

Clinica Ortopedica  
e Traumatologica  
dell'Università di Pavia


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**PARTIAL RUPTURE: CLINICAL AND  
IMAGING DIAGNOSTIC**

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In a situation like this.....




...diagnosis is not difficult

- Knee kinematics evaluation:
  - Action (video)
  - Clinical findings: swelling, posterior pain, Lachmann test, (Pivot-shift test, Jerk test intraoperative)
- MRI:
  - Bone bruise
  - Complete ACL disruption




Treatment is not difficult

- Acl reconstruction:
  - BPTB (football player)
  - Treatment of associated lesions
- Rehab:
  - FKT
  - Return to play



But this is an **acute complete rupture!!!**



And if it was a acute partial rupture?

- Could have been easy to diagnose?
  - Mechanism of injury unknown (no video)
  - Knee very painful and swollen: difficult evaluation
- MRI findings ?
  - Presence of bone bruise
  - Swelling of AM and/or PL
  - Evidence of acl disruption

And if it was a acute partial rupture?

Is it possible to diagnose an acute single bundle ACL lesion?

Diagnosis of an **acute single bundle ACL lesion** seems to be very difficult.....if not impossible without an arthroscopy



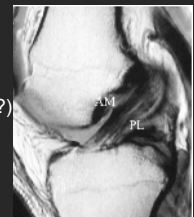
Diagnosis

wall (Fig 6A). The arthroscopic assessment of an AM or PL bundle elongation is a difficult arthroscopic task, and an advanced level of experience of the normal arthroscopic aspect of the intact bundles and their tensioning patterns might be very helpful.

Siebold and Fu, Arthroscopy, 2008

Things may change in chronic instability

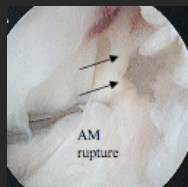
- Clinical evaluation:
  - Anterior instability tests
  - Rotational tests



- MRI:
  - Easier evaluation of the bundles (?)

Partial tears in chronic instability

- Partial tears 21 % of ACL tears (174 patients):
  - AM bundle tear: 70%
  - PL bundle tear: 30 %



- MRI:
  - No consideration of MRI

"Arthroscopic identification of isolated tear of the PL bundle of the ACL"  
Sonnery-Cottet et al. Arthroscopy, 2009

Laxity in partial acl rupture

- Partial vs complete tears:
  - Minor laxity
  - Lachman: 1+
  - Pivot-shift: 1+
- Medial meniscal tear:
  - Lower incidence
- Minor delay between injury and surgery
- Minor medial men laxity

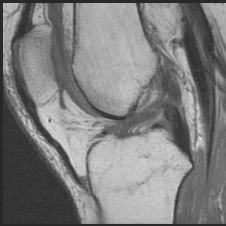


"Clinical, radiological and arthroscopic analysis of the acl tears. A prospective study of 418 cases"  
Panisset et al., 2008

### AM tears in chronic instability

AM is the primary restraint against **anterior tibial translation in flexion**

- Clinical evaluation:
  - Anterior drawer sign: +
  - Lachman test: +
  - Pivot-shift: -



Petersen et al., Arthroscopy, 2006

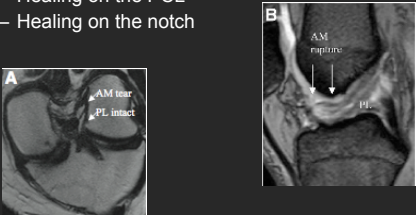
### AM tears in chronic instability

rent pain and swelling. More specifically, patients with a symptomatic AM bundle tear describe an anterior instability during activities of daily living and during sports activity similar to a complete ACL tear. They usually show a significantly increased (1+) anterior drawer test at 90° of knee flexion and a KT-1000 side-to-side difference between 2 and 4 mm. The anterior translation in the Lachman test at 30° is rather small (0 to 1+) and the pivot-shift test is negative or only slightly positive (0 to 1+).

Siebold and FU, Arthroscopy, 2008

### AM tears in chronic instability

- MRI evaluation:
  - AM: big and vertical: more easy to evaluate
  - Healing on the PCL
  - Healing on the notch



Petersen et al., Arthroscopy, 2006

### AM tears in chronic instability

- Arthroscopic evaluation:
  - Easy to evaluate: nothing before the AM bundle
  - Absence of AM
  - Healing on the PCL
  - Healing on the notch

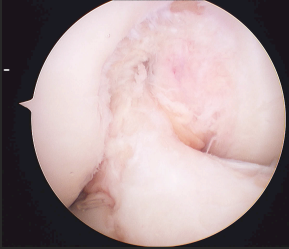


Petersen et al., Arthroscopy, 2006

### PL tears in chronic instability

PL bundle stabilizes the knee in **near full extension**, particularly **against rotatory loads**

- Clinical evaluation:
  - Anterior drawer sign: -
  - Lachman test: -
  - Pivot-shift: +



Petersen et al., Arthroscopy, 2006

### PL tears in chronic instability

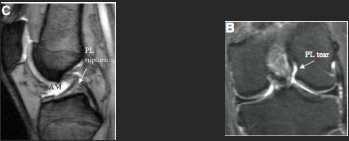
In contrast, patients with a symptomatic PL bundle tear complain of rotational instability with pivoting sports rather than complaining of a significant anterior instability with activities of daily living or sports.

ity. Clinical examination of these patients often shows a positive pivot-shift test (1+), while the anterior drawer test and the Lachman test might be 0 to 1+. The KT-1000 usually shows a small side-to-side difference of 1 to 3 mm.

Siebold and Fu, Arthroscopy, 2008

### PL tears in chronic instability

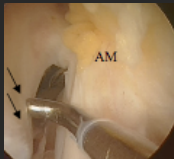
- Problems in MRI:
  - PL: small and with oblique course: very difficult to evaluate



Petersen et al., Arthroscopy, 2006

### PL tears in chronic instability

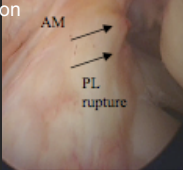
- Arthroscopic evaluation:
  - Possibly missed through the antero-lateral portal
  - AM bundle overlies the PL bundle
  - Retraction of the AM bundle with a probe: but you have to have the suspicion!!!!!!



Petersen et al., Arthroscopy, 2006

### PL tears in chronic instability

- Arthroscopic evaluation:
  - PL retracted
  - Distally toward the tibial surface over time
  - Amount of retraction correlated with the time elapsed from the injury to the reconstruction

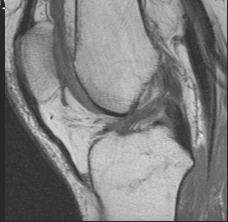


"Arthroscopic identification of isolated tear of the PL bundle of the ACL"  
Sonnery-Cottet et al. Arthroscopy, 2009

### In everyday practice is it really the way?

Every knee is (has) a different story:

- Clinical findings: not always feasible
- Problems in MRI evaluation



### In everyday practice is it really the way?

Clinical and radiological findings help us to go in the correct direction with our suspicion.....

But an accurate arthroscopic evaluation is mandatory to have the correct diagnosis and the correct treatment

### One more question:

Is the partial repair the correct one?

