Case Studies in Runners

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IRONMAN WORLD CHAMPIONSHIP MEDICAL SYMPOSIUM

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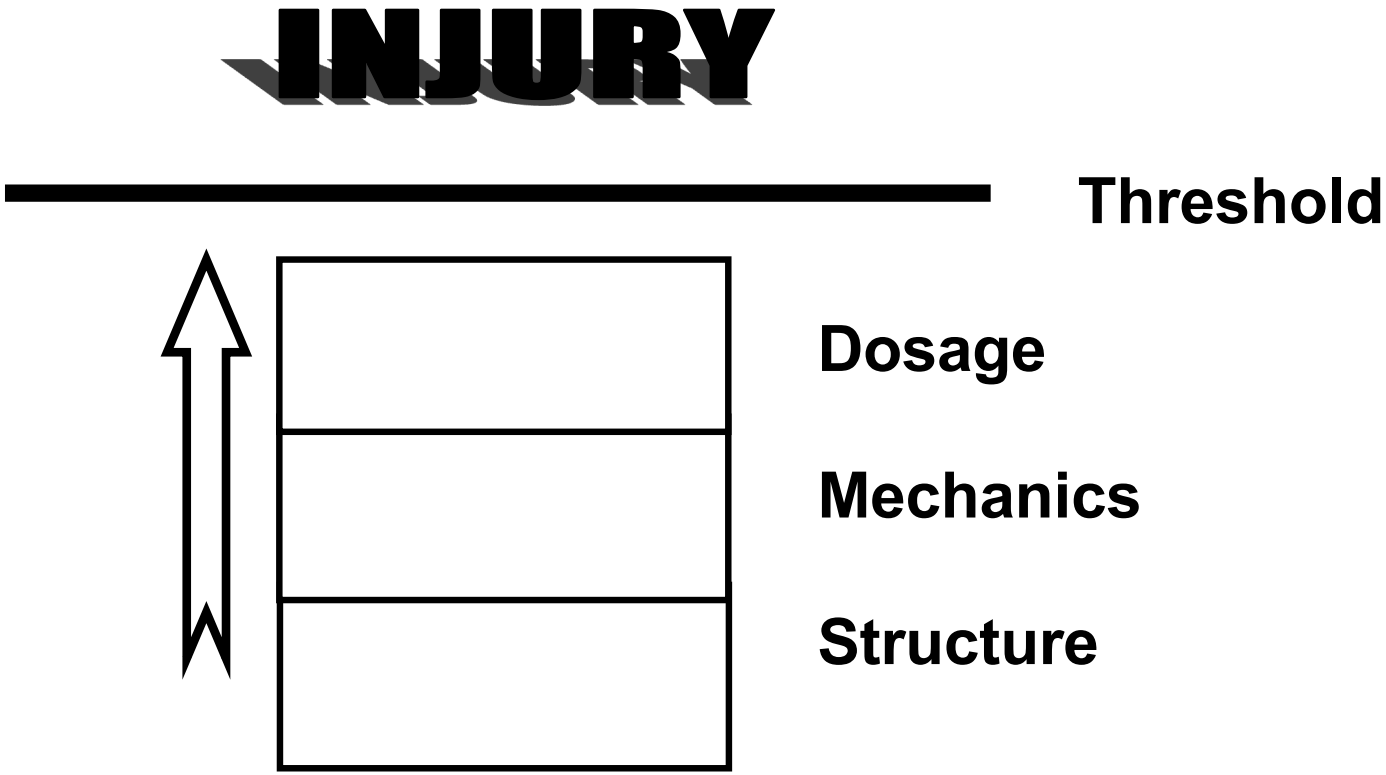
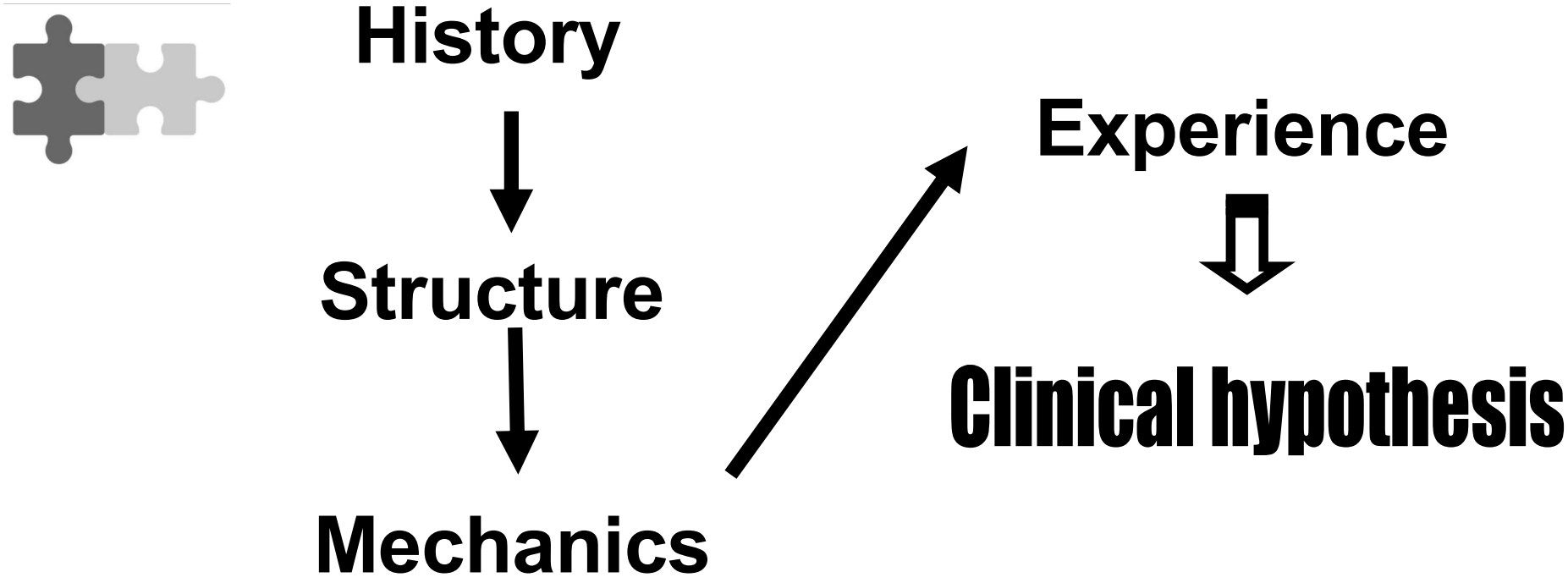
Disclosure

I have nothing to disclose

Case 3: A Running Mystery




History
Structure
Mechanics
Experience
Clinical hypothesis

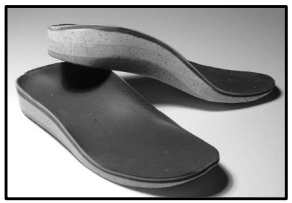
Case 1: From Running... to Disability... to Running

History

27 yr. old male with presented with BIL plantar foot and knee pain

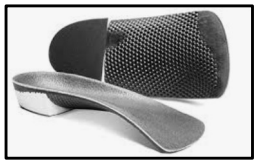
2007, developed bilateral PFP with running

One course of PT and prescribed orthotics
No change in symptoms so stopped wearing orthotics
Pt stopped running, therefore symptoms resolved



2011, pt moved to London, walked a lot in flat, non- supportive flat shoes (Vans)

Developed BIL heel pain R>L that radiated into his arch
Progressed to a burning sensation
Prolonged walking and standing became excruciating



Prescribed another pair custom orthotics by a podiatrist

History

Moved to the States one year later and underwent

1. Steroid Injections
2. Tarsal Tunnel Release on the R
3. Small Morton's Neuroma diagnosed: no change with injection
4. Blood Tests (-) for rheumatoid factor and Lyme's
5. MRI of spine: mild nerve impingement, not associated with foot pain
6. MRI of foot : showed inflammation (per pt report)

Symptoms persisted with increased pain after 3 minutes of walking and standing.
Unable to take public transportation or care for his 2 yr old daughter.

At 27 yrs old, he was disabled

Physical Findings

Pain Dull/diffuse pain along post. tib, plantar fascia origin, 1st MTP joint
burning sensation throughout plantar surface
VAS 6/10

ROM Decreased ankle DF BIL

LE strength Post tib., peroneals, toe flexors weak and painful with contraction
Hip EXT. and ABD. BIL weak

Special Tests (+)Patella compression and (+)Obers R>L

Function Single leg squat with CPD, femoral adduct.
mid foot pronation

Gait

Running Assessment

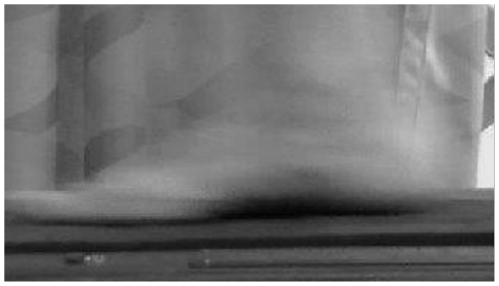
RFS with elevated rates load rates

Contralateral hip drop L>R
Hip ADD and IR L>R

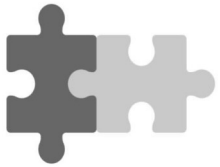
Reduced arch in midsupport

VAS 3-4/10 foot, 2/10 knees

With Forefoot Strike trial:
- Reduced knee pain slightly to 0-1/10
- Reduced loadrates



Clinical Hypothesis



1. Pt presents with bilateral **Patellofemoral Pain** due to:
    - Hip weakness, Hip ADD and Contralateral Pelvic Drop
    - ITB restrictions – tension on lateral patellofemoral ligament
    - Elevated rates of loading while running

2. Pt developed bilateral **Plantar Fasciitis** due to:
    - orthotic use (weakens feet)
    - rapid increase in walking without support
    - increased pronation
        - medial collapse of lower limb
        - compensation for reduced ankle dorsiflexion

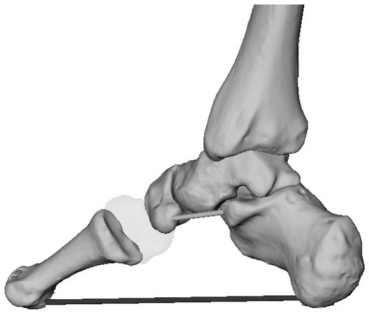
He did not respond to prior treatments perhaps because underlying mechanics were not addressed

Patient's Goals

1. Pain-free (feet) standing and walking

2: Pain-free (knees and feet) running

Goal #1 (Stand/Walk): Foot/Calf Strength and ROM



Foot Doming

Toe spreads

Doming and Hopping

Joint Mobilizations

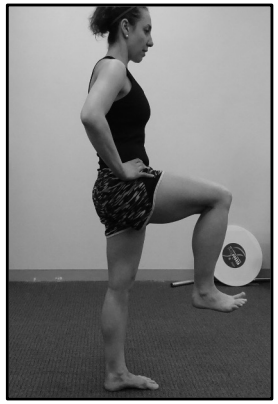
Instrumented Soft Tissue Mobs.

Calf Strength

Calf Stretching

Goal #1 (Stand/Walk): Functional Activities

Active Standing



Single Leg Balance

Jump Rope

Transition to walking in minimal footwear

Fitbit used to track walking steps daily

Results

PT for 2 x week for the 1st 2-3 months.
Treatment was then spaced out with progressions provided each time.

After 32 visits over 11 months pt was able to:

Walk 1-2 hours a day, average 15,000 steps/day in minimal footwear
Take public transportation
Stand 1-2 hours at a time to give lectures
Travel around Boston with his family

Pain < 1/10 without any c/o burning BIL

Pt discharged with comprehensive HEP to progress LE strengthening independently

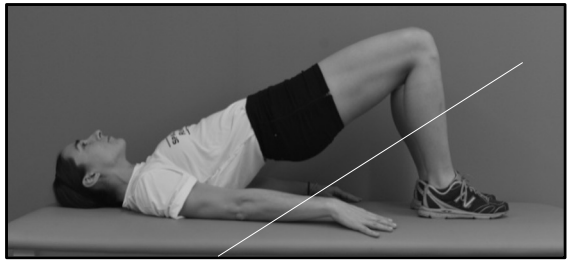
Follow-Up

Pt. returned to PT 7 months later with continual c/o knee pain limiting pt from running

Foot pain continued to improve with pain 0-1/10, even with increased activity

Began 2nd phase of PT focusing on Hip/Core and running

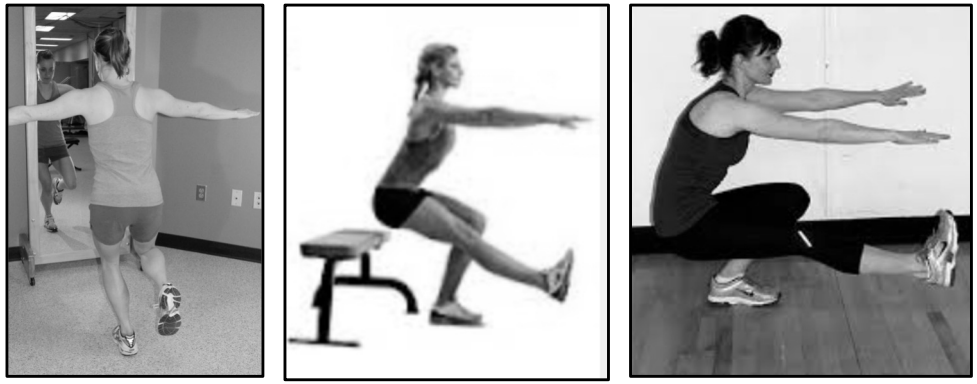
Goal #2 (Run): Hip Core Strengthening



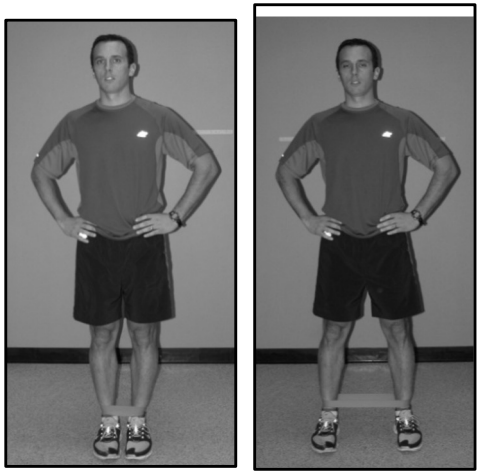
Bridging

Planks

Leg Lowering



Single Leg Squat Progressions



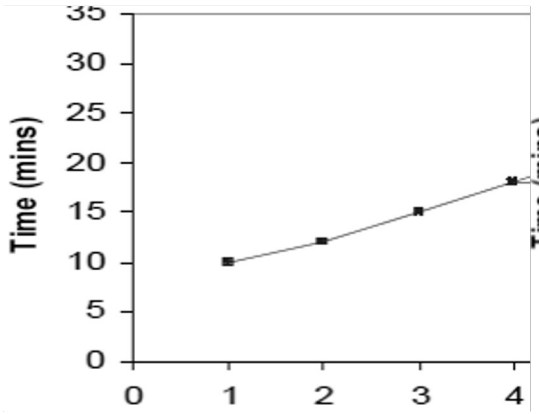
Lateral t-band walks

Walking Lunges

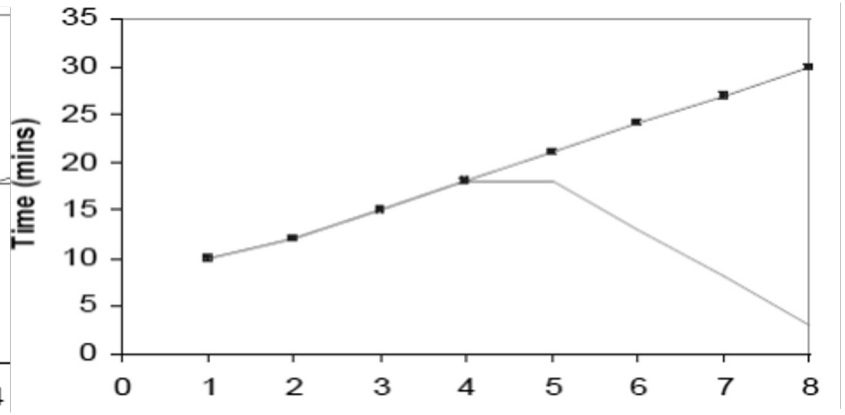
Gait Retraining

Mirror Feedback

12 Sessions of Gait Retraining



Transition to FFS
(reduce impacts)



Alignment Retraining
(reduce Hip ADD)

Results

At Discharge

Reduced CPD and Hip Adduction

Transitioned to a FFS pattern in minimal shoes

Run 25 minutes pain-free in knees and feet

Continual progress in walking and standing

At 9 mo Post-Discharge

Run 20-30 min every other day without pain

Complex Cases take Time (in this case 2 years) .....and Patience

Case 2: Running without Toes

History

43 yr. old F runner with L>R medial lower leg pain

Training for her first half marathon, when she developed a systemic infection June 2014

Complications with the infection resulted in all 10 toes amputated distal to MTP joint Oct 2014

October 2016, pt started a run/walk program but developed L lateral ankle pain.

Underwent surgery to remove scar tissue and re-align Ext. Hallicus Longus

History

Following surgery, lateral ankle pain resolved, but developed bilateral medial lower leg pain L>R with walking and running

Pt. sought running assessment in July, 2017

Despite being told to never run again, she was determined to return to running as it was a large part of her life

Physical Findings

Skin Well healed skin folds over 10 toes distal to MTP
Callus formation under fifth met on L

Pain Tenderness medial lower leg BIL L>R
VAS: Maximum 7/10 L>R
Average 2/10

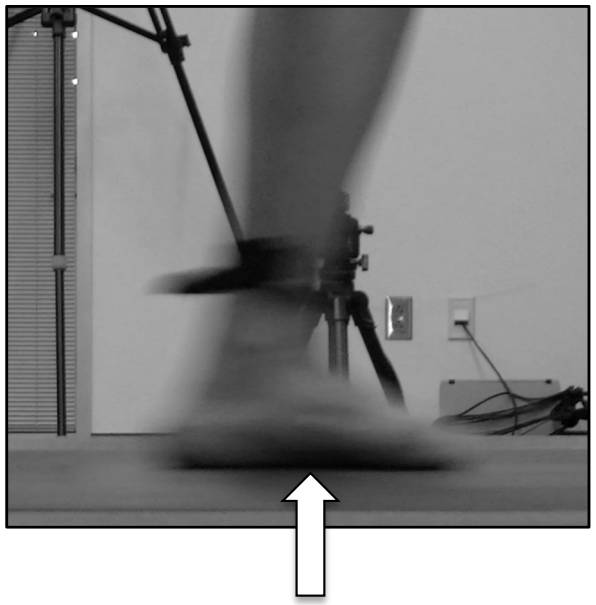
ROM Decreased calcaneal eversion on the L, decreased DF R>L

Strength Weak inverters, everters and calf BIL
Weak intrinsic muscles of the arch
Weak Hip ABD, EXT and ER L>R

Function Poor stability and control in Single Leg Stance and Single Leg Hop

Gait

Ran in a cushioned shoe with custom orthotics and was a RFS BIL
Pain 3/10 on L

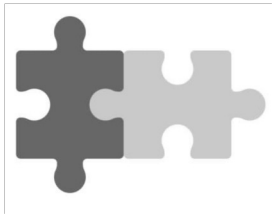


Arch drop (L>R) at midsupport

Increased L INV and
toe-in at FS

Incr BIL hip ADD, IR
and pelvic drop

Clinical Hypothesis



Pt presents with posterior tibialis tendinosis L>R

1. Surgical loss of toes caused foot muscle weakness
2. Weakness of intrinsic muscles of the arch (L arch deflects more) causes:

   Increased work of posterior tendinitis (helps support the arch) = pain

   inversion and toe-in to prevent arch from dropping.
3. Increased hip ADD and IR due to hip weakness and poor motor control

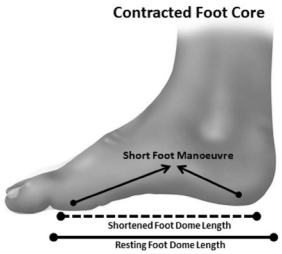
   Increased medialization of knee increases medial load to the lower leg

Treatment Approach

1. Improve foot and ankle strength and mobility
2. Improve dynamic control of foot and ankle with hopping
3. Improve hip/core stability and strength
4. Facilitate normal foot/ankle function by weaning out of foot orthoses and reducing supportive footwear
5. Gait retraining:

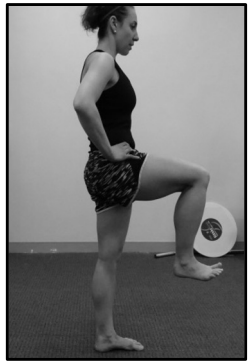
   Reduce inversion and toe in at the foot
   Reduce Hip ADD and IR and CPD

Treatment

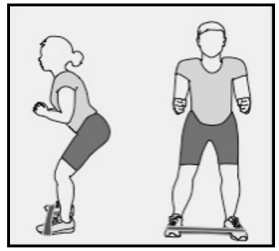


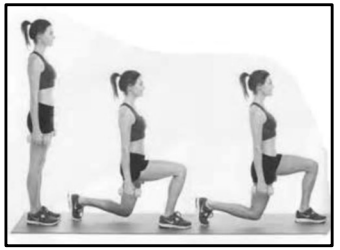
Foot strength

Mobility



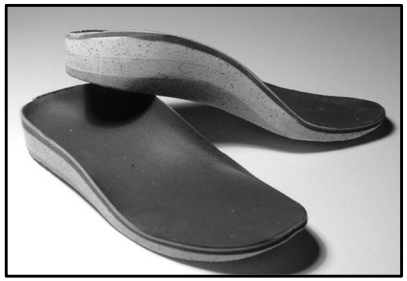
Functional Activity





Hip Core Program

Treatment



Wean slowly out of orthotics

Transition to minimal shoes for walking

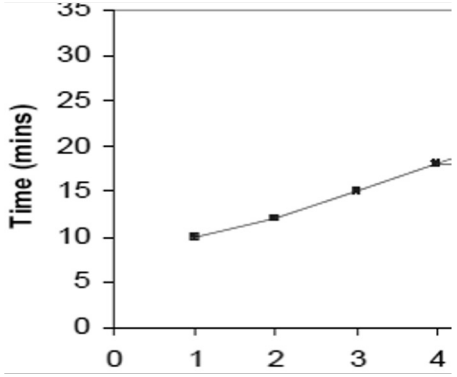
Along with weekly PT sessions

Personal Trainer

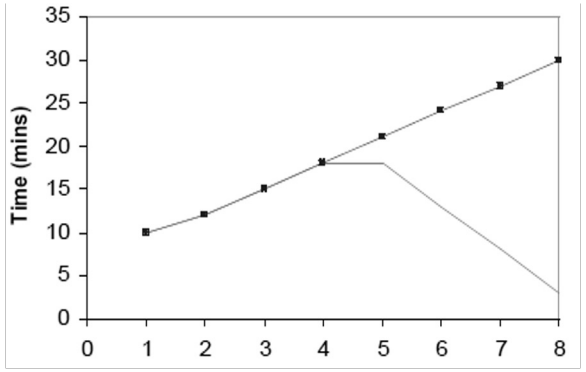
Yoga

Treatment – Gait Retraining

12 sessions of gait retraining

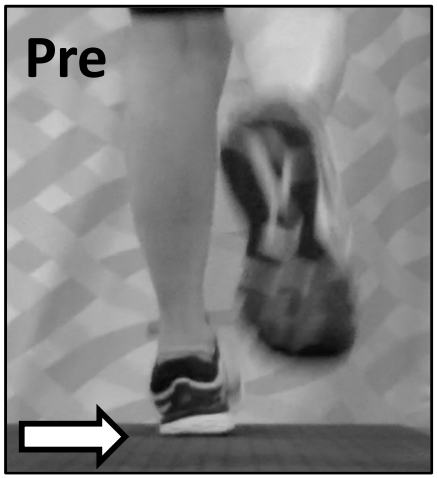


Reduce toe-in and inversion at FS

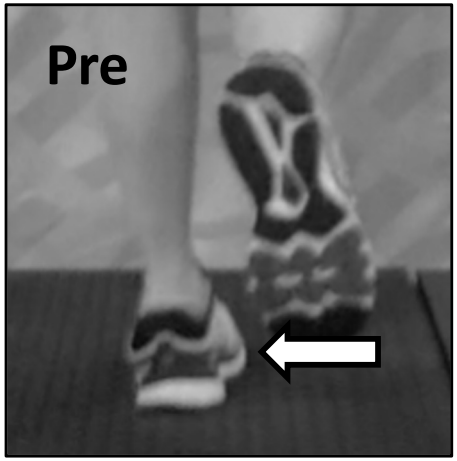


Reduce hip ADD, IR, and CPD

Gait Results

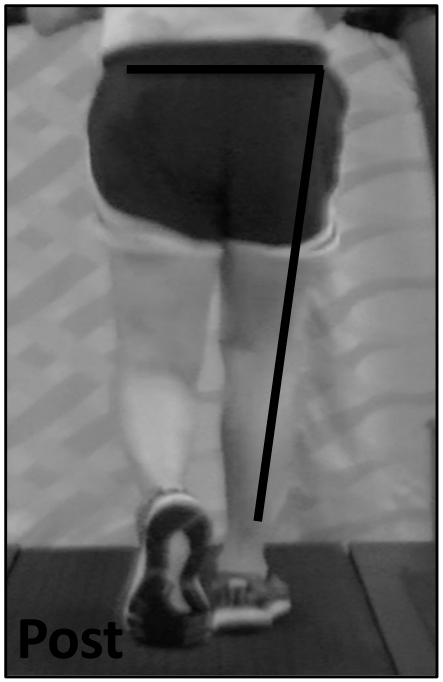


Reduced INV



Reduced Toe-In

Gait Results



Reduced Hip ADD and Pelvic Drop

Patient's Goals Achieved

At Discharge - March 2018

Running 30min 3x/wk in a partially minimal shoe without orthotics
(Given instructions on increasing mileage gradually)

Cross training in minimal shoes

Completely Pain-free in all activities

Able to wear high heels (to daughter's wedding) for the 1st time since her toes were amputated - without pain

The Why

September 2018, Completion of her half marathon!!

Completed a full Marathon in 2022!!

Give all feet a chance!

Case 3: A Running Mystery

History

54 yr old F runner with complaint of gait awkwardness

Training for a half marathon - developed Achilles tendinopathy

Completed race 6 weeks ago

Then developed feeling of awkwardness in running gait at 5-mile point in her training mileage, Left leg pulls into abduction every 5-7 steps

She now senses this with brisk walking or with <1 mile of running and with every other step

Past Medical History – 3 yrs ago, she had a left peroneal transfer and heel correction surgery for supination

Running Gait

Runner's Dystonia?

Overuse Injury of the Brain

Movement representation within the brain merge
Lose ability to generate individually coordinated movement patterns
No two dystonias look alike

Index of suspicion

'Lack of control' in absence pain or weakness
Progressive in nature
Very high mileage
Type A personality
Can be associated with a recent injury

No two are alike!

This is not an orthopedic injury
Refer to a neurologist preferably with expertise in dystonia

Thank You