Role of Tendon Transfers in Achilles tendon Surgery

INDICATIONS
- Remove too much tendon
  - > 50% volume
- Remaining tendon insufficient for patient
  - High BMI
  - Poor host tissue
    - Diabetes
    - Age > 50
- Bridge Gap
  - Missed rupture
  - Resection @ insertion

CAN BE USED TO AUGMENT
- Insertional Tendinosis
- Midsubstance Tendinosis
- Missed Ruptures
  - Retracted tendon / large gap

IDEAL TENDON for TRANSFER
- In Phase
- Close proximity
- Similar strength
- Little morbidity
  - Donor site

Relative Strength Compared to Gastro-soleus Achilles
- FHL: 13 times weaker
- Peroneus Brevis: 18 time weaker
- FDL: 27 times weaker
  - Silver et al. JBJS (B) 1985

Peroneus Brevis

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantages</th>
</tr>
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<tbody>
<tr>
<td>In phase</td>
<td>Loss eversion strength</td>
</tr>
<tr>
<td>Close proximity</td>
<td>15% relative other side</td>
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<tr>
<td>Different facial compartment</td>
<td>Galant Am J Orthop 1995</td>
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</tbody>
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Results

- Good return to sports but little scoring data
  - Turco et al: Foot Ankle 1987
  - Teuffer et al. Ortho Clinics NA 1974

Flexor Hallucis Longus (FHL) tendon Transfer
Initially described by Wapner (FA 1993) - Missed Achilles rupture

2 incision technique
  - FHL harvest @ Knot of Henry in midfoot
  - Inserted through drill holes in calcaneus
  - Looped onto itself

Single Incision technique
  - Can be used for: Insertional / Mid substance / Rupture reconstruction
  - Deep posterior compartment immediately deep to Achilles / Soleus
  - Harvest at medial malleolus (toe and ankle held in full flexion)
    - 3cm shorter harvest than midfoot
    - Tashjian FAI 2003
  - Attach to calcaneus with anchor / interference screw through bone tunnel
    - Den Hartog FAI 2003

How strong is the FHL?
  - 17% increase in FHL muscle volume on MRI following transfer
    - Hahn FAI 2008

Risks & complications
  - Nerve Injury
    - 33% at midfoot harvest (cadaver study)
      - Mulier FAI 2007
  - Cock Up toe
    - Rare case reports
    - Midfoot harvest without FDL tenodesis
    - Not at ankle
  - Toe weakness
    - 4 athletes missed ruptures – no dysfunction
      - Frenette JBJS 1977

Gait Analysis
  - Clinically
    - no subjective or objective gait asymmetries.
  - Pedobarography
    - Unloading of the first toe with a load transfer to the metatarsal heads
      - Hahn : Clin Biomechanics 2008
“morbidity from FHL transfer should be clinically insignificant.”
  • Coull: FAI 2003

**Clinical Results - 2 Incision technique**

- **Missed Rupture (FHL transfer alone)**
  - Muscle strength 29.5% < unaffected side
    • Wapner Foot Ankle 1993

- **Tendinosis (FHL transfer alone)**
  - AOFAS-AH score 40->91.7
  - Muscle strength 30% < unaffected side
    • Martin FAI 2005

**Clinical Results - Single Incision technique**

- **Missed Rupture**
  - FHL transfer plus V-Y advancement repair
    • PF strength 22% < unaffected side
    • AOFAS-AH score 58->94.1 /100 (P<0.05)
    • 11/18 : >20 SLHR
      • Elias / Raikin FAI 2007

- **Insertional Tendinosis**
  - 26 pts # ave 35 months
    • AOFAS-AH score : 41.7 (pre) – 90.1 (post) / 100
    • 23/26 Good / excellent
      • Den Hartog FAI 2003
  - 40 pts @ 27 months
    • AOFAS-AH score : 56.3 -> 96.2 / 100 (p<0.001)
      • Improvement average 39.9 points
    • 37/40 : >20 consecutive SLHR
    • 40/40: >10 consecutive SLHR
    • VAS : 7.5 -> 0.3 / 10 (P<0.01)
    • Cybex : PF strength 94% unaffected side (p=0.251)
      • Raikin / Elias FAI 2009

**Conclusion**

- FHL
  - Useful adjuvant to Achilles surgery
  - Useful when remaining tendon is considered insufficient to support function
  - Can be safely and effectively harvested through same incision as Achilles surgery
  - Little morbidity from hallux IP PF loss