

PCL: Conservative treatment



Jacques Menetrey, MD, PD

Swiss Olympic Medical Center

Unité d'Orthopédie et Traumatologie du Sport (UOTS)

Service de chirurgie orthopédique et traumatologie de l'appareil moteur

University Hospital of Geneva,

Geneva Switzerland



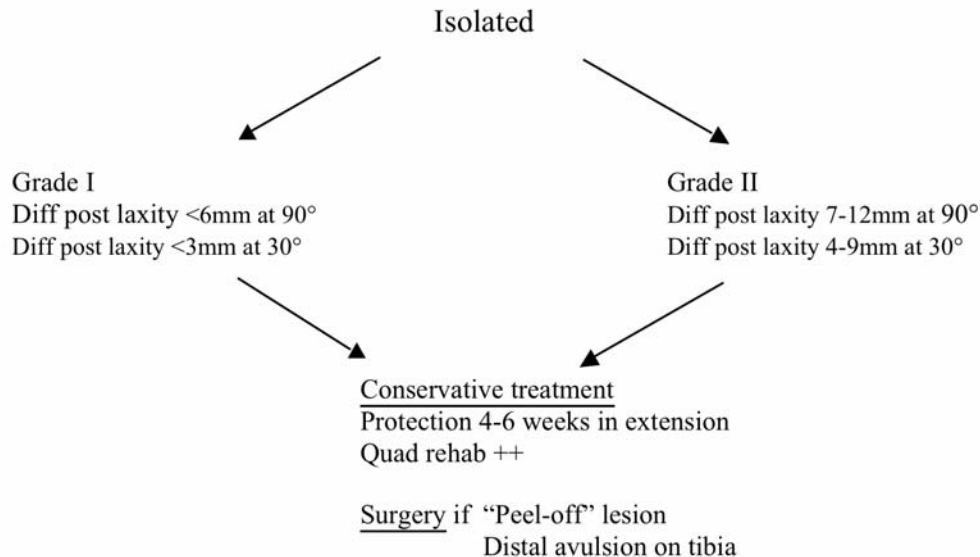
Management

- To define the lesion
- Suitable to conservative treatment
- Personality of the patient (sports expectations)
- Modality of the conservative treatment
- Results - expectations

Indications to conservative ttr?

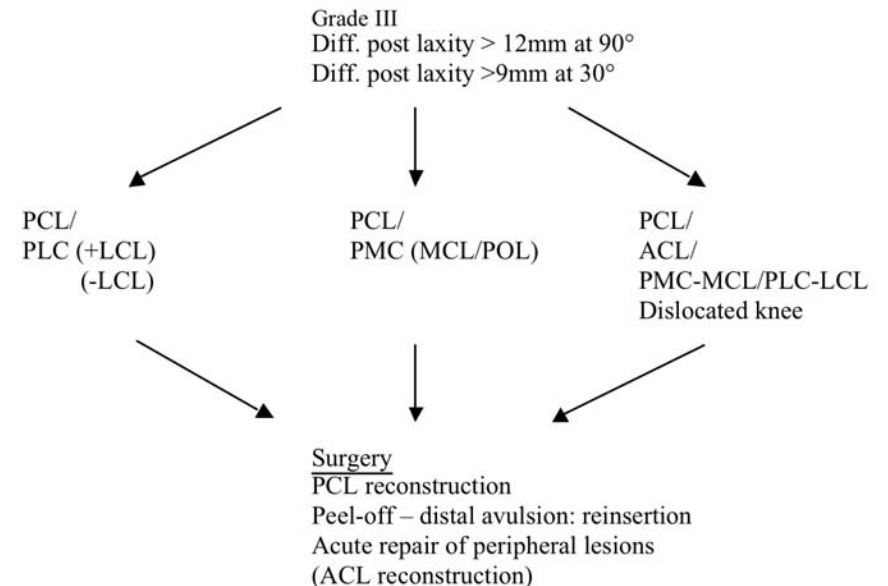
- Isolated partial and complete PCL injury
- PCL ruptures associated with peripheral lesions should be excluded

Table 5: Algorithm for acute PCL lesion



University of Geneva classification

Combined





Definition

- Partial PCL rupture:

is defined as a continuity of remaining ligament fibers or a retention of fibers that are observed to resist tension

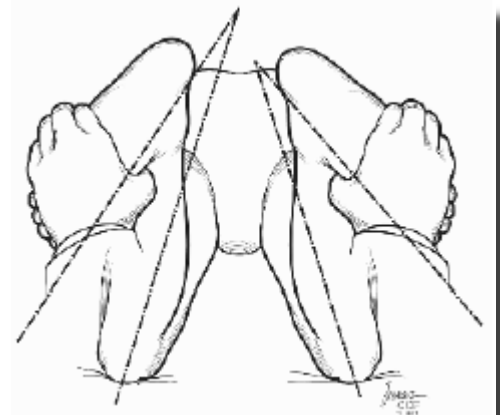
- Complete PCL rupture:

None or a few remaining intact fibers that are nonfunctional

Partial PCL rupture

- Clinical examination:
 - Posterior drawer: 5mm
 - Step-off: > 3mm
 - No varus-valgus laxity
 - No rotational laxity at 30° of flexion

Harner et al *Am J Sports Med* 1998
Wind et al *Am J Sports Med* 2004



Partial PCL rupture

- Stress radiographs
 - Telos 30°: < 3mm
 - Telos 80°: < 6mm

Garavaglia et al *Am J Sports Med* 2008

- MRI:

- Limited hypersignal in one of bundles

Mariani et al *Arthroscopy* 2005
Ahn et al *Arthroscopy* 2011





Complete PCL rupture

- Clinical examination:
 - Posterior drawer: 8-10mm
 - Step-off: 0mm
 - No varus-valgus laxity
 - Post drawer excursion decreases with internal rotation on the femur
 - No rotational laxity at 30° of flexion

Complete PCL rupture

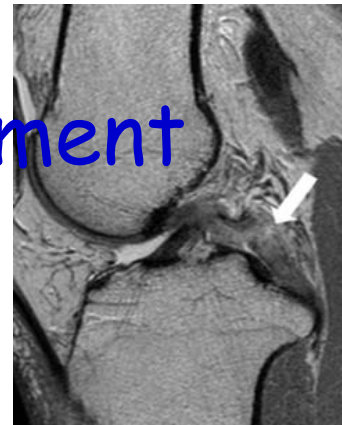
- Stress radiographs
 - Telos 30°: < 6mm
 - Telos 80°: < 12mm

Garavaglia et al *Am J Sports Med* 2008

- MRI:

- Mid-substance hypersignal in ligament

Mariani et al *Arthroscopy* 2005
Ahn et al *Arthroscopy* 2011



Could PCL injury heal with conservative ttr?

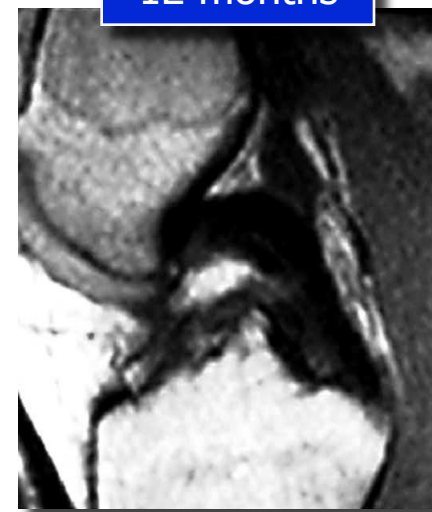
- Unlike ACL, even high-grade PCL injuries can heal, eventually with a firm endpoint, regaining continuity on MRI... Mariani et al *Arthroscopy* 2005
- PCL healing is a slow process and it has been shown that the MRI signal takes at least 6 months to be normalized
- It is not clear which factors enhance the healing process, but it's likely that a well established rehabilitation protocol with a support to prevent posterior translation might enhance the healing potential of PCL...



6 months



12 months





Conservative treatment

- Partial PCL rupture
 - Protective weightbearing for a few days
 - Quadriceps muscle conditioning
 - Proprioceptive training
 - Return to sport between 10 to 21 days



Conservative treatment

- Complete PCL rupture
 - Short immobilization in extension
 - Protective weightbearing for 2 weeks
 - Protection with a dynamic brace correcting the posterior drawer
 - Quadriceps muscle conditioning from the first week
 - Proprioceptive training
 - Return to sport between 10 to 12 weeks

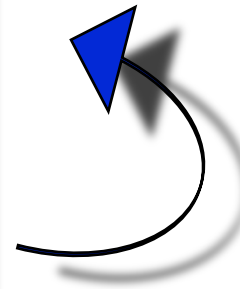
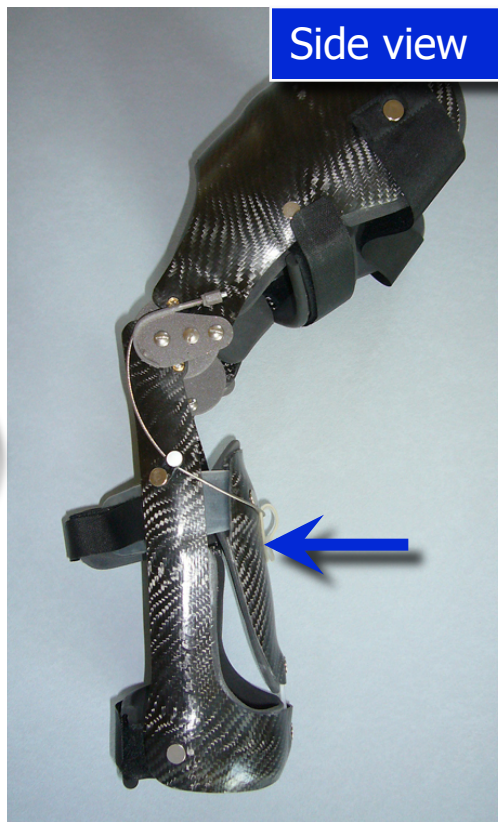
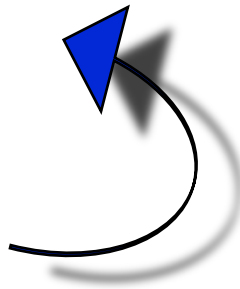


Conservative ttr

- A. Bracing
- B. Quadriceps conditioning
- C. Proprioceptive training
- D. Specific sports re-programmation

A. Brace

Worn only during the healing period (12 weeks)



A. Brace

Front view



Side view



Back view



B. Quad strengthening

From the first week...



Isometric contractions

B. Quad strengthening

From the first week...

Mini-squats



B. Quad strengthening

- Focus on the control of the posterior drawer



Quad strengthening

- Progressive increase in resistance at low flexion angle ($<30^\circ$)



Quad strenghtening

- Progressive increase in flexion



B. Quad strengthening

Progressive increased in training intensity



C. Proprioceptive training

From the 1st week
in partial and the 3rd week
in complete lesion



Two legs on the hemi-sphere



One leg on the hemi-sphere

C. Proprioceptive training



C. Proprioceptive strengthening

From the 1st week in partial and the 3rd week in complete lesion



C. Proprioceptive training

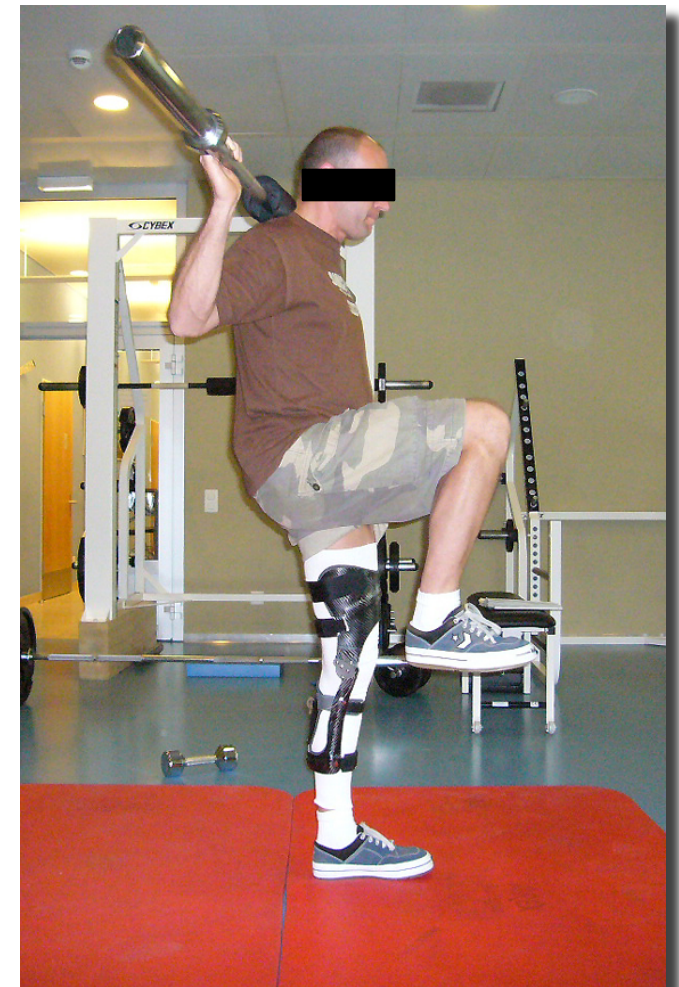
From the 1st week in partial and the 3rd week in complete lesion

Functional
exercises



C. Proprioceptive strengthening

From the 1st week in partial and the 3rd week in complete lesion



C. Proprioceptive training

From the 6th week - plyometry



C. Proprioceptive training

Running on the treadmill from the 3th week



D. General conditioning

Biking from the 6th to 8th week





What functional outcome could we expect ?

- Most patients with isolated PCL injuries achieve excellent subjective scores, but slightly less than an uninjured knee.
- Most studies have shown that the achieved level of knee function is independent of the grade of laxity and of the age of patients.
- Subjective score and quadriceps strength score showed statistically significant correlation.

Ahn et al *Arthroscopy* 2011

Iwata et al *Knee Surg Sports Traumatol Arthrosc* 2007

Shelbourne et al *Am J Sports Med* 1999

Cross et al *Am J Sports Med* 1984

What functional outcome could we expect ?

- Subjective score remains consistent with increasing time from injury.

n=146

FU: 7.8 +/- 4.7 years

Noyes score



Could we treat conservatively PCL injuries in athletes ?

- Half of the athletes are able to return to higher or the same level of sports
- One third are able to return to the same sport but a lower level
- One sixth had to change of sports after the injury
- The return to sports do not depend upon initial posterior laxity

Change in Activity Level From Preinjury to Follow-up by PCL Laxity Grade

Activity description	Grade 1		Grade 1.5		Grade 2	
	<i>N</i>	(%)	<i>N</i>	(%)	<i>N</i>	(%)
Increased activity	1	(2)	3	(8)	1	(2)
Same sport/activity at the same level of intensity	23	(46)	17	(46)	22	(48)
Same sport/activity at a lower level of intensity	18	(36)	9	(24)	15	(33)
Lower recreational sports/activities	7	(14)	8	(22)	7	(15)
Not able to do sports but no problem with activities of daily living	0	(0)	0	(0)	1	(2)
Difficulty with activities of daily living	1	(2)	0	(0)	0	(0)



Could we treat conservatively PCL injuries in athletes ?

- Despite the high return rate after an isolated PCL injury, some performance skills are affected:
 - high-speed running,
 - turning,
 - side stepping,
 - tackling,
 - jumping in line,
 - kicking,...
- The mean time to return to competition was 3 months



But...

- There is a lack of randomized controlled trials for the treatment of PCL injuries of the knee.
- Observational studies have suggested that isolated PCL injuries may be treated conservatively, with good prognosis. In more severe injuries in which the PCL is injured along with other ligaments in the knee, surgical intervention has been used.
- However, recommendations based on observational studies alone must be treated with caution.

Cochrane review 2007 (286 studies)



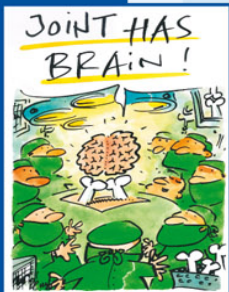
Summary

- Partial and complete isolated PCL injuries may be suitable to conservative ttr
- PCL injuries must be defined by clinical examination, stress-radiographs and MRI



Summary

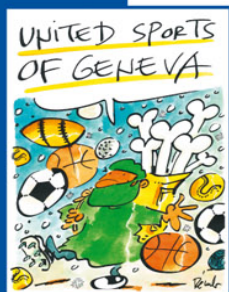
- Conservative ttr relies on protection of the posterior drawer, quadriceps strengthening, proprioceptive training, and specific program for resuming sports
- Observational studies suggest that isolated PCL injuries may be treated conservatively, with good prognosis



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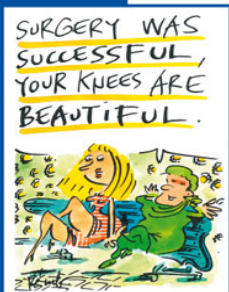
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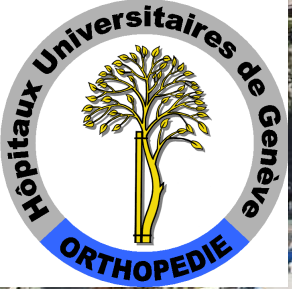


**Early registration
deadline:**
February 10, 2012


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Thank you for listening



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