

# Plantar Fasciitis (Fasciosis ?)

## A Top Down Approach

Ramsay Sloss

ESP Podiatrist/Orthopaedics

Private Practice



# 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.  
Sarrafiian (1993)
- Structure
  - Predominantly longitudinally oriented collagen fibres that are non-compliant  
Perry (1983)



Divides to form 5 slips to the toes

Central band

Lateral band-----

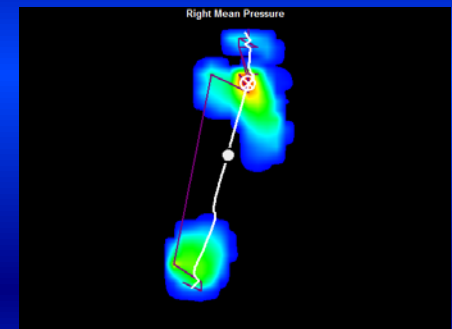
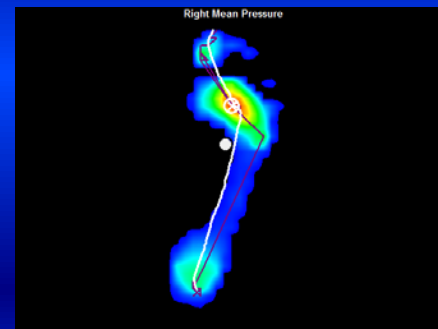
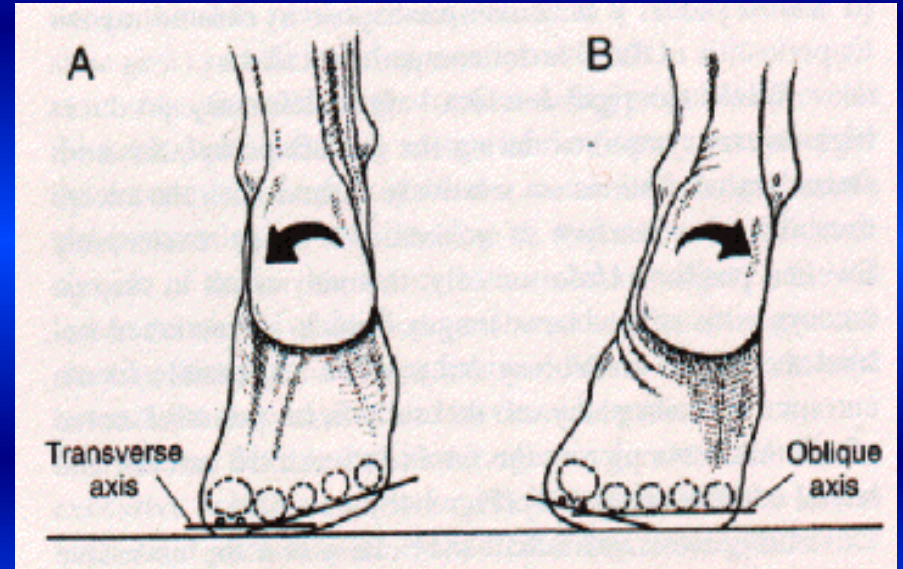
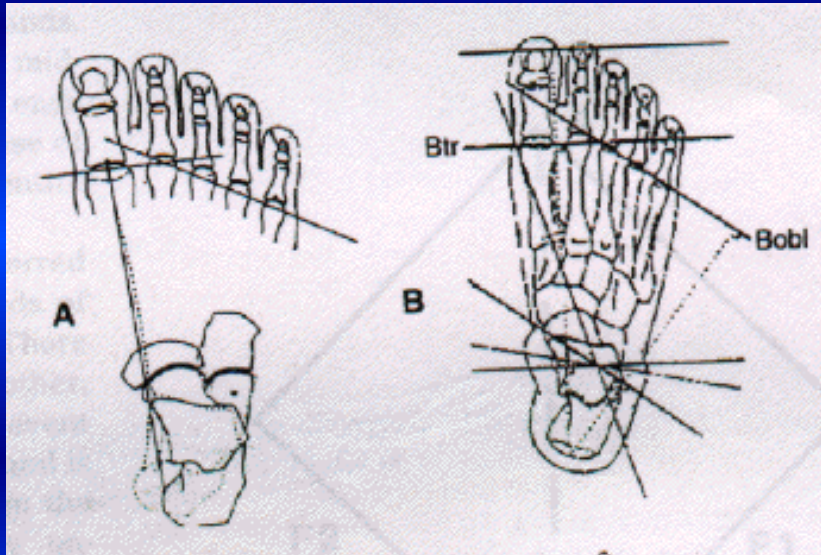
Medial tubercle of the calcaneus

(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 Hicks (1954)
  - Independent of muscle activity

# 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. Lemont et al (2003)

**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.**

**(J Am Podiatr Med Assoc 93(3): 234-237, 2003)**

# 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

**Inferior heel pain**

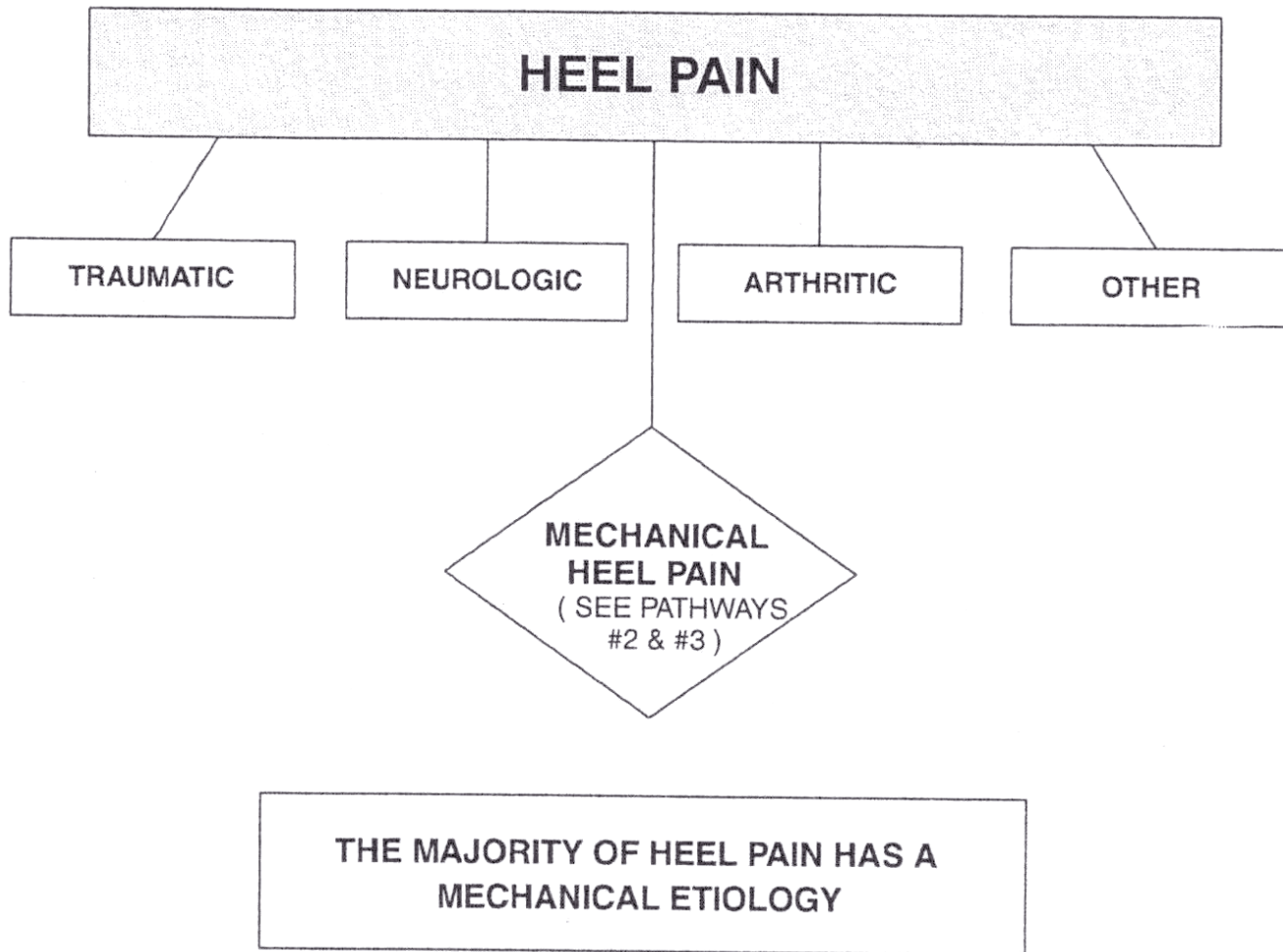
## **Bone**

- 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



# 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

Plantar calcaneal spurs in older people: longitudinal traction or vertical compression – Menz, HB et al (2008)

# Other treatments

- **Endoscopic decompression**. Bazaz, R. Ferkel, RD. (2007) **Results of Endoscopic Plantar Fascia Release**. *Foot and ankle International May Vol 28 #5*
- **Extracorporeal shock wave therapy** NICE Guidelines (August 2009)  
<http://guidance.nice.org.uk/IPG311>
- **Cryoanalgesia** Allen, BH. Et al (2007) **Cryosurgery : An innovative technique for the treatment of plantar fasciitis**  
*The Journal of Foot and Ankle Surgery, Volume 46, Issue 2, March-April 2007, Pages 75-79*

# 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 ?

- Yamaguchi, H. Sueishi, K. (2003). **Malocclusion associated with abnormal posture.** *Bulletin Tokyo Dental College, Vol 44, No2, pp 43-54*
- Michelotti, A . Etal (2006). **Postural stability and unilateral posterior crossbite : Is there a relationship ?** *Neuroscience letters 392 (2006) 140-144*
- Kormacher, H etal (2007). **Associations between orthopaedic disturbances and unilateral crossbite in children with asymmetry of the upper cervical spine.** *European Journal of Orthodontics 29 pp 100-104*
- Micheloti, A. Etal (2007). **Is unilateral posterior crossbite associated with leg length inequality ?** *European Journal of Orthodontics 29 pp 622-626.*

# Milwaukee Brace and Occlusion

- Pollack, JJ. (1969) **The effects of the Milwaukee brace on the dentition and jaws.** *Journal of the national medical association* Vol 62 pp 27-35.
- Rock, WP. Baker,R. (1972). **The effect of the Milwaukee brace upon dentofacial growth.** *The Angle Orthodontist: April* Vol. 42, No. 2, pp. 96-102.
- Amat, P. (2009). **Occlusion, orthodontics and posture : are there evidences ?** The example of scoliosis. *Journal of Stomatology & occlusion medicine.* Vol 2 pp 2-10.

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

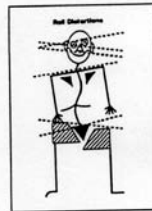
- Ferrario, VF. Sforza, C. Schmitz, JH. Taroni, A. (1996) Occlusion and center of foot pressure variation: Is there a relationship? *The Journal of Prosthetic Dentistry* Vol 76 pp 302-308
- Nobili, A. Adversi, R. (1996) Relationship between posture and occlusion: A clinical and experimental investigation. *Journal of Craniomandibular practice*. Vol 14 pp 274-285.
- Yoshino, G. Higashi, K. Nakamura, T. (2003a) Changes in weight distribution at the feet due to occlusal supporting zone loss during clenching. *Journal of Craniomandibular practice* Vol 21 pp 271-278.
- Sloss, R et al (2009). Foot orthoses and dental appliances : Is there a relationship ? *The Foot* Vol 19 pp 145-148.

# Terminology

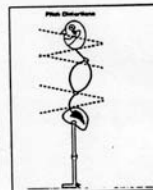
## TERMINOLOGY OF DISTORTION ROLL, PITCH AND YAW

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

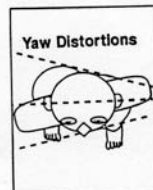
**ROLL** - The position of an object in reference to its horizontal AP axis. In the body, Roll relates to the levels of the transverse planes, especially the pelvis, diaphragm, shoulders and head. In the cranium, Roll relates to the levels of the ears, the eyes, and the maxilla.



**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



# Chirodontic evaluation sheet

## Chirodontic Evaluation - 25 step

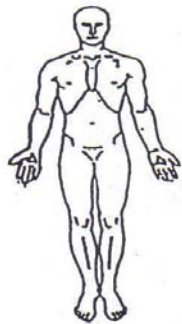
Patient Name \_\_\_\_\_ Date \_\_\_\_\_

### Posture

*ROLL*

*YAW*

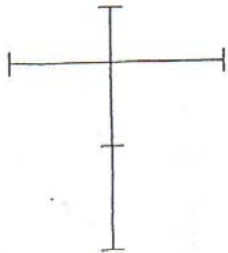
*PITCH*



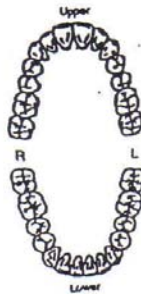
### Tri Planer



### TMJ



### Occlusal



[www.chirodontics.com](http://www.chirodontics.com)

# Measurements

## Chirodentic Evaluation - 25 step

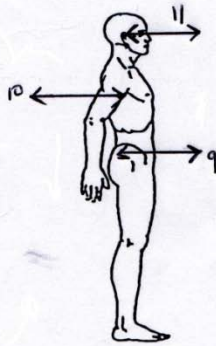
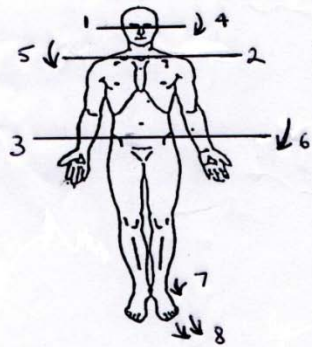
Patient Name \_\_\_\_\_ Date \_\_\_\_\_

### Posture

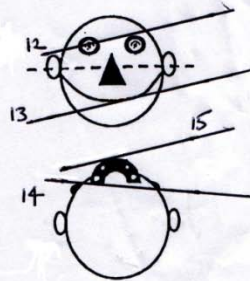
ROLL

YAW

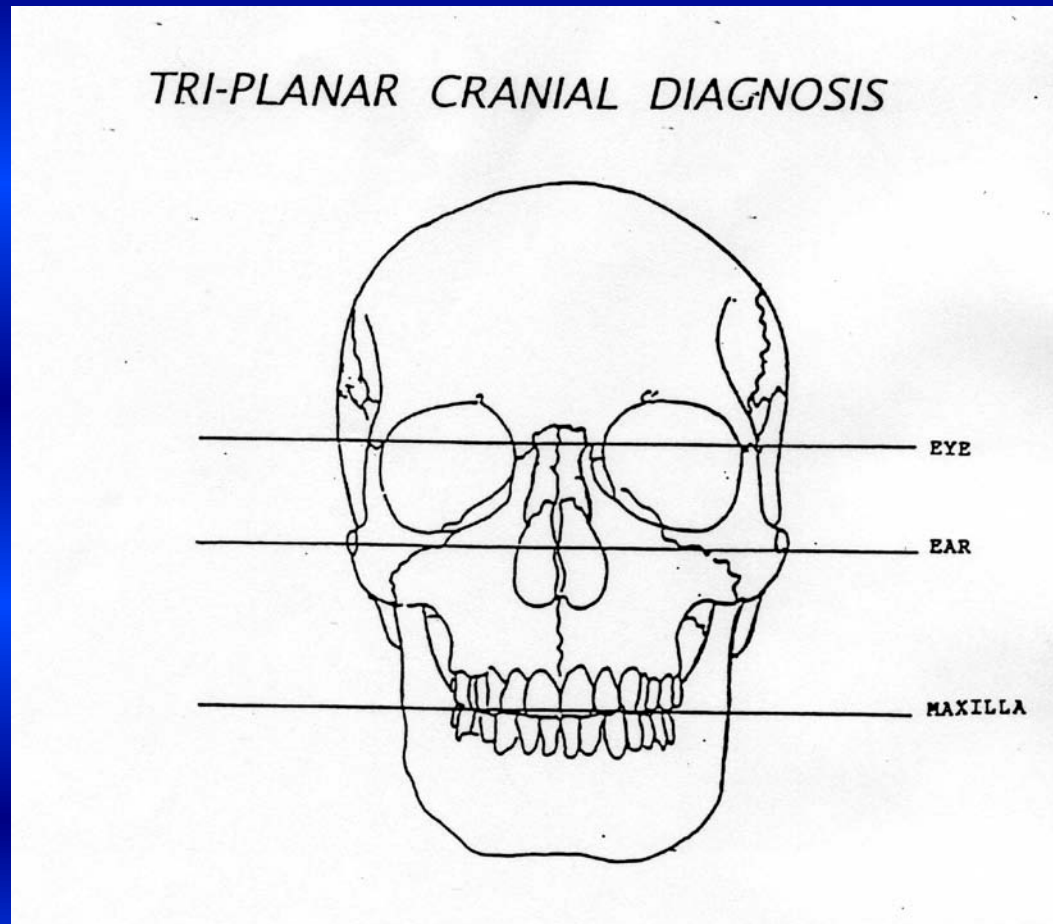
PITCH



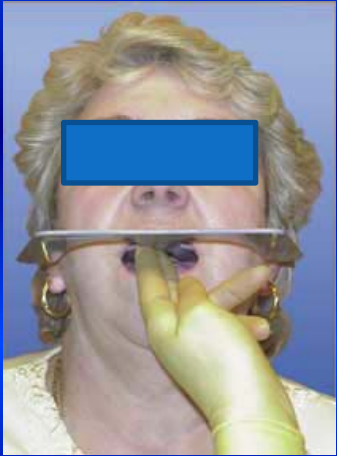
### Tri Planer



# Eye Ears Maxilla Normal levels



# Measurements – Alma bite guide



### Roll Distortions

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

① **Dental Primary**  
*Ears and Eyes are the same, Maxilla is different*

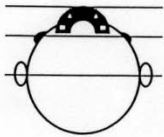
② **Postural Primary**  
*Eyes and Maxilla are the same, Ears are different*

③ **Cranial Primary**  
*Ears and Maxilla are the same, Eyes are different*  
*(the brain is not)*

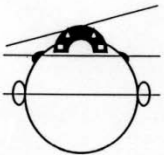
④ FACE = angle

# Measurements

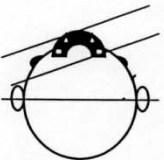
## Yaw Distortions



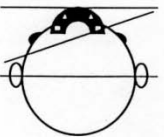
**Normal**  
*All planes are parallel with each other*



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



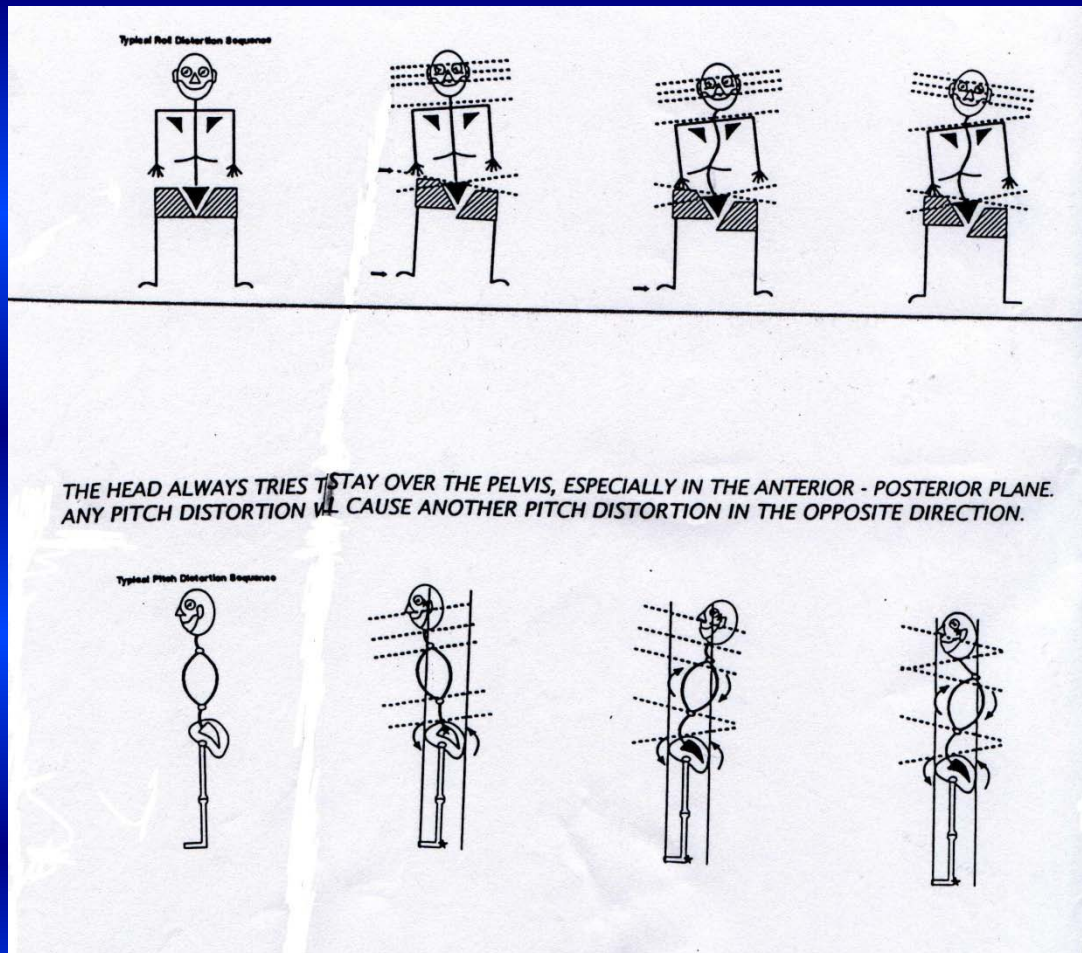
**Postural Primary**  
*Eyes and Maxilla are the same, Ears are different*



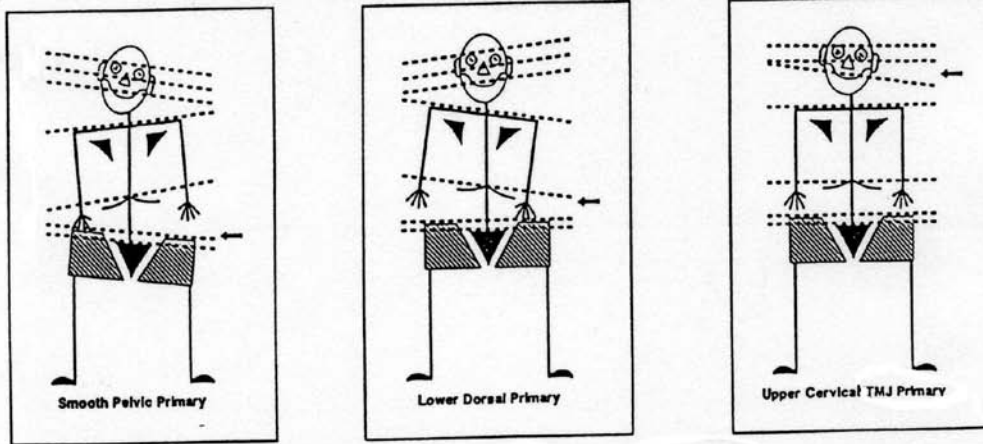
**Cranial Primary**  
*Ears and Maxilla are the same, Eyes are different*



# Normal postural coupling

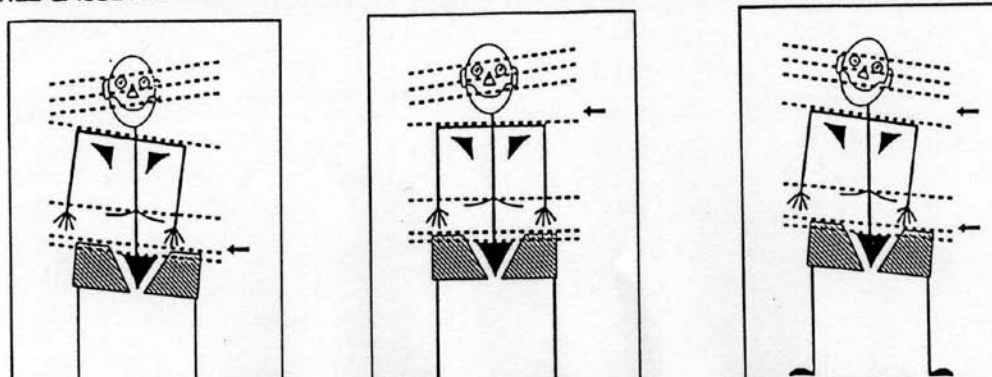


# Non smooth postural coupling

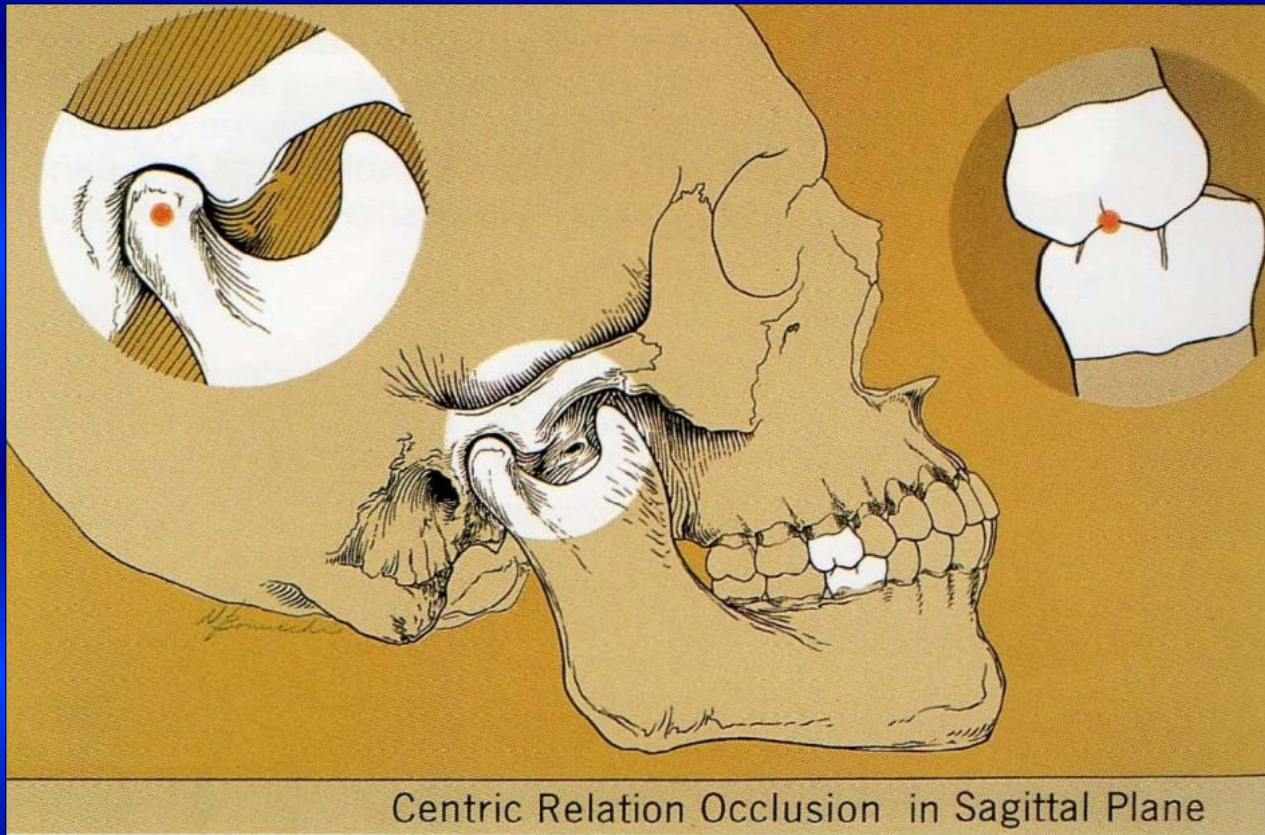


IF THE NORMAL LORDOTIC CURVE IS ALTERED INCREASED OR DECREASED LORDOSIS THEN THE LOWEST FREELY MOVEABLE VERTEBRA WILL ROTATE OPPOSITE OF NORMAL COUPLING.

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.

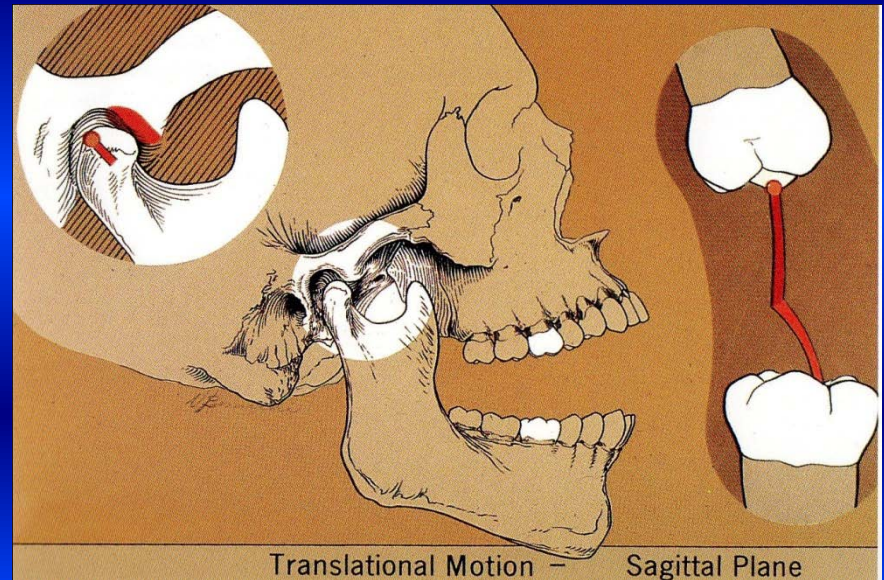
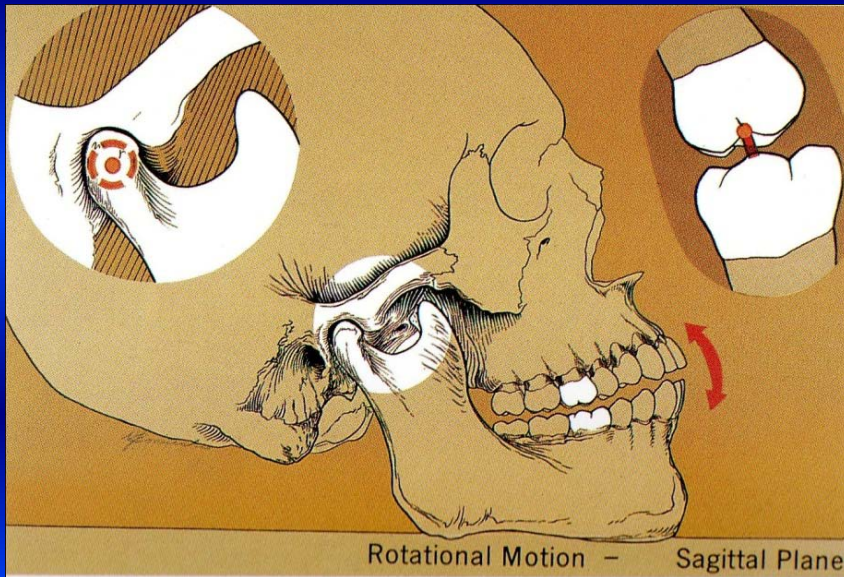


# TMJ Function





# TMJ motion



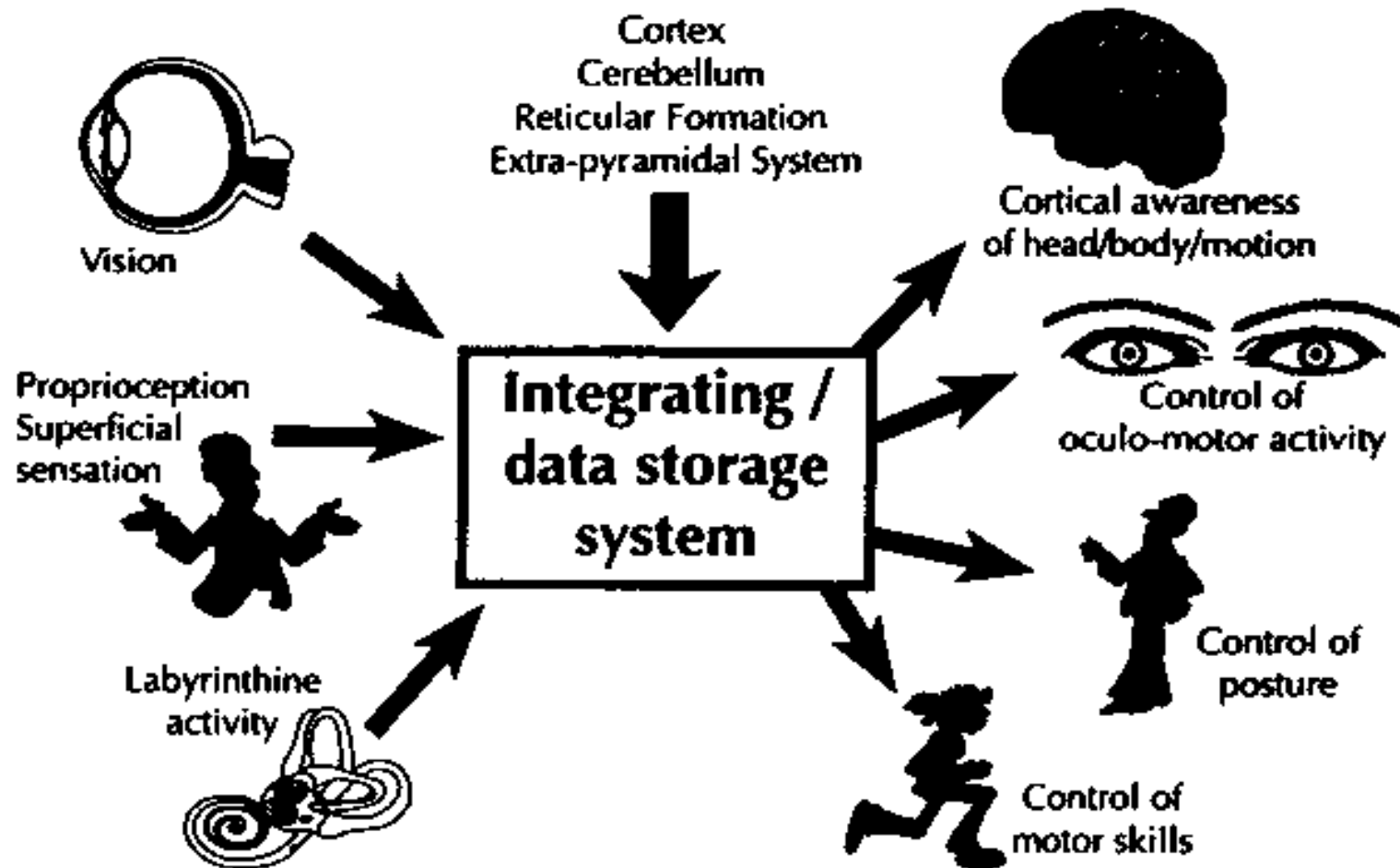
Normal opening 48mm - 3 fingers width

# 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



# 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'*

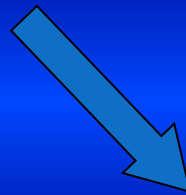
*'get on with your life'*

Frequently the 'traditional' approach finds nothing medically wrong with the patient



**frustration**

( by patients & doctors )



**Lack of clinical effectiveness**

# 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.**

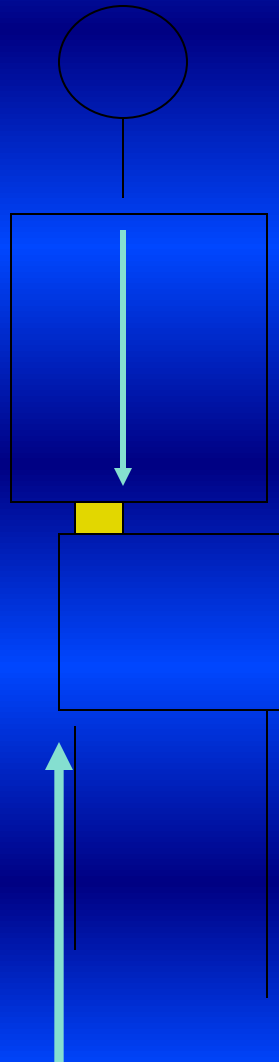
**Limb length raise removed and orthoses fitted**

**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





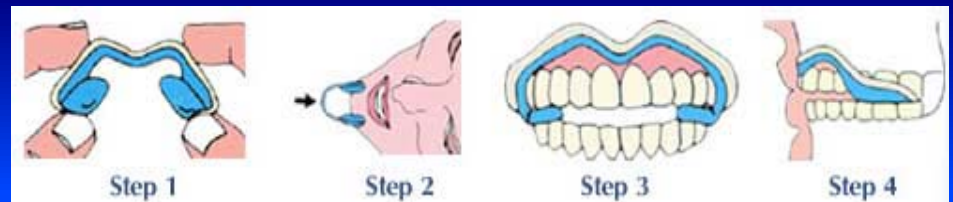
## Findings

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](http://Aqualizer.com)





№	Имя	Фамилия	Рост	Вес	Дата
1	Иванов	Иван	175	75	15.05.2018
2	Петров	Петр	180	80	16.05.2018
3	Сидоров	Сидор	170	70	17.05.2018
4	Климов	Климов	178	78	18.05.2018
5	Васильев	Васильев	182	82	19.05.2018
6	Попов	Попов	173	73	20.05.2018
7	Смирнов	Смирнов	176	76	21.05.2018
8	Мухоморов	Мухоморов	185	85	22.05.2018
9	Иванов	Иван	175	75	23.05.2018
10	Петров	Петр	180	80	24.05.2018
11	Сидоров	Сидор	170	70	25.05.2018
12	Климов	Климов	178	78	26.05.2018
13	Васильев	Васильев	182	82	27.05.2018
14	Попов	Попов	173	73	28.05.2018
15	Смирнов	Смирнов	176	76	29.05.2018
16	Мухоморов	Мухоморов	185	85	30.05.2018
17	Иванов	Иван	175	75	31.05.2018
18	Петров	Петр	180	80	01.06.2018
19	Сидоров	Сидор	170	70	02.06.2018
20	Климов	Климов	178	78	03.06.2018
21	Васильев	Васильев	182	82	04.06.2018
22	Попов	Попов	173	73	05.06.2018
23	Смирнов	Смирнов	176	76	06.06.2018
24	Мухоморов	Мухоморов	185	85	07.06.2018
25	Иванов	Иван	175	75	08.06.2018
26	Петров	Петр	180	80	09.06.2018
27	Сидоров	Сидор	170	70	10.06.2018
28	Климов	Климов	178	78	11.06.2018
29	Васильев	Васильев	182	82	12.06.2018
30	Попов	Попов	173	73	13.06.2018
31	Смирнов	Смирнов	176	76	14.06.2018
32	Мухоморов	Мухоморов	185	85	15.06.2018
33	Иванов	Иван	175	75	16.06.2018
34	Петров	Петр	180	80	17.06.2018
35	Сидоров	Сидор	170	70	18.06.2018
36	Климов	Климов	178	78	19.06.2018
37	Васильев	Васильев	182	82	20.06.2018
38	Попов	Попов	173	73	21.06.2018
39	Смирнов	Смирнов	176	76	22.06.2018
40	Мухоморов	Мухоморов	185	85	23.06.2018
41	Иванов	Иван	175	75	24.06.2018
42	Петров	Петр	180	80	25.06.2018
43	Сидоров	Сидор	170	70	26.06.2018
44	Климов	Климов	178	78	27.06.2018
45	Васильев	Васильев	182	82	28.06.2018
46	Попов	Попов	173	73	29.06.2018
47	Смирнов	Смирнов	176	76	30.06.2018
48	Мухоморов	Мухоморов	185	85	01.07.2018
49	Иванов	Иван	175	75	02.07.2018
50	Петров	Петр	180	80	03.07.2018
51	Сидоров	Сидор	170	70	04.07.2018
52	Климов	Климов	178	78	05.07.2018
53	Васильев	Васильев	182	82	06.07.2018
54	Попов	Попов	173	73	07.07.2018
55	Смирнов	Смирнов	176	76	08.07.2018
56	Мухоморов	Мухоморов	185	85	09.07.2018
57	Иванов	Иван	175	75	10.07.2018
58	Петров	Петр	180	80	11.07.2018
59	Сидоров	Сидор	170	70	12.07.2018
60	Климов	Климов	178	78	13.07.2018
61	Васильев	Васильев	182	82	14.07.2018
62	Попов	Попов	173	73	15.07.2018
63	Смирнов	Смирнов	176	76	16.07.2018
64	Мухоморов	Мухоморов	185	85	17.07.2018
65	Иванов	Иван	175	75	18.07.2018
66	Петров	Петр	180	80	19.07.2018
67	Сидоров	Сидор	170	70	20.07.2018
68	Климов	Климов	178	78	21.07.2018
69	Васильев	Васильев	182	82	22.07.2018
70	Попов	Попов	173	73	23.07.2018
71	Смирнов	Смирнов	176	76	24.07.2018
72	Мухоморов	Мухоморов	185	85	25.07.2018
73	Иванов	Иван	175	75	26.07.2018
74	Петров	Петр	180	80	27.07.2018
75	Сидоров	Сидор	170	70	28.07.2018
76	Климов	Климов	178	78	29.07.2018
77	Васильев	Васильев	182	82	30.07.2018
78	Попов	Попов	173	73	31.07.2018
79	Смирнов	Смирнов	176	76	01.08.2018
80	Мухоморов	Мухоморов	185	85	02.08.2018
81	Иванов	Иван	175	75	03.08.2018
82	Петров	Петр	180	80	04.08.2018
83	Сидоров	Сидор	170	70	05.08.2018
84	Климов	Климов	178	78	06.08.2018
85	Васильев	Васильев	182	82	07.08.2018
86	Попов	Попов	173	73	08.08.2018
87	Смирнов	Смирнов	176	76	09.08.2018
88	Мухоморов	Мухоморов	185	85	10.08.2018
89	Иванов	Иван	175	75	11.08.2018
90	Петров	Петр	180	80	12.08.2018
91	Сидоров	Сидор	170	70	13.08.2018
92	Климов	Климов	178	78	14.08.2018
93	Васильев	Васильев	182	82	15.08.2018
94	Попов	Попов	173	73	16.08.2018
95	Смирнов	Смирнов	176	76	17.08.2018
96	Мухоморов	Мухоморов	185	85	18.08.2018
97	Иванов	Иван	175	75	19.08.2018
98	Петров	Петр	180	80	20.08.2018
99	Сидоров	Сидор	170	70	21.08.2018
100	Климов	Климов	178	78	22.08.2018

## 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**