

ACL RECONSTRUCTION: Current Concepts

GOALS

- 1. Review the graft different options
- 2. Review the TECHNIQUES you'll see

BIG PICTURE

- Skeletally Mature
- Skeletally Immature
 - Transphyseal (13 and up)
 - Grey zone Age 10-13
 - Physeal Sparing (10 and under)

ACL ANATOMY, COMPLEXITY & EVALUATION

- HISTORY
- EXAM – EUA *
- LACHMAN
- PIVOT SHIFT TEST
- ANTERIOR DRAWER
- KT-1000 and MRI

SURGICAL TECHNIQUE

- GRAFT SELECTION
 - Allograft vs. Autograft
 - Soft tissue vs bone block
- METHOD OF FIXATION
 - Aperture
 - Cortical

GRAFT OPTIONS

- Tendon (ipsilateral or contralateral)
 - AUTOGRAFT
 - HAMSTRING, PATELLAR, QUAD, ITB
 - ALLOGRAFT
 - TIBIALIS ANTERIOR AND POSTERIOR
 - ALL OF THE ABOVE
- Synthetics
- Bioengineered: ACL cells seeded on a scaffold in a rabbit model. U.VA 2007
 - *Proceedings of the National Academy of Sciences*

PATELLAR TENDON

- Gold Standard
- Less than ideal pain
- Suboptimal tendinitis
- Suboptimal Contracture
- PT BTB

ALLOGRAFT

- Tibialis Anterior / Posterior
- Achilles
- Patellar Tendon
- Quad Tendon
- ITB
- Same techniques of Fixation
- Multiligament damage

PROS: surgical time, incisions, morbidity, pain, confidence

CONS: cost, availability, possible reaction, vascularity

HAMSTRING TENDON

- Hamstring
- Single Incision
- Two Incision

DOUBLE BUNDLE

- The ACL consists of two functional bundles, the AM and the PL bundle.
- Cadaver studies have indicated that anatomic ACL double-bundle reconstruction provides greater AP and rotational knee stability.
- Than what?
- How much greater?
- “In vivo kinematics using high-speed stereoradiography have shown that ACL single-bundle reconstruction can restore AP knee stability but is unable to restore the rotational stability of the knee joint”
- OK - how has it been working then?
- DOES IT MATTER?
- Improved in vivo kinematics
- Improved functional outcomes
- Decreased risk DJD or re-tear
- Do we want to exactly restore
- Something that just popped?

DB TECHNIQUE

- Graft harvesting and preparation
- Calibration
- AM tunneling position
- PL Drilling
- AM & PL tunnels
- Tibial tunnels
- PL graft
- AM graft

TWO BUNDLES, DB CT and MRI

MENISCUS and ACL FAILURE

- Meniscal deficiency can be associated with laxity
- Medial (pain and re-tear)
- Lateral (simulate pivot shift)

MENISCUS ALLOGRAFT

BEEN HERE BEFORE:

- Freddie Fu used to not use bone plugs for meniscal allografts.... One of the few.
- A generation of Fellows trained as such
- Now bone attachments are almost universal

1. MENISCUS TEARS

2. CONTRALATERAL

3. FIXATION METHODS

- Metal
- Hybrids
- Biologics

INTERFERENCE SCREWS

- Metal
- Bio
- PLLA
- PLA
- White
- Cortical
- Mulch

VENDORS

- LINVATEC
- SCANDIUS
- ARTHROTEC
- ARTHREX
- SMITH NEPHEW
- INNOVASIVE

RETRO SCREW

- **Conclusion:** The BioScrew XtraLok with instrumented tensioning displayed superior fixation to the RetroScrew System and the 35-mm Delta Screw applied with manual tensioning.
- **Clinical Relevance:** The BioScrew XtraLok may provide superior soft tissue graft–tibial tunnel fixation.

- **ENDOBUTTON**
- **TRANSFIX**
 - ARTHREX – graft looped around a pin
- **RIGID FIX**
 - DePuy Mitek – 2 pins through the graft
- **SYNTHETICS**
 - www.ligament.net

EXTRA-ARTICULAR

- Old technique, still done
- Pediatric Population – Open Growth Plates
- Multiligament reconstruction
- Intra-operative complication

TUNNEL ISSUES & INCISIONS

PEDS – OPEN PHYSES

ALLOGRAFT ISSUES

TENSILE PROPERTIES

- AGE
 - Younger than the recipient?
 - Age of tissue
- GENDER
 - Differences in elastin / collagen?
- RACE
 - Speed or strength in Collagen?

TRENDS - ALLOGRAFT

- INCREASING ALLOGRAFT USE
- TISSUE AVAILABILITY
- TISSUE SAFETY
- LEARNING INDICATIONS

REVISION SURGERY

- Bone Grafting
- Demineralized Bone Matrix (DBM)
- Scaffolds
- OsteoCel – stem cells
- Tunnels issues – 2 bundle
- Multiligament surgery

STEM CELLS

SUMMARY

- Be Wary of Claims re: Two Graft ACL or Two Tunnel ACL
- The Anterior Tibialis Allograft is a two bundle graft and is increasingly popular
- We are so far off from normal – does it really matter?
- Cellular solutions will probably have more of an impact than anything else

