ACL Allograft Vs. Autograft

Robert Hunter MD
Director, Orthopedic Sports Medicine Center
Salida, Colorado

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Conflict of Interest Disclosure

- **Paid Consultant for:**
  - Smith & Nephew
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- **Royalties**
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- **Institutional/Program Support:**
  - Smith & Nephew
  - Biomet
  - DJO
  - Arthrex

- **AANA: Committee Chair, Member BOD, Member Executive Committee**
Allograft vs. Autograft ACL: Predictors of Failure
The MOON Prospective Longitudinal Cohort

• Patient Age and Graft Type Were Significant Predictors of Graft Failure
• Age 10-19 Y/O Had the Highest Failure Rate
• Allografts Had a 4X Failure Rate

Kaeding et al ‘11
ACL Reconstruction

• Has Your Technique (Landmarks On the Femur and/or Tibia, Fixation Materials, Guides, Drills, Drilling Method, Visualization Portal/s) Changed In Any Way In the Past 10 Years?

• Why Do ACL’s Fail (Historically)?
Causes of Failure

Recurrent Instability

- Uncorrected Laxities
- Technical Errors
  - Uncorrected Malalignment
  - Biologic Failure
  - Re-Rupture
Femoral Tunnel Malposition in ACL Revision Reconstruction

- MARS Group
- 87 Surgeons and 460 Revision Surgeries
- 60% Had Technical Error As Cause of Failure
  - Femoral Tunnel Malposition Most Common Reason Cited for Graft Failure
  - Femoral Tunnel Malposition a Cause 48%
  - Femoral Tunnel Malposition the Cause 25%
    - Too Vertical 36%
    - Too Anterior 30%
    - Too Vertical and Anterior 27%
- Revision With Entirely New Femoral Hole 82%

Morgan et al ‘12
Junction Sidewall and Dome

10:00-10:30 O'clock
Zero Tourniquet Time
Clinical Comparison: ACL Auto vs. Allograft

- 100 ACL’s:
  - 50 Hamstring Autograft
  - 50 Tibialis Anterior Allograft
- F/U: Ave 25.6 M (12 to 33)
- No Difference in Objective Results
- No Difference in Lysholm Scores

Zhang et al ‘09
Allograft vs. Autograft ACL: Predictors of Failure
The MOON Prospective Longitudinal Cohort

• Study Begun in 2002
• Evaluated Variables:
  • Autograft
  • Allograft (No Breakdown for Type (BTB vs. Soft Tissue), Graft Prep (Irradiated, Chemical Sterilization) or Technique)
  • Sex
  • Age
  • BMI
  • Activity at Injury
  • Meniscal Tears
  • 1° vs. Revision

Kaeding et al ‘11
BTB Auto vs. BTB Allograft
A Meta-Analysis

- BTB Allograft vs. Autograft 1° ACL Reconstructions
- Prospective Trials
- Minimum 2 Yr F/U
- 6 Studies Met Criteria
  - 256 Pats With Autograft
  - 278 Pats With Allograft
- Allografts More Likely to Rupture (P = .01)
- When Irradiated and Chemically Processed Grafts Were Excluded, There Was No SS Difference In Rupture Rate.

Krych et al ‘08
Revision Rate:
BTB Auto vs. BTB Allograft

• Single Surgeon (2000-2006)
• 223 Met Criteria for Study 173 Available for F/U
  • 142 Pats: BTB Autograft
  • 31 Pats: BTB Allograft
• Mean F/U: 49 M (11-91M)
• Revision Rate: Auto 0.7% 9.7% Allo (P= .02)
• With Exclusion of Irradiated Allografts There Was No Statistical Significance Difference In Revision Rate

Meta et al ‘10
Analysis of Irradiation on Clinical Effectiveness of ACL Allograft Tissue

- Systematic Review: Prospective and Retrospective Studies
- 2010-2012
- English Language
- Min 2 Yr F/U
- Excluded: Revisions, Open, Autograft, Meniscal Allograft, Immature Pats, Ethylene Oxide

Parks et al ‘15
Analysis of Irradiation on Clinical Effectiveness of ACL Allograft Tissue

• 21 Articles
• 415 Irradiated Grafts  1038 Non-Irradiated
• Mean Pat Age 32.2 Y/O
• Non-Irradiated Grafts:
  • Higher Lysholm
  • Better KT-1000/2000
  • Grade 0/1 Pivot Shift
  • Lower Revision Rate

Parks et al ‘15
Autograft vs. Nonirradiated Allograft for ACL Reconstruction

- Systematic Review
- Prospective or Retrospective
- LOE 1, 2 or 3
- Exclusion: No Specification Regarding Graft Irradiation
- Nine Studies
  - 6: BTB Auto vs. BTB Allo
  - 2: Hamstring Auto vs. Hamstring Allo
  - 1: Hamstring Auto vs. TA Allo

Mariscalco et al ‘15
Autograft vs. Nonirradiated Allograft for ACL Reconstruction

- Patient Age:
  - 7/9: 24.5-32 y/o
  - 1/9: All ≥ 40 y/o
- Mean F/U: 24-94 Months
- Clinical Graft Failure Rate: 6/9
- PO Instrumented Laxity: 8/9
- PE Findings 7/9
- Outcome Scores 9/9
- No SS Differences Between Autografts and Nonirradiated Allografts In Any Outcome Measure.

Mariscalco et al ‘15
Autograft vs. Nonirradiated Allograft for ACL Reconstruction

- “Findings Apply to Patients In Their Late 20’s and Early 30’s.”
- Caution Applying These Finding to Younger, More Active Patients.

Mariscalco et al ‘15
Factors Affecting ACLR Costs

- **Graft Cost**
  - Allografts

- **Surgery Costs**
  - Surgery Time
    - Operating Room Time
    - Recovery Room Time
    - Anesthesia Costs
  - Technique
    - Outside-In
      - Lower Material Costs Than All-Inside\(^1\)

- **Complications**
  - Allograft Vs. Autograft
  - Provider Volume
    - Higher Volume Surgeon
      - Lower Adverse Events Rate\(^2\)

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2. Scott DJ, Sherman S, Dhawan A, Cole BJ, Bach Jr BR, Mather III RC. Quantifying the economic impact of provider volume through adverse events. OJSM. 2015;3(3); 2325967115574476.
Economic Implications
Allograft/Autograft ACL Reconstruction
Summary

- **Equal Surgical Costs**
  - **Autograft**
    - Longer Operating Room Time
  - **Allograft**
    - Cost of Graft

- **Costly Complications**
  - **Patellar Fracture**
    - BPTB Autograft
  - **Infection**
    - HS Autograft
  - **Equal**
    - Stiffness
    - Osteolysis
    - Revision Surgery
  - **Osteoarthritis**
    - Concomitant Meniscal Tear
    - QOL Costs
    - Societal Costs
    - Surgical Costs

- **ACLR Savings Over Rehab Alone**
  - Short Term - $4,500
  - Lifetime - $50,000
Tib. Ant. Folded Once and Tensioned to Reduce Creep
Six Weeks P/O

(100% Success)

Better Motion Than Before Injury

Better Stability Than The Normal Side

Back to Full Sports In 3 Weeks

Stronger, Faster, More Virile Than, Well, .......Me)
Thank You