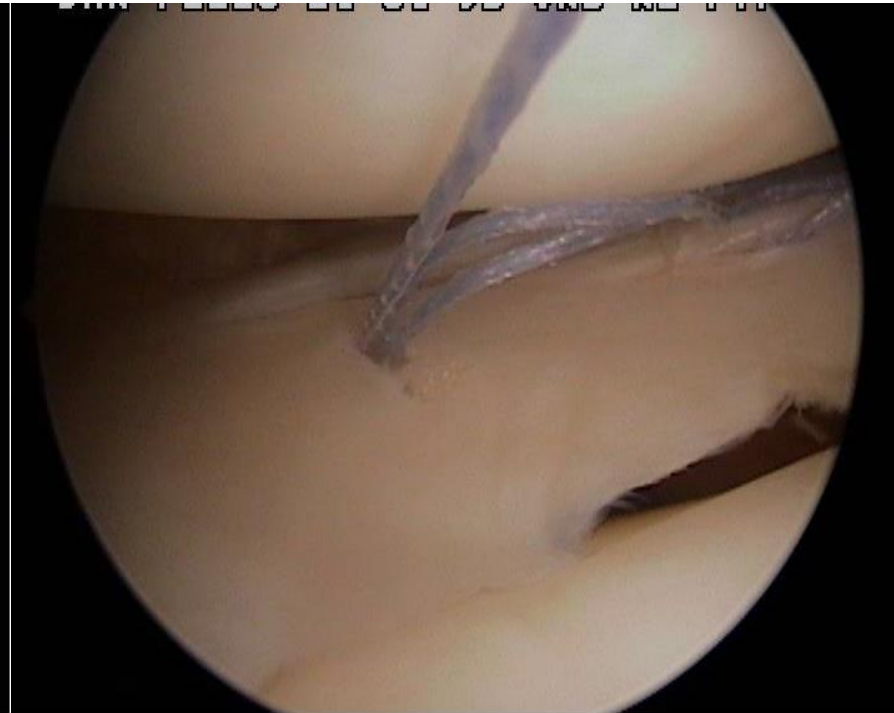
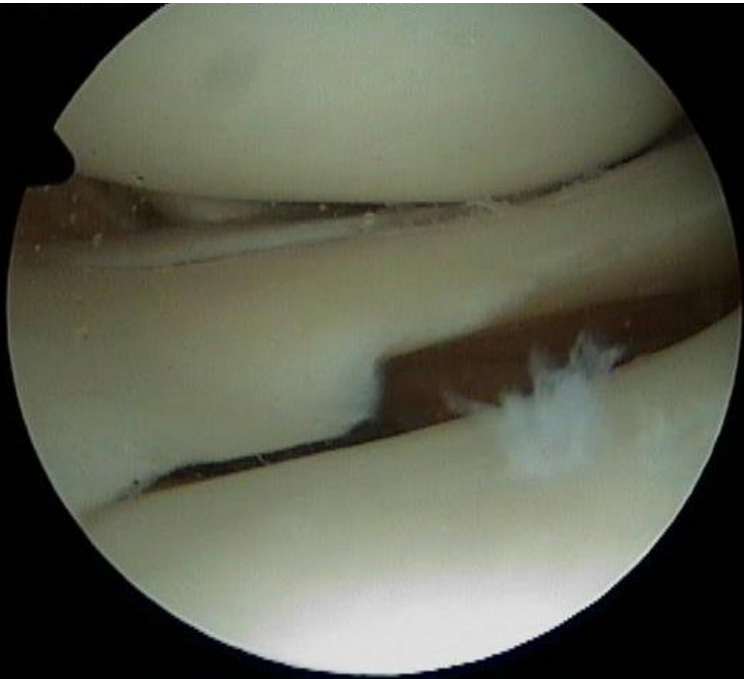
ICONE

# Knee injury

- Combined injuries
  - Ligament / meniscus
  - Ligament / cartilage
  - Ligament / EA structures
  - Subsequent/ secondary injury

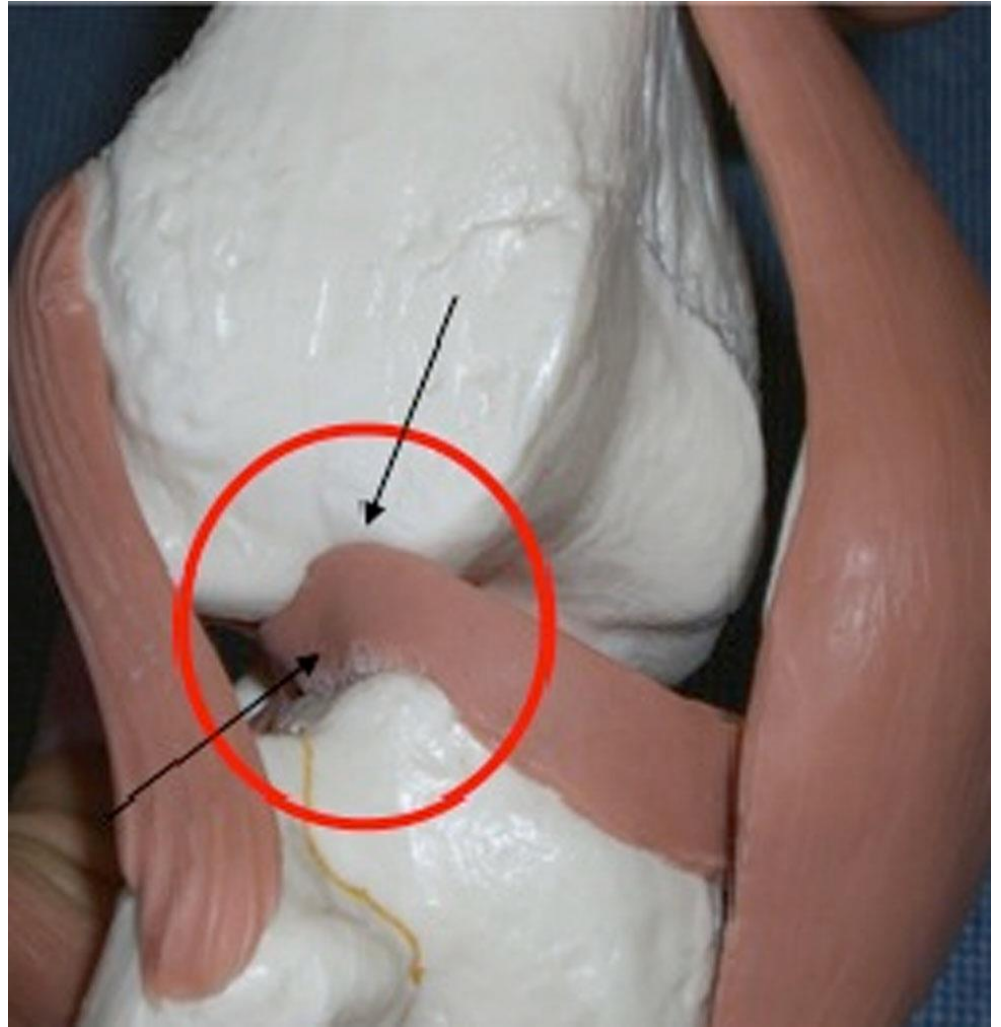
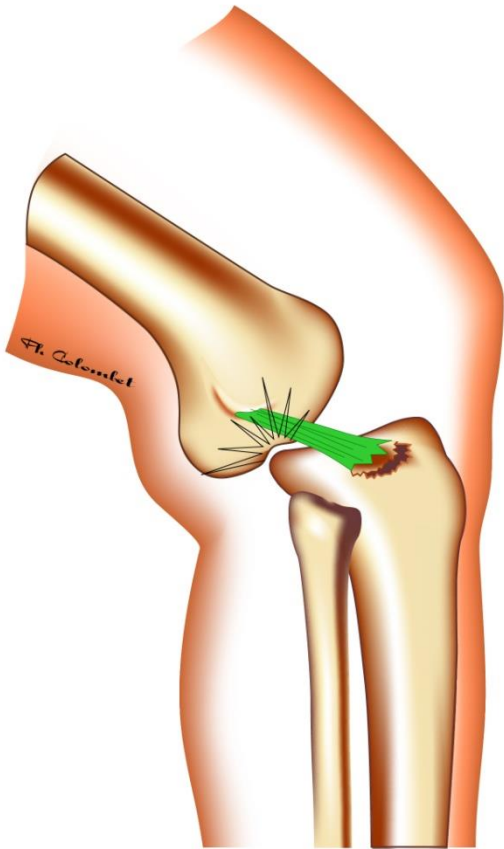
# Combined lesions

- Meniscus repair

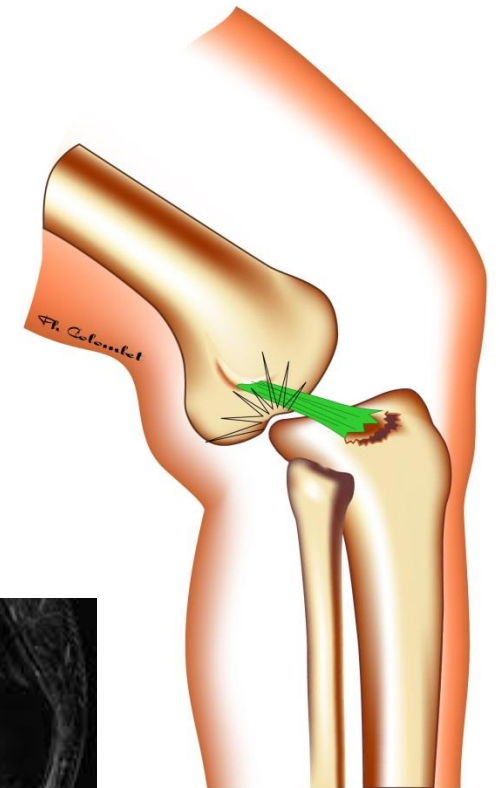


# Combined lesions

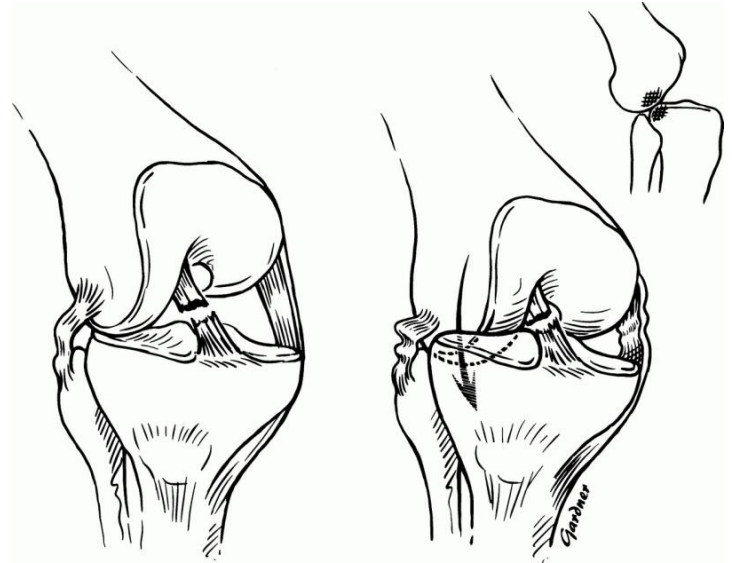
courtesy Ph Colombet , Ch Fink



# Primary injury / plain X ray information



# Segond fractuur



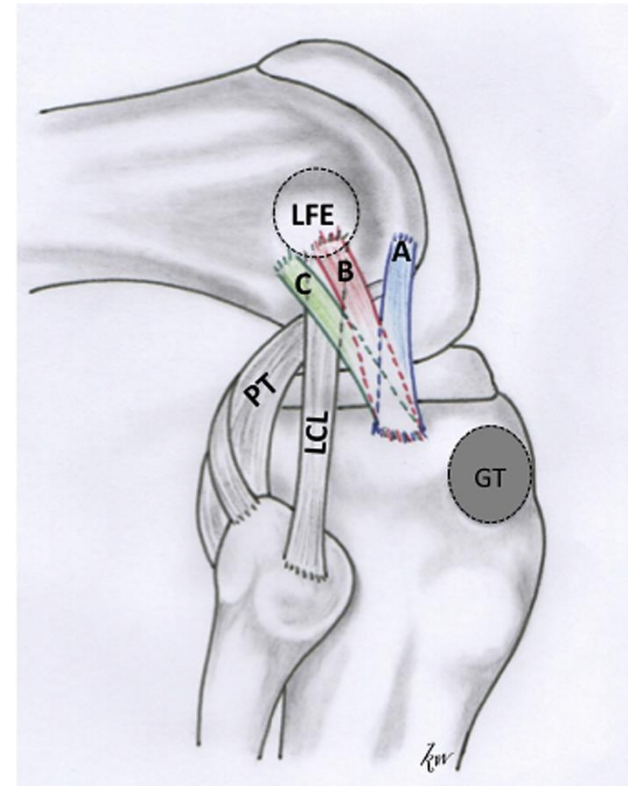
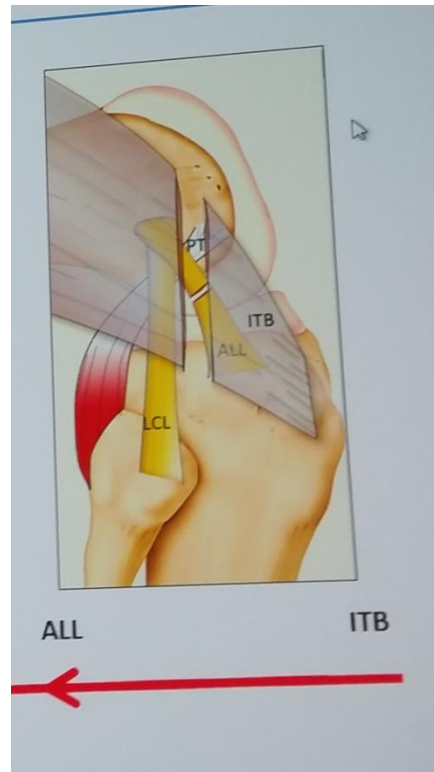
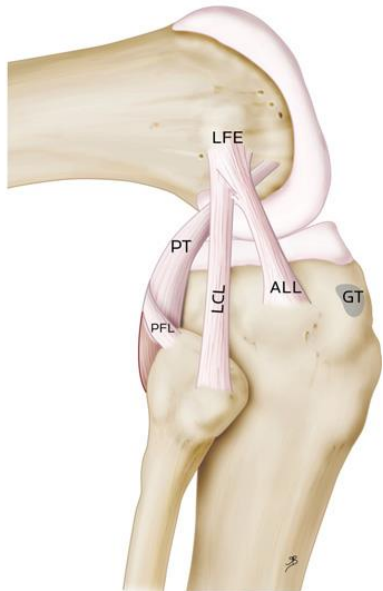
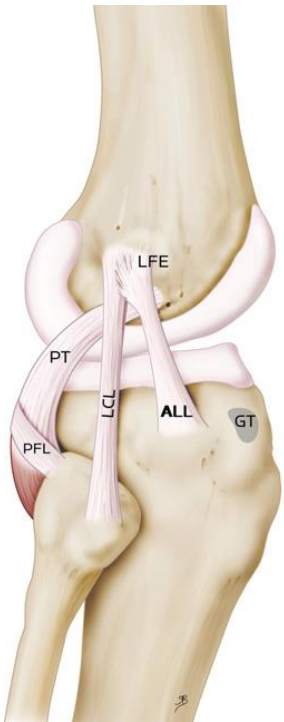


# ALL anatomy 2016

Belgium

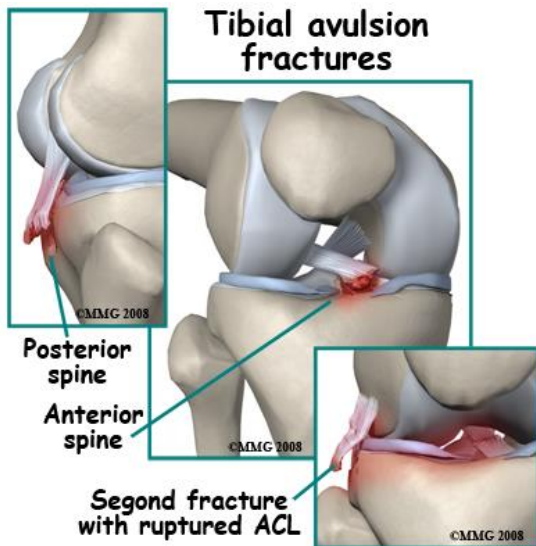
Lyon

Toulouse



# Hypothesis

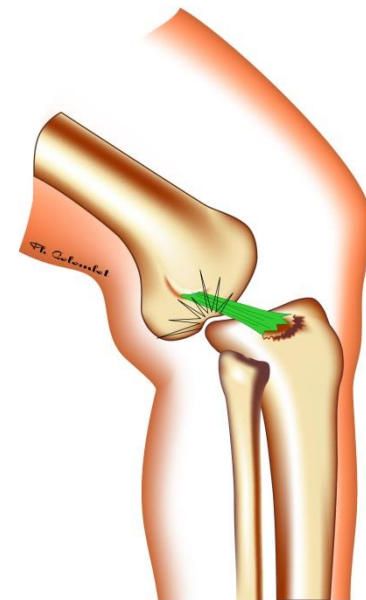
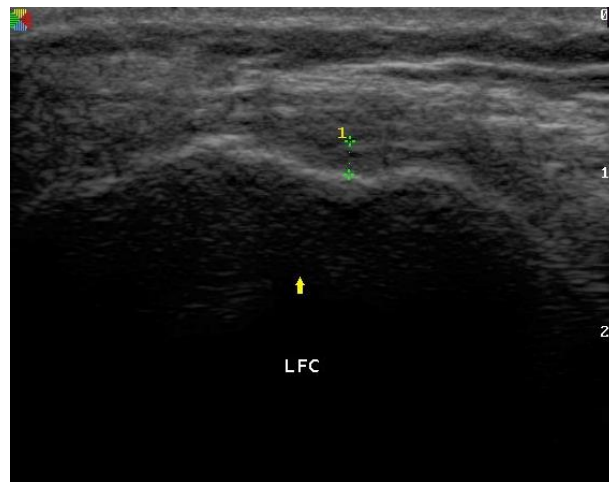
- Avulsion lesions are a possible goal for refixing important lateral structures.
- The same approach we have for lateral fibula and tibial spine avulsion fractures





# Ultrasound imaging

- 88 patients with ACL #
- 25 Segond lesions
- 70 Impaction # lateral FC

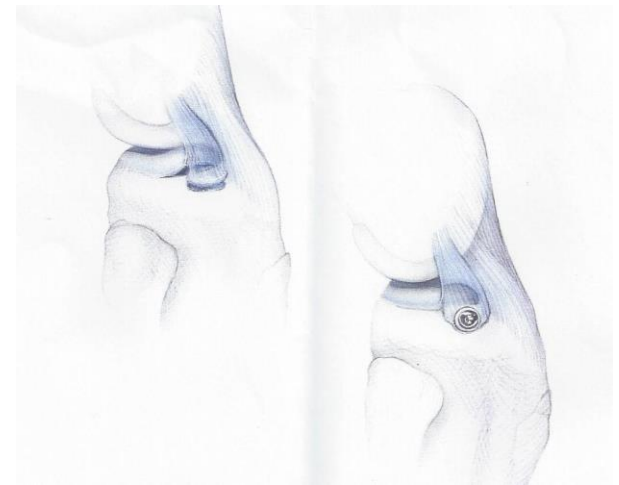


# US ALL ligament and #



# Imaging Segond avulsion


- Incidence in MRI 3 % Resnick USA 6 % AUS
- Incidence in X ray CORR Hess D 9 %
- Incidence ultrasound 28 % (ICONE)
- Higher velocity trauma ?
- Refixation / Feagin :



# Laxity check





TEST 90° - DRAWER  
REFERENCE POSITION



ACL  
Surgeries X

P T F  
1 2 C

DR24 - Drawn

R  

PRE-OP. LAXITIES

- DRAWER**
- ROTATION 90°
- LACHMAN
- ROTATION 30°
- VAR-VALG. STABILITY
- PIVOT-SHIFT
- PRE-OP. SUMMARY

FLEXION: 89°      ROTATION: 15° INT

Place the leg in the reference position for the drawer test (90°), without any drawer.

PRAXIM

# Rotation



**TEST 90° - ROTATION ACQUISITION**

Lateral (mm)

Ant 0 4 Post 4

Ext 13 13

Axial rotation (°)

Medial (mm)

Ant 2 3 Post 0 2

5 POSITIONS (MIN 10 - MAX 500)  
FLEXION: 82° ROTATION: 10° EXT

Perform the rotation test at 90°.  
BLUE pedal to stop the acquisition.

ACL Surgeries

P T F  
1 2 C

PRE-OP. LAXITIES

DRAWER

**ROTATION 90°**

LACHMAN

ROTATION 30°

VAR.-VALG. STABILITY

PIVOT-SHIFT

PRE-OP. SUMMARY

PRAXIM

# Peroperative imaging lift off lateral meniscus





# Data

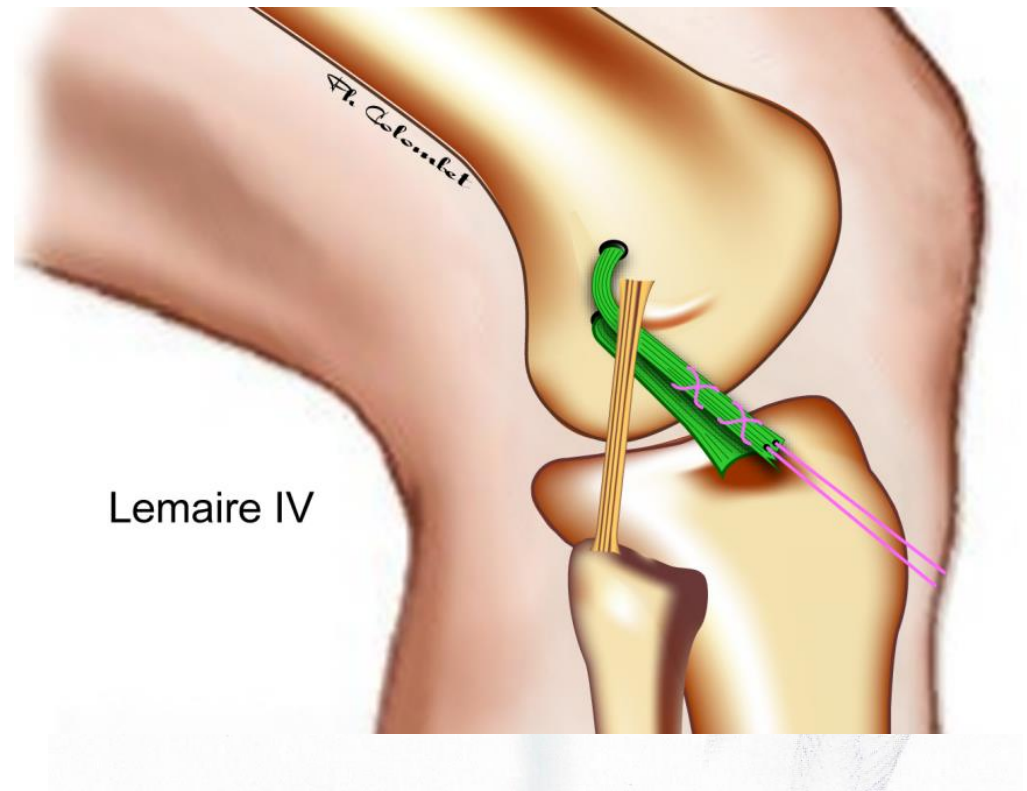
- 18 patients / knees .
- Second fracture with intra operative signs of displacement .
- Preoperative marking # on the skin .
- Staple fixation .
- 5 cases with navigation .



# Case Report : Refixing ALL / Second # Checking the pivot on the table is pulling the staple off / prove of importance in stability ?



# Refixing Segond or reconstruction AL complex ?



# Conclusion

- Validation study
- Importance of diagnosis (5>9>28 % )
- Ultrasound imaging ( increases 5x incidence )
- Distal avulsion lesions refixation in stead of reconstruction ?
- Clinical outcome ?

# ALL lesions (courtesy Ferretti)

## 60 ACL lateral exploration.

Type 0 No lesion 6 /60 patients (10%)

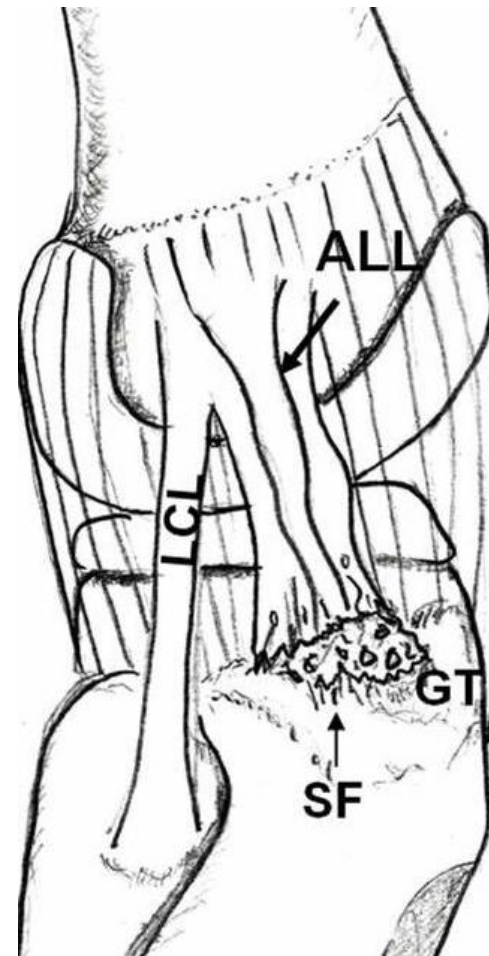
Type I Multilevel with macroscopic hemorrhage involving ALL 19/60 patients (31.6%)

Type II Multilevel rupture in which individual layers are torn extended from ALL and capsule to PL corner 16/60 patients (26.7%)

Type III

Complete transverse tear involving ALL near its insertion to the lateral tibial plateau 13/60 patients (21.7%)

Type IV Bony avulsion (Segond's fracture) 6/60 patients (10%)



# Ferretti 2008 importance secondary structures (ALL)

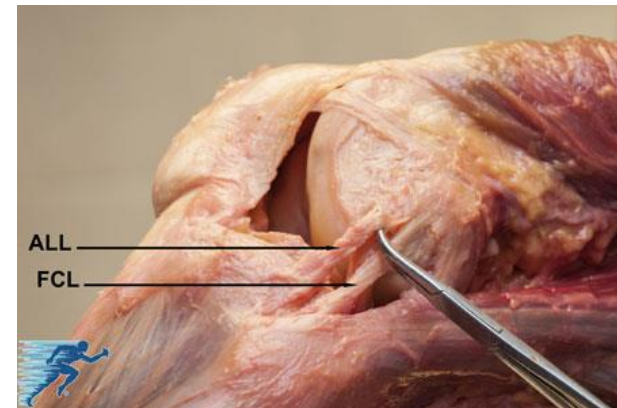
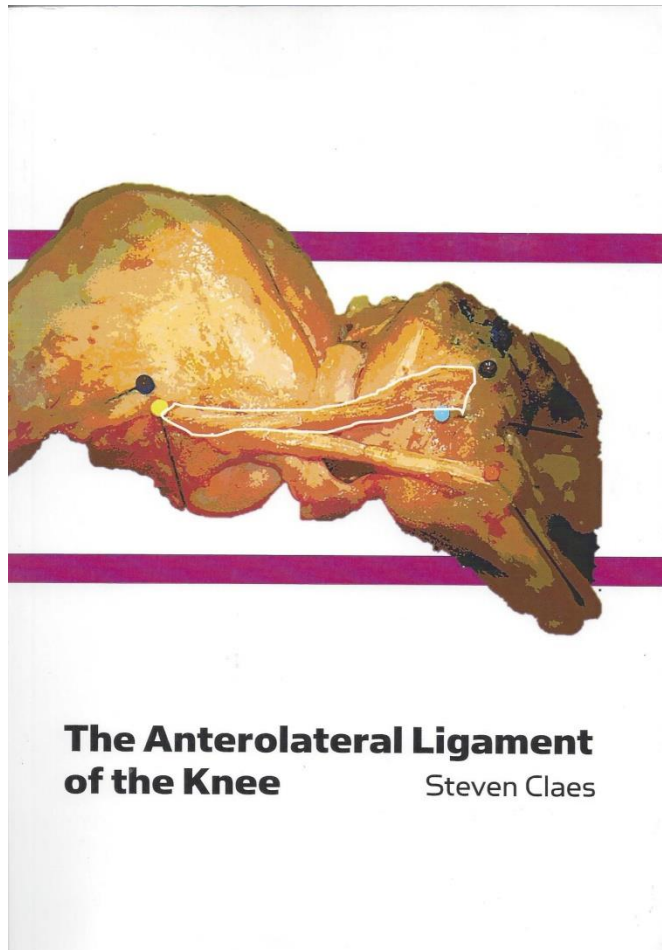
- A lesion to the anterolateral structures in the absence of
- the ACL resulted in an increase in combined rotation at all
- flexion angles, with statistically significant increases seen
- at 30, 45, and 60 ( $P < 0.05$ ).



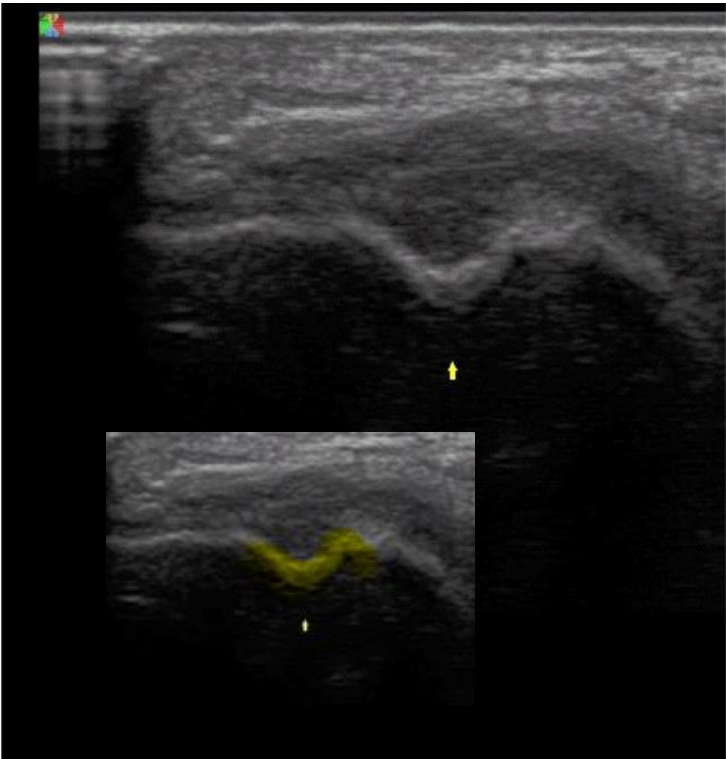
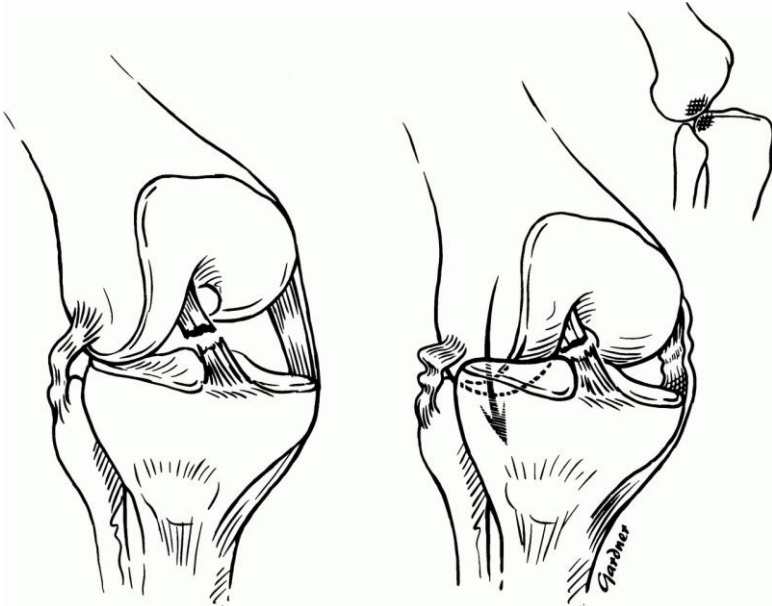


# ALL ligament ?

## November 2013 Belgium

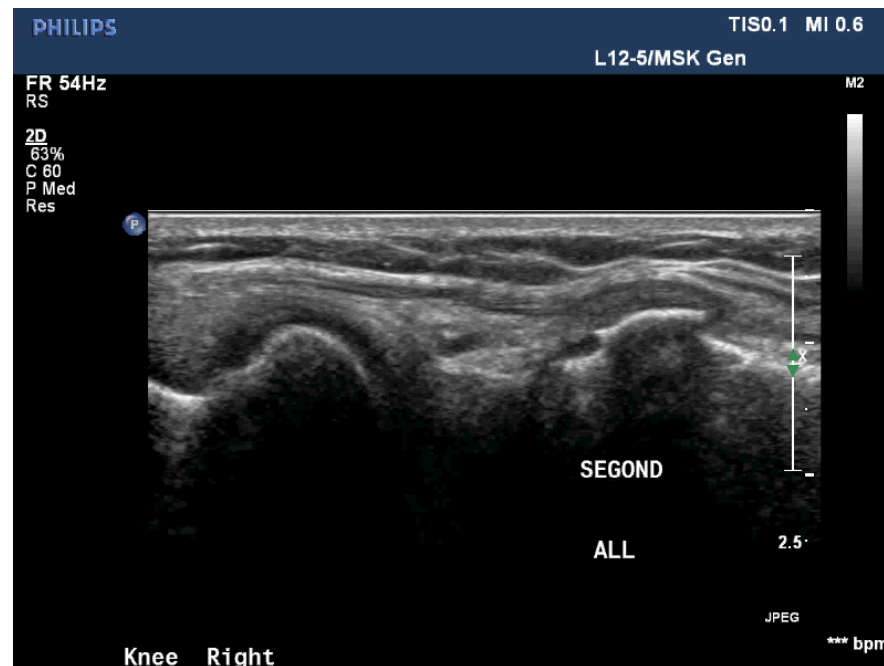


# Impaction lateral FC



# ALL in Anatomy / Ultrasound

- JBJS 2015 Dodds / Amis ALL in cadaver 83 %
- Claes in cadaver 96 %
- Cavaignac 2016 ALL Ultrasound (n = 18) 100 %

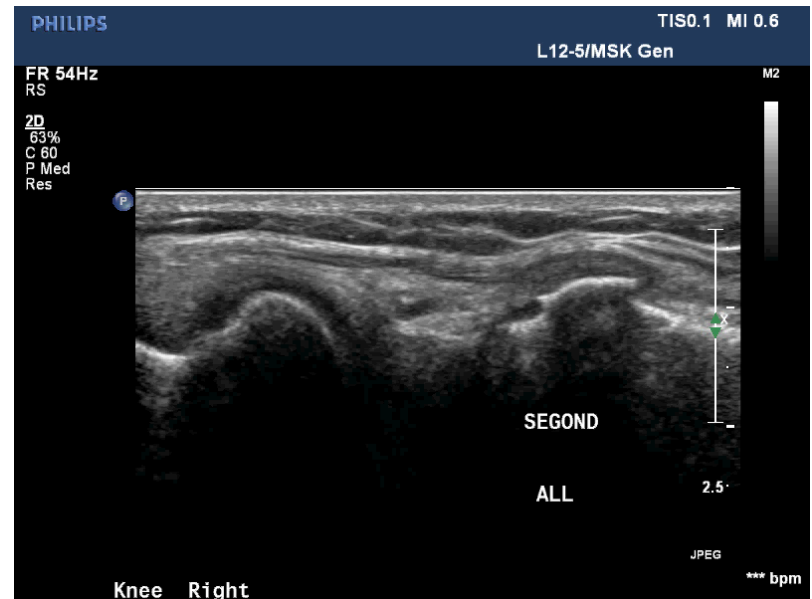


# Fluoroscopic laxity AP



# Ultrasound anatomy

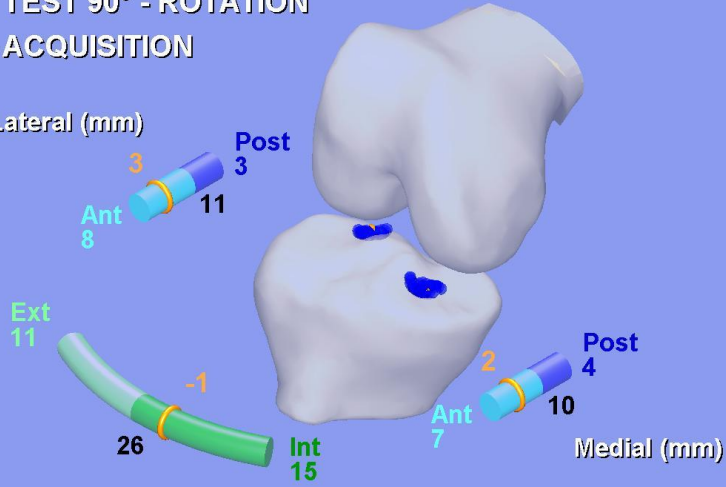
- Arthroscopy 2016
- Ultrasonographic Identification of the Anterolateral Ligament of the Knee
- Etienne Cavaignac, M.D. et al Toulouse



# Navigation

## TEST 90° - ROTATION ACQUISITION

Lateral (mm)



Axial rotation (°)

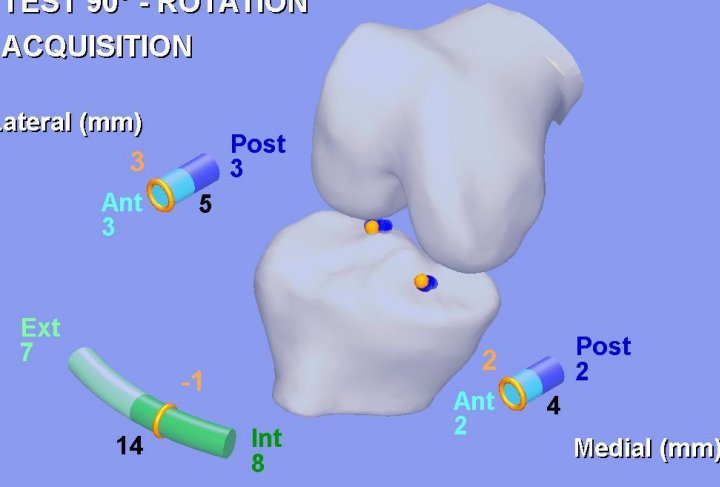
## ACL Surgetics X TEST 90° - ROTATION ACQUISITION

P T F  
1 2 C



- PRE-OP. LAXITIES
- DRAWER
- ROTATION 90°
- LACHMAN
- ROTATION 30°
- VAR.-VALG. STABILITY
- PIVOT-SHIFT
- PRE-OP. SUMMARY

Lateral (mm)



Axial rotation (°)

## ACL Surgetics X TEST 90° - ROTATION ACQUISITION

P T F  
1 2 C



- POST-OP. LAXITIES
- DRAWER
- ROTATION 90°
- LACHMAN
- ROTATION 30°
- VAR.-VALG. STABILITY
- PIVOT-SHIFT
- POST-OP. SUMMARY

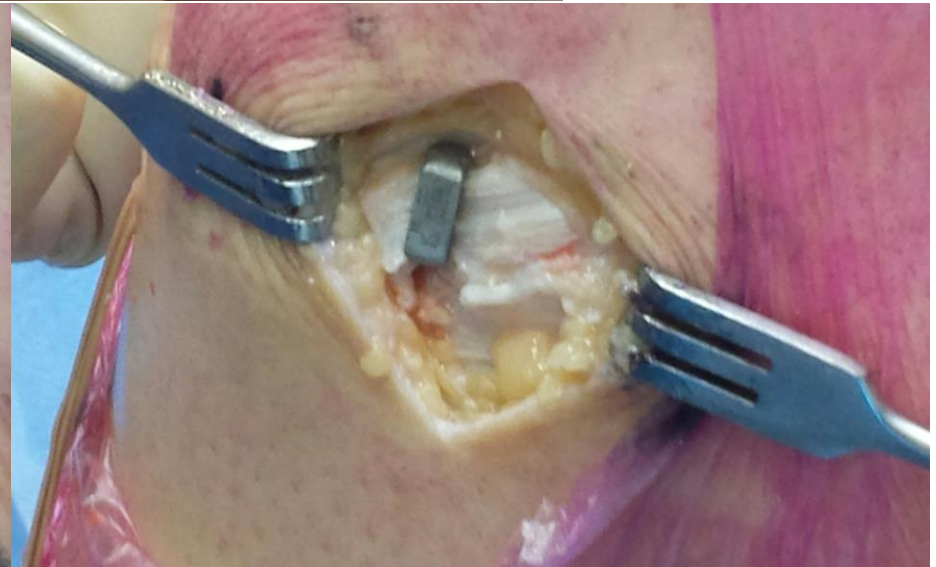
Perform the rotation test at 90°.  
BLUE pedal to stop the acquisition.

PRAXiM Perform the rotation test at 90°.  
BLUE pedal to stop the acquisition.

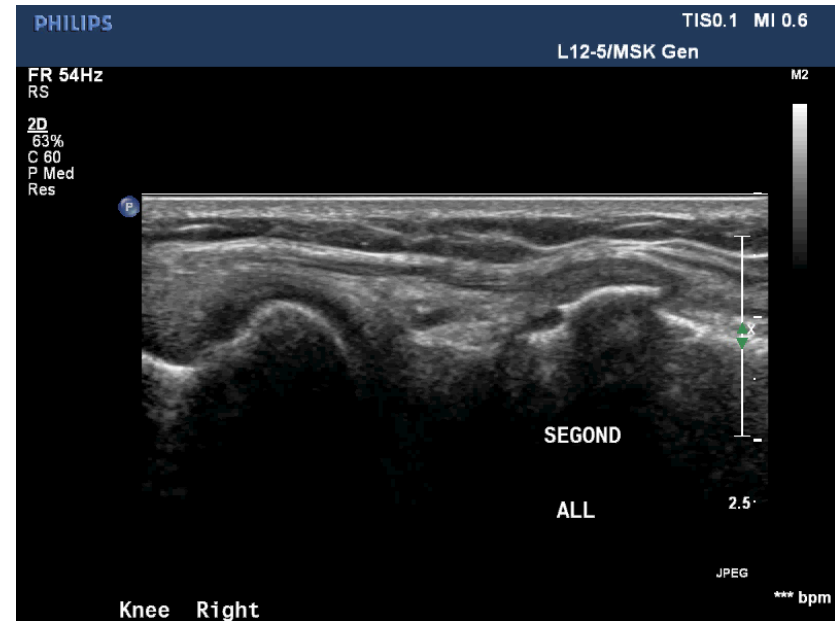
PRAXiM



# Ultrasound localisation



# Ultrasound anatomy



# ALL instability ?

