

ACL Reconstruction

Place for augmentation

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Augmentation : definition

- Sparing parts of the native ACL
 - Intact bundle (PL or AM)
 - Torn ACL, which is completely detached but continuous



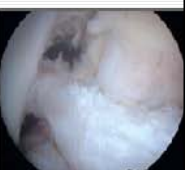
Adachi 2000 Arch Trauma Surg Anterior cruciate ligament augmentation under arthroscopy...

Ochi : 2006 Arthroscopy ; Anterior cruciate ligament augmentation procedure with a 1-incision technique: anteromedial bundle or posterolateral bundle reconstruction

Byung Ill 2006 Arthroscopy Arthroscopic ACL reconstruction with the tibial-remnant preserving technique

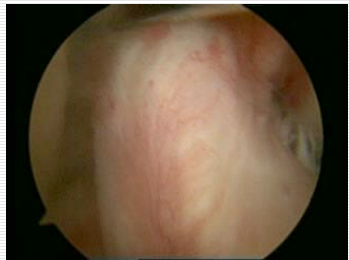
- I'll not discuss the results
- No comparative study regarding outcomes

- It doesn't mean always : partial reconstruction +++

Complete tear, but remaining tissue
Partial tear

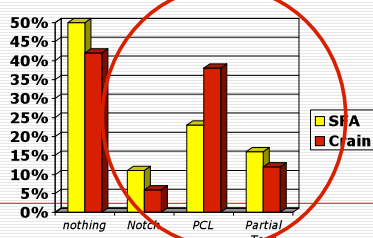
Complete Tear at femoral side



Frequency

□ SFA 2007 (Panisset et al Symposium Dejour & Potel)
418 cases

□ Crain 2005 Ascropy
48 cases



| Tear Type | SFA 2007 (%) | Crain 2005 (%) |
|--------------|--------------|----------------|
| nothing | ~48% | ~42% |
| Notch | ~12% | ~8% |
| PCL | ~22% | ~38% |
| Partial Tear | ~18% | ~12% |

Theoretical advantages

1. Faster vascularization and ligamentization
2. Higher level of proprioception
3. Better stabilization

Ochi Arthroscopy 2006
Siebold Arthroscopy 2008

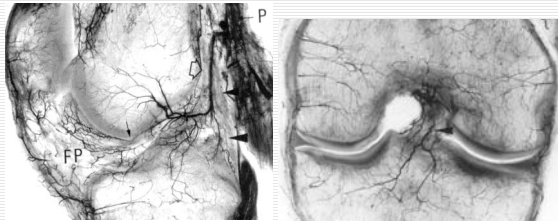
Background : vascularization

□ Arnoczky : 1985 ; *Cl Orthop* ; *Blood supply to the ACL ...*

- intra-articular soft tissues of the knee (the infrapatellar fat pad and synovium) mediate the blood supply to the cruciate ligaments
- preservation and utilization of these tissues should be considered when repair or reconstruction of the anterior cruciate ligament is being performed

Background : vascularization

□ Scapinelli ; 1987 *Clin Anat*



Background : vascularization

□ Gohil 2007 *JBJS B ACL reco* : a comparison of std vs minimal debridement techniques using MRI to assess revascularisation

- minimal debridement leads to earlier revascularisation within the mid-substance of the ACL graft at two months
- significant reduction of mid-substance signal six months after the minimal debridement technique »

Background : vascularization

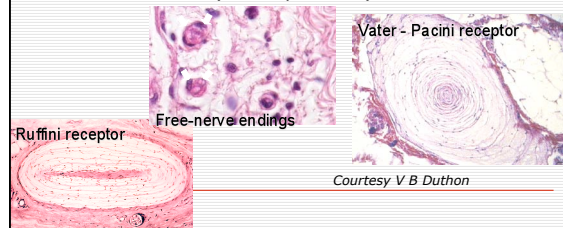
□ Falconiero *Arthroscopy 1998*

- fiber pattern, cellularity, vascularity, and degree of metaplasia obtained gross histological similarity with a normal ACL by 12 months after autogenous reconstruction

Background ; proprioception

□ Carter *Br J Sp Med 1997* Mechanoreceptors in normal ACL.

Byung-III *KSSTA 2009* : Mechanoreceptors in ACL remnants (but only in 33%)



Background ; proprioception

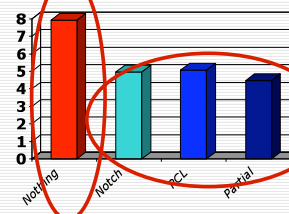
- Mechanoreceptors in the ACL contribute to the joint position sense

Carter *Br J Sp Med* 1997
 Adachi : *Act Orthop Scand* 2002.
 Ochi *JBJS Br* 2002

Background : laxity

- SFA 2007 Panisset & Duraffour / 418 cases

Laxity and Scar Pattern



Background : 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 »

Background : laxity

- Ochi *Arthroscopy* 2006

- augmentation procedure avoids resection of the ACL remnant, which contributes to prevention of anterior laxity
 - resection of the ACL scar results in a measurable increase in passive anterior laxity in a subset of ACL-deficient knees. »

Technique

Technique

- Siebold ; *Arthroscopy*, 2008

- isolated reconstruction of the AM or PL bundle is an advanced arthroscopic procedure
 - precise pre- and intraoperative diagnostic assessment of the injury pattern,
 - exact arthroscopic knowledge of the anatomic insertion sites,
 - careful debridement, and bone tunnel placement while preserving the intact parts of the ACL. »

1step

- Since graft choice and/or graft size may be influenced by the presence or absence of ACL remnants, start with intra articular assesment before graft harvesting, in case of history suggesting partial tear, firm lachman test, moderate side to side laxity, suggesting MRI...



2step Intra articular assesment

- 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

Partial Tear



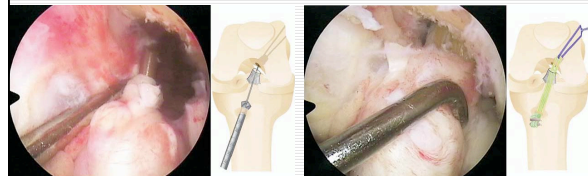
3step – graft harvesting

- Size :
- Complete Tear : 9-11mm
 - Usual graft : hamstrings or BPTB
 - Partial Tear : 7 -8 mm
 - Hamstrings : doubled or tripled semitendinosus
 - BPTB

3step – graft harvesting

- Size :
- Panisset *SFA 2009*
- ACL Reconstruction – partial tear – 51 cases :
 - 24% flexion contracture (4%>5°)
 - 4 arthroscopic release

4step- Preservation of ACL stump



Byung-III ; Arthroscopy 2006

4 step : debridement

- Cautious debridement



5step : Tibial Tunnel

- No trephine

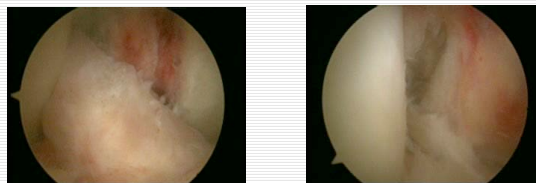


6step : femoral tunnel

- Soemtimes difficult to see the exact location of the femoral footprint



7step : graft fixation and testing



Conclusion

- Whatever the type of tear (complete or partial), presence of ACL remnants should be preop suspected
- If so, consider ACL augmentation
- ACL augmentation doesn't mean allways partial reconstruction
- Change your technique
 - Arthroscopy first
 - Size of graft depending of type of tear
 - Cautious debridement and tunnel preparation

