Evidence Based Conservative Treatment of Foot and Ankle Pathology

Lawrence Z. Huppin, DPM
Foot and Ankle Center of Washington
www.FootAnkle.com

• Common Foot Problems
  – Arch and Heel Pain
  – Ball of Foot Pain
  – Great Toe Joint Pain
  – Toenails
• Obesity Effect

Plantar Fasciitis

• Etiology
  – Tension on Plantar Fascia

• Treatment
  – Reduce Tension on Plantar Fascia
  – Reduce Inflammation

Plantar Fasciitis

• Etiology
  • Tension on the plantar fascia

Plantar Fasciitis

• Treatment - Initial
  – Reduce Tension on Plantar Fascia
    • OTC Inserts
    • Shoes

  – Reduce Inflammation
    • Ice
    • NSAIDS
    • Etc
  – Stretching
    • Gastroc/Soleus

Shoes Must Be Stable

• Specific Shoes Based on Criteria
  ♦ Firm Heel Counter
  ♦ Flexion Stability
  ♦ Torsional Stability
Seattle Shoe Stores

- Super Jock 'n Jill – Greenlake
- SHOES-n-FEET – Fremont
  - Shoreline, Bellevue, Everett, Fed. Way, Tacoma
- Sound Sports - Downtown
- Seattle Running Co. – Capitol Hill
- Chicks – Mercer Island
- REI

- Buyer Beware: Neo Vita

List of shoes and Seattle shoe stores:
www.FootAnkle.com

---

Plantar Fasciitis - Recalcitrant

- Reduce Tension on Plantar Fascia
  - Custom Orthoses
- Reduce Inflammation
  - Injection
  - Immobilization
  - Night Splints
- ECST
- Surgery – last resort

A rigid total contact orthotic, has a success rate of 86%
Roukis, JAPMA, 1996

- Plantar Fascia Strain
  - Decreased with lateral forefoot wedge
  - Increased with medial forefoot wedge

The most effective way to decrease strain on the plantar fascia is to evert the forefoot
Kogler, et al, JBJS, 1999

---

Forefoot Extension

Valgus (lateral) Forefoot Wedge

---

Plantar Fasciitis - Recalcitrant

- Reduce Inflammation
  - Injection
  - Immobilization
  - Night Splints
  - Physical Therapy
- ECST
- Surgery – last resort
Ball of Foot Pain

- Metatarsalgia
- Capsulitis
- Neuroma
- Ulcerations

Factors increasing Peak Plantar Pressure

- Hallux Valgus*
- Digital Contracture*
- Keratoma*
- Everted Calcaneus


Predictors of Forefoot Loading

- "What are the primary forefoot structural factors that predict regional peak plantar pressure during walking in groups of people with and without DM and PN?"
- Results:
  - Metatarsal phalangeal joint angle (hammer toe deformity) was the most important variable predicting pressure
  - Callus and hallux valgus were the other most important predictors of increased pressure.

Forefoot structural predictors of plantar pressures during walking in people with diabetes and peripheral neuropathy.

Reducing Peak Pressure

- PURPOSE: Determine the effect of a Total Contact Insert and an Metatarsal Pad on metatarsal head peak plantar pressures and pressure-time integrals.
- CONCLUSION: The TCI and the MP caused substantial and additive reductions of pressures under the metatarsal heads.
  - The TCI reduces excessive pressures at the metatarsal heads by increasing the contact area of weight-bearing forces.
  - The MP acts by compressing the soft tissues proximal to the metatarsal heads and relieving compression at the metatarsal heads.

Efficacy and mechanism of orthotic devices to unload metatarsal heads in people with diabetes and a history of plantar ulcers.
• Cushion
  – Orthotic / Arch Support
  – Socks

• Acrylic vs. Cotton
  – Improved Cushion
  – Better Wicking
  – Decreased Friction

• Brands
  – Thor-lo
  – Wrightsock
  – Coolmax

List available at www.FootAnkle.com

• Socks

Dai, et. al.  
Effect of sock on biomechanical responses of foot during walking.  

Dress Shoes
• In high heel shoes, a Total Contact Insert reduced heel pressure by 25% and medial forefoot pressure by 24%, and offered higher perceived comfort when compared to the non-insert condition.


• Metatarsalgia
  • Shoe Changes
    – Deeper Toe Box
    – Rigid Rocker Sole

Rigid Rocker Soles
“Greatest forefoot peak pressure reduction was found in the Rocker Sole group (37.3% reduction)”

Alterations in plantar pressure with different walking boot designs.  Foot Ankle Int. 2007 Jan;28(1):55-60.
**OTC Rockers**

- **Dansko**

**Prescription Rockers**

**Other Metatarsalgia Treatment**
- NSAIDs
- Injection
  - Capsulitis
  - Neuroma
- Immobilization

**Prescription Rockers**

**Neuroma**
- Treatment
  - Wide tie shoes
  - Padding
  - Orthotics w/ Padding
  - Injections
  - Do nothing
  - Surgery
- 82 patients – Percent with Relief at One Year
  - Orthoses with Modifications: 63%
  - Steroid Injections + Orthotics: 82%


**Great Toe Joint Pain**

**Normal First MPJ Motion**
Abnormal First MPJ Motion

- Jamming of first MPJ
  - Hallux Limitus
  - Hallux Valgus (Bunion)

Hallux Valgus - Bunion

- PCP Treatment
  - Wide tie shoes
  - OTC inserts
  - Bunion shields

Hallux Limitus

- PCP Treatment
  - Supportive shoes
  - OTC inserts
  - Refer before severe DJD

Hallux Valgus and Hallux Limitus

- Role of Podiatrist
  - Functional orthoses to reduce jamming
  - Patient education
    - shoes & orthoses
    - padding
  - Reduce surgical intervention
  - Surgery if necessary
**Custom Foot Orthotic Effect**

<table>
<thead>
<tr>
<th>Dorsiflexion Motion</th>
<th>Mean Ave. % increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>109%</td>
</tr>
</tbody>
</table>


**Hallux Valgus - Surgery**

**Ingrown Nails**

• 54 patients with infected ingrown nails
• 3 groups randomly assigned
  – 1 week antibiotics and simultaneous chemical matrixectomy (group 1)
  – Antibiotics for 1 week and later matrixectomy (group 2)
  – Matrixectomy alone (group 3)
• Group 1 healed significantly sooner than group 2
• No difference in healing between group 1 and 3

CONCLUSION: “The use of oral antibiotics as an adjunctive therapy in treating ingrown toenails does not play a role in decreasing the healing time or post-procedure morbidity.”


**Antibiotics?**

**Obesity and Foot Pain**
Influence of Obesity on Forefoot Pressure while Standing

- Significant increase in peak forefoot pressure in obese patients, compared to control, during quiet standing
  - Fabris, et. al. *Computerized baropodometry in obese patients; Obes Surg. 2006*
- Young obese individuals showed significantly increased plantar contact areas and pressures.
  - Gravante, et. al. *Comparison of ground reaction forces between obese and control young adults during quiet standing on a baropodometric platform; Clin Biomech (Bristol, Avon): 2003*

Influence of Obesity on Forefoot Pressure in Gait

- Mean peak dynamic forefoot pressures generated by obese subjects (39.3 N.cm) were significantly higher than those generated by non-obese (32.3 N.cm).

Influence of Obesity in Children on Forefoot Pressure and Arch Collapse

- While walking
  - Obese children experienced significantly higher plantar pressures in the midfoot and under the second to fifth metatarsal heads compared to non-obese.
  - Continual bearing of excessive mass flattens the medial midfoot region
- Conclusions
  - Obese children are at increased risk of developing foot discomfort and/or pathologies due to increased plantar loads on small forefoot bones and flattening of the midfoot arch

Influence of Obesity on Heel, Midfoot and Forefoot

- Standing
  - Mean pressure values of the obese were higher under all anatomical landmarks
  - Significant increases in pressure were found:
    - Heel
    - Midfoot
    - Metatarsal heads II and IV for men and III and IV for women.
  - Foot width during standing was also significantly increased in obese subjects.
- Walking
  - Also significantly higher peak pressures

Obese Patients

- Foot Risk Education
- New Shoes
  - Stable
  - Professionally Fit
- OTC Arch Supports – semi-rigid
- Acrylic Socks
- Advise to follow-up if pain occurs or continues
Adult Acquired Flatfoot