

It's clear that lower extremity bracing can have a positive effect in many patient presentations

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In a study of children with hypotonia and flatfoot dysfunction, findings concluded that use of dynamic orthoses combined with an exercise program resulted in significant improvements and positive trends, including velocity, step length, single-limb support, and cadence changes.¹

Orthotics pioneer Nancy Hylton has found that flexible orthoses provided improved and more consistent proprioceptive feedback, which in turn improves control of movement.²

However, when it comes to which style of orthosis to choose, there is little evidence to guide specific selection for individual patients.

A soon-to-be-published study conducted at the Children's Hospital of Los Angeles attempted to do just that by comparing the effects of two different styles of orthoses, specifically a Cascade DAFO and an Ultraflex Systems Adjustable Dynamic Response (ADR) AFO, in patients with cerebral palsy.

All participants in the study were children, aged 4 through 12, who presented with various levels of crouch and/or equinus gait.

The results?

The kinematic and kinetic outcomes of the two devices were relatively close, with the ADR AFO resulting in better knee extension and greater push-off power.

However, the outcome that stood out to me the most: patients recorded more steps per day in the DAFOs and patient satisfaction was significantly higher in the DAFOs. Patients cited the light weight and better comfort, fit, cosmesis, and ease of use as reasons for increased satisfaction.

In other words, the patients moved in the DAFOs more because they liked wearing them better.

Now, I'm not pointing this out to degrade the competition, and I'm not saying kinetic outcomes don't matter. They absolutely do.

What I *am* saying, and what this study showed, is the importance of *real life* in choosing the most appropriate, effective orthosis for your patient.

Let's talk more about that. My approach to pediatric lower extremity bracing has always had three basic parts:

1. Aim for the best position of function. By this I mean a relatively balanced, neutral, typical foot position, neither pronated nor supinated. We attempt to bring the foot into this position: vertical heel, forefoot horizontal, ankle angled slightly forward (in about three degrees of dorsiflexion). This neutral position, in my view, is best for both weight-bearing and the swing phase of a child's gait. If it's possible to achieve this position without pain or discomfort to the patient, we aim to cast or measure the foot in this best position of function.
2. Children learn movement by moving. In order to learn good movement, the foot needs to be able to move repeatedly. A child who lacks the skills to recruit voluntary control, if left untreated, never experiences the repeated success that normal movement provides. Choosing a brace that will allow movement where the child's gait is functional – starting with what they do right – is a highly effective alternative to more restrictive bracing. Comfort increases compliance. Compliance leads to extended wearing and practice.

3. Choose the least amount of support needed to provide the planned position of function. We want a child to experience as much useful movement as possible, in a guided range -- think of guardrails on a highway, with the freedom to move ahead yet with protection from danger. For this to happen, I use braces with as much flexibility as possible along the axes where the child has good control, providing support where the child needs it. Our overarching goal is to provide the least amount of support that will achieve the best position of function.

Patients come to us with a wide range of skills, needs, and developmental levels. They require a correspondingly wide range of choices. Through our online curriculum, we teach practitioners to identify gait deviations and place patients into one of the following groups: low tone pronation, high tone pronation/supination, swing phase inconsistency, excess plantarflexion, hyperextension, excess dorsiflexion, and positioning/limited ambulation. Once a group is chosen, the practitioner is led to a selection of brace style choices.

When it comes to making a brace style choice, I can't stress the importance of weighing global, real life factors enough, especially for children.

Always choose a device that blends a patient's functional needs with his reality.

How is his home environment? What about his family dynamic? Is the family enthusiastic about the improvements that can be achieved through a pair of articulated AFOs or are they skeptical about bracing? Are you taking in to consideration the patient's physiotherapy goals? His everyday activities?

As young children become school-aged, there can be a social stigma connected with wearing a brace. If this is an issue with a particular family, keep it in mind as you select a brace style. A less obtrusive brace style is more likely to be worn than a high-profile one that may attract unwelcome notice – and it may be an acceptable choice as long as it does some good.

It's rare that I meet a child happily volunteering to wear braces of any kind, DAFOs or otherwise. The prospect of wearing orthoses day in and day out can be daunting.

We can encourage compliance by choosing orthoses that are comfortable, lightweight, easy-to-wear, and as aesthetically-pleasing as possible. More importantly, we can increase compliance by thinking holistically – start with the patient, not the product.

Consider the goals for your patient's feet, ankles, knees, and hips when choosing orthoses.

But remember: consider real life too.

REFERENCES

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 2. Hylton NM. Postural and functional impact of dynamic AFOs and FOs in a pediatric application. *Journal of Prosthetics and Orthotics*. 1990;2:40–53.
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