PHYSICAL THERAPY PRODUCTS Product Solutions for Physical Therapists

Physical Therapy Products • February/March 2009

Looking For A Good Fit

by Loretta Sheldon, ROA, CFO

Ensuring patients have a properly fitting AFO

The ankle-foot orthosis (AFO) brace design and patient needs are well matched, but does the brace fit? A comfortable fit and good alignment control are critical to the success of any bracing project. Even if all other aspects are perfect, a poor fit will cause failure. What exactly should you look for when evaluating the initial fit, and what steps can be taken to address problems? Let's look at a top 10 list of things to look for when evaluating fit and then consider typical minor fitting adjustments.

First, let's address the fit around the foot and ankle portion of the brace.

1 The patient's heel fits fully into the heel cup without excess space.

If the heel volume is too small, the patient's heel will not seat well in the heel cup. This may throw the brace contours out of alignment with the foot, inducing redness. If the heel volume is too large, the heel will be free to piston up and down and move side to side. Those actions can cause blistering or lack of alignment control.

2 The contours of the plantar surface on the brace match up well to the patient's foot.

When a patient bears weight on plantar surface contours that are mismatched to the contours of their foot, the result can be very uncomfortable.

3 The metatarsal head width fits comfortably under weight-bearing.

If the brace is too wide for the weight-bearing width of the met-heads, the patient will be able to use the extra space to move into an uncorrected position (ie, forefoot abduction in a pronating

patient). Shoe fit will also be more difficult. If the met-head width is too small, there will be pinching and redness at the medial and lateral met-heads.

4 If the brace is a wraparound design, it closes snugly over the instep and dorsum with some "give" for comfort and growth.

Some braces wrap fully over the foot, contributing to alignment control through mild compression and offering considerable comfort (since there are fewer potential areas of edge pressure). When fitting this kind of orthosis, especially for children, look for a mildly compressive wrap that includes some "give" or "bounce" if you press downward on the instep. If the fit is too tight, it will cause discomfort and redness; if too loose, alignment and support are diminished.

5 The toe shelf length under weight-bearing leaves 1/8 inch to ½ inch for comfort and growth allowance.

Naturally, growth room is gauged by the patient's growth rate. Adults will not need extra room for growth. Toddlers and teens, on the other hand, will need a generous allowance, but not so much extra length that it contributes to tripping problems.

6 The space allowed for any boney prominences, such as the navicular, base of fifth metatarsal, or malleolar bones, is correctly placed and contoured.

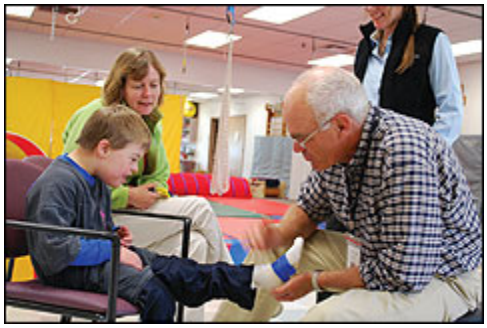
Ideally, a small amount of extra space is centered around the apex of the boney prominence. The fit remains close in the supporting contours around that apex.

Now let's consider our fit expectations for the lower-leg section of an AFO. There are three points to check here.

7 The brace height is tall enough to control the alignment or support needs being addressed. It is also short enough to allow freedom of movement without pinching or digging in to the calf or popliteal crease of the knee.

No one wants any more restriction than needed in a brace. When hyperextension of the knee or extreme pronation or supination is involved, you may want a taller overall AFO height. If the issue is toe walking or excess plantarflexion (PF), you may be able to use a lower height. Your target is somewhere between the apex of the calf belly and an inch below the fibular head. One thing to watch for at the fitting, especially for pediatric patients, is the action of crouching to the floor and returning to standing. Make sure the proximal edge of the brace will not dig into the calf belly, back of the knee, or thigh of the patient during this activity.

8 If the design is expected to allow the tibia to move freely forward into dorsiflexion, the leg portion is wide enough to allow this action with ease.



Some AFOs are designed to be used without an anterior strap to allow dorsiflexion (DF) while blocking PF of the tibia. In this style, the anterior opening of the brace needs to be wide enough to allow the tibia to move freely out of and back into the leg portion of the brace.

9 The width of the leg portion is wide enough for comfort over long periods of time but fits closely enough to help with alignment improvement.

Alignment of the leg in relation to the foot section of the brace is important for improved positioning. Excess brace width decreases this correction in alignment. Conversely, a fit that is too tight on the leg is not comfortable to wear. We're going for the happy medium here.

Finally, an overall look at the brace's trimlines (or edges) is useful.

10 The trimlines allow a comfortable fit and room for expected movement.

The edges of the brace trimlines should not present a comfort problem—there should be no pinching or digging. (Look for redness at the trimline edges.) Also, the edges should allow movement: the ability to toe-off easily during gait, for example.

If you are able to answer "yes" to this full checklist without making any minor adjustments, you and your patient are having a wonderful day. A more typical scenario is that the initial fit is very close but could be improved with a few minor adjustments. Here are the most common adjustments made at the initial fitting of an AFO:

The toe shelf may need trimming to achieve the desired final length. (Point 5 above.)
If the width at the met-heads is too tight, heating and stretching the medial and lateral sides outward by about 1/8 inch may solve the problem. (Points 3 and 4.)
The plastic over boney prominences may need to be heated and stretched outward to allow additional relief for these potential problem areas. (Point 6.)
The plastic may need to be heated and trimmed lower at the proximal edge to change the overall height of the brace to a more appropriate level. (Points 7 and 10.)
The plastic may need to be heated along the posterior length of the leg portion and pulled apart to widen the leg section of the brace. (Points 8 and 9.)
The trimlines may need to be adjusted by heating and trimming away areas that are too distal at the medial and lateral toe shelf or too anterior at the leg portion, limiting movement. (Point 10.)

The plastic at the trimlines may need to be heated and rolled or flared where contact with the patient is causing discomfort or redness due to edge pressure. (Points 8 and 10.)

Making these minor changes and then reapplying the brace may allow you to go back to your top 10 list and answer yes to each point, saving the day after all. (Note: Generally, if the "fit" test fails on Point 1 or 2, no minor adjustments can be made.)

If you can't answer yes to every point, you'll need to fully assess where the problems are and describe them accurately. Referencing each of the items on the fit list will allow you to describe the problem to the technical staff or orthotist involved with fabricating the brace. It's also helpful to have accurate measurements that describe the excess space or lack of space you're seeing. Depending on the issue, this detailed description could allow remodification of the positive mold the brace was made from and remaking of the brace for an improved fit. If the problems are too extensive, it may be a better idea to recast and make the brace over again from the beginning.

If the brace style is right for the patient and the fit looks good initially, the patient can begin habituation, or living with the device. Usually, a practitioner schedules a follow-up appointment 2 to 3 weeks after the initial fitting. By the end of 3 weeks, if the patient or caregiver has not noticed any improvement from wearing the brace over not wearing it, or if they are still having trouble with comfort, there may be a problem. The first step here, again, is to rule out a fit issue. Go right back to item 1 of the fit checklist and work your way down. Make minor adjustments if needed; if the trouble is larger, call your technical staff or orthotist.

If a fit problem is not the cause, the next step is to re-evaluate the level of support or function of the brace selected. A caveat: it's not uncommon to jump to the conclusion that the brace design (its level of support and intended functional outcome) is at fault when in fact a minor fit problem may be the root of the issue. Once you've ruled out fit challenges, though, a different brace design may in fact be the answer. Now go out there and make it a great day for you and your patient.

Loretta Sheldon, ROA, CFo*, is an ABC-Registered Orthotic Assistant and Certified Fitter of Orthotics. She manages the Education Resource team at Cascade Dafo Inc, Ferndale, Wash, and is the clinical assistant to Don Buethorn, CPO, founder and owner of Cascade Prosthetics and Orthotics and Cascade Dafo Inc.*