Central Tendon Splitting Approach

William C. McGarvey, MD

Relevant Biomechanics

Achilles tendon accepts 2000-7000 N of stress depending on applied load
1. Subjected to forces 6-10 times body weight during single cycle of running gait pattern
2. Talocalcaneal insertion can lead to uneven rotation on the calcaneal insertion of the Achilles predisposing the tendon to stress overload (e.g. overpronation)

Causes of Posterior/Retrocalcaneal Heel Pain
- Insertional Achilles Tendonitis (IAT)
- Haglund’s Disease
- Retrocalcaneal (RC) Bursitis

Historical Perspective: since Patrick Haglund’s original description in 1928, retrocalcaneal heel pain, its cases and treatment have been lumped together in the reported literature without distinction. In 1992, Clain & Baxter gave the first description of Insertional Achilles tendinitis as an entity separate from other causes of posterior heel pain as well as its more traditional non-insertional counter part. Classic Achilles tendinitis (or more appropriately tendinosis) occurs 2-6 cm proximal to the insertion near the musculotendinous junction and is not relevant to this topic. Difficulty surrounds differentiation between Insertional Achilles tendonitis, Haglund’s disease, and

Retrocalcaneal Anatomy
Calcaneus
1. Superior tuberosity
   a. May be hyper, normal or hypo-convex
   b. Contains the bursal projection
   c. More prominent laterally
2. Posterior tuberosity
   a. Most posterior projection of calcaneus
   b. Area of most proximal portion of Achilles insertion

Achilles Tendon
1. Coalescence of gastrocnemius, soleus
2. Rotates 90° internally leaving soleus fibers medial
3. Inserts on inferior portion of posterior calcaneal tuberosity ~ 1cm distal to superior tuberosity
4. Insertion more substantial medially, extends approximately 2 cm distally
5. Attaches to medial/lateral walls at insertion point
6. Surrounded by paratenon (one layer) instead of tenosynovium (two layers)

Bursae
1. Retrocalcaneal
   a. Between Achilles insertion and superior tuberosity
   b. Horseshoe shaped, fluid filled sac (1.0-1.5cc)
   c. Fibrocartilaginous anterior wall = posterior to bursal projection
   d. Contiguous posteriorly with anterior Achilles epitenon
2. Adventitious
   a. Variably present
   b. Subcutaneous, retrotendinous

Vascularity
1. Derived from epitendinous vessels (Anterior)
2. Watershed area 2-6 cm from insertion, hypovascular
3. Calcaneo-Achilles network more well defined
   a. Derived from posterior tibial (larger), lateral plantar and peroneal arteries
retrocalcaneal bursitis. Pertinent literature suggests some overlap does exist, but distinctions should be made.

A. Insertional Achilles Tendonitis

1. Incidence
   a. Occurs in 6.5 – 18% of runners/athletes
   b. 9-20% of these have insertional variety
   c. Felt to be overuse injury – mostly runners, but also repetitive jumpers (e.g. basketball, volleyball players)
   d. Can occur at any age, but tends to affect older age group than non-insertional group (avg. = 44 yrs vs. 33 yrs)

2. Pathophysiology
   a. Overuse injury, accumulated impact load
   b. Attritional, degenerative – “osis” changes histologically
   c. “Itis” may be present as a result of concomitant RC bursitis but is not primarily responsible for the condition
   d. Chemical irritation and mechanical abrasion may lead to chronic inflammatory response at the heel
   e. “stress enthesisopathy” - (Helal)
      - gradual repetitive traction force at insertion point leads to calcification
   f. Tight Achilles, overpronation, cavus configuration, obesity have been implicated to predispose to the above changes
   g. Diagnosis

3. History & Physical Exam – Pain of the bone/tendon junction
   a. History of
      i. Posterior heel pain worse after exercise, may become constant
      ii. Worse on hard surfaces, stair-climbing or with heel running
      iii. Recent increase in mileage or resumption of training after periods of inactivity (“weekend warrior”)
      iv. Poor stretching habits
   b. Physical exam
      i. Tender at bone tendon interface
      ii. Thickening at insertion or even palpable defect
      iii. Limited dorsiflexion compared to uninvolved side

4. Radiographs
   a. Lateral heel
      i. Association with prominent superior tuberosity
      ii. Variable but common presence of intratendinous spur or “calcific tendinosis”
      iii. Assess for presence of Haglund’s deformity by pitch angle, parallel pitch lines, posterior calcaneal angle
   b. MRI
      - More helpful to define extent of involvement of tendon insertion than as diagnostic tool
   c. Ultrasound
      - May be helpful, but technician dependent.
      - Good preliminary results from Europe

5. Differential diagnosis
   a. Most common Haglund’s disease – coexists in ~60% of patients with IAT, but true syndrome is different
      i. RC Bursitis
         - Most likely a continuum
         - Rare as isolated condition
         - Pain more medial/lateral, but not directly at insertion of tendon.
         - More anterior to tendon
      ii. Others
         - Seronegative spondylarthropathies
- Gout
- Familiar Hyperlipidemia
- Sarcoidosis
- Systemic Corticosteroids
- DISH
- Oral Fluoroquinolones

6. Treatment
   a. Conservative – effective in 95% of cases
      i. Rest, NSAID’s
      ii. Crosstraining – after subsidence of acute episode (e.g. Swimming, bicycling, aqua-jogging, weightlifting, etc.)
      iii. PT – emphasis on gastroc-soleus, hamstring stretching modalities, iontophoresis
      iv. Resume running – reduce mileage, encourage soft surfaces
      v. Heel lift – (1/4 –3/8”) – unload Achilles, displaces heel away from shoe counter; may incorporate wedge to control overpronation if present
      vi. Orthoses – correct biomechanics – pronation, cavus
      vii. Cast – 3-4 weeks followed by gradual resumption of activity
      viii. AVOID STEROID INJECTIONS!!
   b. Surgical – usually employed after 6-12 months failed conservative treatment
      i. Primary goals
         - Excise RC bursa
         - Resect superior prominence
         - Debride calcitic or diseased portion of tendon insertion
         - Reattach if necessary
      ii. Surgical approach – controversial
         - Single medial or lateral
         - Double
         - Inverted Y
         - J or Hockey stick
         - Short transverse
      iii. Central tendon – splitting approach (Go where the money is!)
         - Allows direct access to tendon, calcaneus, bursa
         - Good visualization
         - Technically simple
         - No skin bridge

7. Results – Operative findings – intratendinous classification is predominantly central – expands medial or lateral in smaller percentage; extent of disease and tendon involvement much greater in patients >50-55 yrs
      i. 91% satisfactory results
      ii. Compares favorably with literature analysis
         - Schepsis, Leach, et al; AJSM, 1987 – 71% good
         - Schepsis, et al.: AJSM, 1994 – 86% good
      iii. Most with good pain relief, return to weight bearing and activity in 2-3 months, but some still had lengthy recovery times up to 1 year
      iv. Older patients (>55) still had difficulty with residual pain, problems with shoewear, return to prior activity level 1-2 ear recovery time or more
      - 93% satisfaction – RC bursitis
      - 74% satisfaction – IAT
      - Patients with IAT and calcification were older, had longer recovery, more pain and shoe wear restrictions
      - IAT group had 41% complications
8. Conclusions
   a. Good alternative
   b. Not panacea
   c. Use only in younger patients

9. For non-calcific tendinosis and insertional pain, dorsal closing wedge osteotomy presents another option for treatment (see pg. 7)

10. Older patients- treat as chronic Achilles tendon deficiency
   a. Consider immediate tendon transfer
      i. Alternatives for tendon transfer = peroneus brevis, FDL, FHL
   b. Preference – FHL
      i. Greater strength, durability – 2:1 compared to FDL
      ii. Anatomically better – “In phase” muscle (plantar flexor as opposed to PB which everts)
      iii. Axis of contraction most closely approximates Achilles
      iv. Fires in sync with G-S group
      v. Anatomic proximity facilitates less dissection, better approximation
      vi. Avoids need to disturb N-V bundle
      vii. FDL musculotendinous unit compensates for FHL function via vincular attachments

11. Technique - traditional
   a. Supine position
   b. 2 incisions
   c. Detach FHL at master knot
   d. Optional suturing of distal stump to FDL
   e. Split anterior Achilles paratenon
   f. Bring FHL tendon through drill hole dorsal central to medial
   g. Sew FHL muscle belly to residual Achilles (increase vascular supply)
   h. Newer techniques are evolving - fewer incisions, better fixation, less dissection, etc.

12. Caveats
   a. Postero-medial incisions tenuous in older patients (check $T_cPO_2$
   b. Do Not over resect Haglund’s
   c. Do Not put drill holes too close together (compromise bridge)

13. Rehabilitation (Wapner)
   a. 4 weeks equinus cast
   b. 4 weeks neutral walking cast
   c. Begin rehab/motion
   d. Protect with walker brace till 10° DF & 4/5 inversion strength
   e. May have regular shoe with lift for home ambulation
   f. I prefer less cast use and earlier mobilization

B. Haglund’s Disease
1. Constellation of symptoms associated with Haglund’s deformity
   a. Bursal projection
   b. Objective radiologic finding – not necessarily symptomatic
   c. Haglund’s disease occurs when bursal projection is compressed with poorly fitting shoe heel counter leading to retrocalcaneal bursal inflammation and pain
   d. Adventitious bursal inflammation due to direct irritation
   e. NO Achilles involvement

2. Diagnosis
   a. History and physical exam
i. Painful heel, especially with certain shoes
ii. Tender medial and especially lateral to Achilles insertion on calcaneus
iii. Pumps actually can reduce symptoms by reducing pitch angle and forcing foot downward and away from hell counter

3. Radiographic
   a. Posterior calcaneal angle >75°
   b. Parallel pitch lines – bursal projection should lie below superior line
   c. Pitch angle – less is better; avg. ~20°
   d. Plantar osseous projection leads to higher pitch angle and can lead to tipping of the bursal projection posteriorly causing a + PPL – these occur in 40% of adults

4. Treatment
   a. Conservative
      i. Much like that of IAT
      ii. Remove the offending shoes (hard counters)
      iii. Wear heel lift or slightly high heel
   b. Surgical
      i. Resection
         - Goal is to decompress calcaneal prominence thus relieving impingement on surrounding bursal tissue
         - Must remove entire bursal projection plus additional 0.5 cm
         - Excise bursa if inflamed
         - Lateral paratendinous approach – projection is superolateral
         - Complication rate is low – Stephens; OCNA, 1994 – 0%
      ii. Osteotomy – dorsal closing wedge (Keck & Kelly: JBJS, 1965)
         - Goal is to reorient bursal projection by closing it anteriorly
         - Takes longer to heal
         - No guidelines on amount to remove
         - Changes biomechanics at heel cord by altering insertion
         - Results – small numbers but not great; up to 40% complications

C. Retrocalcaneal Bursitis
   - Helal has advocated these for IAT as well, but results are few in numbers and no long-term follow-up available.
   1. Rarely exists as isolated entity
   2. Usually direct result of compression between heel counter and large Haglund’s deformity leading to irritation/inflammation
   3. If present as isolated source of pathology must consider more global etiology e.g. calcaneal osteomyelitis or systemic etiology: Gout, RA< Reiter’s Syndrome
   4. Isolated RC bursal symptoms may be treated with conservative modalities like NSAID’s or local steroid injections (be careful not to inject Achilles!) Excision works well in recalcitrant cases
   5. RC bursitis in association with other conditions (e.g. IAT or Haglund’s) is treated by addressing attention to the offending agent and treating the primary problem

Bibliography