Academy of PHYSICAL MEDICINE

Knee and foot pain

Simeon NielAsher © 2020

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1

WHAT WE WILL BE EXPLORING

Seventh in our series of workshops

- Runners Knee
- Trigger points 101
- Achilles Tendinopathy
- Planter Fasciitis/Heel pain
- Conclusions
- Next workshop

2

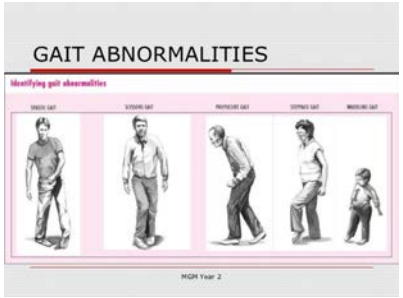
Knee and Foot Pain

- Knee pain accounts for approximately 33% of all musculoskeletal pain that presents to family doctors (Calmach 2003).
- Incidence increases with age
- More common in patients who are physically active. For example, in one large study as many as 54 percent of athletes reported some degree of knee pain over the course of a year (Rosenblatt 1983).
- Knee pain can be extremely debilitating and, if untreated can affect the whole body in a myriad of ways. The body is constructed for locomotion and using our legs is a fundamental part of how our nervous system works. The lower extremity also plays an important role in proprioceptive function (Freeman 1966).
- It has long been known that locomotion contributes to both sensory and cognitive health. The corollary is of course true, that 'painful' knees can cause a host of unwelcomed effects physically and emotionally.
- The body often compensates for pain by going into a 'holding pattern' around the knee. Depending on chronicity this can affects the hips, feet, ankles, lower back and all the way up to the neck via myofascial chains.

3

Gait and the knee and trigger points

- Changes in knee, or gait mechanics eg. (O/A) often induces 'trigger points' due to uneven loading.
- Trigger points can develop in muscles for a number of reasons. When present they cause the host muscle to be shorter, tighter and less efficient.
- Trigger points can also add negatively to the cycle of increased input to the peripheral and central nervous system (sensitization).
- Treating trigger points can have both immediate and long lasting effects for acute knee injury.
- Trigger point therapy can also help manage chronic conditions such as arthritis. It can also reduce the patients' dependency on medication.



4

Runners Knee

- Runner's Knee refers to a number of injuries resulting from overuse, causing pain around the knee cap (patella). The name comes from its high prevalence in runners, where the repeated stress on the knee causes irritation where the patella rests on the femur.
- Patellofemoral pain syndrome (PFPS) is the most common type of Runner's Knee and is the one we will focus on in this. Runner's Knee can be related to tension or weakness in the hip muscles (**ITB**, **Gluteus Maximus** and or **Medius** muscles) and or **Quadriceps** muscles.
- The pain can be sudden and piercing or chronic and dull and the knee can suddenly "give way".
- Runner's Knee is most likely to occur when the **Hamstrings** and **Quadriceps** are too tight and inflexible. This leaves the patella unsupported creating pressure and causing it to move from its correct position.
- Other mechanical factors have been described such as and **imbalance** between over developed lateral quadriceps (**Vastus Lateralis**) and weaker medial quadriceps (**Vastus Medialis**). Clinically, if you suspect this, it is well worth looking for trigger points in these muscles.

5

Symptoms of Runner's Knee

Symptoms may be felt in one (unilateral) or both knees (bilateral).

- Pain will center around and behind the patella
- Pain on flexion from kneeling, squatting or even getting up from a chair
- Pain in the lateral knee in the lower part of the ITB
- Cracking sensation, clicking or grinding
- Pain after prolonged sitting with bent knees
- The knee seems to 'give-way' or buckle for NAR
- Increased pain when walking **up or down** hills or stairs

6

Who Is Prone to Runner's Knee?

- Women are more likely to get Runner's Knee than men. This is due to their wider hips which causes a greater angling (Q-angle) of the knee to the thighbone, creating increased stress on the knee cap.
- Younger runners (teens) as well as those who run for recreational purposes tend to suffer most
- Hikers, cyclists and even office workers - those who sit for long periods can get Runner's Knee
- Around 40% of professional cyclists will develop a form of Runner's Knee a year
- It can also affect other athletes whose activities require repeated bending of the knee, e.g. jumping, biking and walking.

7

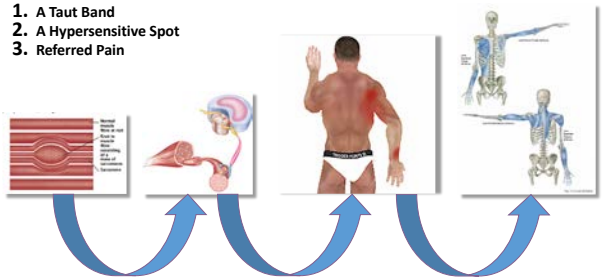
Differential Diagnosis

- Medial or lateral meniscal cartilage tear
- Medial or Lateral ligament strains (including collateral ligaments)
- Stress reaction or stress fracture of the patella (knee cap)
- Contusion of cartilage or bone
- Referred pain from lumbar spine L4/5 nerve root
- Quadriceps tendinopathy
- Tenosynovitis
- Patellar tendon tendinopathy
- Painful **plica**
- Pes anserinus bursitis
- Pes anserinus tendinopathy
- Biceps femoris tendinopathy
- Pes Ancerinus bursitis
- Lateral patellar compression syndrome
- Stress reaction or stress fracture of femur, tibia or proximal fibula
- Proximal tibial-fibular joint sprain

8

TRIGGER POINTS 101

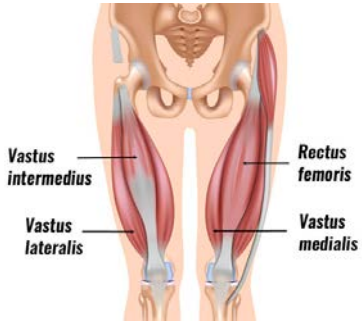
1. A Taut Band
2. A Hypersensitive Spot
3. Referred Pain



9

Attachment Trigger Points

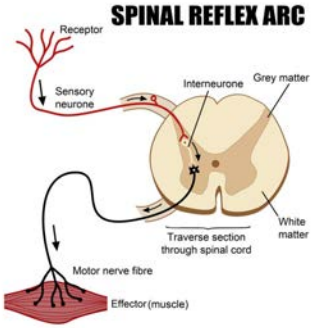
- Myofascia is a continuum
- It has been noted that the area where the tendon inserts into the bone (tendo-osseous junction) is often "exquisitely" tender (Simons et al. 1998; Davies 2004)
- This may well be the result of the existing forces travelling across these regions. It has also been suggested by the same authors that this may result from an associated chronic, active myofascial trigger point. This is because the tenderness has been demonstrated to reduce once the primary central trigger point has been treated; in such cases, the point is described as an *attachment* trigger point
- Furthermore, it has been suggested that if a chronic situation occurs where the primary and attachment trigger points remain untreated, "degenerative changes" within the joint may be precipitated and accelerated (Simons et al. 1998)
- **Ligamentum Patellae** has several attachments



10

Trigger Points, Knee Pain

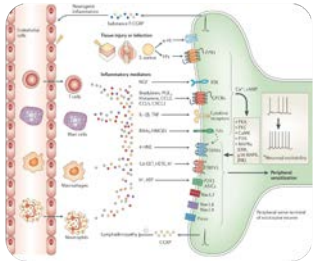
- Trigger points may play a hugely important role in activating, perpetuating and also relieving Knee Pain
- Peripheral and central sensitization
- Nociceptive drive
- Dorsal Horn Wind-up



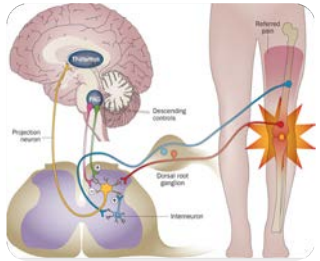
11

Sensitization – Increasing the burden of nociceptive input

Peripheral – 2 to 5 segments



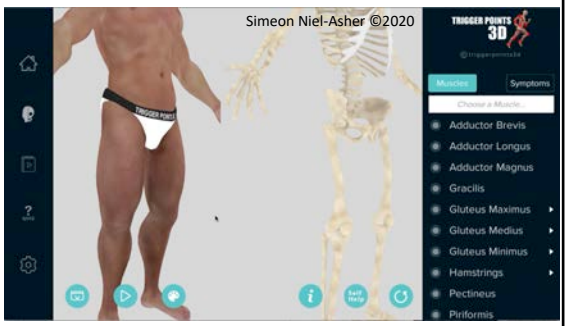
Central - Windup



12

Runners Knee and Myofascial Trigger Points

- Quadriceps Femoris
- Vastus Lateralis
- Vastus Medialis
- TFL/ITB
- Gluteus Maximus
- Hamstring
  - Biceps Femoris
  - Semimembranosus/ Semitendinosus
- Popliteus - STP



13

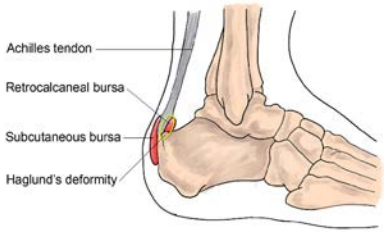
Simeon's – Approach to treatment

14

Achilles Tendinopathy

Epidemiology of ankle and foot overuse injuries in sports: A systematic review. *Sobhani S, Dekker R, Postema K, Dijkstra PU Scand J Med Sci Sports. 2013 Dec; 23(6):669-86.*

- The Achilles tendon is the largest tendon in the body, packed with deep pain receptors it connects the Gastrocnemius and slips of the Soleus muscles to the heel bone (calcaneus).
- These large calf muscles are used in many activities such as walking, running and jumping and are commonly injured.
- Achilles tendinopathy is one of the most frequently diagnosed ankle and foot overuse injuries (Sobhani 2013).
- It is commonly associated with explosive physical activities such as running and jumping. It may affect up to 9% of recreational runners and is believed to cause up to 5% of professional athletes to end their careers.
- Midportion or Insertional +/- retrocalcaneal bursopathy.
- Even though the Achilles tendon is 'designed' to withstand the plyometric forces caused by running and jumping, the tendon responds to injury (or disease) with swelling, pain and/or irritation. In severe injuries to the Achilles tendon, the tendon may tear partially (true partial) or rupture completely.



15

Causes

- Overuse of the Gastrocnemius, Soleus and or Achilles tendon – repetitive activity leading to micro-injury of the tendon fibers. Heels with fatty deposits which weaken the architecture
- Due to this ongoing stress on the tendon (oxidative), the body is unable to repair the injured tissue. The structure of the tendon is then altered, resulting in continued pain
- Increasing level of physical activity too quickly and suddenly – tendons don't like rapid change. "Weekend warriors"
- **Footwear**: Old trainers, Improper support, high heels
- Underlying biomechanical problems with feet the such as pronation, Pes Planus or Cavus or cases where the muscles or tendons in the legs are over-tight

Trigger points in the **Gastrocnemius** and or **Soleus**

16

Symptoms

Some of the symptoms of Achilles tendinitis are the following:

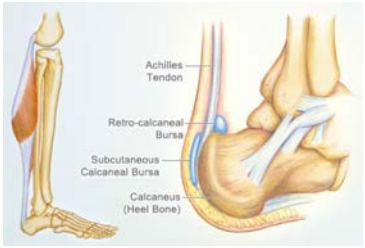
- Pain along the back of the foot and above the heel and sometimes all the way up the calf
- Difficulties pointing the toes or flexing the foot. Pain when stretching ankle or standing on toes
- AM pain and pain after activity
- Tenderness especially to digital compression
- Swelling – including retrocalcaneal bursitis
- Stiffness
- A snapping or popping sound during the injury
- Painful or enlarged nodules or lumps (+/- bursopathy)

The degree of pain will vary depending on the amount of damage to the tendon. Pain may be mild and worsen gradually if your Achilles Tendinitis is due to overuse or a non-serious injury. If there is a rupture in the tendon, the pain can be abrupt and severe.

17

Aetiology (Hong-Yun Li et al 2016)

- The risk factors of Achilles tendinopathy can be divided into **Intrinsic** and **Extrinsic**, either alone or combination.
- **Intrinsic factors** include biomechanical abnormalities of the lower extremity such as leg length discrepancy Hyperpronation, Varus deformity of the forefoot, Pes Cavus and limited mobility of the subtalar joint.
- **Extrinsic factors** include excessive mechanical overload and training errors such as increased interval training, abrupt changes in scheduling, excessive hill training, training on hard or sloping surfaces, increased mileage, increased repetitive loading and footwear with poor or degraded shock absorption.



18

Differential Diagnosis – Diagnostic Imaging

- **Acute rupture**
- **Chronic Rupture**
- **D.V.T. -** A true story
- **Paratenon** - Paratenon inflammation often presents with a reactive or irritable pain that flares for days after activity and can also be painful with low load activities such as calf raises.
- **Plantaris Tendinopathy**? Uncommon.
- **Accessory Soleus**? - differential diagnostic sign is that pain gets worse with activity and does not warm up with activity, similar to compartment syndrome.
- **Fat pad pain**? usually the fat pad around the proximal/midportion of the Achilles that is affected, rather than more distally

19

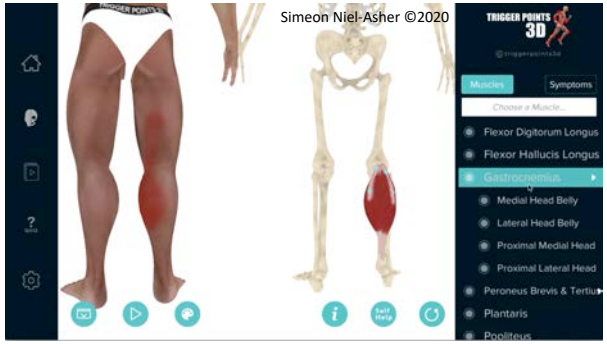
Red flags

- Consider Achilles tendon rupture (tear of the tendon) if there is a history of a sudden snap or sharp pain in the region where the Gastrocnemius muscle attaches to the heel
- Pay attention too if your patient is unable to stand on tip toes or if there is a gap above the heel in the area that the muscle attaches to the bone of the heel

20

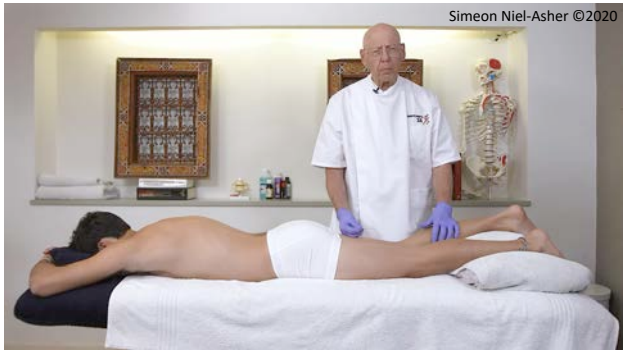
Myofascial trigger points for Achilles tendinopathy

- Gastrocnemius
- Soleus



21

Dr Bob Gerwin on the Gastrocnemius



22

Simeon's – Approach to treatment

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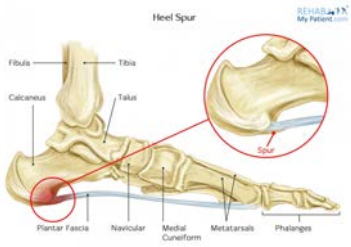
23

Plantar Fasciopathy (PF)

- Heel pain presents commonly in clinical practice and Plantar Fasciitis is the most common disorder which causes heel pain making up for 11-15% of foot care complaints affecting adults.
- The PF is a thick band of tissue that runs across the bottom of the foot and connects between the calcaneus and the Navicular, Cuneiforms and the metatarsals.
- The plantar fascia supports the arch of the foot and if strained, becomes weak, swollen and inflamed. Repetitive strain can bring about micro-tears in the soft tissues leading to pain, swelling and pre-disposing to further symptoms. Plantar Fasciitis can be unilateral or bilateral.
- Heel spurs have commonly been implicated as a risk factor for PF. Studies have reliably demonstrated a highly significant association between calcaneal spur and PF (Johal 2012).
- There is a *weak association* between PF and decreased first MTP joint extension and decreased ankle dorsiflexion.
- Despite the high prevalence of PF, information about its pathogenesis is still limited, its histological changes are suggestive of degeneration rather than inflammation.
- The fascia is usually markedly thickened and gritty, these pathologic changes are more consistent with fasciosis (degenerative process) than fasciitis.



24

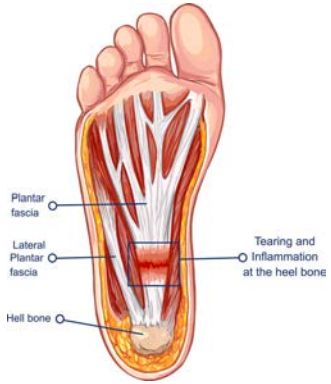
Symptoms of PF

- Sharp pain that occurs with their first steps in the morning.
- Once the foot 'warms up', the pain of Plantar Fasciitis starts to decrease, appearing again after long periods of standing or from sitting to standing.
- Sudden stretching of the sole of the foot may increase the pain.
- In extreme cases, symptoms include numbness.

25

Who is Prone to Plantar Fasciitis?

- Approximately 10% of people experience Plantar Fasciitis at some point in their lives.
- Plantar Fasciitis most commonly arises in middle Aged, obese females and young male athletes.
- It may also occur in younger individuals who are on their feet for many hours of the day.
- It is particularly typical for runners to experience Plantar Fasciitis.
- It may occur if one starts running on a different surface, such as road instead of track.
- It may be associated with extreme pronation of the foot, which is connected with Pes Planus.

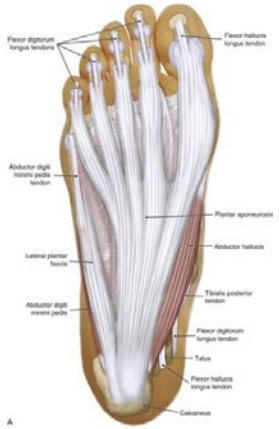


26

Hypothesized mechanism

- The Calcaneum is separated from plantar skin by a fibro-fatty fat pad that acts as a shock absorber.
- The posterior tuberosity of calcaneum has medial and lateral processes. The medial process gives attachment to the **Flexor Digitorum Brevis** (FDB), **Abductor Hallucis** (AH), and the medial head of **Quadratus Plante** (QP) as well as the central band of plantar fascia.
- The plantar fascia or deep fascia of the sole, proximally has a direct fibrocartilaginous attachment to the calcaneum.
- This triangular fibrocartilage diverges distally at mid-metatarsal level into five separate strands, which are attached at the forefoot onto the plantar skin, the base of proximal phalanges (via plantar plate), the metatarsophalangeal (MTP) joints via the collateral ligaments and deep transverse metatarsal ligaments

Hossain M, Makawana N. "Not Plantar Fasciitis": The differential diagnosis and management of heel pain syndrome. Orthopaedics and Trauma. 2011;25(3):198–206.



27

DD

Bone Issues
- (Avulsion) fracture
- Fat pad syndrome (heel)
- Heel Spur
- Stress fractures
- Tarsal tunnel syndrome
- Calcaneal bursitis
- Bone spurs (heel)
- Broken ankle/broken foot
- Referred pain from the low back (S1 radiculopathy)
- Severs disease (Children/youth)
- Medial Calcaneal Nerve Entrapment

Inflammatory
- Gout
- Osteomyelitis
- Pseudogout
- TB
- Paget's disease of the bone

•Functional
- Spinal Stenosis
- Achilles tendonitis or rupture
- Achilles bursa pathology
- Mortons Neuroma
- Boxters Nerve compression
- Calcaneal stress fracture
- Tarsal tunnel syndrome
- Plantar fascia tear, partial tear, or rupture

Very rarely
- Fibrosarcoma
- Osteoarthritis
- Reactive arthritis
- Psoriatic arthropathy (from psoriasis)
- Subcalcaneal bursitis
- Other arthritis as above (seronegative or other associated HLA B27 arthritis, such as with IBS, ankylosing spondylitis, psoriatic arthritis, arthralgia or Reiter's Syndrome)

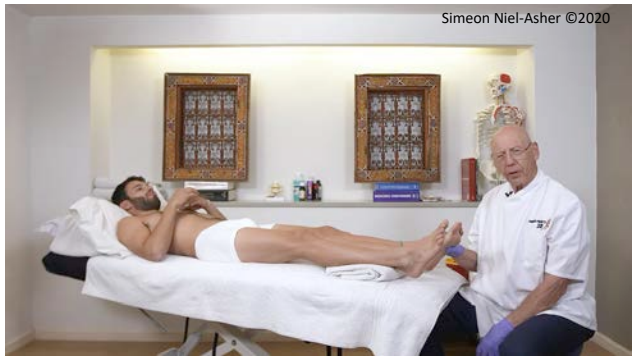
28

Heel Pain and myofascial Trigger Points

- Gastrocnemius
- Soleus
- Quadratus Plantae
- Flexor Digitorum Longus
- Tibialis Posterior

29

Dr Bob Gerwin on the Quadratus Plantae

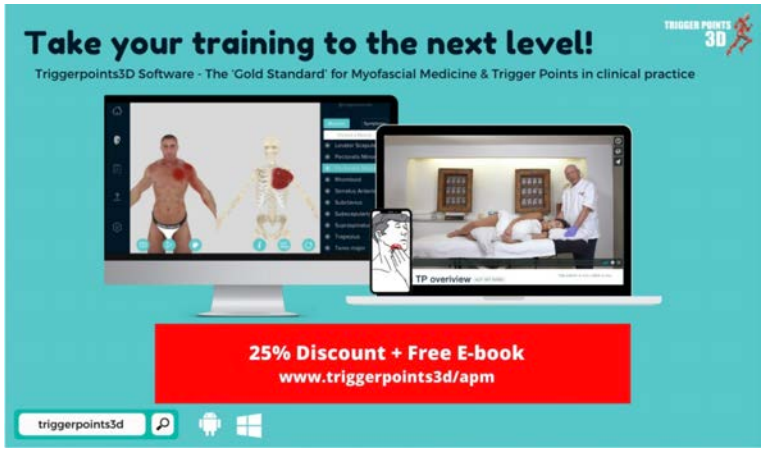


30

Lecture Series - Steve Bruce CPD

- **The Language of Touch**
  - A Trigger Point Thesaurus
- **Face, Head and Neck Pain**
  - Greater Occipital Neuralgia (GON)
  - Whiplash Associated Disorder (WAD)
- **Shoulder and Upper Arm Pain**
  - Rotator Cuff Syndromes (RCT)
  - Sub Acromial Pain Syndrome (SPS) (RCT)
- **Forearm and Hand Pain**
  - Lateral Epicodylalgia - The Tennis Elbow
  - Carpal Tunnel Syndrome
  - Pronator Teres Syndrome
- **Torso and Spine Pain**
  - T4 Syndrome
  - Spondylolisthesis
- **Lumbo-Pelvic Pain**
  - The SI and the Sacrotuberous ligament
  - Sciatica and the piriformis
- **Knee and Foot Pain**
  - Runners Knee
  - Achilles Tendinopathy
  - Planter Fasciitis/Heel pain
- **Chaos, Vitalism and "Super trigger points"**
  - Trigger points as strange attractors

31



32