Fabricating Foot Orthotics

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During the past 10–15 years there has been a considerable increase in the number of individuals participating in athletic and recreational activities. Corresponding with the increase in participation and the increased intensity of the training regimens has been a higher incidence of patients seen for injuries to the foot and lower leg. This is especially true in the athletic therapy setting. The different surfaces that are now available, combined with the increased number of participants and the increased level of performance and training, have made it imperative that athletic trainers and therapists have the knowledge to manage the associated injuries. Knowledge of common foot injuries and malalignments, as well as skill in the fabricating foot orthotics, is vital to the athletic trainer or therapist. The use of orthotics in the athletic setting is prevalent and is increasing greatly (Klingman et al., 1997; Tomaro & Burdett, 1993); therefore, the purpose of this article is to present a brief guide for fabricating foot orthotics in the clinical setting.

Orthotics that are fabricated in the clinic or athletic training room can be beneficial for a number of different conditions of the foot and lower leg. In addition, they can serve as a valuable tool for returning an athlete to participation as quickly and as pain-free as possible. Research has demonstrated that orthotics are effective in relieving symptoms of lower extremity overuse injuries and providing safe return to functional activity (Tomaro & Burdett, 1993). Other research has demonstrated that orthotics might be as much as 70–80% effective in controlling symptoms and recurrence of overuse injuries (patellofemoral, ankle, and foot) in runners (Klingman et al., 1997).

When to Use an Orthotic

When considering the use of orthotics, a clinician must base the design and fabrication on evaluation of the foot and lower extremity, in an attempt to ascertain what specific alignment abnormalities might have lead to the injury. This, of course, requires knowledge of the anatomy and biomechanics of the foot and lower leg during walking, running, and other functional activities. Consulting a physician is also beneficial (Arnheim & Prentice, 1997; Hunter & Kasselberg, in press; Klingman et al., 1997; Tomaro & Burdett, 1993).

The primary decision with regard to foot orthotics is whether or not prescription orthot-
ics are needed. Many conditions require intricate, expensive prescription orthotics, and some physicians prefer this option. However, many physicians working closely with an athletic trainer or therapist prefer to have the clinician fabricate temporary orthotics as a first option. These are much less expensive, can be fabricated very quickly, and can be altered by the clinician in order to optimize the benefits to the athlete. Most sports medicine clinics and athletic training rooms have the materials and capabilities to fabricate foot orthotics for their athletes rather quickly and inexpensively. Commonly used materials are outlined in Table 1.

### Fabrication of the Orthotic

For athletic trainers and therapists, the temporary soft orthotic is a very helpful tool (Arnheim & Prentice, 1997; Hunter & Kasselberg, in press; Klingman et al., 1997; Tomaro & Burdett, 1993). In the clinical setting, temporary soft orthotics are often initially used for evaluating an athlete's response—if the response is good, a more permanent semirigid or rigid orthotic can be used.

The temporary soft orthotics that are commonly used in the clinical setting are usually based on an outline of the foot and posted with felt according to the type of foot being treated. Adjustments are made based on clinical experience, in an attempt to balance the foot toward a neutral position. The most common material used for this type of orthotic is Spenco™ foam with felt fastened to the undersurface. The felt acts as a “post” and serves to compensate for the abnormality. The posting can be done with either the rear foot or the forefoot on either the medial or the lateral side. Again, the type of abnormality determines the type of post used (Arnheim & Prentice, 1997; Hunter & Kasselberg, in press).

The first step in fabricating a soft orthotic is determining the type of posting to use. The next step is drawing an outline of foot on the foam (Figure 1).
Heat-malleable material such as Plastazote™ or Aliplast™ can also be used. This material is heated and then molded to the foot while the foot is in a semi-weight-bearing position. The foam is then trimmed in order to fit the outline of the foot, after which the post is fastened to the underside of the foam in the desired position, either medial or lateral, in the area of the forefoot or rear foot (Figures 2-4). A general rule for posting is to not add a post that is greater than 5°. This can be accomplished by using felt no more than 3/8 in. thick. The different types of posting recommended for specific conditions are described in Table 2.

If a semirigid or rigid orthotic is prescribed, it must be made from a cast. These casts are usually made of plaster and obtained in neutral position. A slipper cast is made with strips of plaster applied to the heel, sole, and forefoot. The plaster is smoothed out, with the foot in subtalar neutral and light pressure on the fourth and fifth metatarsal heads. Care must be taken to ensure that all ridges and air pockets are eliminated from the inside of the cast. The cast can then be sent to a podiatric orthotic laboratory for fabrication of the orthotic.

### Common Conditions Requiring Orthotics

In addition to the biomechanical abnormalities that might require orthotics, many other conditions are easily managed through the use of some type of orthotic. Some of the conditions that are commonly observed are turf toe, pes planus, and plantar fasciitis. Orthotics for these conditions are described in Table 3. “Turf toe,” or a sprain to the first metatarsal-phalangeal (MTP) joint, responds very well to a rigid orthotic fastened to the foot. This can easily be fabricated from Orthoplast. The first step is to draw an outline of the foot on the Orthoplast. The Orthoplast is then cut to the outline, except that only the great toe is included on the mold; the outline of the lateral four toes should be removed from the Orthoplast at
the level of the metatarsal heads. The mold is then heated in order to make the material pliable. Before the Orthoplast is placed on the plantar surface of the foot, the foot must be covered with prewrap or some other material to prevent burns. After the mold is removed from the heat, it is applied to the plantar surface and wrapped tightly with a compression bandage. This should be done with the foot in a non-weight-bearing position. The mold should remain in place until it hardens and should then be removed. It can then be covered with moleskin and trimmed to the comfort of the athlete. When it is finished, the mold can be used along with tape to immobilize the first MTP joint. It might be necessary to trim it additionally in order to fit the shoe. This method of immobilization is very common and is useful in the managing turf toe (Arnheim & Prentice, 1997; Tomaro & Burdett, 1993).

Pes planus and associated "shin splints" can also be treated by use of soft orthotics. A device similar to the soft orthotic, with a medial post, can be easily fabricated. Spenco foam with a felt medial longitudinal arch pad fastened to the undersurface can be very beneficial (Figure 5). The felt pad should be contoured according to the patient's comfort and should not be more than 3/8 in. thick.

Plantar fasciitis is another common condition that can be managed with a soft orthotic-type device. A medial arch support similar to the one mentioned previously, with the addition of a small pad or post near the metatarsal heads in order to prevent hyperflexion of the foot, can also be helpful.

Each of these conditions can be treated with some type of soft orthotic. Of course, the comfort of the athlete is the top priority, and modifications might need to be made often. With each of these types of orthotics, additional padding or supplements can be added to improve comfort. Pads can easily be added to soft-tissue supplements to protect painful areas.

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**Table 3. Common Conditions in Athletes That Require Foot Orthotics**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Orthotic</th>
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<tbody>
<tr>
<td>&quot;Turf toe&quot;—first MTP joint sprain</td>
<td>Orthoplast mold stabilize first MTP joint covered with moleskin fastened to plantar surface of foot</td>
</tr>
<tr>
<td>Pes planus (associated shin splints)</td>
<td>Spenco foam cut to outline of plantar surface of foot medial longitudinal arch pad attached (felt) not more than 3/8-in. felt</td>
</tr>
<tr>
<td>Plantar fasciitis</td>
<td>Spenco foam similar to medial longitudinal arch pad addition of post near metatarsal heads prevent hyperflexion of foot</td>
</tr>
</tbody>
</table>

Note. MTP = metatarsal-phalangeal.
Introduction of the Orthotic

After an abnormal condition has been identified and an orthotic fabricated, it is imperative that the athletic trainer or therapist introduce the patient to the orthotic properly. This will aid in the comfort of the patient and prevent exacerbation of symptoms. Gradual introduction of the orthotic is necessary. For the first 1 or 2 days, the patient should wear the orthotic for a period of 2–4 hr while walking around. After the first couple of days, the orthotic should be introduced during the workout and used at first for one quarter of the workout, then one half of the workout, three quarters of the workout, and finally the full workout. This progression should proceed as tolerated. It is important to consider that it might take 2–4 weeks for an individual to adapt to an orthotic. Younger feet adapt quickly, whereas older feet adapt slowly. During the introduction stage, the orthotic might need to be modified numerous times according to patient comfort (Hunter & Kasselberg, in press).

Summary

Fabricating foot orthotics is a skill that can be very beneficial to the athletic trainer or therapist. In order to maximize the potential of orthotics, proper recognition of the problem and the abnormality causing it is vital. The condition might result from a biomechanical abnormality such as tibial varum or forefoot varus or overuse conditions such as plantar fasciitis. After they have been identified, many of these conditions can be corrected or managed with temporary soft orthotics. Common materials such as foam, felt, and Orthoplast are good options for fabricating temporary orthotics fairly easily in the clinical setting and are relatively low in cost. The athletic trainer or therapist should be aware, however, of the role and availability of prescription orthotics for more serious abnormalities and conditions. Soft orthotics are a great option for initial management and can precede the use of more expensive orthotic devices. Finally, it is important to gradually introduce the athlete to the orthotic device in order to prevent aggravating the condition and to ensure patient comfort.

References


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