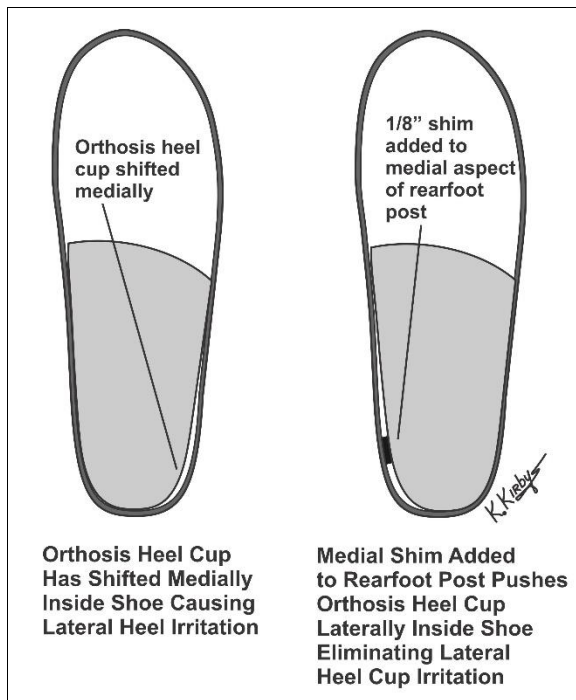


## TROUBLESHOOTING HEEL CUP IRRITATION IN FOOT ORTHOSES

Irritation to the medial, lateral or posterior portions of the heel cup of a custom foot orthosis can sometimes be a difficult problem to remedy. First of all, it must be stated that orthosis heel cup irritation is nearly always seen in orthoses made with relatively stiff plastic shell materials (e.g., polypropylene, graphite laminate) rather than in orthoses made with more compliant orthosis shell materials (e.g., Plastazote, cork and leather). For example, if the heel of the foot is, for some reason, wider than the heel cup of a stiff orthosis, then that stiffer orthosis will not bend away from the patient's heel, which may lead to medial or lateral heel cup irritation. More compliant orthosis shell materials, such as Plastazote and cork/leather orthoses, will simply bend away from the patient's heel, reducing the risk of medial or lateral heel cup irritation.

The most common reasons for medial or lateral orthosis heel cup irritation are when either the cast/impression/scan of the patient's foot produces too narrow of a heel cup, and/or the orthosis heel cup is too low, and/or the orthosis has somehow shifted inside the shoe so that heel cup of the orthosis is not properly positioned under the heel of the patient's foot. I will review each of these causes of heel cup irritation, explain how they may occur and then offer some relatively easy clinical fixes for heel cup irritation in orthoses.

An uncommon cause of orthosis heel cup irritation is when the shape of the orthosis heel cup is narrower than the shape of the patient's heel. When doing a plaster impression cast for custom foot orthoses, if the heel of the cast is deformed during casting or during shipment to the lab, this can result in a narrower orthosis heel cup. Narrowing of the heel is probably less likely to occur if using scanning or a foam-box for making a three-dimensional image of the patient's plantar foot for foot orthoses. However, regardless of whether the podiatrist uses plaster splints, uses a scanner or uses a foam-box for making orthoses for their patient, it is still a good idea to compare the heel cup of the orthosis to the patient's foot during the orthosis dispensing appointment to make sure it matches well to the patient's foot.



**Figure 1.** In cases of lateral heel cup irritation in foot orthoses, many times a medial shim of 1/8" adhesive felt or Korex may be added to the medial aspect of the orthosis rearfoot post to push the orthosis more laterally inside the shoe to eliminate the lateral heel cup irritation.

With this in mind, it must be remembered that the thickness of the plantar heel fat pad is variable from one patient to another and this can also be a source of heel cup irritation. For example, if the patient has a particularly fleshy heel with increased plantar fat pad thickness, then during standing onto the custom foot orthosis, the heel fat pad of this patient may expand much more than normal on weightbearing, significantly increasing the heel width and greatly increasing the chance of orthosis heel cup irritation. If such a patient with a thicker plantar heel fat pad is encountered, it may be wise to have the orthosis lab widen the heel cup of the orthosis by 2-3 millimeters (mm) more than normal to reduce the risk of heel cup irritation.

Making an orthosis heel cup too low in height can also cause orthosis heel cup irritation. Standard orthosis heel cup depth is 14 mm which works well at cupping the heel properly to increase the ability of the orthosis to control foot motion and relieve pressures within the central plantar calcaneus for treating plantar heel pain. Since increased orthosis heel cup height also increases the width of the heel cup of the orthosis, care must be taken to limit the heel cup height of the orthosis in order to allow the orthosis to fit properly into the shoes of the patient. Making the orthosis heel cup only 10-12 mm in height will help the orthosis fit into a wider range of shoes, but this reduced heel cup height, and corresponding decrease in

heel cup width, can also lead to increased risk of heel cup irritation especially when using stiffer orthosis plate materials.

When using the medial heel skive orthosis modification in patients with pronation-related symptoms (e.g., posterior tibial tendon dysfunction, symptomatic juvenile flatfoot), the orthosis heel cup height does need to be adjusted in order to reduce the likelihood of lateral heel cup irritation from occurring (Kirby KA: The medial heel skive technique: improving pronation control in foot orthoses. JAPMA, 82: 177-188, 1992). When a medial heel skive modification is added to an orthosis, the orthosis heel cup is modified into a varus shape, which will tend to make the heel of the patient slide laterally inside the orthosis heel cup. As a result, lateral orthosis heel cup irritation can occur in orthoses made with a medial heel skive if the orthosis heel cup is less than 16 mm. Therefore, if a 2 mm medial heel skive is ordered, then at least a 16 mm heel cup should be ordered, and if a 4-6 mm medial heel skive is ordered, then at least an 18 mm heel cup should be ordered to help prevent lateral heel cup irritation in orthoses made for patients with pronation-related pathologies.

Medial, lateral and/or posterior heel cup irritation can also occur when the custom foot orthosis is not positioned properly inside the patient's shoe. Medial heel cup irritation can be caused by the orthosis shifting abnormally laterally inside the shoe and lateral orthosis heel cup irritation can be caused by the orthosis shifting abnormally medially inside the shoe. In previous newsletters, I have also discussed how an orthosis that has shifted abnormally forward inside the shoe can cause either posterior heel cup irritation and/or cause anterior orthosis edge irritation. The most common causes of this abnormal forward-shifting of the orthosis are when the orthosis heel cup is too wide for the shoe heel counter or when the shoe insole/sockliner doesn't allow the orthosis to fit properly against the posterior shoe heel counter.

In the clinical setting, when a custom foot orthosis is causing heel cup irritation in one of my patients, I first take the orthosis out of the shoe and closely inspect the heel cup shape of the orthosis compared to the foot, both in the non-weightbearing position, and with the patient standing on top of the orthoses. In the non-weightbearing position, the orthosis heel cup should be about 1-2 mm wider than the patient's heel when the orthosis is held up to the patient's foot. When the patient's foot stands on the custom orthosis, the patient's heel fat pad should not be seen to be "spilling over" the edge of the orthosis heel cup, but, rather, should be seen to allow the heel fat pad to remain fully within the confines of the orthosis heel cup.

If I detect some irregularity in the orthosis heel cup shape at the area where the orthosis heel cup is causing irritation to the patient's heel, then I may use a drum grinder or Dremel grinding tool to increase the width of the orthosis in the area of the heel cup irritation. If, however, the orthosis heel cup shape matches the heel shape of the patient and the patient complains of lateral heel cup irritation, then often a simple "shim" can be added to the rearfoot post of the orthosis to push the orthosis more laterally inside the shoe (Fig. 1). The shim is initially fabricated from a small piece of 1/8" adhesive felt which is then adhered to the medial rearfoot post of the orthosis. In effect, this shim will push the heel cup of the orthosis more firmly against the lateral heel counter of the shoe which, in most cases, will reduce or eliminate any lateral heel cup irritation.

In a similar manner, medial orthosis heel cup irritation, even though less common than lateral heel cup irritation, can be resolved by adding a lateral rearfoot post shim of 1/8" felt to the orthosis. This lateral shim will push the orthosis heel cup more medially, placing the orthosis heel cup more firmly against the medial heel counter of the shoe, which, in most cases, greatly reduces the medial heel cup irritation. If the medial and/or lateral shim of 1/8" adhesive felt significantly reduces the heel cup irritation, then, at a subsequent office visit, the felt is replaced by a piece of 1/8" Korex (or EVA) which is then firmly glued to the medial rearfoot post for lateral heel cup irritation, or to the lateral rearfoot post for medial heel cup irritation. In most instances, these simple in-office fixes work very well at providing the patient which much greater comfort and much better therapeutic benefit from their custom foot orthoses.



Kevin A. Kirby, D.P.M.  
Biomechanics Director