

Failed ACL and Revision Surgery

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Primary ACL Recon Goals

- Restore painless function to a knee that is unstable or at risk for instability
- Excellent outcomes following primary ACL R
- Failed ACL is frustrating for athlete and the surgeon
- Complex problem-mastering evaluation of the failed graft will assist the skilled arthroscopist in a successful revision ACL R

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Failed ACL R

- Several factors can impact a suboptimal result in primary ACL R
 - Loss of motion
 - Harvest site/extensor mechanism dysfunction
 - Arthritis
 - Persistent instability
 - Graft failure
 - Meniscal pathology
 - Missed associated injury
 - Poor rehab



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Lack of Agreement?

- Wide variability in agreement between highly experienced knee surgeons as to the cause of ACL graft failure

MARS, AJSM 2015

- Experienced, skilled surgeons cannot agree on most ideal locations to drill the femoral and tibial tunnels

MARS, AJSM 2015
McConkey et al AJSM 2012

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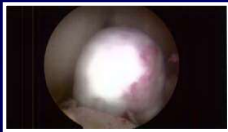
Graft Failure

- Estimated 0.7 - 8.0% in most series –
- MOON cohort 2.9% graft rupture at 2 yrs = contralateral rate (*Wright et al AJSM 35, 2007*)
- Spindler et al SR 9 RCTs HS vs BTB failure rate 1.5% - 5.7% - avg. 3.7%
- Grafts fail at a higher rate in younger more active patients

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Graft Failure

- 3 Broad Categories
 - Technical considerations
 - Biologic (incorporation)
 - Trauma



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MARS

Surgeon determined cause

- Biologic – 5 (6%)
- Technical – 22 (24%)
- Traumatic – 27 (30%)
- Combination – 27 (30%)

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Failure of ACL R

1-Femoral Tunnel Malposition

2-New Trauma

Trojani et al, 2011

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Technical

Believed to be most common avoidable cause

- Improper tunnel placement
 - Independent of graft integrity
- Inappropriate graft tensioning or fixation
- Inadequate graft
 - Magnussen 2012, *Arthroscopy*
 - 16/97 (16.4%) revision rate <20 y and HS auto ≤8mm graft



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Timing of Failure

- Time to failure may indicate cause
 - < 6 months - technical or biological
 - > 6 months - trauma
- Severity of event may also give clues
 - Significant acute event → trauma
 - No/minimal event → gradual graft failure, technical error or biologic

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Preoperative Considerations

- Why did the index operation fail?
 - History
 - Did the patient ever do well?
 - Post operative course?
 - Compliance?
 - Rehab?
- **This is a major key to Revision success!!**

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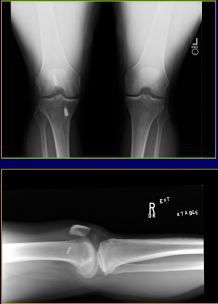
Preoperative Considerations

- Physical Exam
 - Limb alignment
 - Quad atrophy → ?functional instability
 - Timeline for recovery
 - ROM
 - Hyperextension
 - Stiff (esp extension)
 - Effusion?
 - Meniscal and Articular Cartilage integrity
 - Associated instabilities
 - Medial, Posteromedial, Lateral, Posterolateral

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Preoperative Considerations

- Radiology
 - Plain films
 - WB
 - Full extension lateral
 - MRI
 - CT



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Preoperative Considerations

- After a careful history, physical exam and review of appropriate radiology there is typically a reason why the index operation failed.

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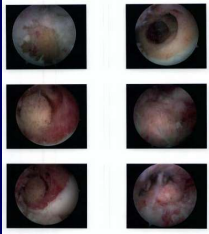
Revision-Graft Choice

- Dependent on index operation and additional surgery
- Autograft
 - PT
 - HS
 - Quad tendon
 - Contralateral knee
- Allograft- multiple choices (tibialis, BTB, HS, Achilles)
 - Delayed incorporation
 - Biologically disadvantaged
 - Highly active young patients 2-4 x more likely graft failure (MOON 2011, Barrett 2010)

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Technical Considerations

- Hardware removal
 - Leave if no issue for revision
 - C-arm, currettes, broken screw set
- Non anatomic femoral tunnel
 - ignore
- Enlarged/partially anatomic tunnels
 - Large-size interference screws
 - Bone grafting at same setting or staged
 - Either side of joint



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Technical Considerations

- Put the tunnels where you want them
 - Know where to expect the previous tunnels/hardware
- Be prepared to improvise
 - Hardware removal
 - Fixation
 - incisions



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Technical Considerations

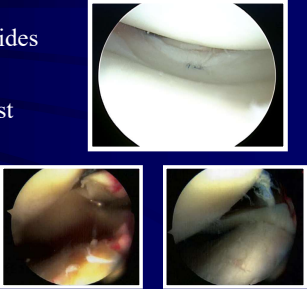
- PORTALS



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Address everything

- Medial and lateral sides
- Meniscus maximalist
- Articular cartilage minimalist



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Femoral tunnel

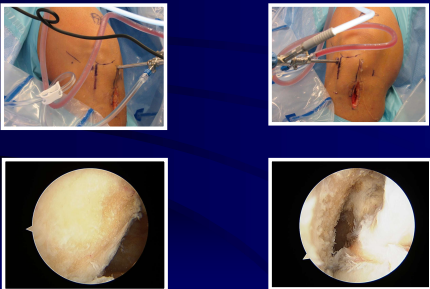
- Most Press
- Frequent cause of failure
- Decide how you want to drill tunnel
 - Accessory medial
 - Outside in
- **AVOID IMPROPER TUNNEL LOCATIONS**



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Portal Pearls

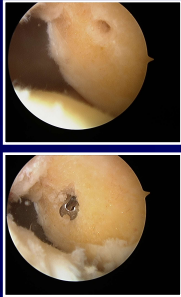
Central Viewing Lateral Viewing



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FEMORAL TUNNEL

- MUST CHECK PROPOSED TUNNEL LOCATION PRIOR TO DRILLING WITH THE SCOPE MEDIAL



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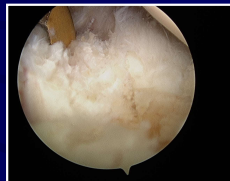
O/I vs MP???



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Tibial Tunnel


- Less press
- Equally important
- View proximal
- AH LM is predictable in revision setting
- Watch out for roots
- Sequential reaming



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Fixation

- Bad miss
- Cortical is my ultimate bailout
 - Back wall thin
 - Lateral wall blowout
 - Tunnel lysis
 - Poor bone quality



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ALL Recon

- Probably a role
- Revision setting
- Hyperextension
- Marked instability
- Reason for failure ambiguous/multifactorial

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Revision Outcomes

- Consensus of experts and available evidence: *revision results in a worse outcome than primary ACL reconstruction*

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Revision Outcomes

- Manage patient expectations
- Thought by many to be a salvage operation
 - Largely dependant on other knee factors
- Go slow with rehab-
 - Err on side of caution
 - 1 yr

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Revision Complications

- Infection
- Damage Nerves, Vessels or Cartilage
- Chronic pain
- Worsening condition
- Need for re-operation
- Persistent instability
- Rerupture
- Arthrofibrosis
- Patella fracture



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Summary Failed ACL R & Revision

- Why did the index operation fail?
- Pre-operative planning
- Be prepared to improvise
- Autograft when available
- Manage patient expectations with candid pre-op discussion

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