

Will My Child Benefit from Using Braces?

Insights on a Challenging Issue

By Don Buethorn

When a child first receives a diagnosis and a treatment plan that include recommendations for bracing, the prospect of intensive orthotic intervention can be daunting for the parent.

Braces traditionally represent a prominent visual cue that the child has trouble walking. The classic brace seems awkward and hard to get into and out of. The scenes in the movie *Forrest Gump*, showing a child growing up in the 1950s with his legs caged in by clunky metal, are a common reference point for parents, representing a treatment you would not care to take on.

It's natural for you to question the need for bracing, and you deserve an answer. Over years of working with children, parents, and physical therapists, I have refined my answers to encourage a pragmatic grasp of what bracing helps. Here are some thoughts that might help you develop a realistic perspective.

More Questions

Though you may trust the advice of your physical therapist (PT) implicitly, you may also want a way to think about the issue that you can see evidence of and discuss rationally. That simple starting question then expands into a series of questions.



When evaluating the effectiveness of braces, parents should see an obvious benefit.

Should I be concerned? Should my child wear a brace at all?

In answering this, the type and magnitude of the motor skill delay the PT has assessed is useful. Generally, a PT evaluates your child's sensory-motor skills with a multi-level approach, considering development, neurological organization for movement, sensory processing, and the ability to acquire new skills.

Wearing a brace can be upsetting from a social standpoint, especially in the beginning. If brace wear becomes a significant social stigma, consider a less obtrusive style. If the style does at least some good, it is more likely to be worn than a high-profile one that may attract unwelcome notice. However, if a child is often in an environment with other children who wear orthoses, brace wear may not be an issue. This is particularly true for very young children.

Which brace is right?



While orthotist Don Buethorn and clinician Loretta Sheldon cast the patient, his mother asks questions of the PT.

Most parents may not be aware of the choices available. If the choices are presented to you in a way that describes the gait dysfunctions they are appropriate for, you have less of a cognitive burden in considering options. You don't need to know the specific biomechanical techniques used to derive a result; you just need to know the problem that is being addressed.

Will the patient be dependent on braces for the long term?

Since the atypical movement patterns we see can result from a wide range of conditions (and, in some cases, combinations of conditions), it's not realistic to expect a categorical prediction at the outset of treatment.

Our goal is not just to support a child's foot, but to guide it towards correction. We do see improvement on a regular basis. The key to graduated lowering of support is to have options available for a smooth transition to the next level down.

The PT's Role



These braces allow the patient to walk naturally, and they fit into her existing shoes.

The function of a child's gait must be considered in the context of not simply bracing, but in a larger holistic scope integrating the entire sensory-motor skills system. The bracing solution must fit into the PT's goals to accelerate motor development; the orthotist's relevant concerns about the role of a more functional foot position, appropriate device and level of stability; and your concerns about what's ultimately best for the child and what you can support. (It's highly beneficial for a patient to receive the combined efforts of a team of professionals: a physician, a physical therapist and an orthotist, for instance.) For example, PTs are often motivated to seek a bracing solution because they are concerned that the patient's poor foot position will make it hard to develop foot-knee-hip-trunk control. So the meta-goal here is to improve foot-knee-hip-trunk control, and bracing is a means to that end.

Generally, if the child approaches age-appropriate control, the PT can begin to reduce the level of support.

Other global considerations—e.g., type of dysfunction, your family dynamics, school situation and attitudes of the individual patient—can carry a great deal of weight.

Normal and Abnormal Foot Position Development

To help you understand what needs to be corrected in your child's gait, it's useful to have a practical understanding of how gait normally develops.

Children may not have a "typical" gait until 6 or 7 years of age. Sit-to-stand, in particular, can happen in unusual ways. The typical baby's foot presents a pronated appearance, with an abundance of soft tissue and flat feet. Children don't start out with good foot position, but normally, they find it fast if their sensory-motor skills are functioning properly. Every child, typical or atypical, develops foot position through constant experimentation: if something works for him, he will use it. If it doesn't work, he'll change what he tries.



Brace fitting should be an enjoyable time. This mother and daughter watch as the clinician helps put the patients brace on.

However, if a PT asks us to support the foot position of children aged birth to 3, it is usually because of a bigger motor developmental delay: gait challenges are anticipated. Thus the unusual foot position is part of a larger, known condition. An example is the case of, a 2-year-old, who is pronated (see glossary of terms) and has extreme extensor tone, preventing even a standing position. This represents a delay of at least a full year. In her case, foot position is deemed crucial, since she can't begin standing (or progress developmentally in her gait) until her foot and ankle are corrected. Pronation in a typically developing 2-year-old is not as critical.

A Bracing Strategy

My basic approach to bracing has three parts.

1. Best position of function

By this I mean a relatively balanced, neutral, typical position, neither pronated nor supinated. We attempt to bring the foot into this position: heel vertical, forefoot horizontal, ankle angled slightly forward (in about 3 degrees of dorsiflexion). This neutral position, in my view, is the best position for both weight-bearing and the “swing phase” of the 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. 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. A brace that allows some movement while serving as a “training aid” towards typical gait is the clear path to eventually diminishing orthotic support. 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.

3. Least amount of support

Rather than brace heavily, we want the foot to experience as much useful movement as possible. We want the child to explore foot position in a guided range: think of guardrails on a highway, with the freedom to move ahead but 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 foot control, providing support (for pronation/supination, DF/PF, eversion/inversion) where the child needs it. Our overarching goal is to provide the least amount of support that will achieve the best position of function.

Starting With the Patient

Patients come to us with a wide range of skills, needs, and developmental levels. They require a correspondingly wide range of choices. At the same time, early bracing can reinforce good foot position and prevent bad habits from being ingrained.

As a tool to use patient characteristics to select a brace, we have developed several patient groups that a child's gait could fit into: low tone pronation, high tone pronation-supination, inconsistent ankle modulation, excessive plantarflexion, hyperextension, crouching and positioning/limited ambulation. Then we examine the set of braces available as choices for each group.

Solutions for Young Children

I consider two types of orthotic solutions. Custom orthoses are created from a cast of the patient's foot. They provide levels of support from moderate to strong. If a child's foot is not fully correctible to a typical position or needs significant support for correction, casting is a good choice. After selecting the patient group and likely solution, an orthotist uses wet fiberglass casting tape to take an impression of the child's foot and lower leg, defining precise shape and details as the cast hardens. Casting can actually feel good: the tape warms a little as it cures, and it feels calming. The cast is then used to create a custom brace for your child's foot.

A new type of orthotic solution for feet that are fully correctible to a typical position does not require casting. They are a low-cost alternative to custom orthoses. Measuring is easy, using a plastic sizing jig or a printable one available on the web. The above-ankle models are covered by most medical plans. And they provide a continuous progression from minimal to moderate levels of support.

Whether the choice is to cast for a custom brace or simply measure for an off-the-shelf product, it's key to work within the overall therapy goals and to build on the aspects of your child's movement skills that are functional.

Directions, Please

Here is a glossary of terms to know when discussing foot alignment.

Heel alignment

Everted (or valgus): The heel rolls away from the midline of the body.

Inverted (or varus): The heel rolls toward the midline of the body.

Vertical (typical): In a typical foot, the heel and lower leg, when seen from the back, are close to vertical.

Ankle alignment

Dorsiflexed (DF): The ankle is flexed so that the shin moves toward the toes. A typical foot goes into some DF during the gait cycle but easily returns to neutral when bearing weight.

Plantarflexed (PF): The ankle moves so that the shin moves away from the toes. A typical foot goes into some PF during push-off in the gait cycle. Excess PF can be observed as toe-walking or knee hyperextension.

Whole-foot alignment

Pronated: Excessive use of the medial (inner) side of the foot for support or ambulation.

Supinated: Excessive use of the lateral (outer) side of the foot for support or ambulation.

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