FOOT & ANKLE

SPECIAL INTEREST GROUP

Clinical Advantage: Making Your Own Temporary Foot Orthosis

Clarke Brown, PT, DPT, OCS, ATC
President, FASIG

Perhaps no other skill is more important to the foot and ankle specialist than the fabrication of a temporary foot orthosis. The foot orthosis, or shoe insert, has been shown to be a reliable intervention for multiple diagnoses, through a variety of mechanical mechanisms. Mastering the fabrication and fitting of a temporary custom foot orthosis (TCFO) further allows the clinician to adapt the device through clinical phases and for differing footwear. Most importantly, the TCFO can be used for short-term effect and as an inexpensive alternative to lab-made inserts.

Foot orthoses comprise a custom made insert or footbed fitted into a shoe. Orthotics provide support for the foot by redistributing ground reaction forces. They are used by everyone from athletes to the elderly to accommodate biomechanical deformities and a variety of soft tissue inflammatory conditions, and they are also used in the prevention of foot ulcers for the at-risk diabetic foot.

Origins of Orthotics

The evolution of foot orthoses began at least 2,000 years ago with underfoot shoe cushioning. Layers of wool were placed inside sandals to give relief to foot fatigue or strain. The first recorded use of a leather arch support orthotic, introduced by Everett H. Dunbar of Bridgewater, MA, dates back to 1865. The first full-fledged foot orthotic was known as the Whitman Brace, introduced in 1905 by Boston orthopedist Royal Whitman. About 1910, Dr William Scholl introduced a lighter, more flexible metal arch support known as the Foot-Easer. Over subsequent years, millions of pairs were sold. During the 1920s and 1930s, many shoe manufacturers began producing corrective shoes with built-in orthotic features, promising to prevent, relieve, or cure a wide range of foot disorders. This footwear became a major and lucrative part of the shoe industry.

Beginning in the 1960s, the steady introduction of lighter and stronger materials gave orthotics a new direction. Custom-made orthotics, fabricated via plaster casts, were offered to patients and became the staple of conservative foot-care by most all podiatrists. The principles of fabrication taught by Merton Root, DPM, (ie, neutral suspension casting) involved the creation of a positive cast model, balancing that model to correct for frontal plane forefoot to rearfoot deformities, and then molding the customized device to the corrected cast. This practice kept orthotic labs busy for decades.

Modern orthotics developed rapidly in the 1970s, with the phenomenal rise of athletic footwear and the jogging boom. As runners complained of assorted ailments, athletic shoes began incorporating orthotic devices or features: contoured sole inserts, flared heels, wedges, rear foot and forefoot controls, special traction sole designs, and especially underfoot cushioning. Materials for making orthotics evolved rapidly too, using assorted densities of foams and thermo-moldable polymers.

Today's Terms of Use

Today, the term foot orthosis may be accompanied by customized. While clinicians can still create a positive mold of the foot, and prescribe features to accommodate or restrict motion and enhance or reduce ground forces at specific areas of the foot, the customization suggests that the mold is still exclusive to that one foot. On the other hand, off-the-shelf (OTS) inserts are generic; a sort of generalized and perhaps computer-generated (CAD) device sold largely by foot size.

Recent research suggests that many foot conditions, such as plantar fascitis, may require only a brief period of orthotic use. Hence, the term temporary has appeared in the description of foot orthotics.

The appropriateness for the use of orthotics in a myriad of medical conditions and dysfunctions is no longer questioned, particularly for conditions such as plantar fascitis, patello-femoral pain, shin splints, arthritis, and Achilles tendonitis. The effectiveness of an orthotic in attenuating, altering, or controlling ground reaction forces is still a fertile area of research. Furthermore, the role an orthotic in reducing a patient's symptoms in the lower extremity is a practical clinical intervention that makes shoe insert fabrication an essential clinical skill. Physical therapists with knowledge and experience in orthotic fabrication should pass this expertise on to new PT graduates and students.

Fabricating the Orthotic

The purpose of the orthotic, to control or to accommodate ground reaction forces, should determine the materials to be used in concert with the posture and stiffness of the foot. In general, the rigid, cavus-type foot may require cushion and plantar force attenuation. The more flexible foot may need a stable foundation of stiffer materials. The molding of the foot can be nonweight bearing or weight bearing.

The following two techniques are examples of temporary orthotic fabrication.

1. Drake, Bittenbender, and Broyles[1] investigated the use of a temporary custom foot orthosis (TCFO) cast in a nonweight-bearing position, with the foot in plantar flexion and inversion, as a treatment option for plantar fascitis. During weight bearing, the orthosis simulates a heel lift and provides a stable base for the plantar fascia to rest through the stance phase of gait by preventing excessive foot pronation and decreasing load from heel to forefoot.

Aquaplast (Patterson Medical, Warrenville, IL) is heated in 160° F water using a hydrocollator or large electric skillet. With the patient prone, the softened material covers the heel and extends to the metatarsal heads. In this case, the foot is held in a position of inversion and plantar flexion. The soft Aquaplast is further stretched to allow for soft tissue spreading with weight bearing and final trimming will allow placement in the shoe.

2. Thermo-moldable plastics such as Orthoplast can be used to create an orthotic that can be adapted to almost any shape or purpose.

Molding can be done in partial or full weight bearing (Figure 1) once the material is softened in a hydrocollator (Figure 2).

The foot can be positioned relative to posture, neutral, plantar flexed or dorsiflexed, using low-density foam to impress the foot (Figure 3).

The Orthoplast can be thickened (doubled) for rigidity or heel height adjustment (Figure 4).

Once trimmed, grinding can optimize internal posting and fit (Figure 5).

External posts for further biomechanical control can easily be added with softened material (Figure 6).

Temporary foot orthotics are an essential tool for practitioners in an orthopaedic setting. Sulcus-length, full-contact inserts, with or without posting, may assist in an array of lower extremity cases including plantar fascitis and heel pain.

REFERENCE

1. Drake M, Bittenbender C, Boyles RE. The short-term effects of treating plantar fasciitis with a temporary custom foot orthosis and stretching. *J Orthop Sports Phys Ther*. 2011;41(4):221-231.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

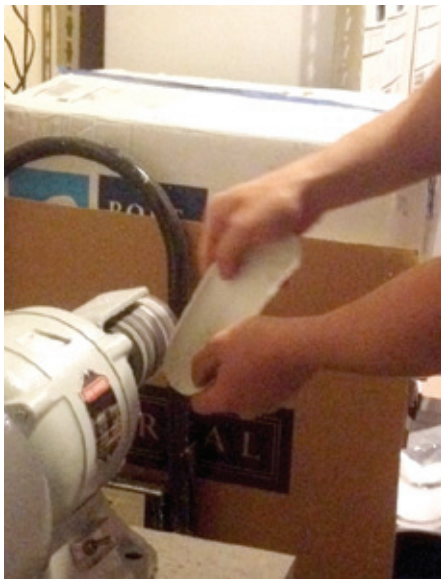

Figure 5.

Figure 6.