Plantar Fasciitis (Fasciosis ?)
A Top Down Approach

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Lecture Plan

1. What is the plantar fascia?
2. Structure and function
3. What is plantar fasciitis/fasciosis?
4. What causes it?
5. Signs and symptoms
6. Differential Diagnoses
7. Treatment
8. The Top down approach
1. What is the Plantar fascia?

- Plantar aponeurosis/ deep fascia
  - Amongst the thickest fascia in the body

- Anatomy
  - Tough fibrous structure that spans the plantar surface of the foot from the inferior heel to the toes.
    Sarrafian (1993)

- Structure
  - Predominantly longitudinally oriented collagen fibres that are non-compliant
    Perry (1983)
Medial band not shown - not always present

Divides to form 5 slips to the toes

Central band

Lateral band

Medial tubercle of the calcaneus

(Medial band not shown - not always present)
2. Structure and function

- Helps maintain the longitudinal arch
  - Acts as a tie-rod that undergoes tension when the foot bears weight  
    Hicks (1955)
  - 14% of the total load of the foot goes through it  
    Kim and Voloshin (1995)
  - When severed, foot length increases 15% with an average load (of 683N)  
    Arangio et al (1997)
  - Up to 1200 Newton's to rupture it in cadavers (2 - 3 times body weight - e.g. running)  
    Kitaoka et al (1994)

- Windlass mechanism  
  - Independent of muscle activity  
    Hicks (1954)
Plantar fascia tightens in High gear propulsion A and is more flexible in Low gear propulsion B
3. What is Plantar fasciitis (Fasciosis)?

- An ‘itis’ means it’s “Inflammation of the plantar fascia …
  However …..
- Collagen degeneration similar to tendonosis rather than tendonitis, therefore “fasciosis” is a more appropriate term. 

These findings suggest that treatment regimens such as serial corticosteroid injections into the plantar fascia should be re-evaluated in the absence of inflammation and in light of their potential to induce plantar fascial rupture.

4. Causes

- Weight – high BMI
- Footwear – inadequate for the job
- Foot types
  - Found in ALL foot types - Pronated mentioned most commonly in the literature
- Trauma – single major or multiple minor
- Profession - Long hours on feet on hard surfaces
- Unaccustomed sporting activity
- Off loading opposite limb
- Descending Biomechanical problems ? (Top down approach)
5. Signs and symptoms

- Pain first thing am which often reduces with some exercise
- Tenderness and thickening of the fascia compared to the asymptomatic side
- Pain around the heel after periods of rest
6. Differential Diagnosis

Plantar fascia
- Plantar fasciitis
- Rupture
- Enthesopathies

Soft tissues
- Fat pad atrophy
- Heel bruise
- Bursitis

Bone
- Stress fracture calcaneum
- Paget's disease
- Primary and secondary tumours
- Infection

Nerve
- Tarsal tunnel syndrome
- Trapped abductor digitii quinti nerve
- Sciatica (S1) radiculopathy
Five Broad categories of heel pain

American College of Foot & Ankle Surgeons (2001)
7. Treatment
Stretch It?

- **NB Not everyone agrees on this**
  - “Contrary to popular belief, stretching exercises are contraindicated, because the fascia cannot stretch and exercise creates more trauma to the area due to overuse”.
    
    Ontario Podiatric Medical Association Website (2005)

- **However: Di Giovanni et al (2003) showed that specific non weight bearing plantar fascia exercises gave relief to patients who had had the condition for +10 months.**

- Orthopaedic viewpoint – Treatment is Orthotics, stretching and if that fails then steroid injection. ???????????????
Strengthen it?

“I cleared my plantar fasciitis using the leg press machine in the gym. I held the weight against my foot, flexed into foot strike position, for six seconds, doing six holds for each foot. It strengthened my tendons and made my stride more bouncy.”

Jemma Simpson- 800m Runner
How to treat it.......cont.

- Strapping/Night splints/Aircast boot/Plaster
- Ultrasound
- Steroid injections
- Massage/Friction rubs
- Acupuncture
What can the patient do?

- Reduce weight?
- Modify activities
  - Sports people – changing to swimming
- Medication
  - NSAIDs - Self medicate with pharmacist’s advice or via GP
- Cryotherapy
  - roll arch of foot with a cold can at night
  - Ice after exercise
And not forgetting.............

- **Orthoses**
  - What do you want them to do?
    - Reduce rearfoot pronation?
    - Increase forefoot pronation?
    - Improve high gear propulsion?
    - Improve shock attenuation?
What can others do?
Topaz surgery?
Bone spur removal: How does that work? Reduces stress-strain ratio? Or compressive force?


Insertion
Other treatments


8. The Top Down approach

1. Descending Biomechanical problems can affect foot function.

2. Functional foot Orthoses to treat plantar fasciitis e.g. may have an negative effect on the more proximal structures causing or aggravating headaches, neck, shoulder or jaw pain. Therefore !!!!

3. Some form of assessment of the head and jaw position/function may be required as part of a Biomechanical Assessment.
What's the evidence from the spinal point of view?

Milwaukee Brace and Occlusion


What's the evidence from the foot point of view?

Terminology

TERMINOLOGY OF DISTORTION
ROLL, PITCH AND YAW

The terms - Roll, Pitch and Yaw - are common aeronautical terms describing the position of an object in space. This simple terminology allows for easy communication and interpretation of the body's postural systems.

ROLL - The position of an object in reference to its horizontal AP axis. In the body, Roll relates to the levels of the transverse planes, especially the pelvis, diaphragm, shoulders and head. In the cranium, Roll relates to the levels of the ears, the eyes, and the maxilla.

PITCH - The position of an object in reference to its lateral axis. In the human system, pitch relates to the pelvis, thoracic cage and head all connected by the lateral lordotic curves of the spine. When the curve or pitch is increased, the spine is said to be hyper-lordotic, and when decreased, hypo-lordotic. Pitch distortions are also responsible for anterior or posterior weight-bearing posture.

YAW - The position of an object relative to its longitudinal or vertical axis. Yaw distortions are rotations of the pelvis, thoracic cage and cranium, relative to one another and the ground.

Frontal plane

Sagittal plane

Transverse plane
Measurements

Chirodontic Evaluation - 25 step

Patient Name ___________________________ Date ______________

Posture

ROLL     YAW     PITCH

Tri Planer

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Eye Ears Maxilla Normal levels
Measurements – Alma bite guide

Roll Distortions

1. Normal
   All planes are parallel with each other

2. Dental Primary
   Ears and Eyes are the same, Maxilla is different

3. Postural Primary
   Eyes and Maxilla are the same, Ears are different

4. Cranial Primary
   Ears and Maxilla are the same, Eyes are different
   (Referred to as 'DSD')
Measurements

**Yaw Distortions**

- **Normal**
  All planes are parallel with each other

- **Dental Primary**
  Ears and Eyes are the same, Maxilla is different

- **Postural Primary**
  Eyes and Maxilla are the same, Ears are different

- **Cranial Primary**
  Ears and Maxilla are the same, Eyes are different
Normal postural coupling

THE HEAD ALWAYS TRIES TO STAY OVER THE PELVIS, ESPECIALLY IN THE ANTERIOR-POSTERIOR PLANE. ANY PITCH DISTORTION WILL CAUSE ANOTHER PITCH DISTORTION IN THE OPPOSITE DIRECTION.
Non smooth postural coupling

IF THE NORMAL LORDOTIC CURVE IS ALTERED INCREASED OR DECREASED LORDOSIS THEN THE LOWEST FREELY MOVEABLE VERTEBRA WILL ROTATE OPPOSITE OF NORMAL COUPLING.

THIS CAUSES THE COUPLING PATTERN TO APPEAR OPPOSITE. i.e. A HIGH PELVIS AND HIGH SHOULDER ON THE SAME SIDE, OR A HEAD TILT AND LOW SHOULDER ON THE SAME SIDE. THIS WILL CAUSE NERVE IRRITATION AND EVENTUALLY DAMAGE TO THE INTERVERTEBRAL DISC COMPLEX.
TMJ Function

Centric Relation Occlusion in Sagittal Plane
TMJ motion

Normal opening 48mm – 3 fingers width
Dental appliance to help with TMJ function and Malocclusion

- Designed to control and improve occlusal positioning
- Enhance posture
- Prevent cranial compensations
- Enhance TMJ function
The maintenance of balance

- Vision
- Proprioception
- Superficial sensation
- Labyrinthine activity
- Cortex
- Cerebellum
- Reticular Formation
- Extra-pyramidal System
- Cortical awareness of head/body/motion
- Control of oculo-motor activity
- Control of posture
- Control of motor skills

Integrating / data storage system
Mr. Dizzy or Mr. Spin or Mr. Queasy .......

Why am I seeing a Podiatrist? For my headaches!!

I’m going to be sick!
Medical Evidence ....

- Tests all normal..
  - Blood tests
  - X-rays
  - MRI
  - Blood pressure
  - Cardiology

Therefore nothing is wrong!

'live with it' 'get on with your life'
Frequently the ‘traditional’ approach finds nothing medically wrong with the patient.

Lack of clinical effectiveness

frustration

(by patients & doctors)
Case study 1 – Lateral strain (L5 Tropism)

Symptoms

- Plantar fasciitis right foot
- Central and right sided headaches
- Malocclusal dental issues

Findings

- Short right leg
- Lateral shift of torso to short leg side
- Right shoulder down
- Head tilt to high left shoulder
Treatment and outcomes

Limb length raise to short leg side of approx. 5mm

Headaches, neck, shoulder and back pain increased dramatically within 24 hours.

Limb length raise removed and orthoses fitted

Headaches resolved within 24 hours with Physio treatment and orthoses.

WHY?
Increased stress on disc with heel lift on the right side

Force couple placed on L5/S1 causing compression stress
Case study 2

A simple case of plantar fasciitis?

Also complained of Headaches, neck and TMJ pain
Findings

Head shoulders and pelvis all down on one side

Leg length discrepancy changed with head rotation when lying prone

Leg length changed with “dental roll test” or with use of Aqualizer

Aqualizer.com
Then why not use Simple orthoses?

Result

- Severe pain in head, neck and jaw within 24 hours
- Symptoms persisted for 4 days despite removal of orthoses.
Orthoses or not for plantar fasciitis?
Things to look out for!

- Non smooth Coupling patterns (Head tilt down to low shoulder side)
- Lateral strain of torso with short leg on same side
- Limb length changes with change to occlusion (Aqualizer/Dental Roll)
- Receiving Orthodontic work at the same time
- Headaches, neck or shoulder pain unresponsive to treatment

Thanks for listening