

INSERTIONAL ACHILLES TENDON CONDITIONS IN FOOTBALL REFEREES

CAN MINIMAL INVASIVE TECHNIQUES STOP US FROM “RUNNING BACKWARDS”?

– Written by Kenneth J. Hunt, Alex Lencioni, USA, and Pieter D’Hooghe, Qatar

WHAT IS ACHILLES TENDINOPATHY

Achilles tendonitis is a term used to include several painful conditions in the athletic population. These include terms like insertional Achilles tendonitis (inflammation of the tendon and sheath), retrocalcaneal bursitis, Haglund deformity and Achilles tendinosis (degeneration of the tendon) which can either occur in isolation or in combination with each other. While we see these diagnosis in the general public in people of varying ages there is an increased prevalence of Achilles tendon pathology in the Football referees (as well as in running and jumping footballers) due to the repetitive eccentric loads placed on the tendon while performing. Nichols et al¹ postulated that both additional time spent training and biomechanical differences as well as sport-specific requirements were likely the etiology of the Achilles tendon pathology in this patient population. They discussed excessive milage/training,

training on uneven or hard surfaces and poorly designed shoe wear as possible training related causes. Additionally Nichols discusses that calf muscle (gastrocnemius-soleus complex) weakness or tightness and hindfoot pronation may be contributing to increased Achilles pathology as well¹. Finally, the heel counter of a cleat can contribute to external forces on the tendon at its insertion.

Achilles tendinopathy by definition is a degenerative change within the tendon^{2,3} while not historically considered an inflammatory process, inflammation may play a role early in the disease process³ and tendons have recently have shown to develop chronic inflammatory changes⁴. Magnan et al² discuss this as a clinical syndrome with 3 key elements, pain, swelling and functional impairment, which correlate to the classic histologic pattern of non-inflammatory degeneration. While degenerative changes are the mainstay

of the tendon pathology the pain may be produced by early inflammation of the tendon or the surrounding tissues like the bursa³.

The incidence of Achilles tendinopathy peaks in middle age patients ranging from 30-55² and in running athletes such as football players around 30% will have Achilles tendinopathy³. Due to the sport-specific nature of running backwards, this condition is also frequently encountered in Football referees. While training and overuse is thought to be a component in the pathway for tendinopathy, there are both catabolic and anabolic phases of tendons that football athletes go through while training. With each training event the tendons will undergo an external stress related to the training and this will lead to changes in the tendons. The initial phase is one of collagen breakdown followed by a increase in collagen production. This is necessary to understand, because with the



Figure 1: T2-weighted sagittal MRI demonstrating prominent Haglunds deformity with associated edema, retrocalcaneal bursitis and degenerative Achilles tendinosis.

correct training intervals (36-72hrs) this will allow for a net positive increase in collagen and tendon strength but with training intervals too close, there is a net loss of collagen fibers³.

Some athletes are at a higher risk of having associated posterior heel pathology. The Haglund deformity, also known as the pump bump, winter heel, or Bauer bump, is an enlargement of the posterior superior portion of the calcaneus bone adjacent to the Achilles tendon (Figure 1). This can lead to impingement of the Achilles tendon and present with similar symptoms and pathology present with degenerative changes in the Achilles tendon seen on MRI. While seen most commonly in middle age people, football players & Football referees - who are at risk of overuse, similar to Achilles Tendonitis - are at higher risk of retrocalcaneal pathology with bursitis and Haglund deformity⁵. This is thought to occur through many mechanisms but overuse, poorly fitting shoes and rigid heel counter shoes or athletic footwear (ice skates) can all predispose the player to developing a Haglund deformity and Achilles impingement and potentially tendon pathology.

While the diagnosis may be clinical based on the physical exam, location of the symptoms, and the timing they arise. Most Football athletes will get additional imaging studies which can range from radiographs, to ultrasound or magnetic resonance imaging. These studies provide additional information to the athlete and the health care provider (team physician) to make a decision on the treatment plan best suited for that individual athlete.

NON-SURGICAL TREATMENT AND REHAB PROTOCOL

Non-surgical management of Achilles pathology is the mainstay of treatment and can consist of a combination of modalities to treat and reduce the symptoms to allow the athlete to return to play. While Achilles tendinopathy is thought to be a non-inflammatory process, and rather due to tendon degeneration there are several theories as to why athletes develop pain. Potentially being from the irritation of the retrocalcaneal bursal to local angiogenesis and nerve recruitment that can occur during the disease process. Ice along with oral and topical anti-inflammatories are the mainstay of pain management.

While pain control and footwear modification can help with symptoms, athletes specifically benefit from guided physical therapy programs focusing on tendon rehabilitation to help them recover and return to play. While repetitive eccentric loading without proper rest and rehabilitation can lead to tissue damage, controlled guided eccentric exercises is the mainstay for tendon rehabilitation. Silbernagel et al recommend that all athletes with Achilles tendinopathy trial at 3 months of exercise based therapy before considering alternative treatment options. Noting it can take up to a year for recovery, which a high recurrence rate when entering the return to play phase⁶, especially in elite football players with short recovery periods. Silbernagel et al. notes that exercise therapy is best supported when eccentric exercises are either used in a 3 set 15 repetition method twice a day 7 days a week for 12 weeks⁶ or in a "do-as-tolerated" approach with the same exercises. The eccentric exercises used in the Silbernagel rehab protocol, the Heel drop with the knee straight, or the heel drop with the knee bent were used by Stevens et al. comparing the Do-as-tolerated, versus the set and repetition regime described above and found no difference in the two groups at 6 weeks⁷. An alternative approach to this would be utilizing both eccentric and concentric exercises which has also resulted in both short and long term positive results⁶.

When entering the return to play phase of rehab for Achilles tendinopathy reinjury rates in football players can range from 27-44%⁶, and are more common in athletes who received a short recovery period or no assistance in their return to sport phase. Gradual and controlled progress in the return to sport phase allows for athletes to have the proper recovery time in hopes to prevent re-injury. This also allows the athletes symptoms to guide the therapists in personalizing a plan to progress the athlete back to play⁶. When determining when to advance athletes, therapists should focus on the symptoms the athlete is having during the rehabilitation period. As the mechanical loading of the tendon is important in the recovery of the tendon, it can also lead to overloading and tissue injury if not allowed sufficient recovery⁶. The monitoring of pain in an athletes recovery is a very important tool as this will allow the therapist to know what state the tendon is in at any point in the return to play phase of the therapy⁶. As

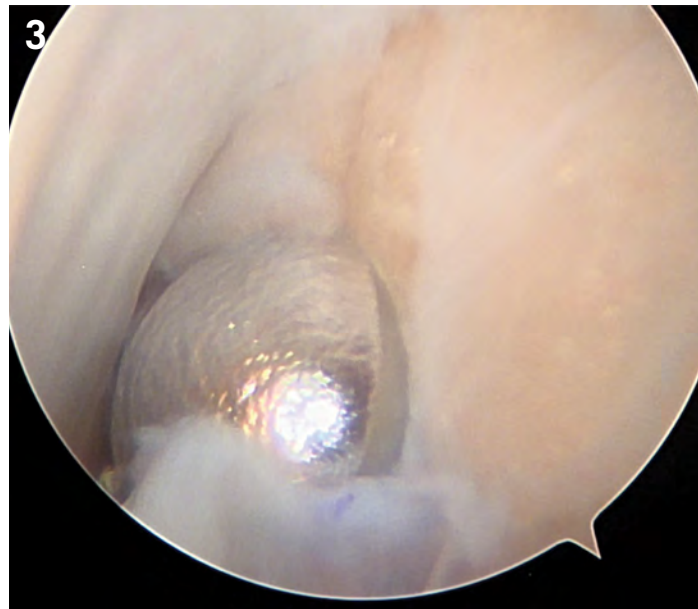


Figure 2: Intra-operative photograph demonstrating location and angle of endoscopic visualization of retrocalcaneal space.

Figure 3: Arthroscopic image illustrating shaver used to remove degenerative fibers of the Achilles tendon and enlarged calcaneal osteophyte (Haglund's lesion).

stated above given that the net catabolic phase of tendons after heavy loading is between 36-72 hours^{3,6}, it is recommended that in the return to play phase of the recovery the trainers/therapists should allow for 2-3 days of recovery between heavy loading workouts⁶. Once a footballer has proven to be capable of returning to play by completing the training and testing recommended for its/hers specific needs, a maintenance phase should begin to maintain the health of the tendon and prevent recurrent injuries⁶.

We can also provide these athletes with heel lifts, heel pads, and shoe modifications to alleviate pressure on the heel and Achilles tendon with activity. Ultrasound has also been used to augment tendon recovery⁸. In mouse models it was shown to stimulate collagen synthesis, and has also been shown to decrease swelling in the acute inflammatory phase⁸. Ultrasound has been thought to increase function, improve pain, and enhance tendon healing in chronic tendon injuries⁸. Another alternative non-surgical modality is Platelet-rich Plasma (PRP) injections. Filardo et al looked at 27 patients (22 men and 5 women) with an average age of 44.6 years old who presented with chronic refractory mid substance Achilles tendinopathy, including 4 patients who had previously undergone surgical intervention⁹. These patients underwent 3 injections total each 2 weeks apart, and found improvement in Tender score, VISA-A score, and activity levels, and noted that longer duration of symptoms lead to a longer return to sport period⁹.

SURGICAL TREATMENT OPTIONS

When non-surgical treatment modalities are not able to return the athlete to perform, there are surgical options available to them. Traditionally these procedures were performed with relatively large incisions, providing direct visualization of the diseased tendon by partially detaching the tendon from the calcaneal insertion and removal of any bursal tissue and bone which could be contributing to the pathology. While this may still be the mainstay procedure for athletes with extensive calcific changes in the tendon which need to be excised, pain related to enlarged calcaneal Haglund's lesions and inflamed bursa with minimal changes within the Achilles tendon, can be an indicator to propose for a novel endoscopic approach to treat Achilles tendinopathy. With open Achilles debridement and calcaneoplasty athletes on average returned to sport at 7.5 months¹⁰ while with endoscopic approaches they are running at 3 months post op.

ENDOSCOPIC REPAIR TECHNIQUE

To perform the procedure the patient is brought to the operating room, undergoes anesthesia and is then placed into the prone position on the operative table. Once prepped and draped in standard sterile fashion we then mark the appropriate landmarks needed for making the endoscopic portals. We identify the Achilles tendon borders, the insertion point of the Achilles on the calcaneus, and the Haglund deformity if present. We then

begin my making the medial portal first. We insufflate the retrocalcaneal space with 4cc of saline and at the midpoint between the Achilles insertion and the Haglund deformity make our percutaneous portal. Next, with the trocar still in the portal we clear the area with a sweeping motion. Once the camera is in place (Figure 2) and we are able to visualize that we are in the appropriate space we then push across the retrocalcaneal space laterally to find the location, and create the lateral percutaneous portal. We then place the shaver in the lateral portal and debride the retrocalcaneal bursa allowing for better visualization (Figure 3). We then can visualize and debride the entirety of the diseased/damaged tendon and any prominent bone and bursa that may be contributing. The Haglund resection is performed under both direct visualization and then confirmed using fluoroscopy (Figure 4).

SURGICAL RECOVERY AND REHAB/RETURN TO SPORT AFTER ENDOSCOPIC SURGERY

For our surgical patients we have them enter our four-phase therapy plan. Phase I, recovery, is Immediately post op and the patient is placed into a short leg splint and remains non-weight bearing for 5 days to reduce swelling, then transition to a waling boot. After their initial 2 weeks post-op visit, they enter phase II (2-6 weeks), rehabilitation, where they initiate range-of-motion and resistance exercises. And are transitioned into regular shoes around 4 weeks with peel away heel lifts. After



Figure 4: Lateral radiograph demonstrating the removal of a prominent Haglund's lesion.

two weeks in the boot (week 4) they are then instructed to peel away one lift every 2-3 days (6 lifts total). Strengthening in phase II begins with inversion and eversion against gentle resistance in weeks 2-6, and starting week 2 they begin working on hip and knee strengthening and passive heel cord stretching. At week 2 they can also start riding a stationary bike while wearing the boot. When pain free with normal gait ambulation, Phase III can begin (weeks 6-12), restoration, is when they will begin advancing running on an anti-gravity treadmill followed by ground and then field running. During Phase III we continue functional strengthening with light resistance to dorsiflexion and plantarflexion. The footballer will also begin isometric training of inversion and eversion. As long as the athlete is progressing appropriately, we will have them begin eccentric strengthening as tolerated. Phase IV, (12+ weeks), return to play. At this time the athlete will continue the phase II and III exercises but now accompanied with isotonic activities, and aggressive focus on plantarflexion eccentric exercise. At 12 weeks, most athletes have fully returned to running and can advance as tolerated until they can meet the needs of their beloved game called "football".

SUMMARY

While not uncommon to Football referees (as well as running and jumping football players), insertional Achilles tendinopathy,

can cause prolonged pain and eventually limit their performance on the pitch. When conservative therapy alone fails to improve, minimal invasive approaches can allow our athlete a much faster return to play compared to the more invasive open procedures, with high success rates.

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Kenneth J. Hunt M.D.

Associate Professor

Chief of Foot and Ankle Surgery

Alex Lencioni M.D.

Orthopaedic Surgeon

University of Colorado Department of
Orthopaedics

Denver, USA

Pieter D'Hooghe M.D., Ph.D.

Orthopaedic Surgeon

Chief Medical Officer

Aspetar Orthopaedic and Sports Medicine
Hospital

Doha, Qatar

Contact: pieter.dhooghe@aspetar.com