When You Need an AFO Expert...

(Continued from page 1)

Materials

No factor has had greater impact on the progression of AFO design than the adaptation of sheet plastics to orthosis fabrication. Custom-fabricated plastic AFOs are considerably lighter in weight, more comfortable to wear, can easily be worn with different shoes, are more cosmetically pleasing, and most importantly, provide the substantial benefits of total contact. In recent years, plastic laminate buildups incorporating fiberglass and graphite resins have been employed to strengthen solid-ankle AFOs to achieve triplanar ankle immobilization. Previously, controlling ankle rotation with an AFO was difficult at best.

Designs

To attempt a comprehensive discussion of all possible AFO types would necessitate a much larger newsletter. Several of these designs are discussed in the MS/ALS management article on page 2. Tone-reducing AFOs comprise an interesting subset of AFO designs at our disposal, each offering its own attributes for different rehabilitation objectives. With the technology and body of knowledge expanding at a rapid pace, it is the particular role of the board-certified orthotist to keep abreast of proven new developments.

That’s a critical point. In our current difficult economy, it is sometimes tempting to choose non-traditional alternative providers for certain health services, foregoing qualifications and experience for a lower price. However, as in most things, “You get what you pay for” generally rings true in our field as well.

Off-the-Shelf or Custom?

The continuing rise of health care costs in America is exerting ever-increasing pressure on orthotic practitioners to foregoing the well-established therapeutic and functional advantages of custom fabrication for the immediate cost savings of prefabricated alternatives. Some applications do lend themselves to off-the-shelf AFOs, particularly those whose use will be short-term or a stepping stone to another orthosis. By far the greater number, however, should be custom-made from an anatomic model. Here’s why:

To carry our their role optimally, most AFOs rely on a total-contact fit and proper pressure distribution across the entire covered area. Total contact, which also helps guard against skin breakdown, does not occur with prefabricated products. Moreover, even when prefab models come in several sizes, achieving a “perfect” fit is difficult. Prefabricated AFOs and other pre-fab orthoses may have their place, but for the majority of applications custom is better and, by doing the job right the first time, is likely the better choice in the long run.

AFO – Orthosis for Many Reasons

The ankle-foot orthosis (AFO) ranks among the leading rehabilitation aids in the U.S. The majority of America’s four million stroke survivors wear some form of AFO to overcome drop foot and other biomechanical complications. Add the additional millions of children and adults challenged by cerebral palsy; multiple sclerosis; head trauma; polio; Charcot disease; ALS; fractures, injury and disease processes of the lower limb; and other central nervous system disorders, and you have a vast population of people whose quality of life can be improved by an appropriately prescribed, designed and fabricated AFO.

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Applications

AFOs are employed to control and correct biomechanical and/or neurological dysfunction, facilitate or restrict joint motion, maintain proper alignment of the lower limb, protect valgus structures from further insult or injury, such as a chronically inflamed Achilles tendon. Other times, the goal may be to immobilize the ankle, such as in the presence of degenerative joint disease when the patient is either unable or unwilling to undergo arthrodesis surgery. Still another AFO objective is relief of axial loading by shifting some of the weight-bearing stresses to the orthosis. Many variables enter into AFO construction: Materials, trims and intimacy of fit are key design determinants.

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Orthotic Solutions for MS, ALS Patients

Multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS) are related neuromuscular diseases that affect patients with progressive muscle weakness in the lower extremities, accompanied by coordination and balance challenges. While the progression of the two disorders is distinctly different, both produce mobility challenges that can be ameliorated with focused orthotic support.

MS affects an estimated 2.5 million people worldwide. Disease onset usually occurs between ages 20 and 50, more often in women. In MS, the body’s own immune cells attack the nervous system causing inflammation, which damages the myelin protective sheath surrounding nerve cells. This process disrupts brain communication to the body, resulting in muscle deterioration. Other MS symptoms include memory and cognitive problems, extreme fatigue, numbness and tremors.

ALS is a progressive disorder that attacks nerve cells in the brain and spinal cord controlling voluntary muscle movement. As these neurons waste away, they can no longer transmit signals to activate the muscles they normally control. ALS typically strikes between ages 40 and 60, more often in men. Besides weakness in the legs and arms, initial symptoms include difficulty speaking, swallowing and writing.

While the progression of the two disorders is distinctly different, both require counter-resistance. For mild-to-moderate MS and ALS patients, orthotic support is frequently prescribed in both instances to stabilize the foot and provide a safer and more efficient gait. In drop foot the leg muscles are unable to achieve a reliable forefoot ground clearance; tripping and falling are common. Patients may try to compensate with an exaggerated high-stepping gait pattern, which is both awkward and tiring. An orthotic device, generally some form of ankle-foot orthosis (AFO), provides a much superior solution.

Treatment Options

Posterior leaf spring AFO—In general, our approach with any orthosis is to provide the lightest and least-complex device that will get the job done. In the early stages of MS and ALS, that objective is generally best delivered by a custom-molded posterior leaf spring AFO, a simple L-shaped brace that provides necessary support primarily behind the ankle and under the foot and adds a degree of dorsiflexion. With this design, weakness and thickness are customized to reflect the strength and weight of the patient. With its thin profile and light weight, this AFO enjoys a high level of patient acceptance.

Articulated AFO—This design, featuring medial and lateral hinge joints closely aligned with the anatomical ankle joint and trimlines encompassing the sides of the leg as well as the back, provides additional support for patients demonstrating drop foot along with medial and/or lateral instability. The articulated AFO can also help control knee hyperextension resulting from quadriiceps weakness. The disadvantage of this design is that it is more bulky and difficult to conceal, an important consideration for some patients.

Solid-ankle AFO—This rigid construction promotes stability in all planes by preventing both dorsiflexion and plantar flexion. It is an appropriate choice when ankle motion must be controlled, as in the presence of ankle or knee instability or when ankle spasticity requires counter-resistance.

Addition of an anterior panel creates a floor attached to the brace heel and adds additional support a true advantage. For additional information on orthotic management for MS and ALS patients and the different types of AFOs, we invite you to call our office.

The Psychological Factor

Significant and prevalent issue when prescribing an AFO for MS and ALS patients is the reality that many will fight wearing a brace because of what it represents, just as they refuse to accept any of the other “baggage” of their disability. Denial and disregard of obvious physical limitations are all too common among this patient population.

When symptoms accumulate gradually, as opposed to occurring suddenly, many patients are already familiar with the need for any form of orthotic support, or at best will acquiesce only to a device providing less control and support than they need...no matter how much the more appropriate brace may help them. Many say they do not want an assistive device because it will make them appear disabled, or the orthosis indicates that their condition has reached a point of no return.

Beyond the denial factor, many patients believe their condition will worsen if their muscles aren’t constantly exercised. While there is some validity to this premise (which can be addressed by other means), the critical considerations of patient safety and the ability to stay mobile for as long as possible by wearing an appropriate AFO often become overlooked.

In the big picture, short-term cost is often well worth the long-term gain of being able to be safe and more active for a considerably longer period.

KAFO—When controlling drop foot is a concern, a knee-ankle-foot orthosis can be applied. This long leg brace effectively prevents knee hyperextension by maintaining close contact both below and above the knee. A locking mechanism can be included as needed for added stability.

FES Systems—In recent years, a non-traditional approach to controlling drop foot and limited knee hyperextension has emerged, which can benefit early stage MS and ALS patients. Functional electrical stimulation (FES) uses the WalkAide and the Biosense L300 direct electrical current to the peroneal nerve to trigger ankle dorsiflexion contraction timed to the gait cycle. FES devices are not widely approved for insurance reimbursement at this time.

Orthotic prescription for MS and ALS patients begins with an individualized evaluation followed by careful measurements and/or casting for creating the most intimate, effective orthosis possible. While we realize both diseases are progressive in nature and likely will require heavier and more technically rigorous orthoses down the road, we also realize that “bracing for the future” will only hasten the need for those more advanced devices. Therefore, we generally design AFOs to reflect existing and near-future conditions and anticipated needs.

Over time, MS and ALS patients tend to receive several braces of varying degrees of support and control, giving them a choice based on their planned activities and how they feel on a given day. MS patients in particular are driven by bad days, making the availability of different levels of orthotic support a true advantage. For additional information on orthotic management for MS and ALS patients and the different types of AFOs, we invite you to call our office.

Fighting MS Every Step of the Way

Down to Cases

60-year-old Jerry has been living with symptoms of multiple sclerosis for more than 20 years. Despite his diagnosis, he has managed to remain reasonably active, self-employed and involved in the community, thanks to excellent on-going medical care and orthotic support.

In “soldering on” Jerry reflects the dogged determination of many people with MS not to give in to their disease, a trait both admirable and at the same time potentially harmful. By minimizing the effects of the disease and his need for biomechanical support in his own mind, he sometimes chooses to wear older, less-supportive orthoses, thereby accepting a less-effective gait and risking a fall.

Over the years Jerry has received a progression of orthotic solutions designed to accommodate his disability beginning with a minimally controlling posterior leaf spring AFO to address his drop foot condition. After five years, his weakness had progressed to the point of requiring a more substantial articulating AFO, but like many MS patients unwilling to accept the visible indications of their disease, he refused to wear it for many months. When he finally came to accept the more prominent AFO, Jerry was already demonstrating significant knee hyperextension, rejuvenating his gait for the future.

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Note to Our Readers

Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection of those particular products nor does it mean that the products were specifically selected for any particular patient or application. We offer this information to enhance professional and individual understanding of the orthotic and prosthetic disciplines and the experience and capabilities of our practice.

We gratefully acknowledge the assistance of the following prominent companies:

- Bioflex Inc.
- Fillauer Inc.
- Horton Technology Inc.
- Innovative Neurotronics
- Orthomerica Products Inc.
- Ossur
- Otto Bock Health Care
- Ultraflexes

So while life is not altogether ideal for this MS patient, he is getting along nicely and expects to continue his active lifestyle for many years to come. His orthotic team is dedicated to helping him every step of the way.
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It is not uncommon for patients to try to keep up with the latest designs and fabrication techniques but rather to recognize that there is one type of practitioner who, generally speaking, knows more about AFOs than anyone else, including how to:

- perform a comprehensive patient orthotic evaluation…
- identify the most appropriate design for a given problem…
- accurately cast and modify a lower limb mold…
- select the most advantageous materials…
- fabricate, then refine, the finished orthosis, and…
- measure outcome and modify the AFO as necessary to produce optimal results.

In the certiﬁed orthotist, rehabilitation decision-makers have at their disposal an AFO expert who can help them achieve optimal outcomes for their patients. Call us for details.

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Overcoming drop foot is the most common and probably most familiar application. The orthosis supports the ankle at a 90 degree angle, and dorsiflexion assist may be incorporated to help the foot assume proper position for heel lift. Thus compensated, patients can walk more efficiently, more safely and with less fatigue.

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