A New Option for Correcting Dropfoot

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Programmable tilt sensor built into the system analyzes movement of the wearer’s leg and foot and controls stimulation during gait. The device is initially programmed with dedicated software on a laptop computer. Though a heel sensor is used for programming, it is not worn during routine use of the system.

Contraindications include lower motor neuron and/or peripheral nerve damage; secondary complications of knee, back or hip surgery; leg trauma; sciatia; peripheral neuropathy; spinal stenosis; post-polio syndrome and Guillain-Barre. The WalkAide should not be used by those wearing a pacemaker or who are subject to seizures.

While probably not the ultimate answer to the control of dropfoot, the WalkAide has the potential to improve gait, overall health, and quality of life for appropriate patients. A physician’s prescription is required.

What’s New

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We gratefully acknowledge the assistance of the following resources used in compiling this issue:

Innovative Neurotronics Inc. • Marta Tankersley Orthomerica Products Inc.

Orthotics Today

AFOs Bring Unruly Legs Under Control

AFOs, ankle-foot orthoses of various designs are widely considered an important aid in managing young patients with spastic cerebral palsy; indeed, they are prescribed for C.P. management more than any other orthotic device. Primary goals include contracture prevention, improved function and ambulation and tone reduction in proximal muscles to improve function at higher levels.

The chief role of the AFO in this application is to limit unwanted ankle and subtalar movement, primarily ankle plantarflexion, and indirectly to affect knee and hip function. Children with spastic C.P. often acquire a dynamic equinus deformity, which prevents them from putting their foot flat and attaining a stable base for stance and walking. Assuming the ankle can be placed in a neutral position at rest, i.e. the deformity is not fixed, a correction can be applied through one of several AFO constructions, depending on the capabilities of and goals for the patient.

Reviewing the different types of AFOs that may be appropriate for C.P. patients:

With a shorter profile

Orthotics for Managing Cerebral Palsy

Orthotics are frequently involved in the management of young patients with cerebral palsy. United Cerebral Palsy estimates that 764,000 children and adults living in the United States manifest C.P. symptoms and that some 8000 babies and infants and 1100-1500 preschool-age children are newly diagnosed each year. Of these, a majority are affected with spastic diplegia—stiff, permanent contraction of the muscles in both legs. Bracing for C.P. is primarily employed to stretch hypertonic muscles and prevent contractures. Ankle foot orthoses (AFOs), the most frequently prescribed devices for C.P. patients, manage abnormal plantar flexion (equinus deformity) by controlling or eliminating ankle and subtalar motion to prevent contractures and improve gait.

Splints can be employed to forestall elbow, wrist and hand contractures. Spinal braces can help children who are having difficulty sitting upright and straighten the spine in the presence of a developing deformity.

This newsletter explores the contributions orthotics can make in the C.P. management milieu. We hope you find the information worthwhile and welcome your comments and inquiries.
Tone-Inhibiting Designs Enhance AFO Function

Tone-inhibiting designs incorporate tone-inhibiting features effective in managing patients with spastic cerebral palsy and other upper motor neuron disorders.

There is considerable evidence that abnormal tone in proximal muscle groups can be influenced by joint position and cutaneous stimulation. For cerebral palsy management, maintaining a neutral position of the ankle and subtalar joint and stimulating key reflexogninous areas of the plantar surface (see drawing) can inhibit deforming reflexes and/or stimulate desirable antagonist reflexes to counter a dynamic equinus deformity, overcome toe grasp, and control foot pronation-supination and inversion-eversion issues, thereby enhancing function.

Tone-inhibiting features can be built into different AFO designs to accommodate the needs of both children and adults with neuromuscular deficiencies. An approach particularly suited to young C.P. patients is the dynamic AFO (DAFO), so named because its flexible design allows for variable correction of one degree of ankle motion. This flexible supra malleolar orthosis can be designed with a custom-contoured soleplate that eschews the desired reflex response. Key to the concept is that it is its thin wrap-around construction, which is particularly brief over the dorsum of the foot. In creating a DAFO, an orthotist can incorporate a set degree of plantarflexion or dorsiflexion as necessary and combine tone-reduction with other features, such as plantarflexion stops and three-pressure point systems, to address unique patient needs.

A DAFO is sometimes constructed around an inner ion, usually made of thermoplastic but sometimes fabricat- ed of very thin foam material.

The boot is formed first over the patient’s mold followed by the remainder of the AFO structure so the two pieces align correctly.

With its lightweight flexible construction, the dynamic AFO is generally well tolerated by young patients. The total-contact, soft plastic design largely eliminates skin breakdown, even in children unable to tolerate other types of AFOs because of breakdown or pressure sores.

Dynamic AFOs can be worn under any type of clothing and will fit inside shoes with a wide toe box. They can be rendered in bright colors and finished with popular children's designs. Assuming the patient does not grow out of them, DAFOs typically need to be replaced after about a year of wear.

Note: The terms “dynamic AFO” and “DAFO” are sometimes associated with different companies that fabricate finished orthoses from patient molds. Other providers fabricate these devices as well, sometimes under different product names. In using the dynamic AFO and DAFO terms, we are referring to the concept, not a particular company’s product.

Plantar surface reflexogenous areas; (1) dorsiflexion, (2) toe grasp, (3) inversion, (4) eversion.

SWASH Orthosis Solves Multiple C.P. Bracing Needs

Choosing the Right AFO for Cerebral Palsy Patients

Managing children born with cerebral palsy is a challenging business as clinicians strive to address a variety of issues, such as dystonia, hip migration, scissoring gait that interferes with ambulation, and hip adduction that limits independent sitting. The SWASH (Standing, Walking And Sitting Hip) orthosis tackles these difficult aspects of ambulating C.P. kids.

Though its primary application has been to benefit C.P. patients, this system is intended for use by any child whose addiction and/or internal rotation at the hip joint interferes with function or induces lateral migration of the femoral head. The SWASH brace has been proven effective for spastic diplegic and spastic quadriplegic children, even those with spina bifida.

The orthosis ensures variable abduction during both extension and flexion and therefore can support an active child in all postures encountered during an active day: standing, sitting, walking, crawling, even toilgeting. It can also be of value at night to retain hips in an abducted position or maintain stretch on tight hip adductors during sleep.

Though outwardly simple in appearance, the SWASH orthosis is capable of advanced biomechanical functions. It uses basic geometry to provide wide hip abduction when the wearer is sitting but narrower abduction when erect.

During ambulation, the brace maintains the legs virtually parallel, thus preventing scissor gait. By neutralizing destabilizing forces at the hips, this device also may improve overall trunk control and thereby facilitate upper limb function.

The orthosis also reportedly encourages some children to learn how to overcome pathological patterns of movement on their own.

How It Works

When properly fitted, the SWASH stabilizes the hip and opposes excessive adduction and internal rotation. As the hip moves into flexion, the joint mechanism is guided into abduction, reducing scissoring gait while walking and improving balance while standing. When the child sits, the orthosis provides continuous abduc- tion, resulting in a wider base and potentially a balanced gait. These configurations help to keep legs from touching and help to prevent or control foot pronation-supination and inversion-eversion issues, thereby enhancing function.

Contraindications to SWASH use include hip dislocation (total loss of contact between the femoral head and acetabulum), a hip flexion contracture of greater than 20 degrees, dynamic or fixed, and excessive external tibial torsion or foot progression.

The SWASH orthosis can be adapted for child growth—four sizes are available, from one for infants (to prevent hip subluxation) through two medium and one large sizes. The orthosis easy to apply and remove and can be worn over or under clothing as desired.
A new therapeutic concept combining the bracing role of the orthotics discipline with the muscle restoration function of FES (functional electrical stimulation) is now available for patients suffering from dropfoot through a product called the WalkAide.

Dropfoot, the inability to properly lift the forefoot during ambulation, frequently results from interruption of normal signals from the brain to the peroneal nerve, which normally trigger dorsiflexion in swing phase. The condition is a common outcome of multiple sclerosis, cerebral palsy, stroke, traumatic brain injury, and spinal cord injury.

Common manifestations are toe dragging in swing phase and foot slap at the beginning of stance phase as the dorsiflexors are unable to overcome the plantarflexion moment created at heelstrike. Patients with dropfoot often compensate with an exaggerated high-stepping ambulation known as steppage gait.

The WalkAide surmounts dorsiflexor weakness or paralysis by stimulating the peroneal nerve at the appropriate point in the gait cycle to lift the forefoot, assuring ground clearance and providing for a normal heel-to-toe rollover. The result is a more natural, smoother, safer, and more energy-efficient gait.

In recreating the natural nerve-to-muscle response, the WalkAide not only corrects for biomechanical dysfunction but may improve circulation, reduce atrophy and increase joint range of motion. This technology was under development at various research centers for 10 years before recently receiving FDA approval.

The device consists of a battery-operated electrical stimulator, two electrodes and electrode leads packaged into a small case, which are worn on the lower leg, near the fibula head. The WalkAide is an alternative to the conventional orthotic treatment for dropfoot, an ankle-foot orthosis. AFOs have long been an effective management tool for this condition, but for some patients an FES system may provide an improved gait and be more comfortable to wear and more cosmetically acceptable.

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Innovative Neurotronics

A Publication of Falk Prosthetics & Orthotics, Inc. No. 22

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