Disorders of the Ankle and Achilles Tendon

In this session…

- Ankle arthritis
- Ankle fusion
- Ankle instability
- Achilles tendinitis
- Achilles rupture/tear
- Achilles contracture
- Retrocalcaneal bursitis
- Haglund's deformity
- Pedorthic interventions

Ankle Arthritis

- Also called *degenerative joint disease*.
- May be caused by wear-and-tear, old age, or past trauma.
- As with virtually any arthritic joint, the ankle is painful when it moves. The way to relieve/resolve the pain is to restrict the painful motion.
- As a practical matter, to restrict motion through a joint, the device must necessarily span the joint.
- Ankle arthritis simply cannot be managed with devices that do not extend proximally past the malleoli.

Ankle Arthritis

- Pedorthic Management:
  - Footwear: In-depth shoe to accommodate SCFO
  - Shoe modifications: Rocker soles to – at least to some degree – obviate the need for dorsiflexion at the ankle and, more importantly, to replace the ankle motion that will be lost as a direct consequence of SCFO/AFO therapy.
  - SCFO/AFO: Solid ankle devices are much preferred to articulated devices, even those with a 90° dorsiflexion stop. Triplanar motion restriction is ideal, but sagittal plane motion restriction is the primary concern. A custom-made Arizona-type gauntlet with either a full-length footplate or, at least, a sulcus-length footplate will be the best option available to a CPed.

s/p Arthrodesis (Fusion) of Ankle

- Or a pantalar fusion – ankle, subtalar joint, talonavicular joint and calcaneocuboid joint.
- Obviously, the ankle fusion patient has no motion at the ankle joint. However, many times the patient will walk relatively normal after some time has passed as the ROM of the subtalar joint increases to allow more sagittal plane motion to compensate for the loss of ankle motion. There is evidence to support the theory that this phenomon, in turn, will prematurely age or "wear out" the subtalar joint.
- The pantalar fusion patient has only minimal dorsiflexion of the foot through the TMTJ complex.
- In both cases, pedorthic intervention includes:
  - Rocker soles to replace lost motion at ankle
  - Shock absorbing, semi-rigid foot orthosis to replace the shock attenuation previously provided by the ankle joint
  - Elevation on shoe sole if patient is now shorter on the fused side

Chronic Ankle Instability

- About 20% of acute ankle sprain patients will develop chronic ankle instability.
- Depending on the severity of the sprain, the ligaments may be permanently damaged contributing to:
  - Deficits in postural control
  - Compromised proprioception
  - Delays in muscle reaction time
  - Loss of strength
- Clinically, the history of patients with chronic ankle instability reveals past recurrent ankle sprains and severe inversion injury. They may take special precautions against weight-bearing, strenuous activities, and/or walking on uneven surfaces.
- Physical therapy can be often be helpful.

Chronic Ankle Instability

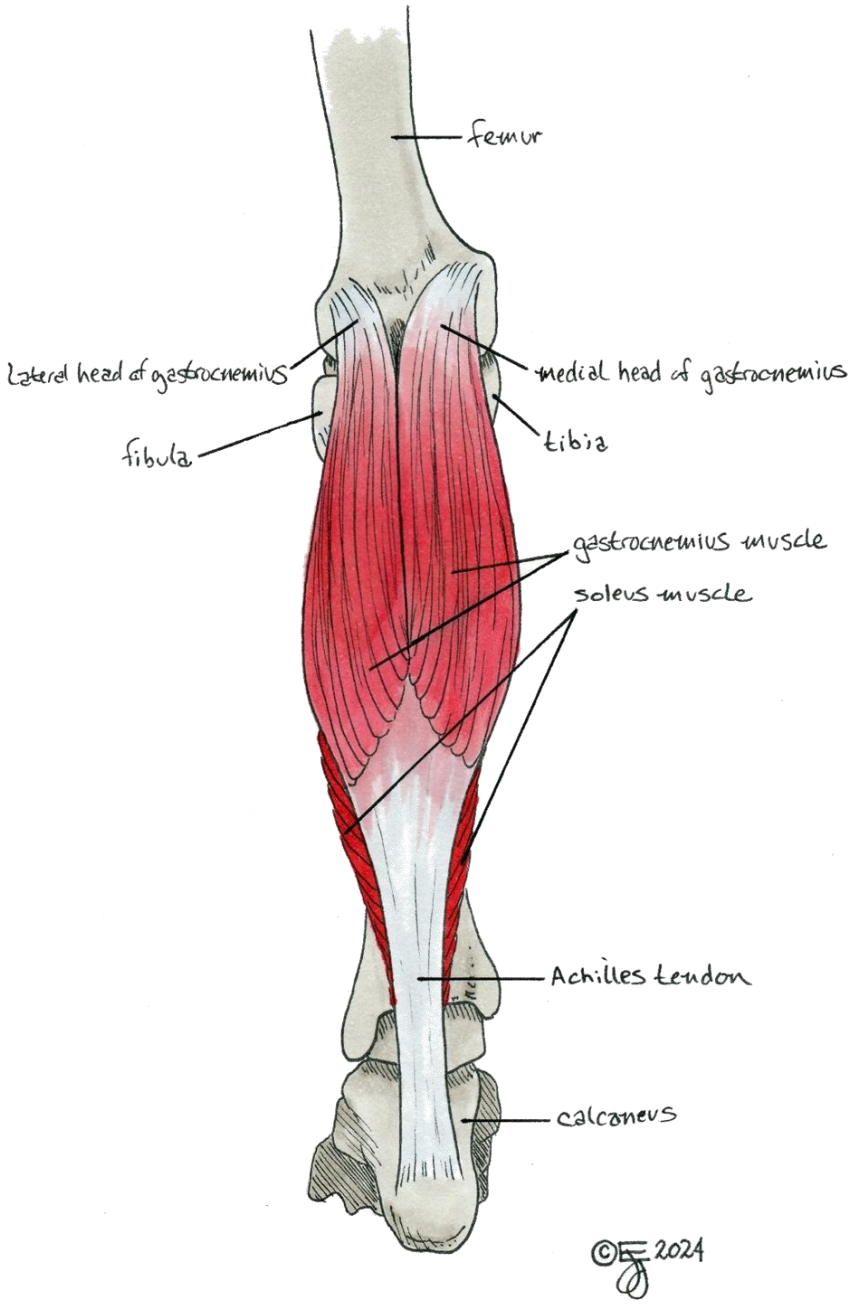
- Pedorthic intervention focuses on providing frontal plane support and control
  - Footwear: High-top boot for ankle support, extra depth to accommodate FO or SCFO
  - Shoe modifications: Lateral and/or medial flares (heel vs full)
  - Foot orthoses: Semirigid with deep heel cup, long flanges and reinforcement
  - SCFO: Arizona-type molded plastic/leather gauntlet, short-articulated AFO, Richie-type AFO, Aircast-type stirrup

Achilles Tendinitis

- Tendinitis Vs. Tendinopathy Vs. Tendinosis
  - Tendinopathy
    - *Tendinopathy* is a term that generally describes any problem with a tendon - tendonitis and tendinosis, as well as tendon tears and inflammation of membranes around a tendon.
  - Tendinitis
    - *Tendonitis* occurs when a tendon is irritated and/or inflamed. This inflammation usually occurs due to microtears in the tendon.
  - Tendinosis
    - *Tendinosis* is the chronic non-inflammatory degeneration of a tendon. Tendinosis may develop as the next step in the continuum from chronic tendonitis. It can also develop after a series of strain injuries to a tendon without adequate healing time between incidences.
  - When a tendon becomes painful, it is often assumed to be tendonitis. However, research shows that tendonitis is less common than tendinosis. As a result, tendinosis is often misdiagnosed (and inappropriately managed) as tendonitis.
- Insertional Vs. Proximal
  - Achilles tendinitis and tendinosis frequently occur at or near its insertion point on the posterior calcaneus, but it can occur higher up the back of the ankle/calf.

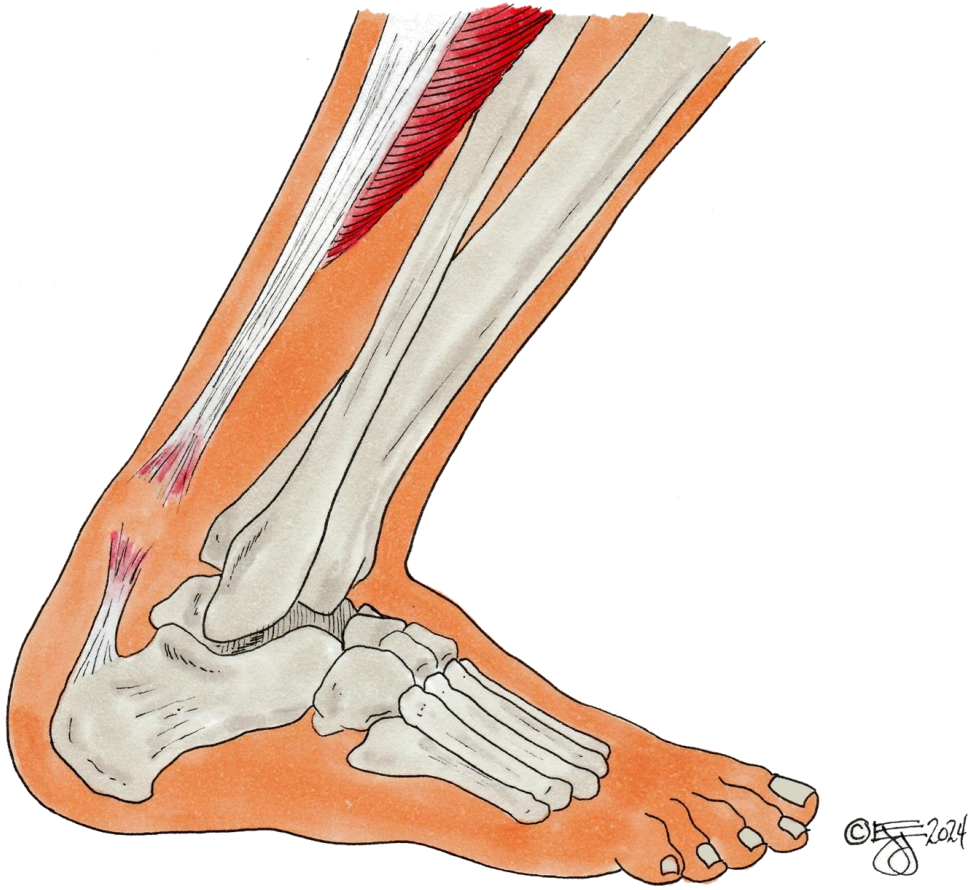
Achilles Tendinitis

- Acute Achilles tendinitis can be best treated with immobilization.
- Sometimes the patient is placed into a cast that is fixed in a few degrees of plantarflexion to reduce strain on the tendon. A similar effect can be achieved by using heel lifts on a walker boot.
- Pedorthic intervention follows suit.
  - Chronic Achilles tendinitis may be treated with heel lifts.
  - It may also require use of a solid ankle AFO to prevent any dorsiflexion past neutral
- A word on heel lifts…
  - Keep in mind that most shoes, as a practical matter, will only comfortably accommodate up to ½” thick internal heel lift before fit and function are affected.
  - Long-term use of a heel lift will necessarily promote an Achilles contracture.



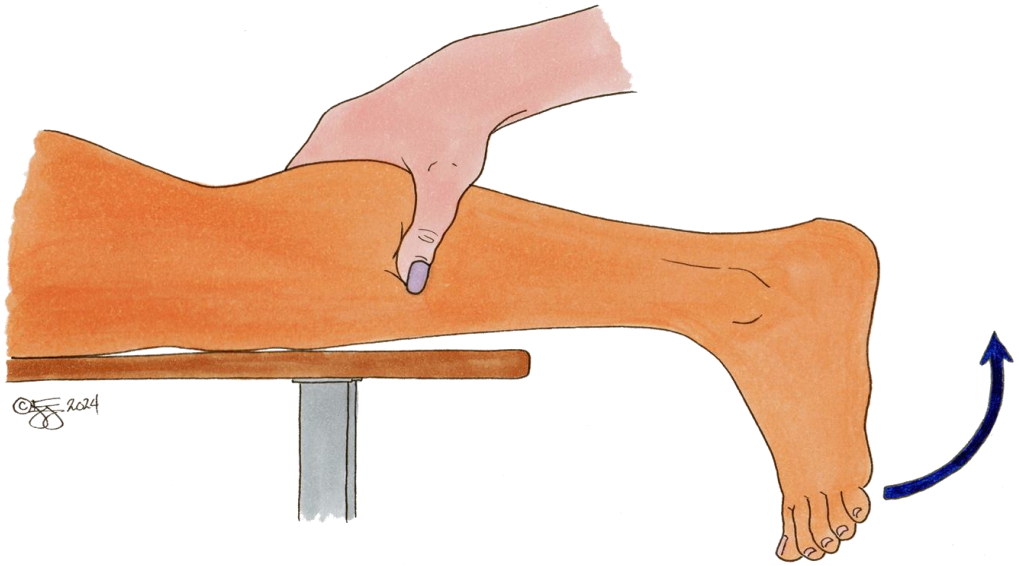
Achilles Rupture/Tear

- Achilles tendon rupture is the most common tendon rupture in the lower extremity.
- Occurs most commonly in adults aged 20- to 50-years.
- Acute ruptures often present with sudden onset of pain associated with a "snapping" or audible "pop" heard at the injury site.
- Patients may describe a sensation like being kicked in the lower leg.
- As one can easily imagine, an Achilles tendon rupture causes significant pain and disability.



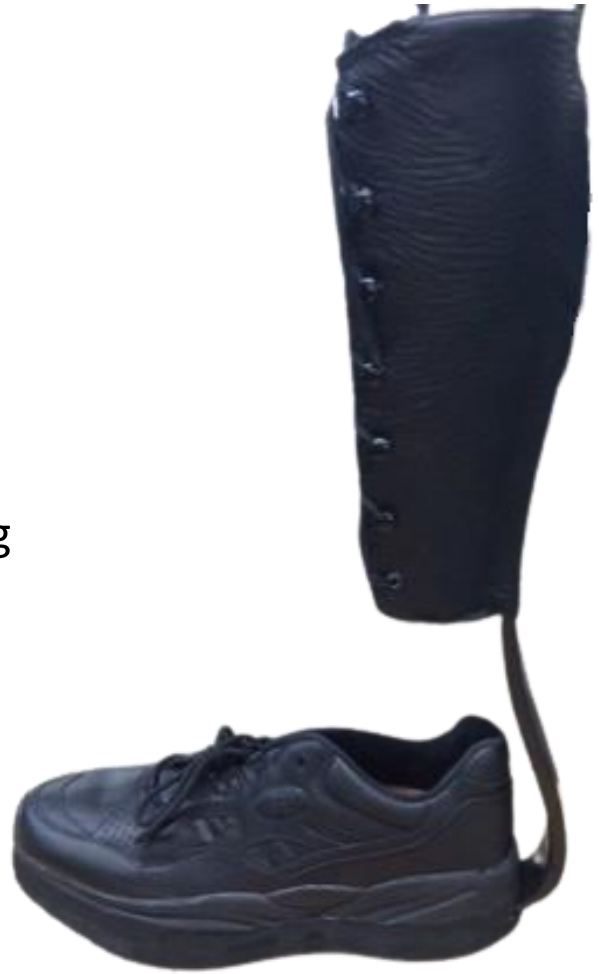
Achilles Rupture/Tear

- Thompson test
  - With patient lying prone, the physician will squeeze the muscle belly of the soleus.
  - If the calf squeeze causes the foot to move, there is *not* a complete rupture of the Achilles between the soleus and the calcaneus.
  - If the calf squeeze does *not* cause the foot to move, there is a complete rupture.
- Traditional thinking was that surgical intervention is better than nonsurgical. That thinking has changed as studies have proven no difference in outcome.
- Casting or functional bracing is now commonplace, especially if there is no urgency associated with a return to activity as would be the case in a professional athlete.
- Functional bracing is an alternative treatment in which the patient's lower leg is placed into a removable walker boot that contains wedges to lift up the heel. The brace allows the patient to put weight on their leg as they walk and can be removed to allow for physical therapy.



Achilles Rupture/Tear

- Pedorthic intervention is usually called for in a post-healing or chronic pain/dysfunction situation as opposed to being used to treat an acute rupture.
- Footwear: High-top shoe/boot to provide ankle support
- Shoe modifications: Heel lift to reduce stress and strain on the Achilles
- AFOs:
  - In the case of chronic rupture and/or one that was missed on initial presentation, the patient may have weakness, especially at toe-off. Bracing can be very useful in these cases. Dorsiflexion-assist braces have been around for decades (as the objective is easily achieved). Plantarflexion-assist devices are a but more challenging. However, the objective can be met via use of modern carbon composites and special design features.
  - Alternatively, bracing to essentially lock the ankle at 90° used in conjunction with a rocker sole can help restore functional gait.
  - As the CPed's Scope of Practice precludes one from independently providing an AFO to manage a problem that originates above the ankle, this would only be applicable in a scenario where the CPed is being privileged by a CO or CPO.

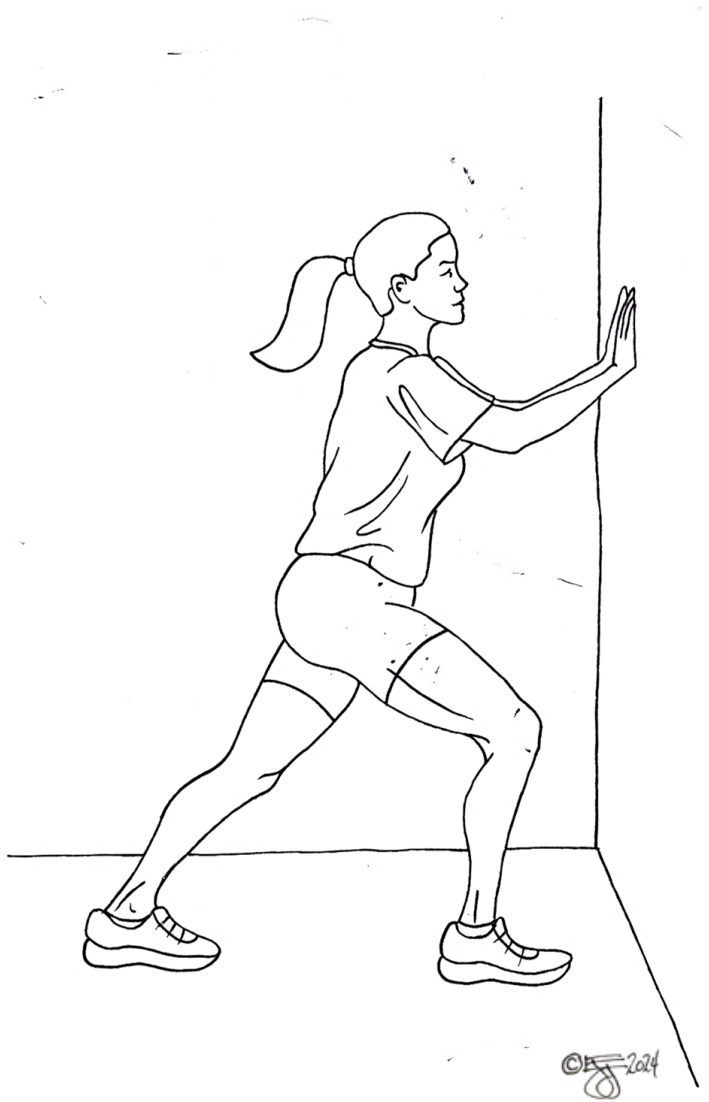


Achilles Contracture (Equinus)

- Limited dorsiflexion of the foot compensated by toe-walking gait
- Can be caused by:
  - Tendoachilles contracture
  - By ankle arthritis with anterior spurring/bony block
  - Congenital
  - Long term use of casts, crutches or high heels
  - Diabetes
- Anterior ankle pain
- Metatarsal head overload pain

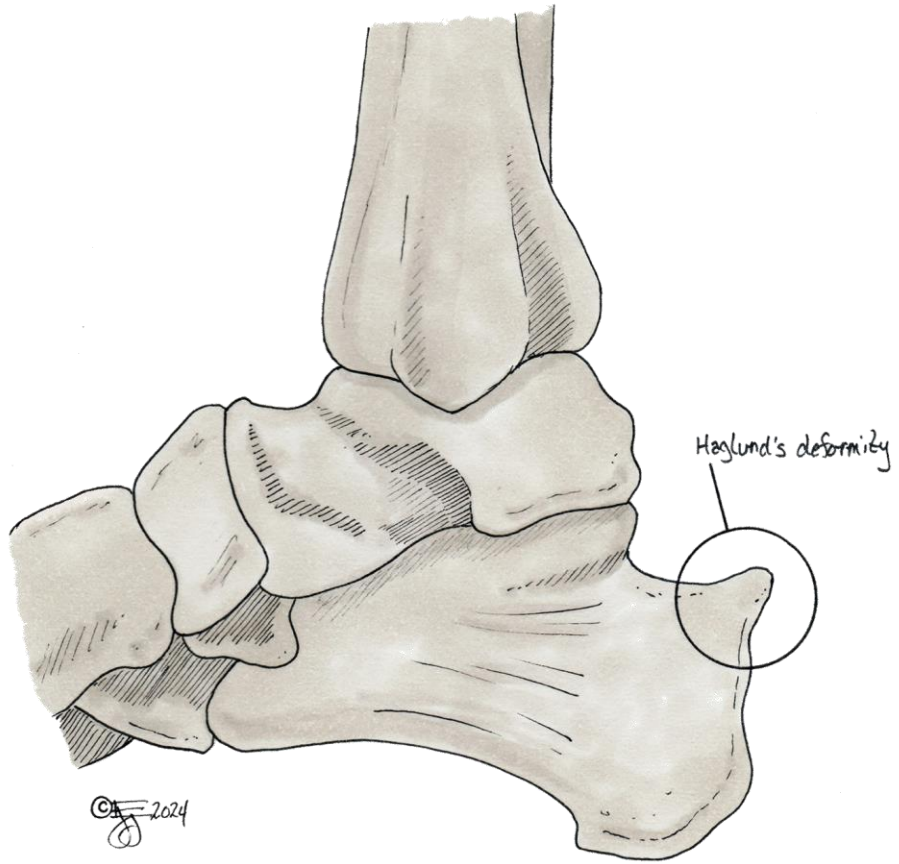
Achilles Contracture (Equinus)

- Pedorthic Management
  - Achilles tendon/gastrocnemius/soleus stretches. Perhaps even hamstring stretches.
  - Progressive night splints
  - Heel lifts
    - If goal is to accommodate the fixed equinus deformity, they can be used indefinitely.
    - If goal is to eventually stretch patient back out to regain full ROM, then they should be lowered progressively as Achilles lengthens via stretching until heel lift is no longer necessary.
  - Foot orthoses
    - Heel lift to bring ground up to foot
    - MTH offloading



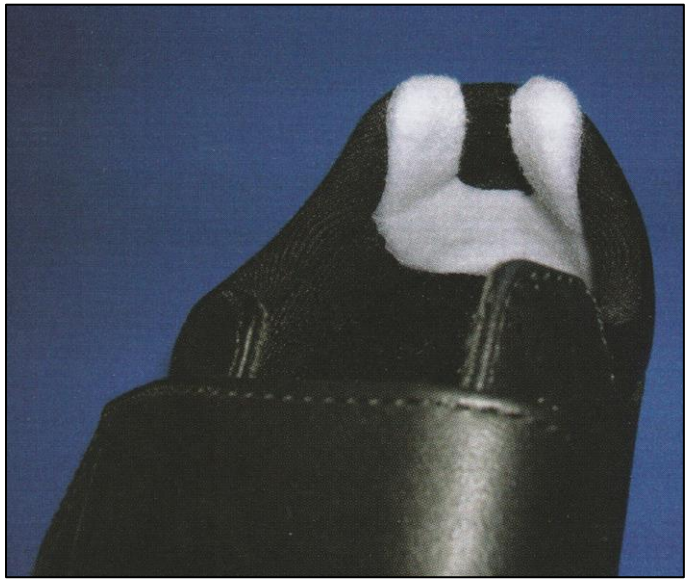
Haglund's Deformity

- First described by Patrick Haglund in 1927.
- It is also known as *retrocalcaneal exostosis*, or a "pump bump."
- It is a very common - but poorly understood – condition.
- Haglund's deformity is an abnormality of the bone and soft tissues in the foot. An enlargement of posterior calcaneus (at the Achilles tendon insertion site) triggers this condition.
- The soft tissue near the back of the heel can become irritated when the large, bony lump rubs against rigid shoes.



Haglund's Deformity

- Relief from shoe-related pressure is the key to pedorthic success.
- Custom orthotics may be designed to alter hindfoot position and/or protect the prominence from pressure.
- A horseshoe pad may be placed inside the heel counter area of the shoe to push the heel forward and allow relief for the painful prominence.
- Alternatively, a heel lift may be placed under the heel to raise the bump above the collar of the shoe.
- Finally, the counter of the shoe may need to be modified to relieve pressure. This can be done by removing some of the reinforcing material (plastic or fiberboard) or heating and relieving it the area.

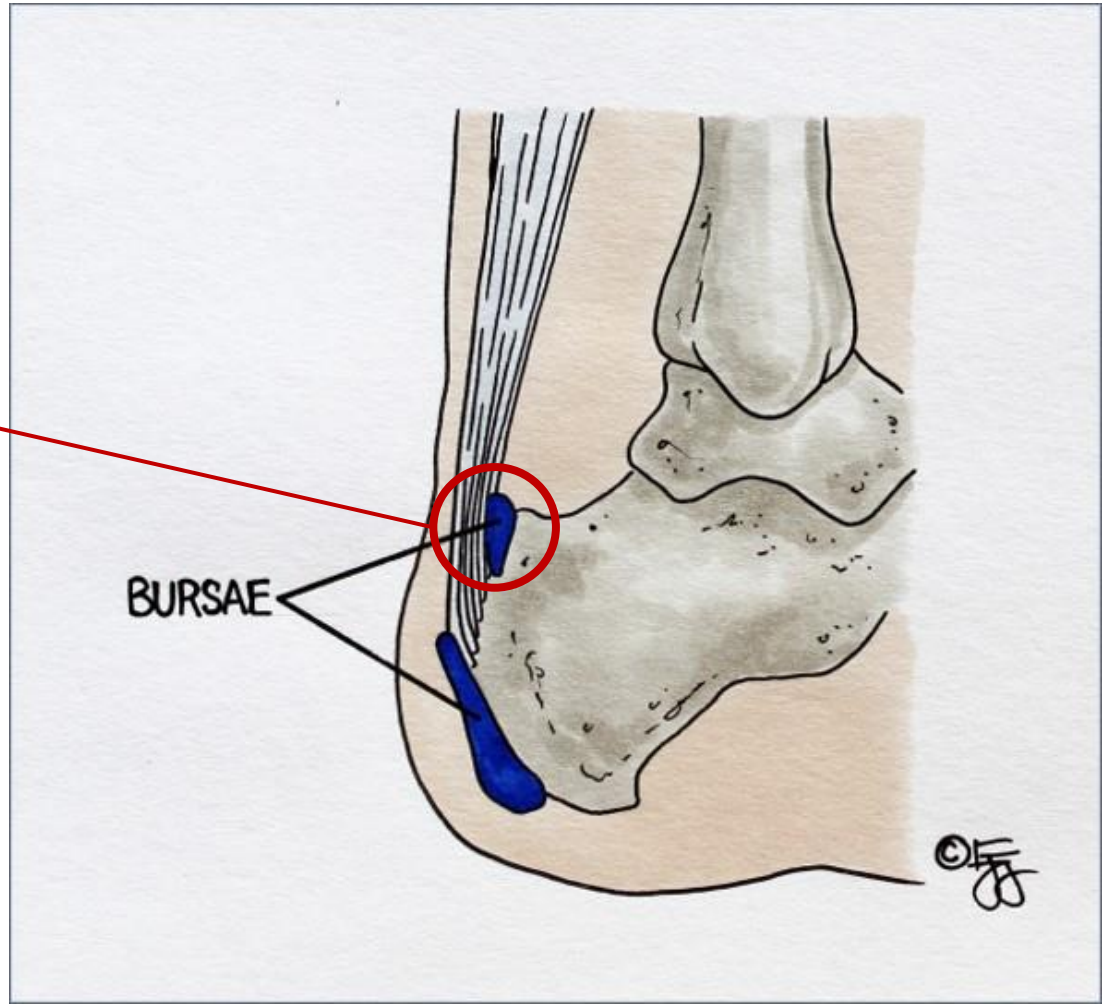


Retrocalcaneal Bursitis

- Anatomy Review:
  - A bursa appears at a junction of a tendon on the bone.
  - A bursa is filled with a thin layer of lubricating synovial fluid.
  - It protects the joint by reducing or braking the shock to the joint.
  - The structures nearby the bursa can move with minimal friction due to irritation.
- The retrocalcaneal bursa is saddled over the posterior-superior prominence of the calcaneus under the Achilles tendon and its lateral expansions.

Retrocalcaneal Bursitis

- Retrocalcaneal bursitis is the most common heel bursitis. Retrocalcaneal bursitis is the inflammation of the bursa located between the calcaneus and the anterior surface of the Achilles tendon.
- Anterior or deep to the tendon is the retrocalcaneal (subtendinous) bursa, which is located between the Achilles tendon and the calcaneus.
- Retrocalcaneal bursitis can often be mistaken for Achilles Tendinopathy or can also occur in conjunction with Achilles tendinopathy.
- Retrocalcaneal bursitis may also be caused or exacerbated by the presence of a Haglund's deformity.



Retrocalcaneal bursitis

- Pedorthic treatment:
  - Heel lift to reduce calcaneal pitch angle and move the bursal prominence forward from the Achilles tendon. While both internal and external heel lifts will reduce intracorporeal pressure on the bursa, only the internal shoe lift will reduce extracorporeal pressure form the shoe counter.
  - Keep in mind that most shoes, as a practical matter, will only comfortably accommodate up to ½” thick internal heel lift before fit and function are affected.
  - Horseshoe pad or counter modification to provide pressure relief from rigid counter.
  - Stretching and strengthening once symptoms resolve may help to prebvent recurrence.

The End