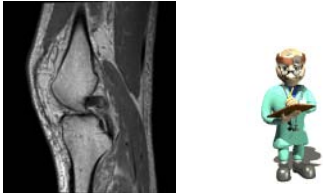



## Clinical Results after PCL Repair



Fredrik K. Almqvist, MD, PhD  
 J. Barth, P. Verdonk, J. Victor  
 Dept. of Orthopaedic Surgery and Traumatology, Ghent University Hospital,  
 Ghent University, Belgium

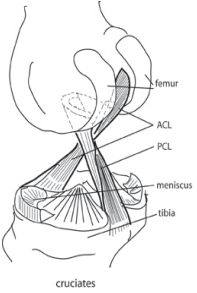
## How often ... ??

Once a week

Once a month ... 

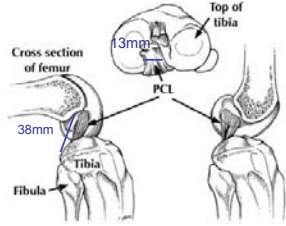
Once a year

## Anatomy



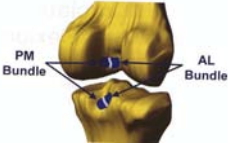
- Origin : medial femoral condyl
- Insertion  
Extra articular  
 1 cm distal to joint line
- Slightly laterally to the posterior border of the tibial plateau

## Anatomy



Divided simple in  
PosteroMedial  
AnteroLateral  
 bundles

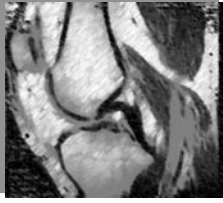
## Anatomy



AL 65% CSA PM 35%

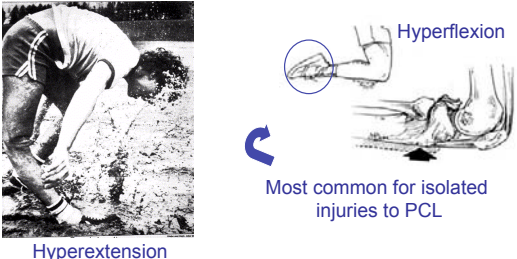
AL tight in flexion  
↑↓ PM  
 AL lax in extension

## Anatomy



Twice as strong  
 Twice as thick  
↓  
**LESS COMMONLY INJURED!!**


### Mechanism of Injury



Hyperextension


Hyperflexion

Most common for isolated injuries to PCL



### Complications Operative Treatment


- Neurovascular problems
- Infection
- Failure of Graft
- Stiffness
- Residual Instability
- Patella fracture
- Patellar tendon tear
- Osteonecrosis femoral condyl Athanson et al 1995 JBJS



### Introduction PCL Repair

Optimal surgical technique for PCL reconstruction remains **controversial**.

- Conservative treatment does well.....
- Transtibial vs inlay technique
- Allografts vs autografts.
- Single vs double-bundle
- Isolated PCL tears vs combined lesions




Knee Surg Sports Traumatol Arthrosc (2009) 17:140–149  
DOI 10.1007/s00167-008-0632-9

**KNEE**


### Clinical studies on posterior cruciate ligament tears have weak design

Anne Marie Eriksen Watsend · Toril M. Ø. Osestad · Rune B. Jacobsen · Lars Engebretsen



Very few studies in the literature focus on isolated PCL injury.

Generally low methodological quality shows that caution is required when interpreting results after management of injury to the PCL.




Cochrane Database Syst Rev. 2005 Apr 18;(2):CD002939.

### Interventions for treating posterior cruciate ligament injuries of the knee in adults.


Peccin MS, Almeida GJ, Amaro J, Cohen M, Soares BG, Atallah AN.

No randomized or quasi randomized controlled studies.

Adequate numbers of patients and an objective methodology for patient evaluation must be used in future studies of these interventions to determine the long-term results.



### Multiple surgical techniques



Knee Surg Sports Traumatol Arthrosc (2010) 18:1568–1572  
DOI 10.1007/s00147-010-1176-3

**KNEE**

**Clinical outcome after reconstruction for isolated posterior cruciate ligament injury**

Odd Arve Lian · Emilie Jul-Larsen Aun · Steiner Johansen · Tom Clement Lovdigen · Wender Figved · Lars Engseth

**Table 1 Clinical data**

Number of patients	43
Male/female	29/14
Median age at operation (years)	28 (17–53)
Timing of surgery after injury	
<3 months	1
3–6 months	4
>6 months	38
Double/single incision	16/27
Graft choice	
BPTB	19
Hamstring	24
Single bundle	17
Double bundle	7
Median follow-up time (months)	48 (17–109)

Outcome measure	n	Median (range) or mean (SD) result
Lysholm	43	80 (range 32–95)
Tegner pre-injury	43	7 (range 1–10)
Tegner at follow-up	43	6 (range 0–9)
Cincinnati	43	74 (range 12–100)
IKDC 2000	43	63 (range 24–100)
VAS knee function	43	67.6 (SD = 22.9)
KT 1000 injured knee (mm)	37	9.2 (SD = 4.1)
KT 1000 non-injured knee (mm)	37	5.9 (SD = 3.0)
Max flexion injured knee (°)	43	133 (SD = 7.5)
Max flexion non-injured knee (°)	43	138 (SD = 6.9)
Stress-radiograph difference, injured vs non-injured knee preop (mm)	16	12.3 (SD = 3.9)
Stress-radiograph difference injured vs non-injured knee at follow-up (mm)	41	8.4 (SD = 4.8)

13th ESSKA 200 Congress – May 21-24, 2008: Porto / Portugal

**Isolated PCL reconstruction with hamstring tendon autograft – clinical results after a minimum follow-up of 2 years**

Richter J., Schulz M., Immoendorfer M.

28 consecutive patients  
Isolated PCL rupture  
Single-incision transtibial technique, quadrupled hamstring tendon graft  
Minimum FU 24 months

posterior tibial translation (mm) on stress-radiographs

overall IKDC classification postoperatively

- Conclusion:** acceptable improvement of objective ligament stability and subjective knee function in patients with PCL insufficiency.

Arch Orthop Trauma Surg  
DOI 10.1007/s00402-011-1403-5

**ARTHROSCOPY AND SPORTS MEDICINE**

**Isolated AL bundle reconstruction of the PCL.**

Matthias Lahmer · Tobias Vogt · Lars Victor von Engelhardt · Martin S. Schulz · Michael J. Strabel

N= 33 patients , isolated PCL insufficiency.  
2 year FU

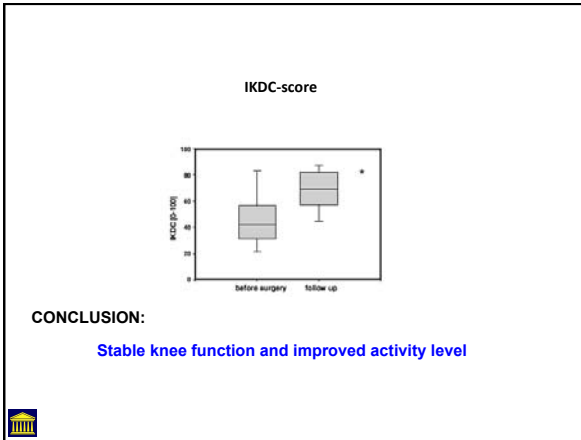
Isolated PCL reconstruction using semitendinosus and gracilis tendons with single-bundle technique.

**Posterior instability**

Preop: 10,1 ± 1.8mm  
Postop: 5,0 ± 2,5 mm

**Tegner-score**

Preop: 2,8 ± 0,8  
Postop: 5,9 ± 1,2



*Arthroscopy*, 2005 Sep;21(9):1042-50.  
**Clinical outcomes after isolated arthroscopic single-bundle posterior cruciate ligament reconstruction.**  
Sekiya JK, West RV, Ong BC, Irgang JJ, Fu FH, Harner CD.

- 21 patients
- Grade 3 isolated PCL injury , acute and chronic ruptures
- Achilles tendon allograft through femoral and tibial tunnels
- Average FU 5,9 yrs

**TABLE I. IKDC Scores**

IKDC Category	Normal	Nearly Normal	Abnormal	Severely Abnormal
Knee function	43% (9)	14% (3)	33% (7)	8% (2)
Acute/subacute	80% (4)	20% (1)	0% (0)	0% (0)
Chronic	31% (5)	12% (3)	44% (7)	12% (3)
Activity level	43% (9)	19% (4)	28% (6)	10% (2)
Acute/subacute	80% (4)	20% (1)	0% (0)	0% (0)
Chronic	31% (5)	19% (3)	37% (6)	12% (3)
Range of motion	64% (9)	29% (4)	7% (1)	0% (0)
Posterior drawer	0% (0)	50% (7)	50% (7)	0% (0)
Acute/subacute	0% (0)	75% (3)	25% (1)	0% (0)
Chronic	0% (0)	40% (4)	60% (6)	0% (0)
Average post-draw	86% (12)	7% (1)	0% (0)	7% (1)
External rotation 30°	86% (12)	7% (1)	7% (1)	0% (0)
External rotation 90°	86% (12)	0% (0)	14% (2)	0% (0)
Radiographic examination	25% (3)	50% (6)	17% (2)	0% (0)

- Acute /subacute reconstructions had better ADLs and SF-36 scores as well as IKDC scores.

**TABLE 3. Corrected KT-1000 Posterior Displacement**

KT-1000	Mean Overall	Mean Acute/Subacute	Mean Chronic
Corrected posterior drawer	4.5 mm	4.3 mm	4.6 mm
Side-to-side difference	1.96 mm	1.25 mm	2.28 mm

All patients had improved laxity of at least 1 grade with posterior drawer testing, with 50% of these patients improving 2 grades.

The average corrected posterior drawer in the acute/subacute group was 4.3 mm versus 4.6 mm in the chronic group

*Arthroscopy*, 2005 Aug;21(8):965-9.  
**Posterior cruciate ligament reconstruction: double-loop hamstring tendon autograft versus Achilles tendon allograft—clinical results of a minimum 2-year follow-up.**  
Ahn JH, Yoo JC, Wang JH.

**CONCLUSION:**

The clinical outcome was the same for both groups.  
The double-loop hamstring tendon autograft was as good as Achilles tendon allograft in PCL reconstruction.

*Injury, Int. J. Care Injured* (2004) 35, 1293–1299  
**INJURY**  
ELSEVIER  
www.elsevier.com/locate/injury

**REVIEW**  
**Arthroscopic single- versus double-bundle posterior cruciate ligament reconstructions using hamstring autograft**  
Ching-Jen Wang<sup>a,\*</sup>, Lin-Hsiu Weng<sup>a</sup>, Chia-Chen Hsu<sup>a</sup>, Yi-Sheng Chan<sup>a,b</sup>

**Table 1 Patient demographics**

	Single-bundle	Double-bundle
Number of patients	N = 19	N = 16
Average age (year)	29.4 ± 13.6 (17–60)	28.2 ± 10.4 (16–47)
Male/female	14/5	12/4
Right/left	9/10	10/6
Mechanism of injury		
Trauma	100% (19/19)	87.5% (14/16)
Sports-related	0	12.5% (2/12)

**Table 4 Ligament laxity**

	Single-bundle (N = 19)	Double-bundle (N = 16)	P-value
Posterior sagging	0.74 ± 0.73 (0-2)	1.00 ± 0.62 (0-2)	0.237
Posterior drawer test	1.16 ± 0.6 (0-2)	1.13 ± 0.6 (0-2)	0.877
Reverse Lachman test	0.74 ± 0.45 (0-1)	0.82 ± 0.81 (0-2)	0.985
Posterolateral drawer (at 30°)	0.42 ± 0.61 (0-2)	0.60 ± 0.24 (0-1)	0.270
Posterolateral drawer (at 90°)	0.37 ± 0.68 (0-2)	0.12 ± 0.33 (0-1)	0.241
Range of knee motion (°)	126 ± 12 (90-140)	124 ± 14 (80-140)	0.521
KT-1000 arthrometer			
Side to side difference (mm)	2.3 ± 1.4 (1-6)	3.1 ± 3.0 (0-7)	0.681
Maximal displacement (mm)	7.1 ± 3.7 (3-15)	6.7 ± 4.5 (2-16)	0.595

**Table 3 Functional scores**

	Single-bundle (N = 19)	Double-bundle (N = 16)	P-value
Lysholm scores	88 ± 10	89 ± 9	0.529
Range	60-100	71-99	
Tegner scores	4.5 ± 1.7	5.2 ± 1.6	0.237
Range	2-9	3-8	
Single-leg hop test	60 ± 39	72 ± 33	0.605
Range (%)	0-100	10-100	
IKDC			0.288
Normal	4	8	
Nearly normal	7	5	
Abnormal	4	2	
Severe abnormal	4	1	

Am J Orthop (Bele Mead NJ). 2006 Dec;35(12):568-71.

**A comparison of arthroscopic single- and double-bundle posterior cruciate ligament reconstruction: review of 20 cases.**

Hatayama K, Higuchi H, Kimura M, Kobayashi Y, Asagumo H, Takajishi K.

Single-bundle and double-bundle reconstructions were applied to 10 patients each.

Posterior tibial translation was measured using stress radiography before surgery and 2 years after surgery.

There was no significant difference in short-term stability between the 2 groups.

Knee Surg Sports Traumatol Arthrosc (2006) 14:1045-1054  
DOI 10.1007/s00167-006-0113-y

**KNEE**

**Arthroscopic posterior cruciate ligament reconstruction with hamstring tendon autograft: results with a minimum 4-year follow-up**

**Table 2 Clinical data**

Patients number	52
Male/female	35/17
Age at operation (years)	31 (22-50)
Surgery timing	
3 weeks	10 (19%)
3 weeks to 3 months	9 (17%)
>3 months	33 (64%)
Follow-up time (months)	54 (48-70)

	Preoperative	Postoperative				Final FU
		1 year	2 years	3 years	4 years	
Posterior drawer test						
Grade I (0-5 mm)	0	46	44	43	42	42 (81%)
Grade II (6-10 mm)	0	6	7	8	8	10 (19%)
Grade III (11-15 mm)	41	0	1	1	2	0
Grade IV (>15 mm)	11	0	0	0	0	0
KT-1000 for IKDC scores						
Normal (0-2 mm)	0	37	35	33	32	32 (62%)
Nearly normal (3-5 mm)	0	9	9	10	10	10 (19%)
Abnormal (6-10 mm)	0	6	7	8	8	8 (15%)
Severely abnormal (>10 mm)	52	0	1	1	2	2 (4%)

**Table 6 IKDC scores after minimum 4 years postoperatively**

Categories	Normal	Nearly normal	Abnormal	Severely abnormal
Knee function	32 (62)	11 (21)	8 (15)	1 (2)
Symptoms	31 (60)	12 (23)	7 (13)	2 (4)
Range of motion	34 (66)	11 (21)	6 (11)	1 (2)
Ligament laxity	32 (62)	10 (19)	8 (15)	2 (4)
PF crepitus	35 (67)	11 (21)	6 (11)	0
Donor site	44 (85)	4 (7)	4 (7)	0
X-ray	43 (83)	6 (11)	3 (6)	0
Functional test	25 (48)	18 (35)	7 (13)	2 (4)
Final rating	30 (58)	12 (23)	8 (15)	2 (4)

Arthroscopy, 2006 Mar;22(3):320-8.

**Comparison of tibial inlay versus transtibial techniques for isolated posterior cruciate ligament reconstruction: minimum 2-year follow-up.**

MacGillivray JD, Stein BE, Park M, Allen AA, Wolkiewicz TL, Warren RF.

13 traditional endoscopic transtibial PCL vs 7 tibial inlay

**CONCLUSION:**

No significant differences in posterior drawer testing, KT-1000, functional testing, or Lysholm, Tegner, and AAOS knee scores at a minimum 2 year follow-up.


Arthroscopy, 2006, Jan;22(1):27-32.

**Reconstruction of isolated posterior cruciate ligament injuries: a clinical comparison of the transtibial and tibial inlay techniques.**

Seon, J.K, Song, E.K.


**CONCLUSION:**

No significant differences were identified between the 2 techniques




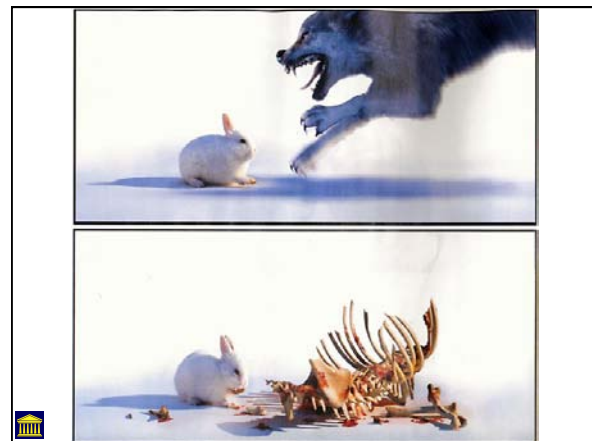
**Conclusions**

- Different operation techniques
- Create more normal kinematics – relevant?
- Reconstruction, until now, does not prevent degenerative changes



**Conclusions**

- Outcome following PCL repair must prove to be better to warrant the procedure and rehabilitation
- Generally low methodological quality - caution is required when interpreting results!

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**15<sup>th</sup> ESSKA CONGRESS  
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[www.esska-congress.org](http://www.esska-congress.org)

Abstract deadline: October 10, 2011

**ABSTRACT DEADLINE**  
**October 10, 2011**



