

Partial versus Complete ACL Reconstruction

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Pro

Con

Partial Tears

Not a new concept (36 papers since 1976)

- Buckley : *AJSM 1989* ;The natural history of conservately treated partial ACL tears
- Sandberg *CORR 1987* : Natural course of 29 partial ruptures

Partial vs Complete Reconstruction

- Biomechanics ? Does exist the concept of partial tear ?
- Diagnosis ? Are we sure it is a partial tear ?
- Rationale for partial reconstruction ?
- Technique – Results ?
 - Advantages
 - Risks - Disadvantages

Epidemiology : pro

- SFA 2007 ; 418 knees ; partial tears 27%

Category	Percentage
No ACL	50%
Scar PCL	23%
AM Intact	11%
PL Intact	16%

- Ochi *Arthroscopy 2006* : 10%
- Zantop *CORR 2007* : 25%
- Sonnery Cottet *Arthroscopy 2009* : 21%

Biomechanics : pro

Knee flexion (degree)	Intact	AM def	PL def	Complete ACL def
0	~5	~5	~5	~5
30	~10	~10	~15	~15
60	~10	~15	~15	~15
90	~10	~15	~15	~15

- Selective cutting study
 - AM bundle = main stabilizer in 60° and 90° of knee flexion
 - PL bundle = main stabilizer close to extension

Zantop T Am J Sports Med 2007

Biomechanics : pro

Pivot shift loading

Knee flexion (degree)	Intact	AM def	PL def	Complete ACL def
0	~5	~5	~10	~10
30	~5	~5	~10	~10

- Selective cutting study
 - Between 0° and 30°
 - PL bundle = main stabilizer against anterior tibial translation AND internal rotation

Valgus: 10 Nm
Internal rotation: 4 Nm

Zantop T Am J Sports Med 2007

Biomechanics: con

□ Back in time ?

1. Yield point
2. Ultimate failure strength
3. Gross disruption

Kennedy JC JBJS-A 1976

Biomechanics: con

□ Back in time ?

Intact ACL Ultimate failure Gross disruption

Kennedy JC JBJS-A 1976

Biomechanics: con

□ Back in time ?

The concept of failure of a ligament which remains visibly intact poses diagnostic and therapeutic problems.

The findings of this study demonstrate that ligaments may be stressed to ultimate failure in the absence of macroscopic disruption.

The clinical implications of this finding need further study.

Kennedy JC JBJS-A 1976

Pre op Diagnosis : is difficult

Partial rupture

- Short time injury to surgery
 - Partial : 7.5m
 - Lost ACL : 24m (SFA2007)
- MRI ? Umans AJR 1995
Duc Act Rad 2005
 - Hypersignal
 - Wave aspect
 - Focal thin ACL

Umans AJR 95

Diagnosis : multifactorial

Partial rupture

- MRI ? Siebold & Fu Arthroscopy 2008
 - Diagnosis in 2 or 3 planes necessary
 - AM bundle in contact with Blumensaat line
 - Empty lateral wall (PL tear)

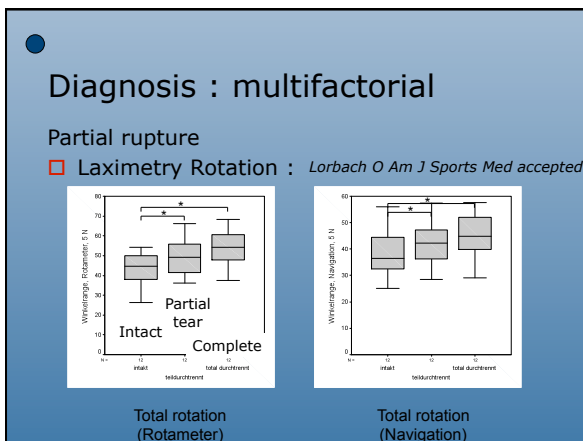
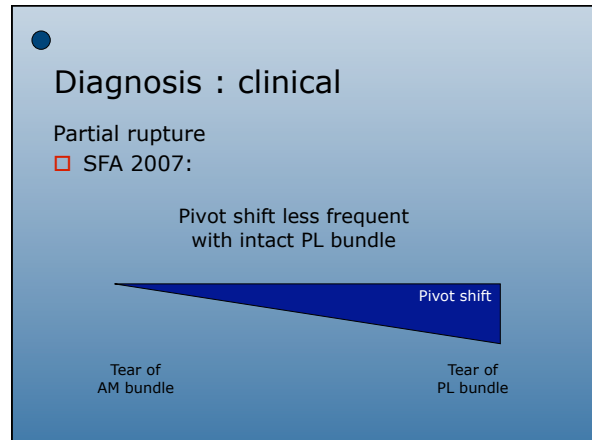
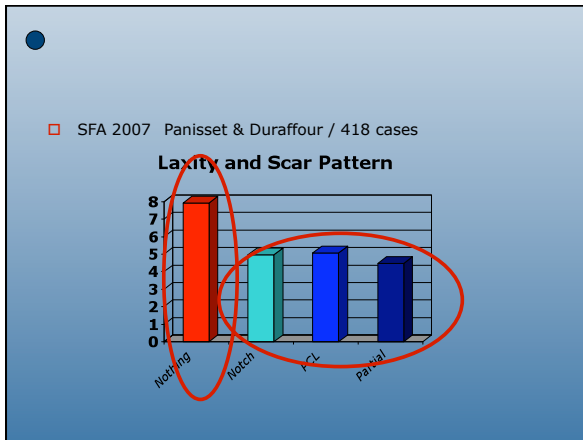
Siebold & Fu Arthroscopy 2008

Diagnosis : multifactorial

Partial rupture

- Laximetry :
 - firm end point lachman
 - Mild side to side laxity : <3mm (Bach JBJS 90)
 - GNRB Robert OTSR 2009 :

	>3mm Complete tear	<1.5mm Partial tear
Sensitivity	70%	80%
Specificity	99%	87%



Diagnosis :

□ Arthroscopic Assessment

- All authors insist on the fact that the decision-making of a partial ACL reconstruction can only be determined intraoperatively !

Diagnosis :

□ Arthroscopic Assessment

- Various knee flexion angles to consider the different tensioning patterns of the two bundles
- AM bundle : 70 – 90°
- PL bundle : 10 – 30° in a « figure of four » position

R Siebold : Arthroscopy 2008
B Sonnery Cottet : Arthroscopy 2009
H Steckel, F Fu : KSSTA 2009

Diagnosis: multifactorial

□ Partial Reconstruction : Con

- Quality of remaining tissue ?

4 categories:

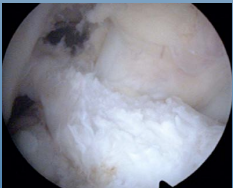
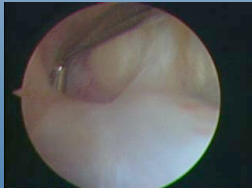
- ACL disappeared
- ACL on PCL
- PL intact
- „notch – scar“

➔ Problems to define an intact AM bundle !

Panisset JC, RCOT 2008

Diagnosis: multifactorial

- Partial Reconstruction : Panisset, RCOT 2008
 - Quality of remaining tissue ?

PL intact:
Easier to evaluate

Diagnosis: multifactorial

- Partial Reconstruction : Con
 - Quality of remaining tissue ?



AM intact ???

Panisset JC, RCOT 2008

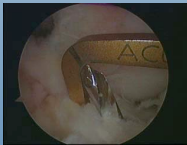
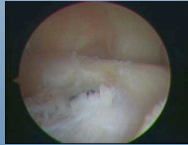


Rationale for partial reconstruction

- Vascularization
- Proprioception
- Laxity

- Crain Arthroscopy 2005 ; Variation in anterior cruciate ligament scar pattern...

« Resection of the ACL scar resulted in a measurable increase in passive anterior laxity in a subset of ACL-deficient knees... We recommend caution in resecting the torn ACL or scar tissue because removal of this tissue contributed to increased anterior laxity »

Technique – Partial Reco : pro

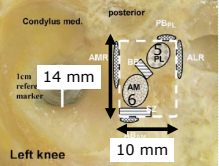





N Pujol

B Sonnery Cottet KSSTA 2009, Arthroscopy 2009
R Siebold : Arthroscopy 2009

Technique -

- Partial Reconstruction : Tibia
 - Tibial square model

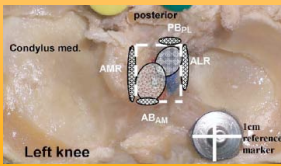


5 mm PL tunnel
6 mm AM tunnel
2 mm security zone

Siebold R, Arthroscopy 2009

Technique -

- Partial Reconstruction : Tibia
 - Tibial square model: limitations



Small knees:
confluent AM and
PL tunnel

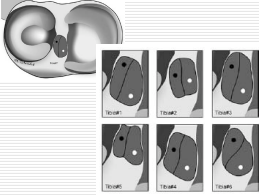
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Risk to damage the
remaining bundle in
partial reconstructions !

Siebold R, Arthroscopy 2009

Technique -

- Partial Reconstruction : Tibia
 - Tibial square model: limitations



Interindividual variations

↓

Risk to damage the remaining bundle in partial reconstructions !

Colombet P, Arthroscopy 2006

Results

- Partial Reconstruction : Con
 - R Siebold : Arthroscopy 2008 *However, an isolated reconstruction of the AM or PL bundle is an advanced arthroscopic procedure*
 - Panisset J Lyon 2008
 - 51 pts
 - 24% flexion contracture
 - 4 arthrolysis

B Sonnery Cottet KSSTA 2009, Arthroscopy 2009
R Siebold : Arthroscopy 2008

Results : partial reconstruction

	Number	FU	Post op laxity	Score	Complic
Ochi	45	2Y	0.5 mm	Lysholm 100	0
Sonnery Cottet	36	2Y	0.8mm	IKDC 74%A	4 arthrolysis
Panisset	51	2Y		IKDCA+B 94%	2 arthrolysis, 1graft rupture
Buda	47	5Y		95.7% exc and good	0

But no comparative studies !

Conclusion : pro or con

- Are we moving too fast ?
- 80 % of surgeons < 20 ACL reconstructions / year
- Most ACL revision procedures related to technical problems at primary surgery
- New (old) complications

10 slides Pro

?

10 slides Con