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## Comfort, support and compliance improve with use of dynamic braces

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The individual dynamics and needs of a patient are the primary determinants when choosing an orthosis for a child or adolescent. No one type of orthosis is going to meet all the needs of every patient (or even all the needs of one patient). However, experience shows that, for many children, dynamic ankle foot orthoses (DAFOs) offer significant benefits over traditional AFOs.

It was only a few decades ago that children with neuromuscular imbalances, such as cerebral palsy and myelomeningocele, wore metal braces mounted onto leather shoes for support.

More recently, rigid plastic AFOs became the norm, offering the advantages of lighter weight and ease of use over their metal and leather counterparts. Today, AFOs continue to be beneficial for many children who require solid ankle support for certain conditions and activities.

However, for some children, AFOs can have the disadvantage of being hot and inflexible and can cause skin breakdown. Searching for a more comfortable type of orthosis for children, physical therapist Nancy Hylton and certified prosthetist/orthotist Don Buthorn of Washington state-based Cascade DAFO, Inc. pioneered a total contact brace. Because it intentionally allowed for some normal motion, their very thin, flexible plastic innovation became known as a dynamic ankle foot orthosis.

### How do DAFOs measure up to traditional AFOs?

Like the traditional AFO, DAFOs control the ankle and hold it in proper alignment while maintaining good positioning of the foot. They also support the subtalar joint and arches in a normal position. Gait analysis studies comparing DAFOs and AFOs have shown minimal differences in function.

However, there are significant ways in which DAFOs differ from solid ankle AFOs:

- DAFOs incorporate a custom-contoured sole plate that supports the dynamic arches of the foot.



*Post leaf DAFOs allow greater range of motion in the ankle, while providing support to prevent drop foot.*

- DAFOs are designed to have total contact with the foot. Their thinner, softer plastic conforms around the foot and distributes the pressure of high spots over a larger surface area. This total contact feature virtually eliminates skin breakdown while helping to reduce tone. Some children, unable to tolerate other AFOs because of pressure sores and/or skin breakdown, are able to wear DAFOs.
- In some styles of DAFOs, the thin, co-polymer plastic intentionally permits more motion than an AFO, allowing free dorsiflexion and some plantarflexion. As soon as that motion begins to occur, the patient's ankle is pulled back into proper alignment. Some standard AFOs lock the ankle at a 90 degree angle, making it quite difficult for a young child to crawl. One particular style of the more pliable, flexible DAFO, however, allows normal plantarflexion to make crawling easier.
- The shorter (supramalleolar) style of DAFOs is more flexible than that of AFOs. They fit into mainstream shoes more easily and make cosmesis more acceptable. Also, with the thinner plastic, patients experience temperature and pressure from the outside more normally.

### Which children are good candidates for DAFOs?

DAFOs seem to be most advantageous for developing children who have low muscle tone or light spasticity, and muscle imbalance problems. Because DAFOs are so thin, they are particularly well suited for lightweight children who do not require significant brace rigidity. They seem to work less well with heavy children or with those who have severe spasticity. In addition, the short style of DAFOs does not provide stability for the tibia in children with soleus weakness (a condition that contributes to a crouched gait).

DAFOs are excellent for holding an ambulatory child's foot in correct position for standing and walking. However, in choosing orthoses, gait analysis is critical to determining the cause of the child's walking deficits. This data will then allow the physician to select treatment (which may include orthoses) that best meets the individual needs of the child.

DAFOs can also be beneficial for non-ambulatory children, including for stabilizing ankles at rest. However, if a foot is twisted or deformed to a point where it cannot be pushed into a good position, a brace without prior surgery will not help.

### DAFO research shows strong patient preference

In a patient satisfaction study conducted at Gillette Children's Specialty Healthcare, 93 percent of the patients surveyed described their DAFOs as "comfortable" or "very comfortable," resulting in increased wearing time over traditional AFOs. The survey respondents also indicated that they liked DAFOs for their aesthetic appearance, thinness of the plastic and ease of fit within their shoes.

The fact that most of the children and parents surveyed preferred the dynamic type of AFO is quite significant. While DAFOs are certainly not the only (or necessarily the best) option for all patients, they do offer a number of significant benefits that may actually increase patient compliance and follow-through with the treatment program.



*The DAFO style of a supramalleolar orthosis (SMO) fits more easily into mainstream shoes making cosmesis more acceptable.*

### **Manufacturing and durability**

DAFOs have proved to be as durable as traditional AFOs. However, because DAFO plastic is much thinner, they cannot withstand as much modification. DAFOs typically need replacement after about a year (slightly more often than an AFO), but that is more dependent on the child's rate of growth than on breakage.

Because DAFOs include a custom-contoured sole plate, they are more time-consuming to manufacture than the traditional AFO. In addition, proper fit is more critical with the thin plastic used in the DAFO than with other braces. Achieving uniform thickness and total contact with the foot — critical for both stability and comfort — requires a skilled orthotist. As with other braces, functionality is only as good as the quality of the mold taken. The orthotist must recognize the normal anatomy of the foot and have the knowledge to place it in the appropriate position. This requires a good understanding of biomechanics and of normal gait patterns.

*Katie Walt, physical therapist, and Darius Picking and Georgia Lallas, certified orthotists, contributed to this article.*