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Case Study:
Achilles Tendinopathy

CASE STUDY PRESENTATION

by Resonance Podiatry and Gait Labs

THE PATIENT

- 47 year old, Female named Jane
- Left side generalized mid portion Achilles tendon pain, duration- 12 months
  - Onset of pain triggered by return to social netball, and umpiring of netball
  - Sought physiotherapy treatment initially, resulting in improvement of symptoms and less pain, however ongoing residual post-game pain, and morning pain and stiffness of the Achilles tendon

Past Medical History:

Previous left side inversion ankle sprain 2005

Recalls a left leg tibial fracture at age 12

- ***Goals:***

  Play netball pain-free, umpire pain-free, and trek Abel Tasman Track pain-free

ASSESSMENT- Process Considerations

- SOAP / DOLCATI
- History
- Physical assessment- static, dynamic, functional
- Activity assessment- loading, frequency
- Footwear- activity suitability
- Imaging- Xray, U/S, MR
- Blood work- arthropathic
- Biomechanical examination
- Gait and functional analysis

KEY FINDINGS

- Palpable **thickening** to the left **Achilles tendon** 3cm proximal to the insertion

- **Nil heat or swelling present to the site of pain**
- **Nil pain with double or single leg serial tip toe test**

- **Weak resupination with tip toe on the left leg**

BIOMECHANICAL EXAMINATION FINDINGS

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- **Limited** first ray, subtalar joint, and ankle dorsiflexion **range of motion, left side more than right**
- **Relaxed calcaneal** stance in mild varus position **left side more than right. Subtalar joint supinated** on stance.
- **Manual supination**: Decreased resupination on the left side, heel inversion occurring however **laterally unstable at end range ankle plantarflexion**
- **Jack's Test: Positive**. Hard, **full windlass** functionality available
- **Single knee bend: Medial knee deviation occurring owing to proximal insufficiencies**
- **Thomas Test: Rectus femoris** tight bilaterally**. Ilipsoas slightly tight.** Iliotibial band flexibility good.
- **Hamstring Length:** Slightly restricted hamstring 90:90 test. Able to achieve **70 degrees of hip flexion with knee extended on straight leg raise**, bilaterally
- **Lunge test: Negative,** bilaterally. **Left: 7 cm Right: 8 cm**

BIOPOSTURAL ASSESSMENT OVERVIEW

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Functional examination

- Static peak loading pressure revealed hyperloading in the central forefoot of the left foot
- Dynamic pressure revealed high forefoot loading, minimal rearfoot loading, and minimal first MTPJ loading
- Gait analysis
  - Walking gait
  - Running gait
  - Jump function
  - Multidirectional function

BIOPOSTURAL ANALYSIS

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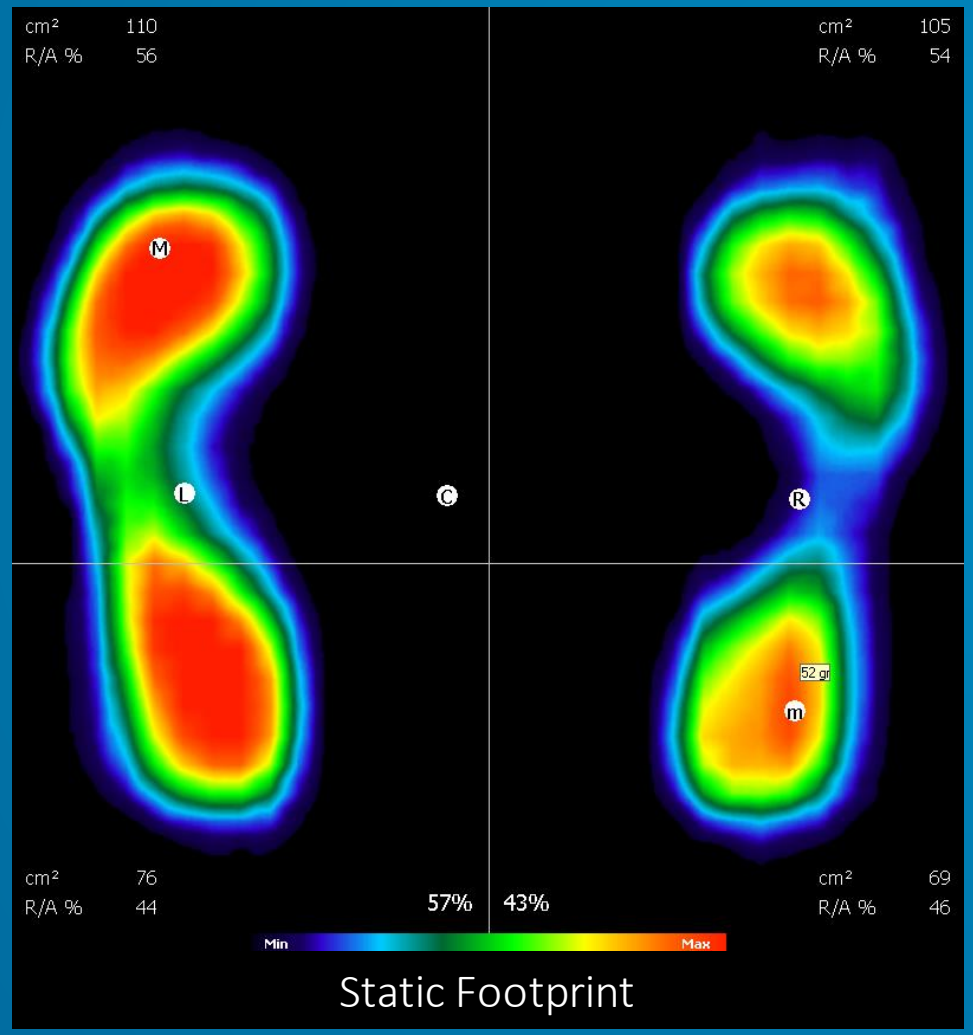
STATIC PRESSURE



Static Footprint

- The body centre of gravity is decentralised, shifted laterally to the left side
- Left side mild hyperloading, 57%
- Maximum load concentration in the left forefoot, excessive load concentration
- Excessive anterior overload, forefoot loading 56% left side

BIOPOSTURAL ANALYSIS

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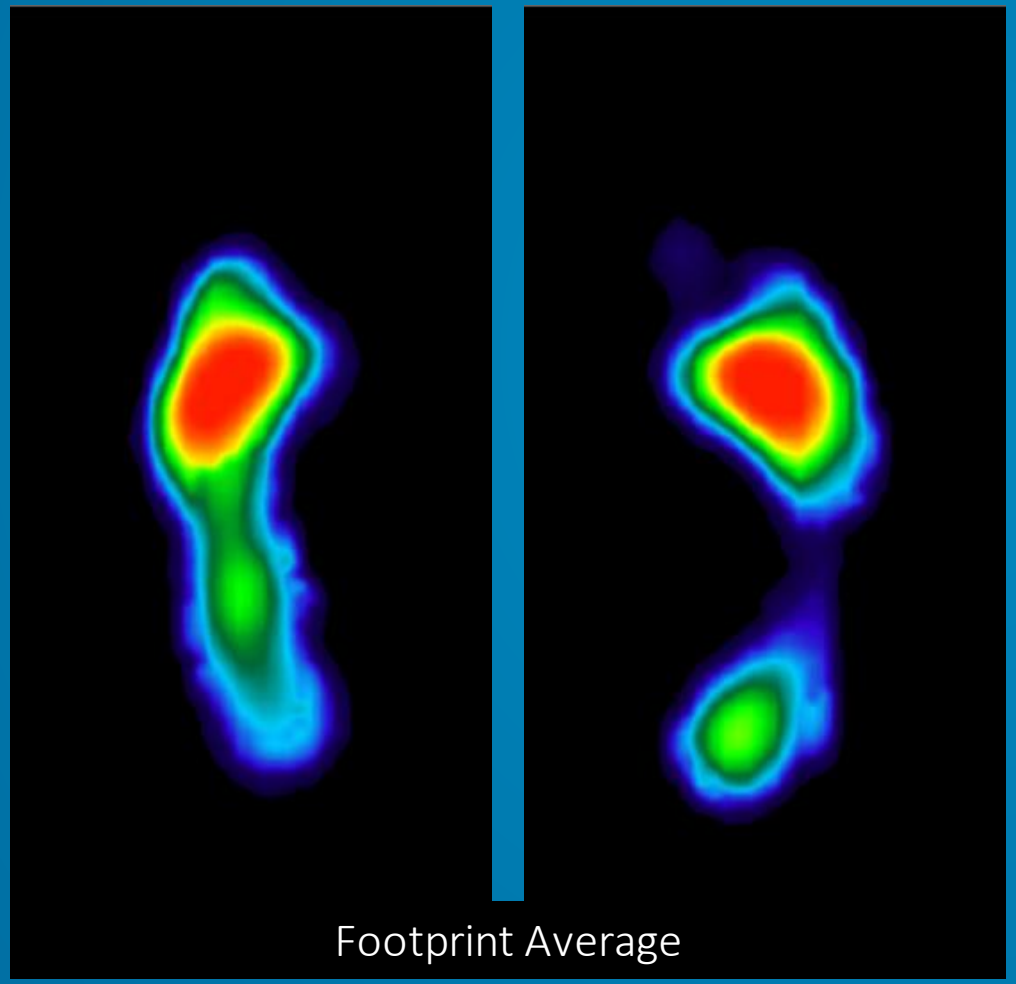
DYNAMIC PRESSURE



Footprint Average

- Central forefoot hyperloading, minimal rearfoot loading
- Minimal 1st MTPJ loading, bilaterally
- Low weightbearing surface area L > R
- Minimal lateral midfoot column loading

TREADMILL VIDEO GAIT ANALYSIS

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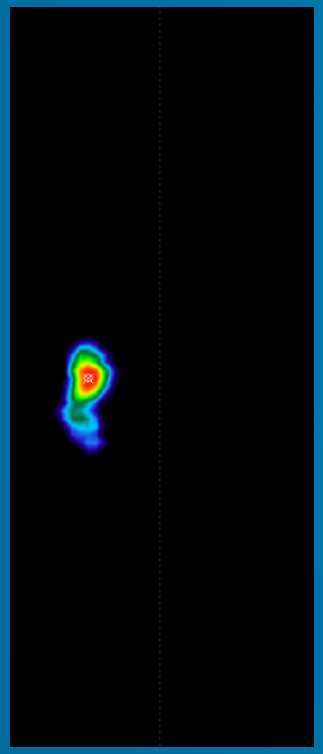

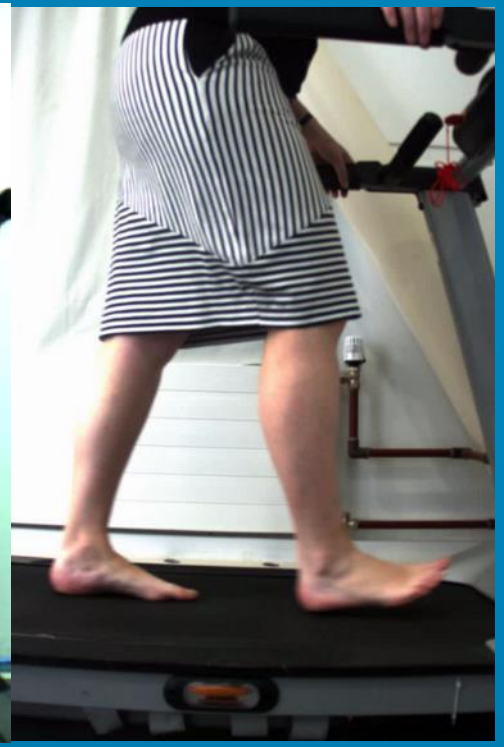

Discussion Points:

- Lateral heel strike on the left side
- Remains fairly supinated on left side throughout gait.
- Mild medially driven abductory twist, with a lateral toe off.

VIDEO GAIT ANALYSIS

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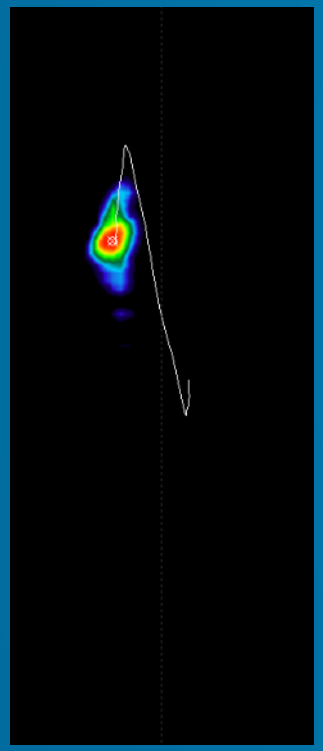

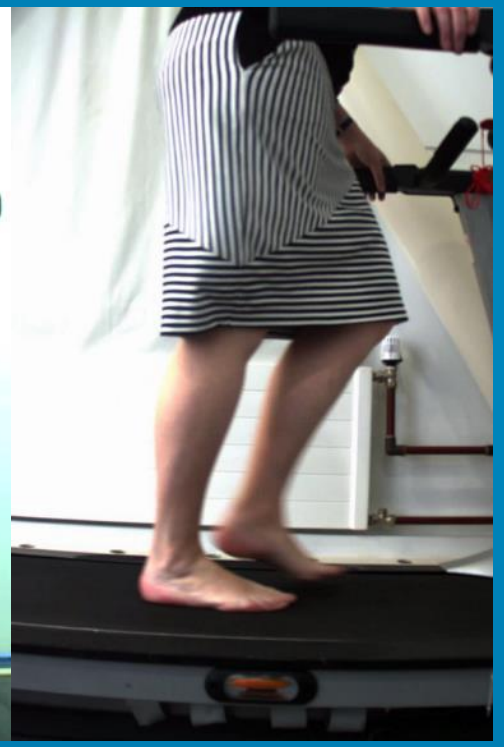

Discussion Points

- Contralateral Trendelenburg occurring during midstance, and consequently quite a lateral low gear toe off.
- Significant pelvic rotation occurring in the transverse plane

VIDEO GAIT ANALYSIS

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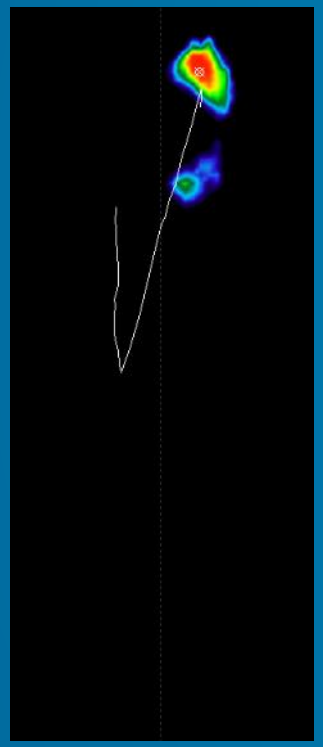
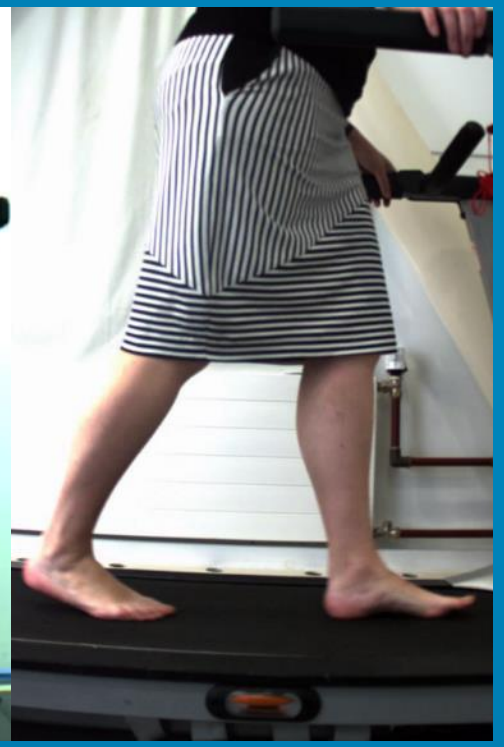




Discussion Points

- Decreased hip flexion and hip extension bilaterally. Thus resulting in increased propulsion required from the posterior calf complex/Achilles tendon.

SUMMARY FINDINGS

Overview

- Jane's definitive diagnosis is left side midportion (3cm proximal to AT insertion) Achilles tendinopathy, secondary to previous injury and ongoing high impact activity with inadequate proximal and lower limb strength, and insufficient foot mechanics.

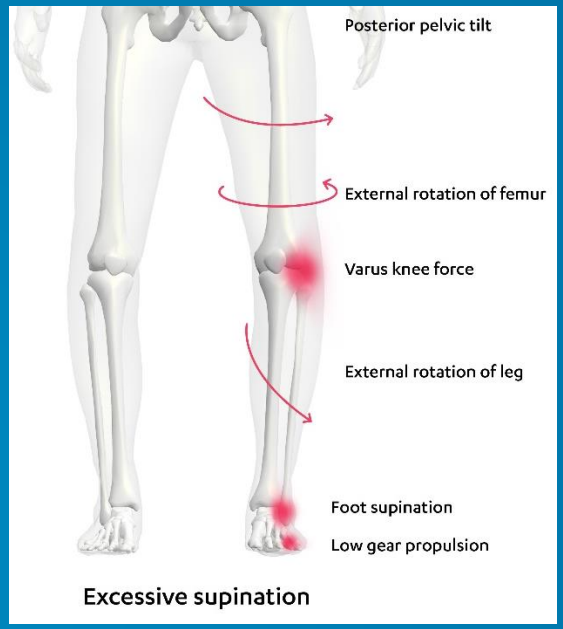
Differential Diagnosis Considerations:

- Achilles tendon partial tear
- Retrocalcaneal bursitis
- Posterior ankle impingement
- Inflammatory arthropathy

Subjects Risk Factors:

- Age, Increased BMI, sudden increase in training intensity, training error, inappropriate footwear (Simpson & Howard, 2009), possible family history of AT tendinopathy (Kraemer et al., 2012)

Biomechanical reasons Jane's Achilles tendon pain has failed to settle due to:



- her supinated foot mechanics on the left side,
- with limited joint range of motion,
- resulting in decreased sagittal plane facilitation,
- reduced propulsion,
- lack of shock absorption, and
- decreased weightbearing surface area throughout both walking and running gait.
- Increased AT loading forces owing to laterally driven ground reaction forces, and external rotation forces occurring at the tibia.
- Additionally, her proximal weakness and inflexibility is contributing to increased Achilles tendon loading owing to minimal glute max activation and lack of propulsion occurring proximally, forcing her posterior calf complex to compensate.

MANAGEMENT

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Physical Footwear Changes

- **New footwear-** torsionally structured, neutral, stable netball shoe with good forefoot propulsion, and increased heel pitch
- **Dual Density Formthotics**

Exercise Regime

- Eccentric Achilles Tendon Loading programme
- Calf stretching to improve ankle dorsiflexion range of motion
- Proximal gluteal strengthening

MANAGEMENT PLAN - FOOTWEAR

- Replace netball footwear- neutral, stable netball shoe with minimal forefoot flex resistance for propulsion, 10mm pitch/drop, comfort, fit and feel
- Dual Density Formthotics- Customised with bilateral lateral forefoot postings extending from styloid process distally through to webbing, to optimally decrease supinatory forces occurring from early midstance, through to propulsion, and optimally engage the windlass mechanism. Thus, increasing weightbearing SA, increasing shock absorption, and reducing lateral bowing of the Achilles tendon. Research has suggested laterally directed forces occurring at early stance phase of gait with medially driven forces at late stance may be risk factors for Achilles tendinopathy (Van Ginckel et al., 2008). Customised orthoses in conjunction with eccentric Achilles tendon loading programmes are effective in reducing pain in symptomatic patients with Achilles tendinopathy.

MANAGEMENT PLAN – STRENGTH TRAINING

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- Eccentric Achilles Tendon Loading programme- Eccentric strength training, which involves actively lengthening the muscle, is an effective therapy that helps promote the formation of new collagen Simpson & Howard, 2009). 15 repetitions on the symptomatic leg, performed in 3 sets. Performed with both the knee in flexion, and the knee in extension to maximally load soleus and gastrocnemius calf muscles. Perform this twice per day, everyday. For 12 weeks. Increasing load in 5kg increments as dictated by alleviation of symptoms.

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MANAGEMENT PLAN – STRENGTH TRAINING EXERCISE

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1. ***Calf stretching*** to improve ankle dorsiflexion range of motion, as 10 degrees of ankle dorsiflexion is required during the stance phase of the walking gait cycle. Hamstring and gastrocnemius-soleus complex-soleus inflexibility is a diagnostic factor for Achilles tendinopathy (Simpson & Howard, 2009).
2. ***Proximal gluteal strengthening-*** Altered knee kinematics and reduced muscle activity are associated with Achilles tendinopathy in runners (Azevedo et al., 2009). Studies have found that there is a correlation between the activation of gluteus maximus and gluteus medius and their impact on the kinematics occurring at the leg and ankle, which can result in increased rearfoot inversion and eversion which is a risk factor for Achilles tendinopathy (Franettovich Smith et al., 2014).

- Jane is currently working on proximal strength work of her gluteus medius and gluteus maximus. Stretching of iliopsoas and rectus femoris were also important.

- ***Functional activation-*** it is imperative that gluteus maximus is optimally functioning throughout walking and running gait, as his controls hip extension. It has been found in the literature that with reduced hip extension, there is increased ankle plantarflexion, and early and excessive plantarflexion moments at the ankle have been found to correlate with Achilles tendinopathy (Frannetovich Smith et al., 2014). Thus glute max activation can be a crucial proximal component to AT tendinopathy.

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MANAGEMENT PLAN – PATIENT FOLLOW UP

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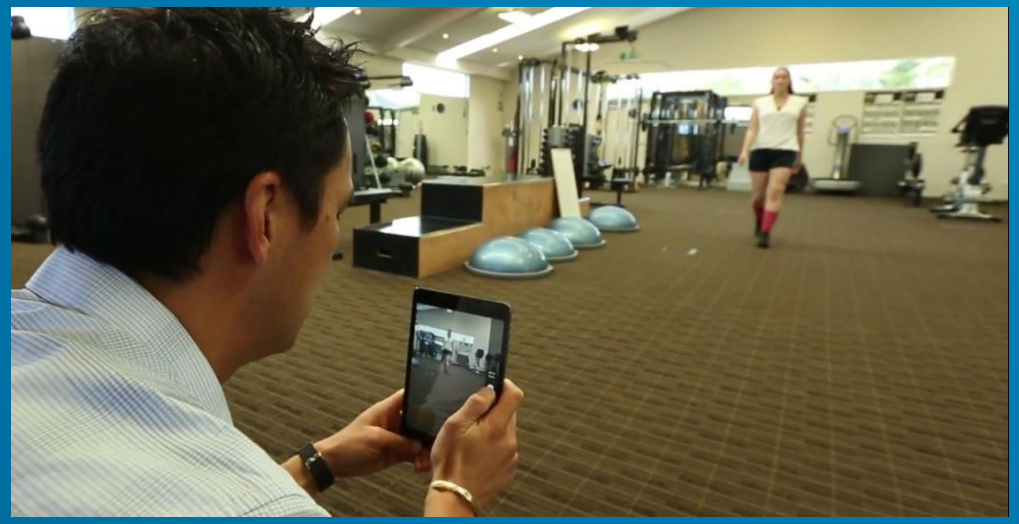
- Patient education- Ensure exercises are performed daily for maximum benefit and positive outcomes. Gradual breaking in of orthoses. Appropriate footwear, good footwear parameters for all activities. Modification of exercise regime to reduce risk of overload.
- Patient review- Patient seen at 2/52, then 6/52 after having orthotics implemented. By this stage the patient had been working on eccentric loading and proximal work for 8 weeks, and all pain had resolved. Jane to continue with the above for a further 4/52, then could discontinue. 12 month review due, unless any issues prior.



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GOAL RELATED OUTCOMES

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- **Pain-free** during game, post-game, and **pain-free** the following morning
- Completed the Abel Tasman Track **pain-free**

FUTHUR INFORMATION FOR OUTCOME MEASURES

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Pain and Disability measure

- VISA-A questionnaire (Victoria Institute of Sport Assessment- Achilles Questionnaire)
- This questionnaire provides an index to indicate the clinical severity of Achilles tendinopathy. This is a condition-specific numerical scale, which research suggests will typically provide a higher sensitivity and specificity than general purpose scales (Robinson et al., 2001). This is questionnaire completed by the patient which provides a total numerical value out of 100 (100 is the perfect score) based on domains of pain, function in daily living, and sporting activity. The higher the score, the less severe the Achilles tendinopathy. Patients who score 100 are asymptomatic.
- PDI (Pain and Disability Index)
- This questionnaire measures the impact that pain has on the ability of the person to perform essential activities of daily life (Chibnall, 1994).

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LONG TERM PROGNOSIS:

- Should conservative management of Jane fail to resolve her pain and dysfunction (including tendon loading programmes, ultrasound, extracorporal shock wave therapy, proximal work, orthoses etc), orthopaedic review may need to be considered.

- In some settings 20-30% of patients presenting with Achilles tendinopathy can require surgical intervention. Jane is at risk of midsubstance Achilles tendinosis developing, and surgical options include Achilles tendon debridement, Achilles tendon debridement and tendon transfer, or Achilles tendon lengthening if AT/calf complex is too tight (https://www.aofas.org/footcaremd/treatments/Pages/Achilles-Tendinosis-Surgery.aspx)

About Us

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Utilising leading edge technology, our Podiatrists manage a wide array of biomechanical injuries, functional ailments, and medical conditions.

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A world-recognised selection of customisable foot orthoses that give ultimate support and comfort to the patient.

Formthotics™ provide the clinician with a versatile tool to fit the patient's foot and shoe, assisting treatment of lower extremity problems.

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