Disclosures

- NONE
ACL Reconstruction

- Approximately 400,000 ACL reconstructions are completed in the U.S.
- Over 20% of ACL reconstructions use Allograft
- Notice that there are regional differences as well

2015

- Graft selection
- Fixation
- Tunnel position
- Literature (Do we have enough?)

Autograft vs Allograft

- **Autograft**
  - Faster healing
  - No risk of disease transmission
  - Multiple options
  - Improved fixation
  - Long standing history with good results

- **Allograft**
  - No donor morbidity
  - Less trauma to knee, No increased risk of anterior knee pain and hamstring weakness
  - Easier rehabilitation
  - Consistent Graft Size
  - Improved safety/Sterilization techniques
  - Multiple options
  - Improved fixation
  - Less pain
  - Decreased OR time
Sterilization
- Have improved dramatically from the late 1980’s
- Tissue processing is a balance between preserving the biologic function of the tissue and removing potentially infectious agents.
- In 2002, American Association of Tissue Banks (AATB) reported only 2 bacterial infections from 900,000 allografts distributed
  - Reporting is voluntary and 43% of tissue banks were not members of AATB in 2002

Sterilization
- Processes vary with every tissue bank
- Irradiated grafts have documented higher failure rates
- Estimated 2.5 mRad or higher can affect mechanical properties
- Recommend using grafts from tissue banks accredited by the American Association of Tissue Banks (AATB), registered with the U.S. Food and Drug Administration and the state, and certified by the International Organization for Standardization.

Allograft sterilization process
- For example:
  - Allowash XG (from Lifenet) since 2004
    - patented and proprietary sterilization process that removes greater than 99% of bone marrows and blood elements from the internal bone matrix. Allowash XG renders allograft bio-implants sterile without compromising their biomechanical or biochemical properties.
    - High Sterility Assurance Level
    - Inactivating enveloped and non-enveloped viruses
    - “controlled and validated dose of gamma radiation administered at low temperatures”
    - Over 4 million tissue grafts have been distributed with no disease transmission since the introduction of Allowash XG®
Literature

  Analysis of irradiation on the clinical effectiveness of allogenic tissue when used for primary anterior cruciate ligament reconstruction.
  Park SS, Dwyer T, Congiusta F, Whelan DB, Theodoropoulos P

  These results suggest that primary ACLRs using nonirradiated allografts may provide superior clinical outcomes than those using low-dose (<2.5 Mrad) irradiated grafts.

  A prospective randomized comparison of irradiated and non-irradiated hamstring tendon allograft for ACL reconstruction.

  compared the Irr-Allo group with Non-ir-Allo group at the final follow-up by Lachman test, ADT, pivot shift test, and KT-2000 arthrometer testing. Statistically significant differences were found:
  According to the overall IKDC, functional, subjective evaluations, and activity level testing, no statistically significant differences were found between the two groups.

  CONCLUSION:
  There was a significant difference in knee stability between the two groups (in favor of Non-ir-Allo), but no differences in functional scores.

Graft selection

- Allografts
  - Bone-Tendon-Bone
    - Patellar tendon
    - Achilles
  - Soft Tissue
    - Hamstring
    - Anterior/Posterior Tibialis tendon
    - Achilles
    - Fascia Lata
Allograft Healing

- Success of ACL reconstruction ultimately depends on the ability of graft to heal in a bone tunnel
- Intra-articular portion of graft must undergo ligamentization
- Bone to bone healing is strongest

Even with BTB graft, some amount of tendon to bone healing must occur (graft doesn’t match perfectly)
- Reconstructed ACL relies on indirect attachment with formation of Sharpey’s fibers (as opposed to direct attachment of native ACL)

Allografts heal in same manner as autograft but at a much slower rate
- Incomplete revascularization at 6-8 weeks
- Ligamentization – large diameter collagen fibrils replaced by smaller diameter fibers
- Biologic incorporation 6-12 months (West/Harner JAOS 2005)
- Malinin et al. conducted human allograft retrieval study, found that remodeling of ACL allografts is gradual and may require 3 years or longer
Other uses of allograft

- Ankle instability cases
- MPFL reconstruction
- AC joint reconstruction
- UCL reconstruction
- Et al.............

Patient consideration

- Age > 30
- Radiographic evidence of mild DJD
- Moderate PF crepitation or pain
- Petite stature
- Questionable quality of donor graft tissue
- Multi-ligament injuries
- Request for allograft
- Need for accelerated rehab (*not return to sport; more for return to job*)
Graft Preparation

Tensioning

- Allows up to 20 lbs. of tension to be applied to the graft
- Allows cycling of the graft under tension
- Frees the surgeon's hands to fixate the graft to the tibia

From BioNet

Conclusions

- Graft position is more important than the graft type
- Allografts require a longer "ligamentization" period but not clinically relevant
- Tensioning of the graft is more important with allografts
- Low risk for use of allograft with improved sterilization techniques and less biomechanical compromise of tissue
AOSSM Survey 2013

- AOSSM in conjunction with AAOS Research and Scientific Affairs
- To assess the practices, beliefs and knowledge of orthopedic surgeons with a sports medicine focus regarding the use of allografts in ACL reconstruction. The results of this survey will serve as benchmark for future research

AOSSM Survey 2013

- Executive Summary
  - 833 respondents
  - Less likely to use Allograft in young athletes
  - Large number using Allograft in active patients 30+ y.o.
  - Majority do NOT have different rehab protocols but delay return to sport

AOSSM survey

- Number of Allografts in Primary ACL: 26.6%
- Number of patients requesting allograft: 18.1%
- Number allografts in Revisions: 62.3%
- 74.9% respondents stated No Difference in their Autograft vs Allograft patients with proper rehab and good compliance
Literature

- Autograft versus nonirradiated allograft tissue for anterior cruciate ligament reconstruction: a systematic review.
  - Mariscalco MW, Maureen RA, Mehta D, Hewett TE, Flanigan DC, Kaeding CC

  No significant differences were found in graft failure rate, postoperative laxity, or patient-reported outcome scores when comparing ACLR with autografts to nonirradiated allografts in this systematic review. These findings apply to patients in their late 20s and early 30s.

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Literature

- Incidence of postoperative anterior cruciate ligament reconstruction infections: graft choice makes a difference.
  - Maletis GB, Inacio MC, Reynolds S, Desmond II, Maletis MM, Funahashi TT

  The overall SSI rate after ACLR was 0.48%. Deep SSIs were identified in 0.32% of the ACLR cases and superficial SSIs in 0.16%. No difference in SSI incidence was identified between allografts and BPTB autografts.

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Carson Palmer

2015 Naples Survey
- What would you want???

Thank You