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 postero lateral 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

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 Ascopy 48 cases

[Graph showing frequency of complete and partial tears]
Theoretical advantages

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

Background : vascularization

- 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

- 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 : proprioception

- Mechanoreceptors in normal ACL.
- 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
Ochi JBJS Br 2002

Background: laxity

- Panisset & Duraffour / 418 cases SFA 2007

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

- 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 assessment before graft harvesting, in case of history suggesting partial tear, firm Lachman test, moderate side to side laxity, suggesting MRI...

2step Intra articular 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

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

4step – Preservation of ACL stump

Size:

Panisset SFA 2009

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

Byung-Il; Arthroscopy 2006
4 step : debridement
- Cautious debridement

5 step : Tibial Tunnel
- No trephine

6 step : femoral tunnel
- Sometimes difficult to see the exact location of the femoral footprint

7 step : 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 always partial reconstruction
- Change your technique
  - Arthroscopy first
  - Size of graft depending of type of tear
  - Cautious debridement and tunnel preparation