

Understanding and Using Prefab Foot Orthoses

In This Session...

- Indications for use of PFOs
- PFO efficacy data
- Styles
- In-office modification of PFOs

When to Use a PreFab

- Rx does not specify
- There is minimal or no deformity
- No need for high profile device
- Protective sensation is intact
- Cost/insurance coverage is an issue
- Children's growing feet
- As a trial FO
- As a dress FO

Clinical efficacy and cost-effectiveness of bespoke and prefabricated foot orthoses for plantar heel pain: a prospective cohort study.

- Musculoskeletal Care. 2014 Mar;12(1):1-10. Ring K, Otter S
- **BACKGROUND:** Plantar heel pain is a common reason for referral to podiatric practice, and one of the key interventions is the use of orthoses. The aim of the present study was to compare the clinical efficacy of bespoke, casted foot orthoses and prefabricated foot orthoses for plantar heel pain.
- **METHODS:** People with plantar heel pain were included if, following initial assessment, foot orthoses were indicated and participants received either bespoke, casted foot orthoses or prefabricated semi-rigid orthoses (Powerstep™). Clinical efficacy was assessed at eight weeks using the Manchester Foot Pain and Disability Questionnaire (MFPDQ).
- **RESULTS:** A total of 67 patients completed the trial and at baseline there were no appreciable differences in the two groups of patients in terms of the MFPDQ score; however, at eight weeks post-treatment both had significantly reduced foot pain and disability (both $p < 0.0001$). There was no significant difference in effectiveness between the bespoke or prefabricated orthoses. However, prefabricated devices were 38% cheaper per patient compared with the average costs of casted devices.
- **CONCLUSION:** For most patients with plantar heel pain, prefabricated semi-rigid insoles such as the Powerstep™ devices used in the present trial provide short-term benefit equivalent to that of bespoke, casted foot orthoses, but at considerably reduced costs

Prefabricated Foot Orthoses

- McCourt FJ, *To cast or not to cast? The comparative effectiveness of casted and non-casted orthoses*. The Chiropodist 1990;45(12):239-43.
 - No significant difference in outcomes
 - Overall, 96% improved with FO use

Prefabricated Foot Orthoses

- Cameron-Fiddes V, Santos D. The use of 'off-the-shelf' foot orthoses in the reduction of foot symptoms in patients with early rheumatoid arthritis. Foot (Edinb). 2013 Dec;23(4):123-9.
 - OTC FOs for pts w/ early RA
 - Reduction of number of swollen and tender jts
 - Statistically and clinically significant reductions in pain
 - Patients diagnosed with early RA may benefit from using off-the-shelf foot orthoses with the majority of their pain reduction occurring within the first 3 months of use

Effectiveness of prefabricated and customized foot orthoses made from low-cost foam for noncomplicated plantar fasciitis: a randomized controlled trial.

- Arch Phys Med Rehabil. 2009 Apr;90(4):701-6. doi: 10.1016/j.apmr.2008.11.002. Baldassin V, Gomes CR, Beraldo PS
- **OBJECTIVES:** To evaluate the effectiveness of prefabricated and customized foot orthoses made from low-cost foam (ethylene vinyl acetate [EVA]) in plantar fasciitis.
- **DESIGN:** Double-blinded randomized controlled trial.
- **PARTICIPANTS:** One hundred forty-two adults (75% women) with plantar fasciitis, without anatomical alterations in the feet. Seventeen subjects (12%) were lost during the follow-up.
- **INTERVENTIONS:** Prefabricated and customized foot orthoses, both made from EVA, used for 8 weeks.
- **MAIN OUTCOME MEASURES:** The primary outcome was pain (modified subscale of the Foot Function Index, [FFI] pain). The secondary outcomes were pain elicited by palpation in the medial calcaneal tuberosity and modified FFI total. Each participant was reviewed in the 4th and 8th weeks of follow-up.
- **RESULTS:** One hundred twenty-five participants returned to at least 1 of the follow-up evaluations (63 in the prefabricated and 62 in the customized groups). There was a significant improvement in both groups ($P < .05$), but there was no difference of modified FFI pain between intragroup differences at 4 (4.03 points; 95% confidence interval [CI], -4.2 to 12.3) and 8 weeks (3.93 points; 95% CI, -4.6 to 12.5).
- **CONCLUSIONS:** The low-cost prefabricated and customized foot orthoses, as used in this trial, had similar effectiveness in the treatment of noncomplicated plantar fasciitis after 8 weeks of use. Our results were similar to other trials, although those trials did not use orthoses made from EVA. Thus, EVA prefabricated inserts may be the best choice for the treatment of plantar fasciitis without complication

Prefabricated Foot Orthoses

- Plantar Fasciitis

- Landorf et al. *Effectiveness of different types of foot orthoses for the treatment of plantar fasciitis*. JAPMA 2004 Nov-Dec;94(6):542-9
 - FOs do have a role in the treatment of PF
 - Premades and custom work equally as well
 - Cannot be inferred that custom FOs are more effective
- Landorf et al. *Effectiveness of foot orthoses to treat plantar fasciitis: a randomized trial*. Arch Intern Med 2006 Jun 26;166(12):1305-10.
 - Foot orthoses produce small short-term benefits...and may also produce small reductions in pain for people with plantar fasciitis, but they do not have long-term beneficial effects compared with a sham device.
 - The customized and prefabricated orthoses... have similar effectiveness in the treatment of plantar fasciitis.

Prefabricated Foot Orthoses

- Plantar Fasciitis
 - Scherer PR, *Do prefab foot orthoses have a place in treating plantar fasciitis?* Podiatry Today 2007 Nov;20(11).
 - Semi-rigid PFOs work better than accommodative
 - Semi-rigid prefab FOs work just as well as custom
- Is plantar fasciitis simply a self-limiting condition?

Custom vs. prefabricated orthoses for foot pain.

- Am Fam Physician. 2009 May 1;79(9):758-9. Kripke C.
- **Clinical Question**
- Are custom-made foot orthoses effective for the treatment of foot pain?
- **Evidence-Based Answer**
- Compared with placebo or sham, custom-made foot orthoses modestly reduce foot pain from pes cavus (high arch), arthritis, plantar fasciitis, and painful hallux valgus. However, there is no evidence that custom orthoses are more effective than prefabricated ones.

Effects of prefabricated foot orthoses on pain and function in individuals with patellofemoral pain syndrome: a cohort study.

- Phys Ther Sport. 2011 May;12(2):70-5. Barton CJ, Menz HB, Crossley KM
- **OBJECTIVES:** This study evaluated the effects of unmodified prefabricated foot orthoses over a 12-week period on functional performance; and subjective pain and function in individuals with patellofemoral pain syndrome (PFPS).
- **DESIGN:** Prospective cohort study over 12 weeks. Each participant was prescribed prefabricated foot orthoses at baseline.
- **PARTICIPANTS:** Sixty individuals with PFPS (18-35 years).
- **MAIN OUTCOME MEASURES:** Change in pain and ease of completing a single leg squat; change in the number of pain free step downs and single leg rises from sitting; usual and worst pain in the previous week; the anterior knee pain scale (AKPS); and the lower extremity functional scale (LEFS).
- **RESULTS:** At 12 weeks, significant improvements in single leg squat pain and ease, and the number of pain free step downs and single leg rises from sitting were found. Additionally, significant reductions in usual and worst pain, and improvements on the AKPS and LEFS were observed.
- **CONCLUSIONS:** Functional performance improvements following unmodified prefabricated foot orthoses were greater at 12 weeks than those achieved immediately. Enhanced functional performance over time may have significant implications for osteoarthritis prevention in some individuals with PFPS. Improvements in subjective pain and function appear to plateau over time.

Changes of postural steadiness following use of prefabricated orthotic insoles.

- J Appl Biomech. 2013 Apr;29(2):174-9. Bateni H
- **Abstract:** Orthoses are designed to assist a malaligned foot in adapting to the environment and reduce the frequency of injury. Literature is divided on the benefits of orthotics insoles for postural stability. The current study was conducted to determine the effect of prefabricated orthotic arch supports on postural stabilization. Twelve healthy young adults participated in this study and were tested with and without prefabricated orthotics. Different variables were computed from movement of center of pressure (COP) during orthotic use as suggested in the literature. The mean position of COP was significantly shifted forward and toward the dominant side. Neither the COP movement nor the velocity changes following the use of orthotics revealed significant differences. Mediolateral range of COP movement and the 95% confidence circle area of sway was significantly reduced ($P = .022$ and 0.048 respectively), but changes in 95% confidence circle and ellipse areas of fractal dimension were not significant ($P = .053$ and $P = .057$ respectively).
- In conclusion, orthotic insoles significantly improved postural sway initially by reducing mediolateral range of postural sway and 95% confidence circle area of sway at the cost of increased fractal dimension area variables and power.

The effect of prefabricated and proprioceptive foot orthoses on plantar pressure distribution in patients with flexible flatfoot during walking.

- Prosthet Orthot Int. 2013 Jun;37(3):227-32. Aminian G, Safaeepour Z, Farhoodi M, Pezeshk AF, Saeedi H, Majddoleslam B
- **BACKGROUND:** Previous studies have suggested that orthoses with different constructions could alter gait parameters in flexible flatfoot. However, there is less evidence about the effect of insoles with proprioceptive mechanism on plantar pressure distribution in flatfoot.
- **OBJECTIVES:** To assess the effect of orthoses with different mechanisms on plantar pressure distribution in subjects with flexible flatfoot.
- **METHODS:** In total, 12 flatfoot subjects were recruited for this study. In-shoe plantar pressure in walking was measured by Pedar-X system under three conditions including wearing the shoe only, wearing the shoe with a proprioceptive insole, and wearing the shoe with a prefabricated foot insole.
- **RESULTS:** Using the proprioceptive insoles, maximum force was significantly reduced in medial midfoot, and plantar pressure was significantly increased in the second and third rays (0.94 ± 0.77 N/kg, 102.04 ± 28.23 kPa) compared to the shoe only condition (1.12 ± 0.88 N/kg and 109.79 ± 29.75 kPa). For the prefabricated insole, maximum force was significantly higher in midfoot area compared to the other conditions ($p < 0.05$).
- **CONCLUSIONS:** Construction of orthoses could have an effect on plantar pressure distribution in flatfeet. It might be considered that insoles with sensory stimulation alters sensory feedback of plantar surface of foot and may lead to change in plantar pressure in the flexible flatfoot.
- **CLINICAL RELEVANCE:** Based on the findings of this study, using orthoses with different mechanisms such as proprioceptive intervention might be a useful method in orthotic treatment. Assessing plantar pressure can also be an efficient quantitative outcome measure for clinicians in evidence-based foot orthosis prescription

Styles of PFO

Accommodative



Semi-rigid



Rigid



Dress



“In Office” Insole Modifications

Simple Modifications for Prefabricated Foot Orthoses.

In-office Modifications

- A Dremel® is your best friend
- Felt
- MT pads
- PPT
- Scissors & Glue



In-office Modifications



Metatarsal Pads

- A device placed proximal to the metatarsal heads to relieve pressure and redistribute weight from the metatarsal heads.



Metatarsal Pads

- Available in variety of shapes, sizes and materials. They are designed to elevate the neck of the metatarsal and take weight off the head.



Metatarsal Pads

- Used to treat metatarsalgia, plantar keratoses, and interdigital neuromas.
- Custom MT relief to offload specific areas of high peak pressures

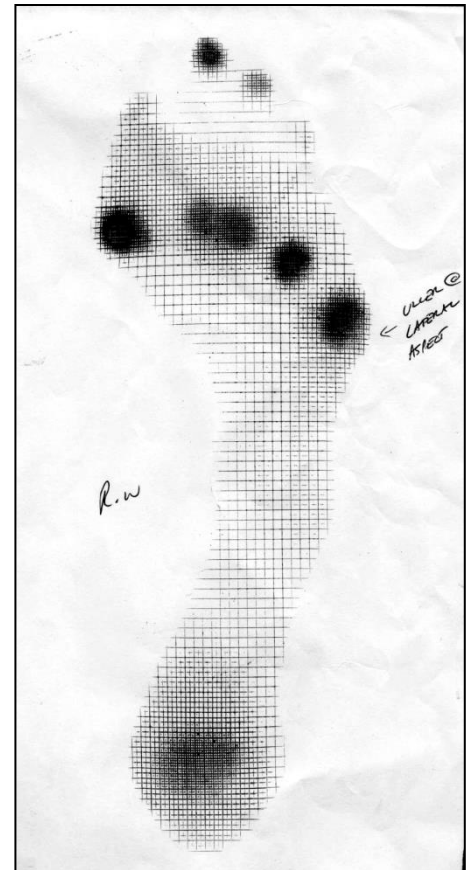
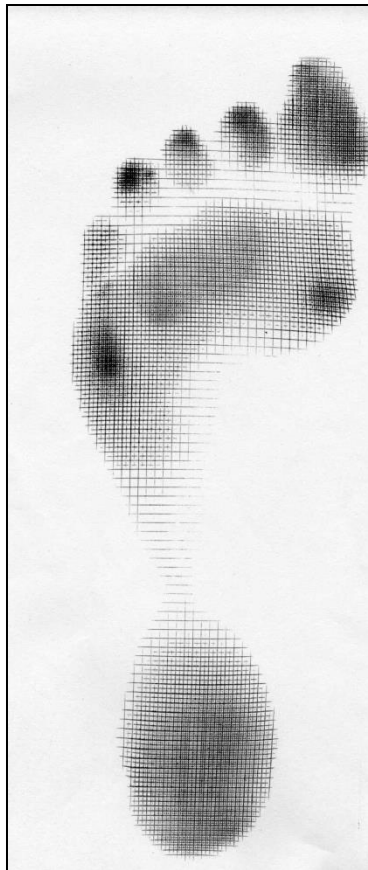


Metatarsal Pads

- Determining proper placement?
 - “Wait & See” is an old reliable method...
 - Hastings, MK, Mueller, MJ, et al. *“Effect of metatarsal pad placement on plantar pressure in people with diabetes and peripheral neuropathy”*, Foot & Ankle International, In-press
 - Optimal placement is to have distal edge of MT pad 6-10mm proximal to center of Mt head.
 - Lipstick
 - Floor reaction imprint

Floor Reaction Imprint

- A.k.a. Harris Mat



Cuboid Pad

- A cuboid pad is a small pad, placed directly under the cuboid, on the lateral side of the orthosis.
- Different materials can be used to make a cuboid pad.



Cuboid pad

- Used for plantar flexed fourth and fifth rays, also for cushioning.



Dancer's Pad

- A dancer's pad is applied to the orthosis to offload the first metatarsal head.



Dancer's Pad

- Used to treat sesmoiditis or first metatarsal head callus and/or irritation.



Medial Arch Fill

- Also called “Arch pad” or “Arch Cookie”.
- Material is added to the medial arch area of the orthosis.



Medial Arch Pads

- Different materials can be used for a medial arch fill.
- Arch pads may come in a variety of sizes and/or thickness.



Rear foot Posting (extrinsic)

- This is wedging added to the base of orthosis.
- Many different types of materials can be used for rear foot posting, generally a more firm or rigid material is used.



Extrinsic Rear Foot Posting

- Neutral Posting is used to stabilize the orthosis in footwear, or may be added for height (a heel lift), as in treatment of Achilles tendonitis.



Extrinsic Rear Foot Posting

- Rear Foot Valgus posting (lateral heel posting) is done by adding material to an orthosis to elevate the lateral aspect of the calcaneus.
- This is used to treat heel varus or supination.
- Rear Foot Varus Posting (medial heel posting) is done by adding material to an orthosis to elevate the lateral aspect of the calcaneus.
- This is used to treat heel valgus or pronation.

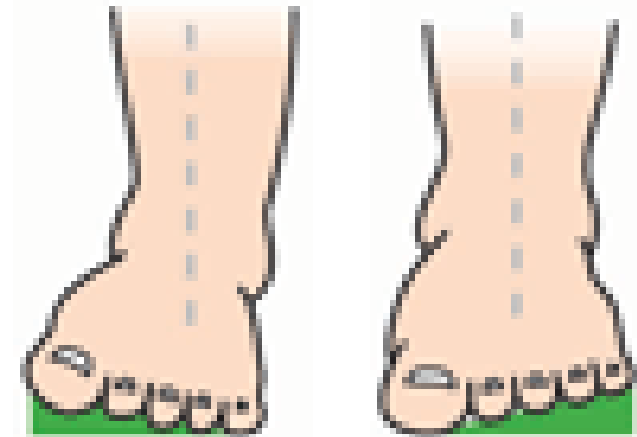
Extrinsic Rear Foot Posting

- With varus and valgus posting different degrees of posting may be added, example: four degrees varus posting.



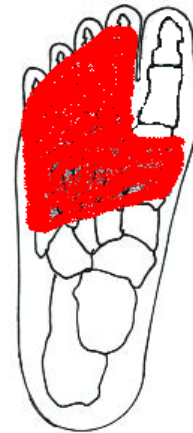
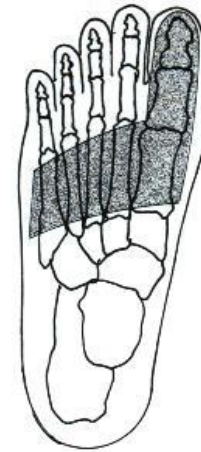
Extrinsic Forefoot Posting

- Fore foot post
 - Used to
 - Manipulate structural position
 - Accommodate fixed position
 - Shift weight bearing
 - Medial / Lateral
 - Primary vs. Compensatory deformity
 - 3-legged stool concept



Extrinsic Forefoot Posting

- Morton's extension
 - Used to
 - Accommodate structural position
 - Increase weight bearing and/or limit 1st MTJ motion
- Reverse morton's extension
 - Used to
 - Manipulate structural position
 - Increase ROM at the 1st MTPJ



Flexible Flatfoot Deformity

- OTC FO w/ medial hindfoot and lateral forefoot post



Top covers

- Top covers can be done with a variety of materials at different lengths to cover the orthoses.



Top Covers

- Proximal to the metatarsal heads is covering the orthosis only.
- Sulcus length is ending at the base of the toes.
- Full length is to the distal toes.



Top covers

- Leather, Neoprene material, Vinyl, and plastazote are examples of the many materials that can be used for top covers.

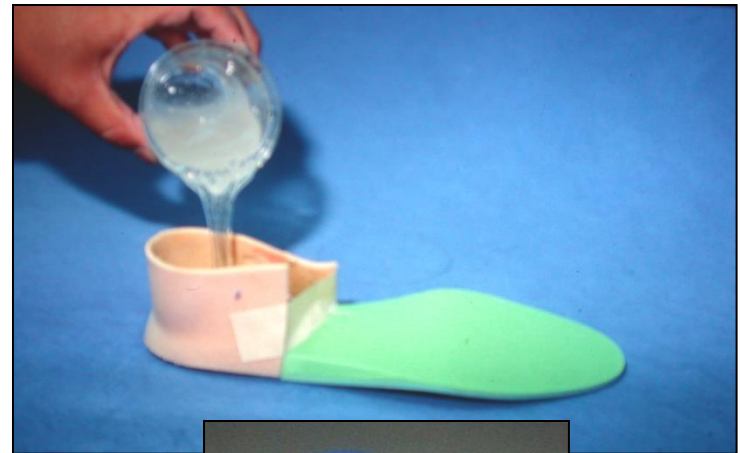


Misc.

- Viscoelastic Polymers

- Ex.

- P.Q., Viscolas, Silicone, Acton
 - Durometer varies depending upon the mixture
 - Available in mixture kit or sheet stock
 - Can be placed anywhere additional cushion, shock absorption or shock attenuation is desired



Misc.

- Carbon Fiber Plates
 - Springlite, Dynaflex, Apex
 - Can be molded at very high temps
 - Rigid foot plates / Shanks
 - Limit bending forces across forefoot and midfoot
- Hammertoe recess
- Toe crest



The End