The Feet and Ankles: The Foundation of Your Body

Kevin M. Wong, DC
Thank You All for being Here!
The Extremity Chiropractor

Dr. Kevin Wong
Foot Levelers
Florida Territory Representative:

Robert Boardwine
GOALS:

• Confidently evaluate/treat your patients’ feet/ankles.
• Understand how the extremities affect the axial spine.
• Introduce/review useful adjustments for the feet/ankles.
Inspire you to evaluate **ALL** of your patients feet because you understand **WHY**.
The Riches Are in the Niches
When the foundation of your home is not level, the walls will start cracking and crumbling which can create problems on your top floor.

It’s the same with your body!
Start with the foundation
Every biomechanical imbalance is transmitted to the spine
Different surfaces effect forces on the LE and body.
LE significantly affects the body and clinical conditions showing up in your practice.
Kinetic Chain

Cervical Spine
Thoracic Spine
Lumbar Spine
Hip Joints
Knee Joints
Ankle Joints
The entire body is supported by the feet
LOSE THE SHOES
How many bones are in each foot?
The **Talus** is the only bone with no muscular insertion.

It moves around during ankle motion.
Palpate the Feet:

- Calcaneus (heel)
- Talus (dome, just under the tibia)
- Navicular (tubercle) inside foot
- Cuboid (proximal to styloid process of MT5)
- Cuneiforms (medial, intermediate, lateral)
- Metatarsals 1-5
- Phalanges 1-5 (3 parts, except big toe)
Joint Movements

Inversion and Eversion of the foot at the ankle

Dorsiflexion and Plantar flexion of the foot at the ankle
ANKLE & FOOT JOINT - MUSCLES INVOLVED

- Dorsi flexion: - Tibialis, Extensor Digitorum longus.
- Planter Flexion: - Gastrocnemius or soleus.
- Inversion: - Tibialis Anterior.
- Eversion: - extensor Digitorum
How many arches under each foot?
How many arches do patients think we have?
• Plantar vault
• Not present at birth
Arch Architecture

- crown
- keystone
- voussoir
- springer
- haunch
- intrados
- extrados
- rise
- span
- spring point
- impost

Roman arch

- stilted arch
- Gothic arch
- Moorish arch
- Tudor arch
- trefoil arch
- ogee arch
Colosseum - Rome (80 AD)
Distal Transverse Arch

1. Medial Longitudinal Arch

2. Lateral Longitudinal Arch

3. Proximal Transverse Arch
Plantar Vault
A - C = Inner Arch (Medial Longitudinal Arch)
B - C = Outer Arch (Lateral Longitudinal Arch)
A - B = Across the Balls of Feet (Anterior Transverse [Metatarsal] Arch)
Arches of Foot

- **Medial longitudinal arch**
  - Is formed of calcaneum, talus, navicular, 3 cuneiform bones, and first medial 3 metatarsal bones.

- **Lateral longitudinal arch**
  - Is formed of calcaneum, cuboid & lateral 4th & 5th metatarsal bones

- **Transverse arch**
  - Lies at the level of tarso-metatarsal joints, formed of bases of metatarsal bones, cuboid & 3 cuneiform bones.
Lateral longitudinal Arch

- Flatter than medial longitudinal arch.
- Rests on the ground during standing.
- It is made up of – calcaneous, cuboid, 2 lateral metatarsals.
Medial Longitudinal Arch
Foot Development

Not all foot bones formed at birth

Avg. Foot length is 7.6 cm

Navicular last to ossify (age 2-5)

Walking starts 10-16 months
Skeletal maturity of the feet is age ~ 13 for girls and age ~ 15 for boys
• The highest relative contribution to arch stability was provided by the plantar fascia, followed by the plantar ligaments and spring ligament.

• Plantar fascia was a major factor in maintenance of the medial longitudinal arch.

Arch Support

“The first line of defense of the arches is ligamentous.”

“...muscles did not come into play until a force greater than 400 pounds was exerted.”

WHAT NORMALLY HAPPENS TO THE 3 ARCHES WHEN YOU STAND UP?
In case of having a moderate height of heel:

- 50% of the load is ideally distributed to the heel and shank.

In case of not having the height of the heel:

- 80% of the load is overloading the heel.
- 20% is distributed to the shank.

Heel is ideally distributed load

Shank

Over load to heel
PLEASE STAND UP!

...ON YOUR BARE FEET
Weight Shift Exercise

- Equal
- Non-Dominant
- Dominant
Patient Awareness Demo: hands on greater trochanters

Excessive Supination

Feel your arches, ankles, knees, hips, pelvis..
Patient Awareness Demonstration:

Excessive Pronation

- Patients *SEE* and *FEEL* connection between feet, knees, hips, pelvis and spine.

(Makes Foot-Spine-NS Connection)
Foot Flare: normal is 12-18 degrees
ARCH FUNCTIONS

• Absorb & Disperse Shock

• Support body weight

• Propel body
Posture without orthotics

- Tech Neck
- Rounded Shoulders
- Thoracic Extension
- Low Back Pain
- Sciatica
- Abnormal Hamstring Stretching and Tension
- Knee Pain
- Shin Splints
- Achilles Tendinitis
- Metatarsal Stress Fractures
- Plantar Fasciitis
Heel strike force sends a shock wave up the leg to the pelvis, spine and skull.
5 G’s of force on the foot/ankle becomes .5 G’s at the skull (TMJ) within 10 ms*

*Hyland, John K., Musculoskeletal Shock: Causes and Prevention, 1980
• Unlocks foot

• Absorbs ground shock (30%),
Normal Pronation Is Important!

- Conforms foot to grip the ground
- Then re-stiffens (supinates) for leverage as leg propels forward to the next step.
Pronation is necessary for correct biomechanics.
ELASTIC VS. PLASTIC DEFORMATION
Plastic Deformation
Plastic deformation takes over....

Tibialis Anterior
Flexor Hallicus
Abductor Hallicus

PRONATED

PRONATED
The remaining 1% is a mix of supinators and “healthy” weight bearing individuals.
Supinators (<1%)

- Flattened lateral & transverse arches
- Stress on lateral ankle, knee, hip, LB
SEVERE PES CAVUS

The Quad A foot type is commonly thought of as an over-supinated or Severe Pes Cavus foot. This condition, also known as a torque foot, occurs when an Uncompensated Rearfoot Varus is coupled with a Large Rigid Forefoot Valgus.
LOWER EXTREMITY ASSESSMENT TOOLS:

- Standing posture
- Gait analysis
- Manual Muscle Testing
- 3-D, Digital, Laser Scan
Do your patients look like this during your posture exam?
4 Global Posture Distortions

3. Kyphotic posture with thoracic extension

1. Bilateral, asymmetrical Foot pronation

2. Anterior Pelvic Rotation and Translation

4. Forward head Translation or carriage
“THE 2 SECOND EXAM”

- Achilles tendons bowing inward or outward?
- Medial arches dropped or high?
Why Am I over pronating?

- Joint Fixation
- Hypermobility/Instability
- Muscle Imbalance
- Acute/Chronic Injuries
Gait Cycle

- **STANCE PHASE 62%**
  - **CONTACT 27%**
  - **MIDSTANCE 40%**
  - **PROPULSIVE 33%**

- **SWING PHASE 38%**

**Phases:**
- **HEEL STRIKE**
- **FOREFOOT LOADING**
- **HEEL LIFT**
- **TOE-OFF**
• Calcaneus inverts
• Foot supinates
• Force goes from heel to ankle
• Foot pronates at subtalar joint

• Medial rotation of tibia/femur
• Foot supinates
• MTP’s dorsiflex
• Plantar fascia tightens
• Leg externally rotates
Foot/Ankle Limits of Normal Movement

<table>
<thead>
<tr>
<th></th>
<th>Walking</th>
<th>Running</th>
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</thead>
<tbody>
<tr>
<td>Pronation</td>
<td>8°</td>
<td>12°</td>
</tr>
<tr>
<td>Supination</td>
<td>2°</td>
<td>4°</td>
</tr>
</tbody>
</table>
Walking 1 Mile puts approximately 50 tons of pressure on your arches.

Running = 3x-5x more
TOE OFF

INITIAL SWING (Acceleration)

MIDSWING

TERMINAL SWING (Deceleration)

HEEL STRIKE

stance phase = 62%

swing phase = 38%

HEEL STRIKE

TOE OFF

HEEL STRIKE
Foot Conditions By Age

- 99% of feet are normal at birth
- 8% of feet develop trouble by age 1
- 41% of feet develop trouble by age 5
- 80% of feet develop trouble by age 20
- Nearly everyone has foot trouble by age 40
What Else Do You See With Over Pronation?

- Knee pain
- Current/previous injury
- DJD
- Ankle Sprains
- Plantar Fasciitis
- Heel Spurs
With Over Pronation, What Else Do You See?
Don’t Overlook the Lower Extremities!
In 1965 in Japan, the Yamasa Clock and Instrument Company wanted a snappy name for a new pedometer. It chose “Manpo-kei.” It translates, literally, as “10,000-steps meter.”

Research shows low back pain, knee pain, hip pain, and ankle pain are often related to foot problems. Make sure you keep your feet healthy by exercising, wearing good shoes and rotating them, and using custom orthotics to provide a balanced foundation.
The Effects of Over Pronation:

- Excessive spinal rotational stress
- Chronic SI joint stress
The Effects of Over Pronation:

- Excessive shock transmission
- Pelvic unleveling due to LLI
Factors of Pronation
Symptoms of Over Pronation

• History or chronicity of symptoms

• Spinal/extremity symptoms worse with WB.

• Short-term response to Chiro. Adjustments
How do the Sexes Differ?

Woman have a narrower heel/midfoot with a wider forefoot

Their biomechanical forces are distributed differently!
Are Female Feet Different?

Biomechanical, forefoot conditions in women > men
(Bunions, hammer toes, calluses, neuromas, metatarsalgia)

• MT arch support is key!
Footwear

- People cram feet into shoes that don’t fit.
- Many don’t update their shoe size as they age.
High Heels throw the weight force forward, causing the heads of the metatarsals to bear most of the body's weight.
Forefoot pressure increases by:

1 inch heel - 22%
2 inch heel - 57%
3 inch heel - 76%

Dangers of Heels
75% of people will suffer from foot problems in their lifetime*

Because of the types of shoes women wear, they have 4 times the number of foot problems as men*

*American Academy of Orthopedic Surgeons
Visual/Palpatory Findings:

- Corns
- Bunions
- Callouses
- Hammer toes
- Hallux Valgus
Visual Findings:

• Collapsed arches
• Morton’s Foot
• Past foot/ankle injuries
• Fat/callous pads under arches
A bunion is a bony bump on the inside of the big toe. A bunionette or “tailor’s bunion” forms on the outside base of the little toe.

1/3 of U.S. adults will develop bunions. 10x Women are 10 times more likely as men to have bunions.

Risk factors:
- Arthritis
- Genetics
- Trauma
- Pregnancy
- Overpronation (flat feet)
- Unhealthy foot alignment

Shoes styles that contribute to bunions:
- Pointed toes
- Shoes that are too small or narrow
- High heels (3 inches or more)

Once formed, bunions don’t go away on their own. They can modify the way you walk, causing biomechanical issues in other parts of the body. This can lead to pain and increase your risk for injury.
THE 4 STAGES OF BUNION DEVELOPMENT

STAGE 1
FORMATION OF BUNION
FORMATION OF 'BUMP' CAN BE SEEN ON BASE OF BIG TOE

STAGE 2
INWARD MOVEMENT OF BIG TOE
THE BIG TOE STARTS TO MOVE TOWARDS THE SECOND TOE

STAGE 3
ABSENCE OF GAP BETWEEN TOES
THE BIG TOE PRESSES AGAINST THE SECOND TOE

STAGE 4
COMPLETE DESTRUCTION OF TOE ALIGNMENT
THE BIG TOE MOVES UNDER THE SECOND TOE
Surgical correction of a bunion

Pre-op

Post-op

Fixation screws

Cut

Metatarsophalangeal joint

Metatarsal bone
Bunionectomy
Bunionectomy
Bunionectomy
HAMMER TOES
Hammer Toes
Hammer Toes

This postoperative X-ray depicts a bunionectomy and crossover second hammertoe repair using a traditional percutaneous Kirschner wire.
2) Three days after Surgery. Note the metal pins with white colored pin caps.
3 PRIMARY FOOT TYPES IN NORTH AMERICA

SQUARED FOOT 9%

MORTON’S FOOT 22%

EGYPTIAN FOOT 69%
Morton’s Toe/Foot
Morton’s Foot
5 RED FLAGS OF PRONATION

1. Foot Flare During Gait
2. Internal Knee Rotation
3. Bowed Achilles Tendon
4. Flat Foot
5. Uneven Shoe Wear
12-18 degrees is normal
4 Flat Foot
Uneven Shoe Wear
Structural stress produces muscle imbalances
**Before**

Full Body Pain

Stress Pain

Stress Pain

Stress Pain

Stress Pain

**After**

Full Body Relief

Without functional orthotics flat feet aren’t supported

With functional orthotics flat feet are supported
SAME PERSON
DIFFERENT FEET

Scanning the feet shows immediately asymmetrical overpronation
How do You Know Who Can Benefit from orthotics?
SCAN EVERY PATIENT!
SCAN EVERY PATIENT! (Part of your Protocol)

Various studies show overpronation creates biomechanical dysfunction.

Why??

It’s an educational opportunity to show patients the feet play an instrumental part in the care you provide.
Cutting Edge Technology

1. Patient engagement and education.
2. Comprehensive Report of Findings
3. Earth-friendly and quick
The Foot Levelers Kiosk

Standard Design Dual-Foot Kiosk
Ease Your Pain Design Dual-Foot Kiosk
Spanish Design Dual-Foot Kiosk
Performance Design Dual-Foot Kiosk
PROBLEM:

“I know I need to scan all of my patients but I don’t always have time.”

SOLUTION:

THE FOOT LEVELERS KIOSK
Your patients scan themselves!

https://vimeo.com/299742943

RESULTS:

- Improved Outcomes
- Happier, Healthier Patients
- Practice Growth
3-D Kiosk

• **TIME SAVER** - Designed so patients can scan themselves

• **Referral tool:** Patients receive social media-ready scan results

• **Patient education:** Helps patients understand how problems in their feet could be the cause of their pain

• **Cloud-based:** Near-instant Report of Findings provides patient results. Streamlines the ordering process.
### Report of Findings

<table>
<thead>
<tr>
<th>Patient: Jane Doe</th>
<th>Pronation/Stability Index</th>
<th>Results</th>
<th>Optimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 01/02/2023</td>
<td>Arch Height Difference</td>
<td>8.64</td>
<td>&lt;4%</td>
</tr>
<tr>
<td>Exam Date: 01/05/2023</td>
<td>Left to Right Balance</td>
<td>3.2</td>
<td>&lt;4%</td>
</tr>
<tr>
<td>Examinee/Test</td>
<td>Orthotic Recommendation</td>
<td>VITAL</td>
<td></td>
</tr>
</tbody>
</table>

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**Your Scan**

**Optimal Feet**

<table>
<thead>
<tr>
<th>Pronation Stability Index™ (PSI)</th>
<th>Optimal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-34</td>
<td>Optimal</td>
<td>35-84</td>
<td>85-124</td>
<td>125+</td>
</tr>
</tbody>
</table>

**Arch Height Difference**

PSI **123**

**Recommendation**

Custom Orthotics

Foot Levelers is the only custom orthotic that restores healthy function of all three arches.

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**Your Practice Name Here**

Dr. Jane Doe

123 Main St., Roanoke VA

800-558-4860 | www.yourwebsite.com
• Shows patient’s scan next to Optimal feet

• Shows left-to-right balance and arch height difference

• Educates the patient on the Kinetic Chain and how custom orthotics can help

• Includes your logo and contact information
2nd Page of Report of Findings

Based on your report, multiple pairs of custom orthotics are recommended.
Shareable Patient ROF

After the scan, patients are emailed their own Report of Findings (ROF)

• Patient ROF is emailed before patient steps off scanner

• Shareable on social media – REFERRALS!

• Branded with your practice’s logo and contact information

• Helps educate on the need and value of orthotics

• Shows PSI score
Do you have an **Optimal Foot** like this?

- Optimal Foot
- Mild Pronation
- Moderate Pronation
- Severe Pronation
Foot Imbalances Cause Serial Distortions

Medial Arch

Lateral Arch

Transverse Arch

SUPINATION

Excessive Pronation
FL orthotics help your feet perform like the Optimal Feet. This reduces imbalances and helps prevent pain in other parts of the body.
• 77% of people suffer from moderate to severe pronation ¹
• 90% have some degree of leg length inequality ²
• Back pain is the #2 cause of work-related disability in the U.S. ³
• 80% of people will experience some sort of back pain in their lifetime ⁴

¹ - “77% of Participants Improve Body Balance with Stabilizer.” John Hyland, DC, MPH DABCR, DABCO, CSCS
² - NCBI: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1232860/
³ - CDC: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5816a2.htm
⁴ -
Consequences of Pronation

- Morton's Foot/Toe
- Leg Pain
- Shin Splints
- Knee Pain
- Functional Short Leg
- Plantar Fasciitis
- Low back pain
- Achilles' Tendonitis
- IT Band Syndrome
- Piriformis Syndrome
- Patellar Tendonitis
- Hip Pain
- Bunion
- Metatarsalgia
- Stress Fractures
- Subluxations
77% of Patients Improve Body Balance with Stabilizing Orthotics

John K. Hyland, DC, MPH, DABCR, DABCO, CSCS
Foot Facts

Approx. 80% will suffer from back pain in their lifetime*

Similar numbers for foot and low back pain

Coincidence?

*American Chiropractic Association

NCBI: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4339077/
a. Pelvic torque or obliquity
b. Unlevel femoral heads
c. Postural scoliosis
d. Disc degeneration/spondylosis
Leg Length Inequality

**ANATOMICAL**
(Bone Discrepancy)

- Trauma
- Degeneration
- Congenital
- Systemic
- Neoplasms

**FUNCTIONAL**
(Rotational Patterns)

- Pelvis
- Hips
- Knees
- Ankles
- Feet

(Foot Levelers)
Apparent leg Length Test:
Umbilicus to medial/lateral malleolus

True (Actual) Leg Length Test:
ASIS to medial/Lateral malleolus
Structural Short Leg:

**Allis Test**: Supine, knees bent, feet aligned.

- Compare evenness of knees.
Allis Test

If one knee extends past the other = short femur on the short side.

If one knee is higher than the other = short tibia on the low side.
LLI on X-ray

Quantitation LLD
LLI on X-ray
Pronation Affects Spine

ANATOMICAL LLI

FUNCTIONAL LLI = FUNCTIONAL SCOLIOSIS

SPS
Leg Length Inequality
Dramatic results using Stabilizing Orthotics

SPS REDuces LLI

Images Courtesy of Terry R. Yochum, DC, DACBR
Q Angle

- Assessment of
  - Lower extremity alignment
  - Patella position

- Most efficient angle for quadriceps to function is $\sim 10^\circ$
  - Males: $10-14^\circ$
  - Females: $15-17^\circ$

- Genu valgum (knock knee)
  - $> 17^\circ$ = excessive

- Genu varus (bow-legged)
  - Negative

- $\uparrow$ Q angle $\Rightarrow$ $\uparrow$ stress on MCL
Research at Logan CC by Robert Kuhn D.C., DACBR demonstrates Foot Levelers’ orthotics improve Q-angle and patellar tracking.

2002 Sept Vol. 25 #7 Q-Angle and Patellar Tracking Study
Do SPS Reduce Q-Angle?

Effect on Q-Angle with insertion of an Orthotic Device

Robert Kuhn DC, Terry Yochum DC, Anton Cherry DC, Sean Rodgers DC, Dennis Nosco PhD
Sensory neurons enter the spinal cord. Motor neurons leave the spinal cord. Interneurons connect the sensory and motor neurons.
Why Muscle Test?

1. Show the patient how the feet affect the upper extremity.

2. Show them how proper 3 arch, custom, flexible orthotics support the whole body.

3. Show them if their current orthotics are working for them (SPS, rigid, off the shelf)

4. Show them if their orthotic/shoe combination is working for them
Manual Muscle Testing or Applied Kinesiology

Involves putting pressure on a muscle and interpreting the response of that muscle. The **testee** holds out his or her arm and the **tester** applies steady downward pressure on the arm.

Arm must be at $90^\circ$
Place your left hand here and don’t push.

These are the muscles being tested against.

With your right hand, increase pressure here until the muscle strength is tested.

Basics of Muscle Testing.
If the muscle gives way and the arm moves, this an **unlocking** muscle, which indicates **stress** or the answer *no*. If the muscle holds and the arm stays still, this a **locking** muscle, which indicates no stress or the answer *yes*. 
Proprioceptive Test Kit

Muscle Testing:

1. Check the side-to-side imbalance on the functional orthotic.
3. Check the side-to-side imbalance on the functional orthotic.

Functional Squat Test Protocol:

1. Stand on the left foot and squat.
2. Stand on the right foot and squat.

Support:

Support Left

Support Right
Neurological Manual Muscle Test Explanation:

Dr. Lisa K. Bloom, DC, Ph.D

* Professor Emeritus, Northeast College of Health Sciences
* Fellow of the International Academy of Chiropractic Neurology
* Adjunct Professor, Graduate Studies at Concordia University Chicago
Neurological Muscle Test Explanation:

- Nociceptors send impulses to the spinal cord causing **Pre-Synaptic Inhibition** of the anterior horn cells.

- This produces 7-10 seconds of muscle weakness.
Neurological Muscle Test Explanation:

• An adjustment reduces nociceptor activity.

• **Pre-Synaptic Inhibition** is decreased (eliminating the 7-10 seconds of muscle weakness).

• Muscle strength is increased.
PHASE 1
Proprioceptive Testing

After finishing the side view video of the patient standing on the functional orthotics...

“Stay standing on the functional orthotics for a moment. I am going to do a muscle test to see if your nervous system communicates to your muscles in an efficient manner.”

1) Hold your arm up real strong and don’t let me push it down, resist. (tests strong).

2) Good, now step off the functional orthotics and let’s re-test. Hold the arm up real strong, resist. (weak test)

3) Stand back on the functional orthotics and lets check that again. (tests strong).

That tells me that your brain is communicating more efficiently to your muscles when you stand on the functional orthotics than when you aren’t standing on them.

The fact that the arches in your feet flatten out a little like we saw on the foot scan contribute to stress in your nervous system and that weakens some of your postural muscles, we just used your arm muscle to test it.

**Without Orthotics**  
Less Resistance

**With Orthotics**  
More Resistance

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PHASE 2
Functional Squat Test Protocol

For the maximum impact, Foot Levelers recommends the use of a postural screening software.

1. Ask the patient to “stand with your feet shoulder-width apart and raise your hands straight up in the air. Now I want you to squat down like you are sitting in a chair.” Have them repeat that motion twice while recording it on video.

2. Facing the doctor, have the patient stand on the Proprioceptive Test Orthotics, “with your feet shoulder-width apart and hands straight up in the air, squat down like you are sitting in a chair.” Video tape two repetitions of the maneuver.

3. Have them turn to the left and repeat the test, video taping them from the side view. Note how patient’s arms do not cover ear.

4. While the patient is still turned to the left, have them stand on the Proprioceptive Test Orthotics and repeat the maneuver. Note how patient’s arm does cover ear.
Healthcare trends are moving towards active care.
Adjust
How do you want to adjust the 26 bones?
• Manual/Diversified
• Drop table
• Spring Loaded Instrument (SLI)
Portable Drop/Speeder Board:

- Tension
- Inhale/exhale
- Mind Spinal contours
Activator
Computerized Adjusting in Your Hands

Features

- Stainless Steel Bezel For Precise Action
- LED Indicator for Preload Control
- Choose from Three Force Settings
- Audible/Visual Feedback For Doctor and Patient
- Micro-chip Computer With Auto-Sense® Technology
- Validated Accelerometer to Detect Spinal Motion
- Ten Foot Cord for Optimum Mobility
- Lightweight and Durable Lexan® Housing
The Pro-ArthroStim® Instrument

Variable Amplitude Knob
A practitioner can customize the amplitude of the thrust to best match the needs of the application.

Auto-Fan: Custom OPTION
The exclusive cooling system Auto-Fan Option increases the number of techniques and applications, allowing the instrument to be used in more situations.

Spring Cushioned Pressure Responsive Stylus
The spring cushioned action ensures comfort for the patient and the practitioner. The pressure sensitive stylus allows a practitioner to instantly tailor the input for each individual. The ‘Fast On-Off Friction-Fit’ design allows a busy practitioner to quickly exchange adaptors - without clips or locks.

Full Cushion Handle and Comfort Trigger
This combination provides comfort and protection for the practitioner’s hand.

Speed Switch: Custom OPTION
The Speed Switch Option enables a practitioner to instantly select various thrusting rates at the flip of a switch.
READY FOR SOME HANDS ON?
The “Wong Way” to Adjust the Foot

• Comfortable body position = correct LOD

• Forget how the bones misaligned? Stand up and pronate/supinate
Navicular Bone

Misaligns: inferior and medial
(down and in)

“Push” superior and lateral
(up and out)
Navicular
Navicular - Index Finger
Navicular - Index Finger
Navicular - Thenar
Navicular - Hypothenar/Pisiform
Navicular

- Prone: CP - double thumb, pisiform
- Drop table: CP - pisiform, double thumb (prone)
- Adjusting instrument:
Navicular
Cuboid Bone

Misaligns: superior and lateral (up and out) "Pull" cuboid inferior and medial (down and in)
Cuboid
CUBOID BONE

- **Supine**: CP-double thumb web, double index or middle finger
- **Drop table**: foot dorsal, lateral side up. CP-Pisiform, double thumb w/foot slightly dorsiflexed for tension.
- **Spring loaded instrument**: watch LOD
Cuboid - double index
Talus Bone

Misaligns: anterior and lateral

“Scoop” talus posterior and medial
Talus - Double index
Talus Bone:

- **Supine:** CP - double middle or index finger
- **Drop table:** foot dorsal side up. CP is Pisiform or double thumb with foot slightly dorsiflexed
- **Spring loaded instrument:** watch LOD
Calcaneus Bone

Misaligns in **plantarflexion** (superior and posterior) and possibly in **inversion or eversion**.

“**Tug**” the calcaneus into dorsiflexion (inferior) with an eversion or inversion pre-stress.
Calcaneus
CALCANEUS BONE ADJUSTMENTS:

- Supine: CP – palm of hand
- Prone: CP - thumb web with foot over edge of table
- Drop table: foot plantar side up. CP is thumb web
- Spring loaded instrument: watch LOD
Calcaneus
Cuneiforms, MT heads 2,3,4 go inferior (drop to the floor).

“Bicycle” the foot
MT head #1 misaligns superior and medial

MT head #5 misaligns superior and lateral
Cuneiforms & Metatarsals
Cuneiforms/MT’s

- **Supine**: CP - palms and fingertips
- **Prone**: CP - double thumb and palms
- **Drop table**: foot plantar side up. CP is double thumbs
- **Spring loaded instrument**: watch LOD
Cuneiforms/MT’s
Cuneiforms/MT’s
Phalanges
Phalanges
“All In One”

Navicular ➔ talus ➔ cuboid ➔ calcaneus ➔ hip
“All In One Move”
Supinated Foot

- The lateral longitudinal and transverse arches are flatter
- NAVICULAR has gone superior/lateral
- Adjust inferior/medial with double index/middle finger contact.
Supination

Left Foot

Right Foot

Heel turns towards center

Big Toe

Ankle rolls away from center

Little Toe

Little Toe
Support

- Elastic Therapeutic Tape
- Arch support
- Shoe types
Elastic Therapeutic Tape

**Basic Application Tips**

**End to End Application:** Tear backing 2-3” from end of tape and remove from end of tape only. Apply to skin with no stretch and rub to activate adhesive. Apply center of tape with desired stretch. Finish with no stretch in final 2”.

**Middle Stretch Application:** Tear backing across middle and begin to peel back from center. Stretch tape as indicated and apply from center towards ends. Apply final 2” of each end with no stretch.
Foot taping protocol
Tape Care:

- Water is fine
- Roll socks on/off carefully
- Avoid bare feet (carpet, pet hair)
- Lasts ~ 2-4 days
• Stretch structure, not tape
• Cut/shape but do not stretch ends
• stretch tape < 25-50%
• Warn about adhesive (no latex)
Plantar Fasciitis

Strain, inflammation or tear of the thickened fibrous aponeurosis.
PLANTAR FASCIITIS

It is estimated that 1 IN 10 people will develop PF during their lifetime.²

Some reports suggest that 81-86% of patients with PF have excessive pronation.³

Obesity is present in up to 70% of patients with PF.⁶

Plantar fasciitis is the most common cause of heel pain presenting to the outpatient clinic.¹

The use of orthotics can result in reduced pain for those who suffer from plantar fasciitis.⁷

Most experts agree that early recognition and management of PF leads to a shorter course of treatment and greater chance of success with conservative therapies.

Help prevent Plantar Fasciitis in your patients. Order their orthotics today!

800.553.4860
Plantar Fasciitis: Etiology

1. Excessive, long periods of foot pronation or supination
2. Landing hard on the sole of the foot
3. Instant foot acceleration and deceleration
4. WB activities for work or recreation
Plantar Fasciitis: S & S’s

1. Sharp heel pain that radiates
2. Heel tenderness/swelling
3. Gradual onset
4. Worse getting out of bed in AM
5. Worse with WB
6. Better with rest
Treatment:
Physiotherapy modalities

Adjustments: Calcaneus, MT’s, rest of the foot

Elastic Taping
Endoscopic Plantar Fascial Release
Plantar Fasciitis: Support

Stabilizing Orthotics
Shoe types
Elastic Tape
Plantar Fasciitis: Rehab

- Roll foot on lacrosse/trigger/rock balls
- Frozen water bottle
- Gentle stretching exercises
- Towel scrunch exercises
- Teach patient how to tape
- Basic 4 Group of Theraciser Exercises
BEST PLANTAR FASCIITIS EXERCISES

1. Achilles/Gastrocnemius Stretch
2. Plantar Fascia Massage
3. Soleus Muscle Stretch
4. Plantar Fascia Stretch
5. Towel Toe Curls
6. Toe Extensions
Standing calf stretch  
Seated plantar fascia stretch  
Plantar fascia massage

Achilles stretch  
Frozen can roll  
Towel stretch
Theraciser Concepts

- Isokinetic system of exercise
- Tubing permits movements through a joint’s total ROM or a select portion
Theraciser Concepts

• Wide variability of speeds from very fast motion to very slow, sustained contractions.

• Resistance provided by the tubing can easily be very light to very heavy (depending on color).
Eversion

Start

Finish
Inversion

Start

Finish
Dorsiflexion

Start

Finish
Plantarflexion

Start

Finish
## Theraciser Protocol: Normal Patient

<table>
<thead>
<tr>
<th>Phase Motion</th>
<th>Range of Contraction</th>
<th>Speed of Exercise Motion</th>
<th>How Long Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>short</td>
<td>slow</td>
<td>1 min. daily</td>
</tr>
<tr>
<td>II</td>
<td>short</td>
<td>fast</td>
<td>1 min. daily</td>
</tr>
<tr>
<td>III</td>
<td>full</td>
<td>slow</td>
<td>1 min. every other day</td>
</tr>
<tr>
<td>IV</td>
<td>full</td>
<td>fast</td>
<td>1 min. every other day</td>
</tr>
</tbody>
</table>

Use ice after each exercise session. 2 weeks per stage.
# Theraciser Protocol: Athletic Patient

<table>
<thead>
<tr>
<th>Phase</th>
<th>Range of Motion</th>
<th>Speed of Contraction</th>
<th>How Long Each Exercise Motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>short</td>
<td>slow</td>
<td>2 min. daily</td>
</tr>
<tr>
<td>II</td>
<td>short</td>
<td>fast</td>
<td>to fatigue daily</td>
</tr>
<tr>
<td>III</td>
<td>full</td>
<td>slow</td>
<td>to fatigue every other day</td>
</tr>
<tr>
<td>IV</td>
<td>full</td>
<td>fast</td>
<td>to fatigue every other day</td>
</tr>
</tbody>
</table>

After each exercise session use ice. 2 wks per phase
Morton’s Toe/Foot

- 2nd toe longer than first toe
- Present 22% of time
- Present in ~ 80% of pts. seeking care for musculoskeletal problems
Morton’s Toe/Foot

- 2nd toe alters toe off phase.
- Patient must externally rotate foot in order to place the 1st toe in position to toe off.
Morton’s Toe/Foot

- Hypermobility of first and second toes
- Callousing of the 2\textsuperscript{nd} MT head along with hammering of toes 2-3
- Leads to excessive pronation due to foot flare.
Morton’s Neuroma

- Neuralgic radiating pain on plantar surface of foot.
- Located between the 3rd and 4th MT’s.
Morton’s Neuroma: Etiology

- Increased pressure on forefoot and interdigital nerves
- Results in swelling, overgrowth or benign tumor of nerve
SYMPTOMS OF MORTON’S NEUROMA

- A feeling that a rock is stuck in the bottom of your shoe.
- Seems like your sock has a bulge that you cannot seem to straighten.
- A burning sensation in the ball of your foot.
- Tingling or numbness around the impacted toe bones.
- Pain that worsens when wearing tight shoes.
- Discomfort that increases during strenuous activities.
Morton’s Neuroma: Treatment

Physiotherapy modalities

Adjustments: Basic Foot (MT’s, toes)
Morton’s Neuroma: Treatment

Support: Stabilizing Orthotics
Elastic Taping, Shoe Types
Neuroma Surgery
Morton’s Neuroma: Treatment

“Basic 4” Thera-Ciser Exercises

Towel scrunch exercises

Golf/lacrosse ball exercises

Calf Stretches
SEVER’S DISEASE

“Calcaneal Apophysitis”

- Inflammation of growth plate in heel of growing children, typically adolescents.

- Pain in heel due to repetitive stress to and is common in active children.
Sever’s Disease
Sever’s Disease: TX

- Physiotherapy modalities (NO laser, US)
- Orthotics
- Elastic Taping
- Stretching/strengthening exercises
Sever’s Disease: Taping
**Deltoid Ligament**

**Deep component:**
1. Posterior TibioTalar Ligament
2. Anterior TibioTalar Ligament (largely hidden)

**Superficial component:**
3. TibioCalcaneal Ligament
4. TibioNavicular Ligament
Ankle ROM

- Flexion: 20° - 30°
- Extension: 40° - 50°
- Flexion: 50°
- Extension: 30°
- Pronation: 30°
- Supination: 60°
Sprained Ankle

Approximately 1 million ankle injuries occur every year in the U.S., and many of them are inversion sprain injuries.
- **Inversion**
  - Anterior Talofibular
  - Calcaneofibular
  - Posterior Talofibular

- **Eversion**
  - Deltoid Ligament

- ** Syndesmotic**
  - High ankle sprain
Grades of Sprain:

- **NORMAL**: Healthy
- **GRADE 1**: Stretching and Small Tears
- **GRADE 2**: Larger Tear
- **GRADE 3**: Complete Tear
Sprained Ankle

- Inversion vs. Eversion
- Acute vs. chronic
- Arthritis present?
- End feel (soft or bony?)
SPRAIN vs. STRAIN

- Posterior Talofibular Ligament
- Anterior Talofibular Ligament
- Calcaneofibular Ligament

- Peroneus Tertius Tendon
- Peroneus Brevis Tendon
Classification

Weber A
- Fracture inferior to syndesmosis
- Syndesmosis intact
- Medial malleolus may be fractured
- Usually stable
- Reduction and cast
- ORIF occasionally needed

Weber B
- Fracture at level of syndesmosis
- Syndesmosis intact or partially torn
- Possible medial fracture or deltoid damage
- Stability variable
- May require ORIF

Weber C
- Above level of ankle joint
- Tibiofibular syndesmosis damaged → widening of joint
- Usually medial fracture or deltoid injury
- Unstable
- ORIF required
Weber Fracture Classifications:

A

B

C
Sprained Ankle: Tx

- Physiotherapy modalities
- Adjust foot/ankle
- Elastic Tape
- Stabilizing Orthotics
TWO TYPES OF ACHILLES TENDONITIS

- NONINSERTIONAL ACHILLES TENDONITIS
  Fibers in the middle portion of the tendon begin to break down with tiny tears, causing it to swell, and thicken. Most commonly affects younger, active people.

- INSERTIONAL ACHILLES TENDONITIS
  Involves the lower portion of the heel, where the tendon attaches to the heel bone. Can occur at any time, even to people who are not active.
SYMPTOMS OF ACHILLES TENDONITIS

• Severe pain the day after exercising
• Thickening of the tendon
• Pain and stiffness along the Achilles tendon in the morning
• Pain along the tendon or back of the heel that worsens with activity
• Bone spurs (only with insertional tendinitis)
• Swelling that is present all the time and gets worse throughout the day with activity
Achilles Tendonitis: Etiology

- Excessive Pronation flattens the arches and drops the feet medially.
- Stress on the achilles tendons and they bow inward.
Strained Achilles Tendon
The 3 Different Grades of Tendon Strains

Achilles tendon

Grade 1
Stretching, Minor Tear

Grade 2
Partial Tear

Grade 3
Ruptured

Calcaneus (heel bone)

Achilles Tendon Problems

Normal

Tendinitis

Tendinosis

Tendon Rupture

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FOOT LEVELERS
Achilles Tendonitis: Tx

- Physiotherapy Modalities
- Adjust Foot/ankle
- Elastic Tape
- Stabilizing Orthotics
Hallux Limitus/Rigidus

Normal Range of Motion

Hallux Limitus

Hallux Rigidus

Dorsal bunion

Movement is limited

Upward motion blocked by bone spur

Erosion of articular coat
SYMPTOMS OF HALLUX RIGIDUS

Early symptoms and signs include:

• Pain and stiffness in the big toe.
• Difficulty with certain activities such as running or squatting.
• Swelling and inflammation around the joint.

As the condition gets more severe over time, the following symptoms will begin to appear:

• Chronic toe pain.
• Bone spurs (bone overgrowths).
• Dull pain in the hip, knee, or lower back.
• Limping.
WHY SHOULD YOU CARE ABOUT THE FEET?

• Most Chiropractors NEVER check the feet.
• Medical Professionals are too focused on the location of the pain and they ignore the “Big Picture”.
• The feet support and balance the entire body, including the shoulders, neck and TMJ.
• Without proper support arch issues of the feet only worsen with age; they do not improve.
• Extremity problems will destabilize the spine. Stabilize the extremities and the spine follows.
Knee

- Lateral collateral ligament
- Medial collateral ligament
- Anterior cruciate ligament
- Lateral meniscus
- Patella (kneecap)
- Medial meniscus
- Tibia
- Fibula
- Posterior cruciate ligament

Femur
Joints of the Knee

One joint is between the femur and tibia (tibiofemoral joint).

One is between the femur and patella (patellofemoral joint).

Modified hinge joint allows flexion/extension and slight internal/external rotation.

At birth, the patella is formed from cartilage, which ossifies ages 3-5.
The lateral collateral ligament (LCL) runs on the outside of your knee. It limits sideways motion.

The anterior cruciate ligament (ACL) connects the femur to the tibia in the center of your knee. It limits rotation and the forward motion of the tibia.

The medially collateral ligament (MCL) runs down the inside of your knee joint. It connects the femur to the tibia and limits the sideways motion of your knee.

The posterior cruciate ligament (PCL) also connects the femur and tibia. It limits backward motion of the tibia.

The meniscus is cartilage that absorbs shock in your joint.
Knee Movements

- **Flexion**: these muscles produce flexion:
  - Biceps femoris, Semitendinosus, Semimembranosus, Gracilis, Sartorius, Popliteus.
  - Flexion is limited by the contact of the back of the leg with the thigh.

- **Extension**: by the Quadriceps femoris.
  - Extension is limited by the tension of all the ligaments of the joint.

- **Medial Rotation**: by the Sartorius, Gracilis, Semtendinosus.

- **Lateral Rotation**: by the Biceps femoris.
Screw Home Mechanism

- The extended knee is in locked position
  - medial rotation of the femur results in a twisting and tightening of all the major ligaments of the joint
  - The knee becomes a mechanically rigid structure
  - The cartilaginous menisci are compressed like rubber cushions between the femoral and tibial condyles
Knee
(tibiofemoral joint)

Flexion

Lateral rotation of flexed knee (right knee)

Extension

Medial rotation of flexed knee (right knee)
COMMON KNEE CONDITIONS:

- Fracture (Patella most common)
- Dislocation
- ACL Injuries
- PCL Injuries
- Collateral Ligament Injuries
- Meniscal Tears
- Tendon Tears
Patellar Fractures
Patellar Fx Surgery
KNEE DISLOCATION

- Tom medial collateral ligament
- Tom anterior cruciate ligament
- Lateral collateral ligament
- An obvious deformity of the knee
- Medial, lateral and rotatory
- Posterior
- Anterior

Knee Dislocations
NORMAL KNEE ANATOMY

For a knee dislocation to occur, 3 out of 4 of these ligaments have to become ruptured.
Knee Dislocation

*FIGURE A6-2  Anterior Dislocation of the Knee*

This rare injury poses a significant threat to blood vessels and nerves that transverse the knee. Immediate reduction is
PATELLAR DISLOCATION
Torn ACL

ACL injuries occur when bones of the leg twist in opposite directions under full body weight.

- The injury may occur with or without contact. Women have an increased risk of ACL injury because of differences in anatomy, muscle mass and training. Symptoms of ACL tear include hearing a loud pop as the ligament tears, pain, knee swelling, and difficulty walking.
Posterior Cruciate Ligament Tear
TEAR OF THE POSTERIOR CRUCIATE LIGAMENT (PCL)
BACK VIEW OF STRAIGHT KNEE

The PCL is intact

Partial tear of the PCL

Complete tear of the PCL

Posterior cruciate ligament
Anterior cruciate ligament
Medial collateral ligament
Lateral collateral ligament
Collateral Ligament Tears

Knee Sprain
(right knee, front view)

Torn lateral collateral ligament (LCL)
Torn medial collateral ligament (MCL)
Torn medial collateral ligament (MCL) and anterior cruciate ligament (ACL)

Healthy MCL
Grade 1 Tear
Grade 2 Tear
Grade 3 Tear
Meniscus:

* Primary function is to transmit loads and reduce stress on the tibiofemoral joint.

* 98% of people with ACL insufficiency will have a meniscal injury.
* Injuries are found more commonly in people age 20<.
* Non contact forces are the most frequent MOI.
Meniscus Injuries:

* Non-contact forces are the most frequent mechanism of injury

* Patients over 40 can get “acute” symptoms with no active MOI.

* In acute meniscal injuries, swelling occurs 6-24 hours later.
## Prevalence of Meniscal Lesion

<table>
<thead>
<tr>
<th>Age of Patient</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59</td>
<td>25%</td>
</tr>
<tr>
<td>60-69</td>
<td>35%</td>
</tr>
<tr>
<td>70-79</td>
<td>45%</td>
</tr>
<tr>
<td>Patients with OA</td>
<td>75-95 %</td>
</tr>
</tbody>
</table>

* Melissa McDonald, DC, CCSP, Northwestern University of Health Sciences

*
Meniscal Injury S & S’s:

* General knee pain
* Insidious swelling
* Locking of knee
* Joint line tenderness

Displaced tears have a higher likelihood of needing surgery. Patients report that their knee gets “weak” or “gives way” all of a sudden.

Displaced meniscal flap tears are when a fragment of torn meniscus displaces into the recess between the proximal tibia and the adjacent knee capsule and soft tissues.

It commonly occurs after a defined traumatic incident (such as a twisting injury), but may also occur with no clear traumatic mechanism.
Orthopedic Testing:
- Joint line tenderness palpated with knee flexed at 45-90 degrees.
- Knee pain with squatting (hyper flexion)

McMurray Test
For Meniscus Pathology
Flex and extend the knee
- In tibial IR - biases lateral meniscus
- In tibial ER - biased medial meniscus
Positive Test: Pain or audible click
- Sensitivity, 55%
  ○ Medial meniscus, 50%
  ○ Lateral meniscus, 21%
- Specificity, 77%
  ○ Medial meniscus, 77%
  ○ Lateral meniscus, 94%

Thessaly Test
For Meniscus Pathology
In single leg balance and 20 degrees knee flexion
- Rotate medially
- Rotate laterally
Positive Test: Discomfort or sense of locking / catching in knee over medial or lateral joint line
- Sensitivity, 76%
  ○ Medial meniscus, 83%
  ○ Lateral meniscus, 68%
- Specificity, 77%
  ○ Medial meniscus, 76%
  ○ Lateral meniscus, 97%
Longitudinal (vertical) tear

Radial tear

Horizontal tear

Bucket handle tear

Parrot beak tear

Flap tear

Degenerative
Meniscus Injuries

- Red zone
- White zone
- Longitudinal tear
- Oblique tear
- Radial tear

Left knee joint
# Surgery vs Rehab

<table>
<thead>
<tr>
<th>Non-Surgical Success</th>
<th>Indicates Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms develop over 24-48 hours following injury</td>
<td>Severe twisting injury, athlete is unable to continue playing</td>
</tr>
<tr>
<td>Minimal injury or no recall of specific injury</td>
<td>Locked knee or severely restricted ROM</td>
</tr>
<tr>
<td>Able to weight-bare</td>
<td>Positive McMurray test (palpable clunk)</td>
</tr>
<tr>
<td>Minimal swelling</td>
<td>Pain on McMurray’s test with minimal knee flexion</td>
</tr>
<tr>
<td>Full ROM with pain only at end range</td>
<td>Presence of ACL tear</td>
</tr>
<tr>
<td>Pain on McMurray’s test only in the inner range of flexion</td>
<td>Little improvement of clinical features after 3-6 weeks of non-surgical treatment</td>
</tr>
<tr>
<td>Previous History of rapid recovery from similar injury</td>
<td></td>
</tr>
<tr>
<td>Early degenerative changes on plain radiographs</td>
<td></td>
</tr>
</tbody>
</table>

* Melissa McDonald, DC, CCSP, Northwestern University of Health Sciences*
• Feet excessively pronate/flatten
• Ankles turn in/drop
• Tibia/femur internally over-rotate
• Medial knee stress due to torsion and compression of the tibia, femur bones.

Remember Over Pronation Pattern! (99% of patients)
Partner Up!
Right Knee

- Femur
- Anterior cruciate ligament
- Posterior cruciate ligament
- Lateral meniscus
- Medial meniscus
- Lateral collateral ligament
- Medial collateral ligament
- Fibula
- Tibia
Right knee clinical anatomy

- Quadriceps
- Patella
- Lateral Joint Line
- Petellar Tendon
- Fibular Side (actual bony prominence not visible)
- Medial Joint Line
- Anterior Tibial Tuberosity
- Tibia
SEMITENDINOSUS AND SEMIMEMBRANOSUS MUSCLES

VASTUS LATERALIS MUSCLE

BICEPS FEMORIS MUSCLE

POPLITEAL FOSSA

Tendon of semitendinosus muscle

Gastrocnemius muscle (medial and lateral heads)
Knee Misalignments

• Tibia internal (medial) or external (lateral)
• Tibia Posterior
• Patella medial/inferior or lateral
• Fibular head posterior/superior
Internal/External tibia
Internal/external rotated tibia

- **CP**: thumb web contact w/ both hands stabilizing femur and tibia. Cushion under knee.
- **Drop table**: similar to manual.
- **Spring loaded instrument:**
Internal/External Rotated Tibia
Posterior Tibia

- Supine: knee bent, interlaced fingers, slight forward tug on tibia.
- Prone: knee bent, knife edge or thumb web contact
- Drop table: same as supine or prone
- Spring loaded instrument
Fibular Head

• Anterior Fibula
• Posterior/Inferior Fibula
• Manual, Drop table, Spring loaded instrument
Medial, Inferior Patella

CP: supine with knee bent, thumb web

Drop table: pillow under knee

Spring loaded instrument:
Prone knee Adjustments
Knee Support
Pronation and Knee injury

Excessive Pronation causes internal tibial rotation, patellar tracking problems, (chondromalacia patella) and medial knee stress.

- ACL
- Medial Meniscus
- Medial Collateral ligament
- Medial Knee DJD
YOUR FEET COULD BE CAUSING YOUR KNEE PAIN

OPTIMAL FOOT

OVERPRONATED FOOT
(CAN CAUSE KNEE PAIN)

- Femur
- Patella
- Tibia
- Softening and fibrillation of the articular cartilage
- Angle = 20° - 30°
- Rotation of the lower limb
- Overpronation of the foot

Scan of optimal foot
Scan of pronated foot
Where’s the #1 Location of Arthritis?
Figure 5. Standing plain x-rays actually revealed the most significant loss of disc height at L5-S1 with sclerotic endplates and posterior bone spur formation at L5-S1.
WHERE IS THE #2 LOCATION OF ARTHRITIS?
The Medial Knee

Knee arthritis on the medial (inner) side with a bowed leg deformity
Check the feet!

We can reduce knee and hip replacement surgeries!

We can reduce the number of sports injuries in adults and children
For every -1 lb lost
removes 4 lb of pressure off your knees
Normal anatomy

- Femur
- Quadriceps tendon
- Patella
- Patellar ligament
- Lateral collateral ligament
- Lateral meniscus
- Medial collateral ligament
- Medial meniscus
- Tibia
- Fibula

Location of pain

- Pain in front: chondromalacia patella, patellar tracking, bursitis, arthritis
- Pain above: quadriceps tendon or swelling
- Pain behind: Baker's cyst or arthritis
- Pain on inside or outside part: meniscus or collateral ligament tears and arthritis
- Pain below: Osgood-Schlatter disease
Shin Splints

MEDIAL TIBIAL STRESS SYNDROME

KNEE CAP

TIBIA (SHIN)

TIBIAL PLATEAU

ANTERIOR SHIN SPLINTS

POSTERIOR SHIN SPLINTS

FIBULA

PAIN ALONG THE SHINBONE IN THE LOWER LEG

OVERUSE OF MUSCLE TENDONS AND LIGAMENTS THAT CAUSED PAIN

POSTERIOR SHIN SPLINTS

SHIN SPLINTS ARE COMMON PAIN IN RUNNERS, SOCCER, BASKETBALL OR STRENuous PHYSICAL ACTIVITIES THAT HAS AMOUNTS OF FORCE ON THE SHIN BONE AND MUSCLES SURROUNDING.
Shin Splints

Shin Splints down the front of the Leg
Anterior Tibialis
Shin Splints

Shin Splints down the inside of the Leg
Posterior Tibialis
Shin Splints

Area of pain

Anterolateral Shin Splint
Posteromedial Shin Splint
Shin Splints: Etiology

• Overuse injury

• Inflammatory process that affects muscle, tendon and bone.

• Bone resorption

• Stress fracture

• Anyone engaged in WB activity can get th
Role of Excessive Pronation:
Eversion, dorsiflexion, abduction and inward leg rotation increase stretch and decelerate contraction of shin muscles.
SHIN SPLINTS – GAIT CYCLE

**Anterior Shin Splints**: Anterior Tibialis muscle.
Active during heel strike, toe off, swing phase

**Posterior Shin Splints**: Posterior Tibialis muscle
Active just after heel strike to just prior to heel lift.
SHIN SPLINTS: S&S

1. Hx. of change in recent activity
2. Gradual onset of pain that worsens
3. Deep, achy, throbbing
4. Location
SHIN SPLINTS: TX

• Physiotherapy modalities
• Adjust: talus, calcaneus, navicular, rest of the foot
SHIN SPLINTS: TX

Support:
- Stabilizing Orthotics
- Elastic Taping

Types of shoes

Activities
RESEARCH: SPORTS MEDICINE

• High correlation between shin splints and excessive pronation


Shin Pain (Shin Splints) Rehabilitation Exercises

- Towel stretch
- Standing calf stretch
- Anterior compartment stretch
- Resisted ankle dorsiflexion
- Ankle range of motion
- Heel raise
Shin Splints: Rehabilitation

- “Basic 4” foot/ankle series
- Towel scrunch exercises
- Golf/tennis ball exercises
Development of an avulsion fracture at the tibial tubercle

Osgood Schlatter
OSGOOD SCHLATTER: ETIOLOGY

Forceful contraction of quadriceps femoris tendon onto immature tibial tubercle.

Children in rapid growth period are predisposed.
OSGOOD SCHLATTER: S & S

1. Pain, tenderness at tibial tuberosity
2. Swelling may or may not be present
3. Climbing stairs, running, kneeling
4. Possibly enlarged tibial tuberosity
OSGOOD SCHLATTER: TX

Shockwave
OSGOOD SCHLATTER: TX

Physiotherapy modalities:

Adjust:
Tibia, Patella, Femur
Rehabilitation:
Knee Series with the Theraciser
Flexion

Start

Finish
External Rotation
Internal Rotation
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