

Full Assessment of the Foot and it's Function

Session 3

Standard Assessment, Optional
Tests and Interventions

Step Force Training Presented By Paul Graham

1

What is the aim of our examination?

First and foremost to address our patient's concern
To do this we need to:


1. gain enough specific information on their current position to understand why the condition is present,
2. know what treatment strategy will be required to resolve it, and
3. know the expected outcome and how possible it is.

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What is the standard exam for?

- Simple conditions
- Complex conditions
- Second opinions
- Further investigations
- Specific focused assessments
- Functional review after treatment
- Other.....



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What makes conditions Complex?

Complex means: 'many faceted'

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Why do people get injured?

Structural misplacement of force
↓
Overloading of joints / soft tissues
↓
Gait and postural adaptation
↓
Further loading and dysfunction
↓
Tissue failure and inflammation

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Other factors need to be taken into account

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“Start with the end in mind”

- Focus on your patient’s history
 - What is their priority?
 - What is their SEM?
- Discover the complexity of the condition
- Catalogue the components
- Prioritise the main issue based on the above information
- Design a pathway forward and design a plan for your patient

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Special focus on Examination Areas

1. Joint Range of Motion Versus Stiffness
2. LLD & Plantar pressure analysis
3. Gait analysis
4. Other Optional tests and interventions

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Joint ROM Vs Joint Stiffness

Concept of joint stiffness Vs ROM

Force (N)	ROM (degrees)
0	0
60	11
80	11
100	11

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Forces, Function and Joint Stiffness

Foot C: High Forefoot Dorsiflexion Stiffness

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Forces, Function and Joint Stiffness

Foot A: Low Forefoot Dorsiflexion Stiffness

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Forces, Function and Joint Stiffness

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Forces, Function and Joint Stiffness



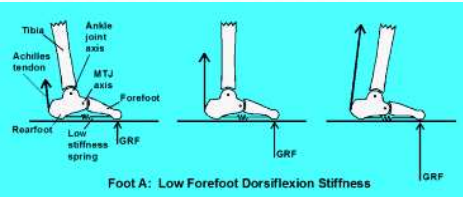
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Forces, Function and Joint Stiffness



Tibia, Ankle joint axis, Achilles tendon, MTJ axis, Forefoot, Rearfoot, Low stiffness spring, GRF

Foot A: Low Forefoot Dorsiflexion Stiffness

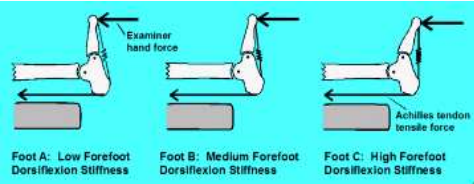
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Joint ROM Vs Joint Stiffness



Examiner hand force, Achilles tendon tensile force

Foot A: Low Forefoot Dorsiflexion Stiffness, Foot B: Medium Forefoot Dorsiflexion Stiffness, Foot C: High Forefoot Dorsiflexion Stiffness

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2. Leg Length Differences & Plantar Pressure

A perplexing factor to examine indeed!

- Research shows up to 90% of us have one
- Research also notes correlation with foot, knee hip and lower back conditions
- How much difference is too much?
- Is it functional or structural or a bit of both?

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Causes of Leg Length Difference

Structural

- Difference in length of Femur / Tibial or Hip joint structure
- As part of a lumbar scoliosis that is not compensated

Functional

- Long term asymmetric severe foot pronation (Sanner et al 1981)
- Windswept structure of lower legs
- Core weakness and pelvic dysfunction
- Chronic pain in foot, ankle, knee or hip of one limb
- Injury, habit, growth phase, pregnancy, etc...

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Is a Leg Length Difference pathological?

Research shows up to 90% of us have one

- LLD causing Plantar Fasciitis
- LLD causing Stress fractures in Athletes

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What about looking at asymmetry in loading rate?

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Other reasons for asymmetrical early heel rise

Not all asymmetry is because of a LLD

- Pain in the ankle, knee or hip of shorter limb
- Trendelenburg gait from weakness of gluteal muscles in opposite hip creating a functional longer leg
- Chronically flexed knee or weak quadriceps limiting extension
- A functional hallux limitus blocking sagittal plane movement

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Dynamic Plantar pressure and LLD

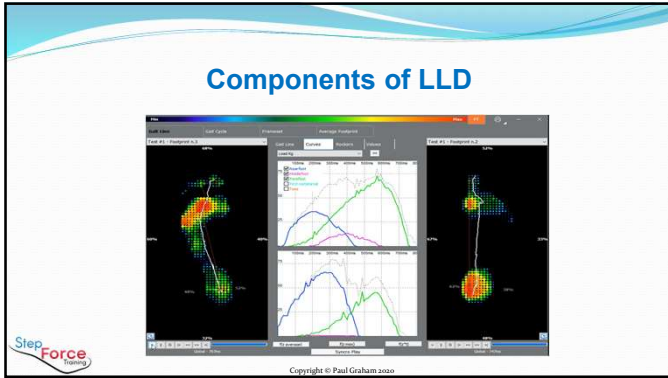
What components should we look for?

- Asymmetry of loading on pressure map
- Asymmetry of CoP trajectory and it's speed through the foot
- Asymmetry in Pressure Vs Time Graphs

But if we find one what to do next?...

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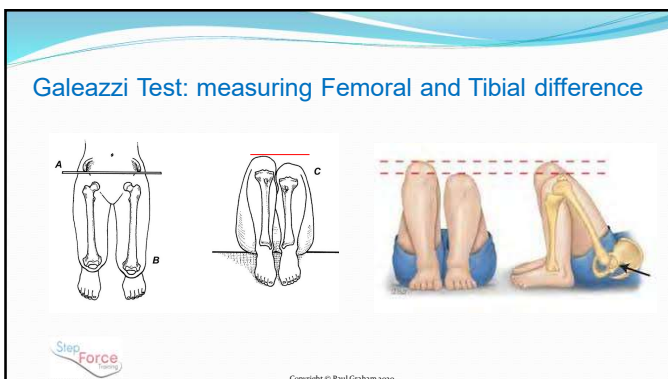
21



22

- ### Assessment Options
- Measurement with Tape measure (other variations)
 - Galeazzi Test for assessing femoral and Tibial length difference
 - Using malleolus comparison method (Gary Fryers 2006)
 - Standing assessment incorporating plantar pressure
 - Including recording again with intervention for difference
 - Radiological imaging (Gold Standard)
 - Other reliable tests you use? *Please put in the chat box*

23



24


Assessing the leg length difference - non weight bearing



From research of Dr Gary Fryers Osteopath (2006)
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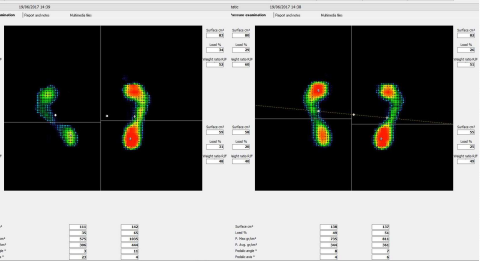
Weight bearing measurement of LLD



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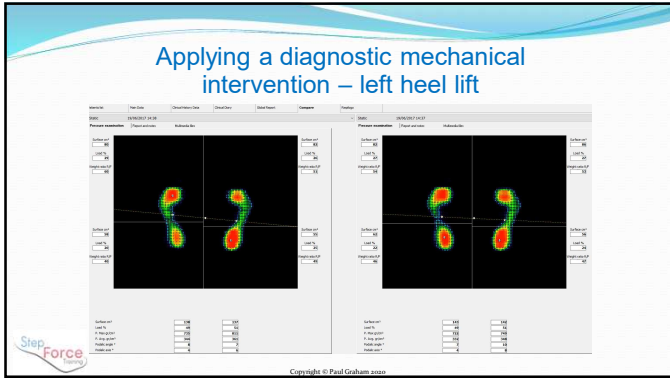
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Analysing asymmetry using plantar pressure



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Management

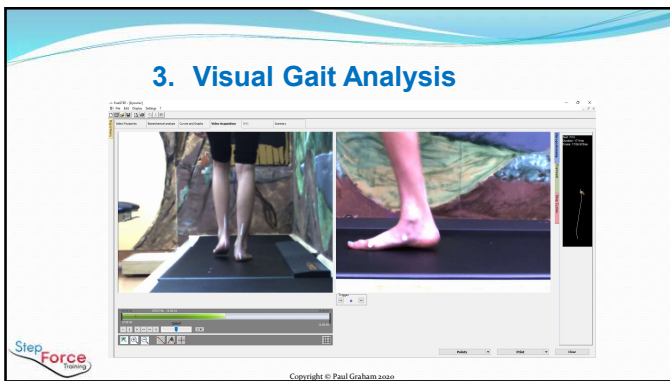
- If you suspect structural LLD advise Imaging
- If you suspect functional LLD advise further assessment

What happens if we just use heel lifts to address symptoms?

- Potential short term improvement
- Potential long term dysfunction, injury and worse!


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Gait Analysis Parameters



Initial Contact

Key Features


- heel rocker.
- pretibial muscles draws the leg forward.



Loading Response

Key Features


- Calcaneocuboid joint stabilisation process begins



Mid Stance

Key Features


- Calcaneocuboid joint closepacked
- Initiation of low to High gear
- Ankle Rocker
- Windlass initiates



Terminal Stance

Key Features

- Windlass continues with reverse windlass on lesser toes
- Medial column stabilises and High gear established
- Forefoot rocker



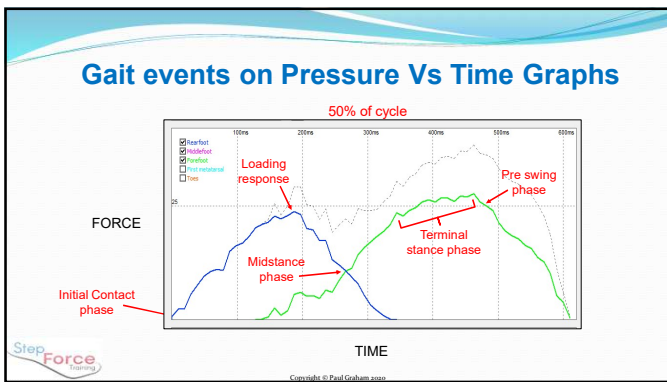
Pre Swing

Key Features

- Reverse Windlass Cont
- Toes Rocker
- Catapult function of toes

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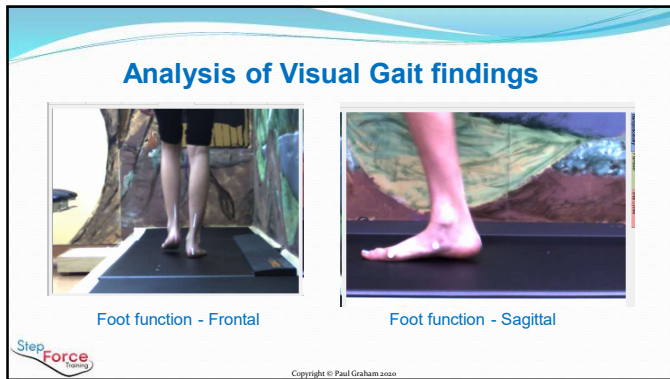
Recording of Visual Gait findings

Visual Gait Analysis Impressions:

Gait Features	Right	Left	Notes
Head Tilt	Please select	Please select	
Head Forward	Please select	Please select	
Shoulder Tilt	Please select	Please select	
Arm Swing	Please select	Please select	
Torso Side Bend	Please select	Please select	
Pelvic Function	Please select	Please select	
Rounded Hip Extension	Please select	Please select	
Leg Internal Rotation	Please select	Please select	
Leg External Rotation	Please select	Please select	
Trendelenburg Gait	Please select	Please select	
Scissor Type Gait	Please select	Please select	
Protrusive / Compensated Gait	Please select	Please select	
Knee Position	Please select	Please select	
Knee Function	Please select	Please select	
Heel position prior to Initial Contact	Please select	Please select	
Ankle Dorsiflexion	Please select	Please select	
Abductory Twist	Please select	Please select	
Heel Lift	Please select	Please select	
1st MPJ Dorsiflexion	Please select	Please select	
Foot Asymmetry	Please select	Please select	

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34




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Analysis of Visual Gait findings

Vertical Displacement of Centre of Mass (CoM)



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Analysis of Visual Gait findings

Angle of Gait



Abducted Adducted

Heel Twist (Whip)



Medial Lateral

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Analysis of Visual Gait findings

Knee Crossover position



Pelvic (Hip) Drop



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Analysis of Visual Gait findings

Head position



Arm Swing



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4. Optional Tests & Interventions

3. Optional Interventions and Tests

Name: Date of Birth: Dated:

Tests:


Test Selected	Outcome Right Foot	Top 3	Test Selected	Outcome Left Foot	Top 3
1. Jerk Description - Straight leg	Med restricted <input type="checkbox"/>		Jerk Description - Straight leg	WNL	<input type="checkbox"/>
2. Talus Congruency Test	Some ROM restriction <input checked="" type="checkbox"/>		Talus Congruency Test	WNL	<input type="checkbox"/>
3. Hop Test	2 metre <input checked="" type="checkbox"/>		Hop Test	L5 WNL	<input type="checkbox"/>
4. Y Balance Test	Very poor Balance <input checked="" type="checkbox"/>		Y Balance Test	Fair symmetry	<input type="checkbox"/>
5. Please select	<input type="checkbox"/>		Please select		<input type="checkbox"/>
6. Please select	<input type="checkbox"/>		Please select		<input type="checkbox"/>
7. Please select	<input type="checkbox"/>		Please select		<input type="checkbox"/>

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4. Optional Tests & Interventions

Hop Test




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4. Optional Tests & Interventions

Y Balance Test



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4. Optional Tests & Interventions

3. Optional Interventions and Tests

Name: Date of Birth: Dated:

Tests:

Test Selected	Outcome Right Foot	Top 3	Test Selected	Outcome Left Foot	Top 3
1. Jerk Classification - Straight leg	Med restricted	<input type="checkbox"/>	Jerk Classification - Straight leg	WNL	<input type="checkbox"/>
2. Talus Congruency Test	Some ROM restriction	<input checked="" type="checkbox"/>	Talus Congruency Test	WNL	<input type="checkbox"/>
3. Hip Test	2 inches	<input checked="" type="checkbox"/>	Hip Test	L5 Nerves	<input type="checkbox"/>
4. Y Balance Test	Very poor Balance	<input checked="" type="checkbox"/>	Y Balance Test	Fair symmetry	<input type="checkbox"/>
5. Please select		<input type="checkbox"/>	Please select		<input type="checkbox"/>
6. Please select		<input type="checkbox"/>	Please select		<input type="checkbox"/>
7. Please select		<input type="checkbox"/>	Please select		<input type="checkbox"/>

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How interventions can really help



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Arch Elongation Taping




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. Ensure good adhesion
4. Start person walking over mat and record as soon as gait normalises

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4. Retest Y-Balance Test



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Combined FF eversion / RF Inversion taping



1. Tape the foot as if 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. Ensure good adhesion
4. Start person walking over mat and record as soon as gait normalises

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4. Optional Tests & Interventions

Interventions:

Intervention Selected	Outcome Right Foot	Top 3	Intervention Selected	Outcome Left Foot	Top 3
1. Arch Extension Taping	<input checked="" type="checkbox"/> Balance Tests slight improvement	<input checked="" type="checkbox"/>	Please select		<input type="checkbox"/>
2. Combined FF Eversion / RI Inversion	<input checked="" type="checkbox"/> Further improvement	<input checked="" type="checkbox"/>	Please select		<input type="checkbox"/>
3. Please select	<input type="checkbox"/>	<input type="checkbox"/>	Please select		<input type="checkbox"/>
4. Please select	<input type="checkbox"/>	<input type="checkbox"/>	Please select		<input type="checkbox"/>
5. Please select	<input type="checkbox"/>	<input type="checkbox"/>	Please select		<input type="checkbox"/>
6. Please select	<input type="checkbox"/>	<input type="checkbox"/>	Please select		<input type="checkbox"/>
7. Please select	<input type="checkbox"/>	<input type="checkbox"/>	Please select		<input type="checkbox"/>

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Decision on Treatment Strategy

Treatment Strategy

Do you need more information?
OR
Is the pathway clear cut?

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Get to know your Patient

3. Plan and Finish
(aim for 10 – 15 Minutes)

- Explain your hypothesis
- Provide a clear plan
- Initial Strategy

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Shouts Outs & further study resources


1. Clinical Biomechanics Boot Camp course:
<https://podiatrycpdacademy.com/lessons/running-gait-analysis/>
2. Kevin Kirby's resources: <https://precisioninricast.com/education/>
3. Richard Souza's Video running gait Paper:
<https://www.sciencedirect.com/science/article/abs/pii/S1047965115000704>
4. Functional Movement Group:
<https://www.youtube.com/c/MATassessment/featured>

This page with active links will be in your dashboard under Session 3

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Questions?



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