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Orthotics Q&A: Selecting Appropriate AFOs: Key Considerations And Modifications

- [Clinical Editor: Nicholas Sol, DPM](#)



When weighing the options for ankle foot orthoses (AFOs), you must consider many different factors in order to find the most appropriate device for the patient. Both hinged and non-hinged AFOs work well for patients with certain conditions but not so well for others. In addition, shoe modifications may be necessary in order to help ensure the success of the AFO. With these issues in mind, our expert panelists take a look at the ins and outs of prescribing hinged and non-hinged AFOs.

Q: What are the three or four most frequent diagnoses for which you prescribe a non-hinged AFO?

A: Nicholas Sol, DPM, and Doug Richie Jr., DPM, both prescribe non-hinged AFOs for Charcot arthropathy. Dr. Richie also uses non-hinged AFOs to treat Charcot-Marie Tooth Disease, cerebral palsy and dropfoot secondary to CVA. Dr. Sol also prescribes these orthoses for post-CVA patients and those who have post-traumatic stress arthrosis and multiple sclerosis.

Lawrence Huppin, DPM, says non-hinged AFOs reduce or eliminate motion at the ankle joint and he frequently uses these orthoses to treat DJD of the ankle joint. The reduction or elimination in ankle joint motion can also lead to reduced subtalar joint (STJ) motion, points out Dr. Huppin. He adds this effect makes a fixed hinge AFO appropriate for some cases of STJ DJD and tarsal coalition.

When confronted with situations in which a dorsiflexion assist hinge would not be appropriate for dropfoot deformities, Dr. Huppin says he will prescribe a non-hinged AFO.

Dr. Richie says his goal in almost every solid AFO prescription is stopping contracture of the posterior calf heel or musculature cord, stabilizing the knee if the soleus is weak and decreasing plantar pressures of the fore- and midfoot. He notes a solid AFO leads to a loss of plantarflexion of the ankle during the contact phase of gait, causing an "abrupt anterior displacement of the tibia and a somewhat severe flexion moment at the knee." Adding a rocker sole to the shoe can minimize this problem, according to Dr. Richie.

Q: Of the three types of non-hinged AFOs (solid ankle, semi-solid ankle and posterior leaf spring), which do you prescribe most often and why?

A: Primarily, Dr. Huppin prescribes functional AFOs such as the ProLab AFO, Richie Brace, Platinum Brace and other devices. These function by connecting the functionally balanced foot orthotic with medial and lateral ankle/leg uprights. As he notes, "balanced foot orthoses offers superior control over subtalar and midtarsal joint motion while the double uprights prevent internal leg rotation. The hinge can be flexible or fixed."



The Arizona AFO is popular among podiatrists for treating Charcot deformities and adult-acquired flatfoot.

However, Dr. Huppin prescribes the Arizona AFO or another kind of gauntlet-type orthotic if the functional AFO does not provide enough support for a patient.

The posterior leaf spring is the most common non-hinged AFO choice for Dr. Sol, who notes that its smaller mass facilitates a better shoe fit profile than other orthotics. If he needs increased durability or stiffness, Dr. Sol says he usually reinforces the posterior leaf spring with carbon graphite, which he notes offers many advantages. However, Dr. Richie points out some disadvantages to using posterior leaf springs, arguing they do not provide sufficient knee stability and do not resist equinus contractures well.

Dr. Richie prefers using a semi-solid AFO design since its trim lines behind the malleoli provide better shoe fit. He emphasizes that he gets good varus and valgus control with the contour of the footplate. He has found solid AFOs do not have such varus/valgus foot control. He has also discovered malleolar irritation and problems with shoe fit in solid AFOs and does not like their trim lines, which are wide and bulky. Dr. Sol says he only orders semi-solid or solid ankle AFOs in extreme cases.

Q: What are the three or four most frequent diagnoses for which you prescribe a hinged AFO?

A: Drs. Richie and Huppin each use hinged AFOs for adult acquired flatfoot secondary to posterior tibial tendon dysfunction (PTTD) and lateral ankle instability. Dr. Sol uses them for PTTD, spastic ankle equinus and neuromuscular disease.

Although adult-acquired flatfoot is "by far the most prevalent" condition for which Dr. Huppin uses a hinged AFO, he also utilizes these devices for subtalar joint DJD. Dr. Richie uses the hinged AFO for peroneal tendinopathy and employs them with dynamic assist hinges for dropfoot if there is no specificity of the calf.

Q: Which types of hinged AFOs do you most frequently prescribe and why?

A: Dr. Richie touts his own Richie Brace®. "This short, articulated AFO with a balanced podiatric

orthotic footplate can address almost all of the conditions previously treated with long leg hinged AFOs," he says. "The advantages are comfort, fit, cosmetic appearance, shoe fit and improved frontal and transverse control of the ankle-rearfoot complex."

Likewise, Dr. Sol uses the Richie Brace or another freely articulated AFO for PTTD. To brace for spastic ankle equinus, he utilizes a tension reducing ankle foot orthotic (TRAFO), which he describes as "an articulated semi-solid AFO with medial and lateral adjustable limited motion joints."

Dr. Sol will usually prescribe either a single or double upright for patients who require spring assisted dorsiflexion or plantarflexion. He says he does this because he has been "disappointed by plastic AFOs with integrated joints that neither provide enough torque nor endurance."

Q: What shoe modifications do you most frequently prescribe for use with an AFO?

A: All three panelists advocate using rocker soles in some instances. Dr. Huppin uses various heel-to-toe rocker soles for those with ankle DJD.

"Prior to getting the AFO, it is imperative patients understand that they are likely going to need new shoes to fit the device and that modifications to those shoes may be necessary," maintains Dr. Huppin.

To that end, he gives his patients a list of stable shoes that work well with the AFOs. For example, when Dr. Huppin treats those who have PTTD, he'll add a medial buttress and medial flare to shoes for additional control.

Dr. Sol's most common modification is a 3/8-inch double rocker sole for those with non-articulated ankle foot orthoses.

"The rearfoot rocker helps smooth loading response and relieves the knee from excessive shock," he notes. "The forefoot rocker assists during the propulsive phase of gait and enhances hip extension, thereby reducing the load on the hip flexors."

The rocker sole is the only shoe modification that Dr. Richie uses. He says he mainly prescribes this with a solid AFO because the abrupt flexion and extension moments transmitted to the knee during contact and heel rise can be "a great concern" with these AFOs. According to Dr. Richie, research has shown that if you use a solid AFO with shoes that have a rocker sole, you can reduce damaging knee moments.

Since post-polio patients commonly have a leg length discrepancy, he recommends using an external shoe lift instead of applying a heel lift to the solid AFO.

Dr. Sol (shown at the right) founded the Walking Clinic, PC and practices in Colorado Springs, Colo. He is a consultant to Tekscan.



Dr. Huppin is an Adjunct Associate Professor and Assistant Chairman of the Department of

Applied Biomechanics at the California School of Podiatric Medicine at Samuel Merritt College. He is also the Director of Education at ProLab Orthotics.

Dr. Richie is a Director of the American Academy of Podiatric Sports Medicine. He is also an Adjunct Clinical Professor of Biomechanics at the California School of Podiatric Medicine at Samuel Merritt College.

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