Graft Choices for ACL: Which is Best?

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Literature Review

• Autografts
  – Multiple studies comparing BPTB to Quadrupled hamstring grafts

– Weaknesses
  • Different techniques, fixation, assessment of results, follow-up periods
Literature Review

• Comparing apples to apples (fixation techniques, outcomes assessment)
  – Ejerhed et al. – incr kneeling pain
  – Shaieb et al. – incr PF pain, decr ROM
  – Beard et al. – no difference
  – Pinczewski – et al. incr kneeling pain (nr)
  – Corry et al. – incr kneeling pain, incr laxity in HT in females (nr)
Literature Review

- Comparing outcomes regardless of technique (BPTB to HT)
  - Jansson et al. – no sig difference
  - Eriksson et al. – no sig difference
  - O’Neill et al. – sig diff in flexion (HT) & ext (BPTB), no sig functional difference
  - Aune et al. – incr kneeling pain, decr single-hop, incr flex strength, decr pt satisfaction
  - Tashiro et al. – incr flexion strength
  - Feller et al. – improved activity scores
  - Mohammadi et al. – no sig difference in hamstring torque, but improved functional testing triple-hop, crossover hop and jump landing in HT
Literature Review

• Meta-analyses (comparing apples to horseshoes)
  – Freedman et al. – 1,976 pts BPTB
    • Lower graft failure rate
    • Less laxity
    • Higher pt satisfaction
    • Higher incidence of knee pain
  – Yunes et al. – 411 pts BPTB
    • Less laxity
    • Higher rate of return to pre-activity levels
Literature Review

• **Systematic Review**
  – Goldblatt et al. –
    • Inclusion criteria
      – Identical rehab protocols
      – Minimum 2yr F/U
      – Subjective or objective data
    • BPTB
      – Normal Lachman, pivot shift, KT-1000
      – Greater flexion strength
    • HT
      – Decr PF crepitus
      – Less extension loss
      – Less kneeling pain
Literature Review

• Systematic Review
  – Goldblatt et al.
    • No significant difference
      – Instability/giving way
      – Functional outcome scores (Lysholm, Tegner, IKDC)
      – Graft rupture
      – Return to pre-injury activity
      – Need for further surgery
      – Complications
Literature Review

• Systematic Review
  – Spindler et al. –
    • Inclusion Criteria
      – Prospective RCT
      – Minimum 2 yr F/U
    • Slight increase in laxity for HT in 3/7 studies
    • Increased kneeling pain for BPTB 4/4 studies
Literature Review

• Systematic Review
  – Spindler et al.
    • No significant difference
      – Graft failure (related to fixation type not graft type)
      – Anterior knee pain
      – Return to activity
Literature Review

• Systematic Review
  – Herrington et al.
    • Inclusion criteria
      – Randomized/quasi-randomized trials
      – Outcome measures
        » Activity recovery
        » Pain
        » Instability
        » IKDC
        » Complications/further surgery
      – No significant difference in any category
Literature Review

• Allografts
  – Weaknesses
    • Comparing different techniques for different types of allografts
    • Relatively short-term data available
Literature Review

• Allografts
  – Results
    • Shelton et al. – BPTB auto vs allo, no sig diff
    • Harner et al. – similar results but improved extension in allograft
    • Victor et al. – increased rupture rate & laxity in allografts
    • Poehling et al. – no difference
    • Barrett et al. – allograft offered faster return to activities, but increased laxity
Literature Review

• Allografts
  – Results
    • Stringham et al. – increased rupture rate
    • Kleipool et al. – no difference
    • Peterson et al. – no difference
    • Chang et al. – no difference
Literature Review

• Allografts
  – Meta-analysis of 5182 pt
    • Kraeutler, Bravman, McCarty AJSM 2013
      – BPTB auto vs BPTB allo
      – Allografts demonstrated a 3-fold increased risk of rerupture
      – Subjective IKDC, Tegner, Lysholm scores, single-leg hop test, KT-1000 favored autografts
      – Return to preinjury level, overall IKDC, anterior knee pain, pivot shift favored allograft
Literature Review

• Allografts
  – Systematic Review
    • Mariscalco, Kaeding, et al. AJSM Aug 2013
      – Compared autografts to nonirradiated allografts
      – 9 studies – 6 BPTB auto vs BPTB allo, 2 studies HT auto vs HT allo, 1 HT auto vs TA allo
      – No sig differences in graft failure rate, knee laxity, or patient reported outcome measures
      – Patient ages range from 24-40
Literature Review

• Allografts
  – Systematic Review
    • Lamblin, Lubowitz et al. Arthroscopy 2013
    • 11 papers included, non-irradiated, non-chemically treated allografts
    • No significant difference in IKDC, Lysholm, pivot shift, KT-1000, failure rates
Literature Review

- Allografts in Young Athletes
  - Pallis, Svoboda, et al. AJSM 2012
    - West Point Study
    - 122 ACL recon prior to matriculation
    - Revision as the primary outcome measure
    - 7/61 BPTB auto (11%) 6/45 HT auto (13%) 7/16 (44%) allografts
    - 7x increased failure rate with allograft
Literature Review

• Allograft Conclusions
  – Numerous studies have demonstrated increased failure rates of irradiated grafts

  Anterior cruciate ligament reconstruction with BPTB autograft, irradiated versus non-irradiated allograft: a prospective randomized clinical study.

  – Emerging studies demonstrating increased failure rates among young and active patients
Which Graft Is Best?
Which Graft is Best?

• Controversy exists

• Surgeon selection
  – What procedure are they comfortable with

• Patient selection
  – What is the patient comfortable with
  – Age and activity of the patient!
Which Graft Is Best?

- **Surgeon selection**
  - BPTB, HT autografts, ant/post tib or peroneal allograft, Quad tendon autograft, BPTB allograft

- **Patient selection**
  - Explain the pros and cons of each and involve the patient in the decision-making process
Which Graft Is Best?

- Revision ACL Reconstruction
  - Same considerations
  - Patient Age
  - Activity Level
  - Previous Graft Choice
  - Consider 2-stage procedure
Which Graft Is Best?

- Case 1
  - 20 y M Div II football player
  - Isolated ACL tear
  - History of Jumper’s knee
Which Graft Is Best?

• What Do You Do?
  - A) BPTB autograft
  - B) Hamstring autograft
  - C) Allograft (any type)
  - D) Quad tendon autograft
  - E) No surgery
Which Graft Is Best?

- Case 2
  - 57 y F skiier
  - Isolated ACL tear
  - History of patellar chondromalacia
Which Graft Is Best?

• What Do You Do?
  – A) BPTB autograft
  – B) Hamstring autograft
  – C) Allograft (any type)
  – D) Quad tendon autograft
  – E) No surgery
Which Graft Is Best?

• Case 3
  – 17 y F soccer player
  – Isolated ACL tear
  – No previous knee symptoms
Which Graft Is Best?

• What Do You Do?
  – A) BPTB autograft
  – B) Hamstring autograft
  – C) Allograft (any type)
  – D) Quad tendon autograft
  – E) No surgery
Which Graft Is Best?

• Case 4
  – 16 y M basketball player
  – ACL, complex medial meniscus tear
  – No previous knee symptoms
Which Graft Is Best?

• What Do You Do?

– A) BPTB autograft
– B) Hamstring autograft
– C) Allograft (any type)
– D) Quad tendon autograft
– E) No surgery
Which Graft Is Best?

• Case 4
  – 16 y M basketball player
  – ACL, complex medial meniscus tear
  – No previous knee symptoms
  – Muslim
Which Graft Is Best?

- What Do You Do?
  - A) BPTB autograft
  - B) Hamstring autograft
  - C) Allograft (any type)
  - D) Quad tendon autograft
  - E) No surgery
Which Graft Is Best?

• Case 5
  – 15 y F soccer player
  – ACL, bucket-handle medial meniscus tear
  – History of contralateral ACL reconstruction
Which Graft Is Best?

What Do You Do?

- A) BPTB autograft
- B) Hamstring autograft
- C) Allograft (any type)
- D) Quad tendon autograft
- E) No surgery
Which Graft Is Best?

• Case 5
  – 15 y F soccer player
  – ACL, bucket-handle medial meniscus tear
  – History of contralateral ACL reconstruction, BPTB
Which Graft Is Best?

What Do You Do?

- A) BPTB autograft
- B) Hamstring autograft
- C) Allograft (any type)
- D) Quad tendon autograft
- E) No surgery
Which Graft Is Best?

• Case 6
  – 46 y M snowboarder
  – Isolated ACL tear
  – No history of previous knee symptoms
Which Graft Is Best?

What Do You Do?

- A) BPTB autograft
- B) Hamstring autograft
- C) Allograft (any type)
- D) Quad tendon autograft
- E) No surgery
Which Graft Is Best?

• Case 7
  – 8 Y M soccer player
  – Isolated ACL tear
Which Graft Is Best?

• What Do You Do?
  
  – A) BPTB autograft
  – B) Hamstring autograft
  – C) Allograft (any type)
  – D) Quad tendon autograft
  – E) No surgery
Thank You