Plantar Pressure Analysis & Diagnosis

USING PRESSURE TO PREDICT TREATMENT OUTCOMES

Step Force Training

Presented By
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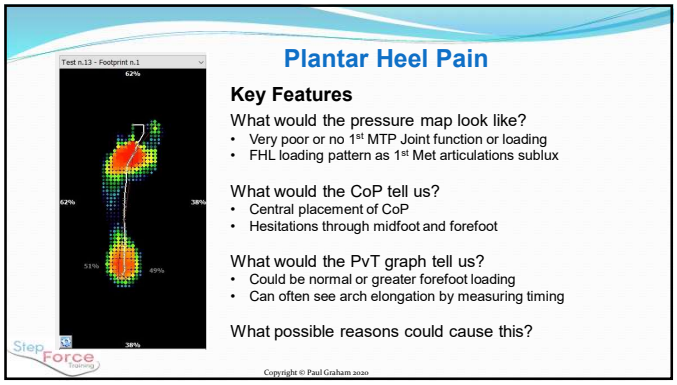
Testing your treatment strategy

- Patient symptoms and history
- Asymmetries affecting the force pathway
- The body's ability to compensate
- Joint, muscle and soft tissue dysfunction
- Plantar Pressure data
  - dysfunction in pressure mapping, CoP and PvT graphs

How interventions can really help


Plantar Heel Pain
Key Features
What would the pressure map look like?
• Very poor or no 1st MTP Joint function or loading
• FHL loading pattern as 1st Met articulations sublux
What would the CoP tell us?
• Central placement of CoP
• Hesitations through midfoot and forefoot
What would the PvT graph tell us?
• Could be normal or greater forefoot loading
• Can often see arch elongation by measuring timing
What possible reasons could cause this?
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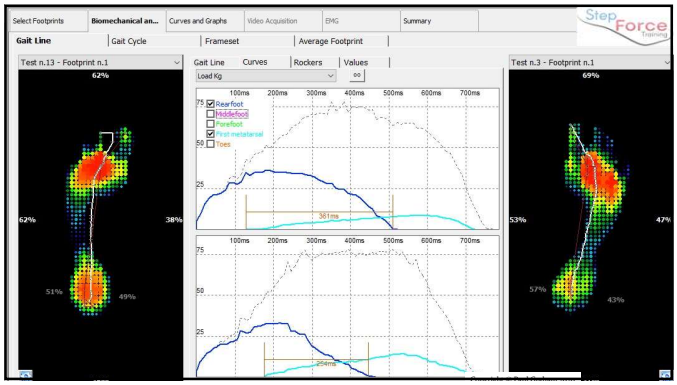


Plantar Heel Pain
Possible tests and investigations
• FhL Test and 1st MTP joint ROM
• Potential of correction of D/flexed 1st Metatarsal
• Soft tissue contractions and adaptation
• Windlass and Sub Talar axis tests
• Subluxation and restriction of Midfoot joints
• Lunge Test for ankle dorsiflexion
• Footwear assessment
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Case Study 1. Plantar Heel Pain

1. **HISTORY**
   - 49-year-old mother of 3 in good overall health
   - Present complaining of heel pain upon first weight bearing for last 2 months
   - Has been working from home due to the virus and wearing flat slippers all day
   - Noticed that the pain occurred around the time when she went out walking to improve her fitness and tried hill-walking to improve her cardio as she was 'feeling unfit' and was concerned about her weight gains that occurred from 'all the sitting'
   - Her goals are to be pain free and able to walk regularly to lose weight

Case Study 1. Plantar Heel Pain

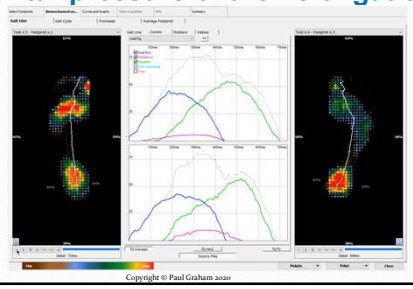
2. **EXAMINATION RESULTS**
   - No actual Injury and / or Surgical Factors
   - Factors affecting the Force Pathway
     - Moderate Tibial varum
     - Moderate High arch structure
     - Short first Metatarsal
   - Compensation Available
     - Some stiffness in midfoot and L/hallux dorsiflexion
     - Lowe leg Muscle strength is WNL for her age
     - Core Muscle strength is only fair and imbalanced
     - Tightness in the leg posterior muscle and soft tissues; L > R

Case Study 1. Plantar Heel Pain

2. **EXAMINATION RESULTS**
   - Adaptations
     - Dorsiflexed 1st metatarsals again L > R
     - Moderate FHL L/foot and Slight+ FHL R/foot
   - Plantar Pressure Analysis
     - High loads sub L?/2nd and 3rd MTPts and Hallux IPJt
     - Central CoP with hesitations and minor blockages in forefoot
     - PvT graph shows L/arch elongation of 307Ms compared with 145 Ms in the R/foot

Case Study 1. Plantar Heel Pain

Plantar pressure of arch elongation



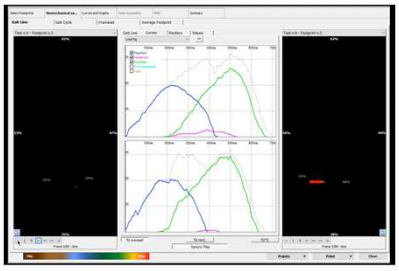
Case Study 1. Plantar Heel Pain

Address Arch collapse

1. Use skin prep if possible
2. Apply 2.5 cm sports tape firmly
   a) 1st piece to adduct forefoot
   b) 2nd piece to plantarflex 1st Metatarsal
3. Unsure good adhesion
4. Start person walking over mat and record as soon as gait normalises

Case Study 1. Plantar Heel Pain

Predicting Outcomes with Intervention



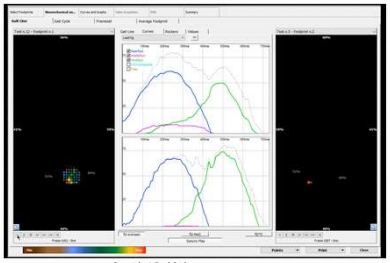
Case Study 1. Plantar Heel Pain

Changing CoP trajectory

1. Tape the foot as to address arch collapse
2. Apply 5 cm sports tape firmly
   a) 1st piece to evert forefoot
   b) 2nd piece to support or Invert rearfoot
   c) 3rd piece to midfoot if required
3. Unsure good adhesion
4. Start person walking over mat and record as soon as gait normalises

Case Study 1. Plantar Heel Pain

Predicting Outcomes with Intervention



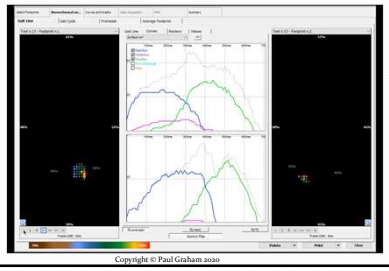
Case Study 1. Plantar Heel Pain

Correct 1st MTP Joint function

1. Tape the foot as to address arch collapse
2. Add appropriate 5 cm tape to improve CoP trajectory; evert forefoot
3. Add 7mm felt pad under hallux, just distal to the 1st MTP joint
4. Unsure good adhesion
5. Start person walking over mat and record as soon as gait normalises

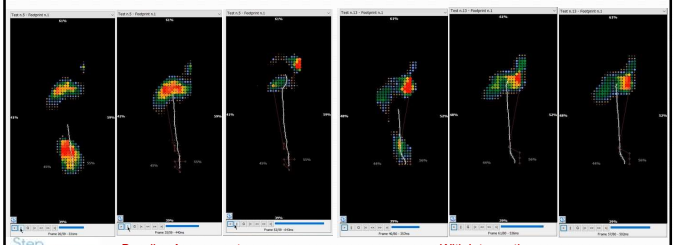
Case Study 1. Plantar Heel Pain

Predicting Outcomes with Intervention



Case Study 1. Plantar Heel Pain

Predicting Outcomes with Intervention



Baseline Assessment

With Interventions

Case Study 2. Lateral Forefoot Pain

1. **HISTORY**
   - 76-year-old man with a 50-year history of polio affecting his L/side
   - L/leg shorter by 1.5 – 2cms with significantly weakened musculature
   - Present complaining of severe pain in Left forefoot for some years
   - Has tried physiotherapy, dry needling and other therapy that gives short term relief, but then “my calf cramps and my foot starts to hurt really hurting a lot”.
   - His goal is to have reduced pain and keep his mobility, which us scared of losing.

Case Study 2. Lateral Forefoot Pain

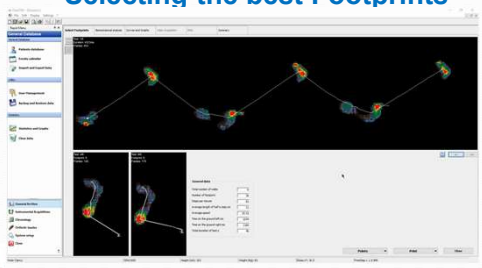
2. **EXAMINATION RESULTS**
   - Surgical Factors
     - THR on R/hip to resolve sever OA from overloading – successful
     - Pain still present but muscular and across core area
   - Factors affecting the Force Pathway
     - Excessive external tibial torsion of 30^0 in both legs
     - Moderate High arch structure with flexible plantar flexed 1st MTPJt
   - Compensation Available
     - Some stiffness in L/hallux dorsiflexion
     - Weak extrinsic muscles L/leg and soft tissue equinus (ankle d/flexion 90^0)
     - Core Muscle strength is only fair and imbalanced

Case Study 2. Lateral Forefoot Pain

2. **EXAMINATION RESULTS**
   - Adaptations
     - Surprising few. Hypertrophy of tissues under the lateral column in the L/foot
   - Plantar Pressure Analysis
     - Initial contact lateral forefoot, loading the forefoot for the rest of stance phase
     - Very high and prolonged loading under 3-5MTPJts L/foot
     - CoP Vacillates under the 3rd MPTJt for most of stance, then moves medially with marked hesitations and minor blockages in forefoot
     - PvT graph shows significant forefoot and midfoot prolonged patterns

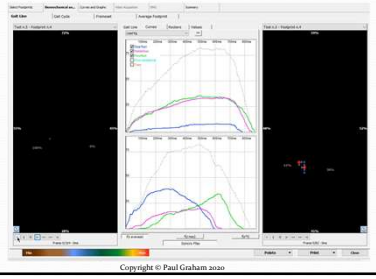
Case Study 2. Lateral Forefoot Pain

Selecting the best Footprints



Case Study 2. Lateral Forefoot Pain

Baseline CoP, PvT and Gaitline Analysis



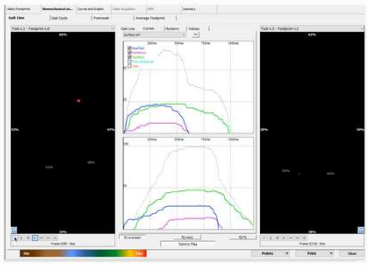
Case Study 2. Lateral Forefoot Pain

Alter Pressure Versus Time Graphs

1. Decide how to alter the PvT Graph
2. Apply the pad under the heel that bests suits the aim of the trial
3. Unsure good adhesion
4. Start person walking over mat and record as soon as gait normalises

Case Study 2. Lateral Forefoot Pain

Baseline CoP, PvT and Gaitline Analysis



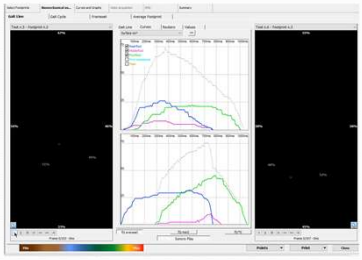
Case Study 2. Lateral Forefoot Pain

Addressing Overloading

1. Decide on the area that is overloaded
2. Decide how function can be improved to assist / resolve the overloading
3. Apply the pad under the heel that bests suits the aim of the trial
4. Unsure good adhesion
5. Start person walking over mat and record as soon as gait normalises

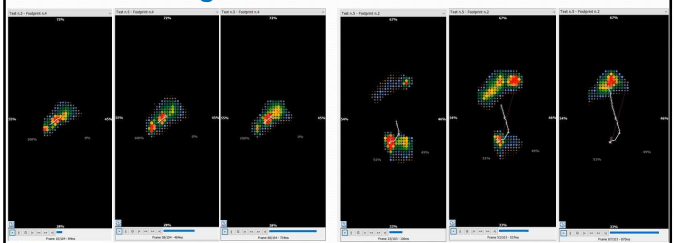
Case Study 2. Lateral Forefoot Pain

Predicting Outcomes with Intervention



Case Study 2. Lateral Forefoot Pain

Predicting Outcomes with Intervention



Baseline Assessment

With Interventions

Questions?