Orthopedic Appliance Company
Asheville, NC • 828-254-6305 • www.OrthopedicApplianceCo.com
Prosthetics • Orthopedic Bracing • Seating & Mobility No. 5

Children Are Not 'Small Adults'

This newsletter focuses on the unique aspects of providing orthotic devices to children. From a biomechanical and design perspective, working with young patients draws largely on the same orthotic principles and materials as with adults; indeed the spectrum of orthotic appliances includes relatively few systems designed specifically for pediatric applications.

Nevertheless, the caveat *Children are not small adults!* clearly applies to orthotic management—kids present unique opportunities and challenges. The overall goals are familiar: prevention and/or correction of deformities and functional improvement.

Orthotics Today

While desired outcomes sometimes can be achieved with scaled-down versions of adult appliances, providing pediatric orthoses calls into play certain skills and considerations that add complexity to the process but offer commensurate professional reward.

Courtesy Shane Coltrain

Here are some special considerations we encounter in managing children:

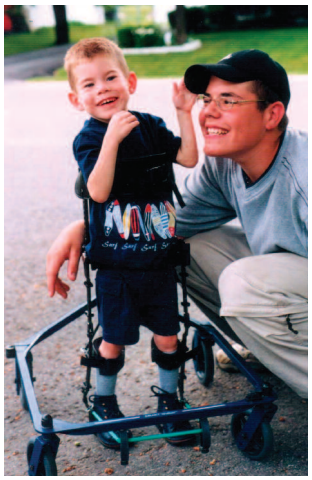
• **Custom vs. off-shelf.** While some popular devices such as the Pavlik Harness, orthopedic shoes and night splints are primarily prefabricated components, pediatric orthoses tend to be custom-made because of the reduced tolerance for error corresponding to the child's stature and smaller area on which correctional forces can be focused.

• **Growth.** The propensity of a child's bones and muscles to grow non-synchronously challenges orthotists to incorporate design features that will sustain productive orthotic forces over time while maintaining range of motion...and at the same time remaining on speaking terms with parents, HMOs, and others who write the checks.

DDH orthosis

Courtesy Fillauer Inc.

• **Developmental age.** Each child presents with his/her unique combination of motor development, cognitive and adaptive function, and learning ability (possibly retarded by disease process). This set of variables challenges orthotists to provide componentry suited to the patient's capacity to benefit from it.



Smart Walker gait training orthosis

• **Communication**. Very young and some older developmentally impaired children are often unable to verbalize pain or describe problems with the way an orthosis fits or feels. Further, young patients cannot be expected to understand or remember details of application, schedule, skin care, orthosis care, etc. Thus, the orthotist is called on to employ special skills of observation and communication with the child and parents to realize the intended benefits from orthotic intervention.

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Compression Hosiery Demand Growing

The value of compression hosiery for treating venous insufficiency has been recognized since the 4th century B.C.; however, the gradient compression stocking (GCS), pioneered by Conrad Jobst, did not appear until 1950. With 77 million baby boomers now reaching their senior years, the demand for this therapeutic legware is reaching new highs.

Gradient stockings gently apply pressure at the ankle and gradually reduced pressure proximally, which helps return unoxygenated blood to the heart. While GCS products are typically prescribed by physicians, increasing numbers of consumers now purchase them as part of their healthy lifestyle.

Orthopedic Appliance Co. maintains a full line of JOBST products. For details, call us at **(828) 254-6305**.

From Tip to Toe, Specialized Orthoses Support and Direct Childhood Development

The following selection presents a cross-section of orthotic componentry employed in contemporary management of pediatric patients. While some also have adult applications, the majority of these designs are primarily prescribed for children.

If you have an interest or questions regarding a particular orthosis presented, or excluded, here, please call our office.

Courtesy Ultraflex Systems

Ankle Foot Orthosis (AFO)

Application: Varum and valgus deformities

Description: Custom-fabricated thermoplastic, metal or composite device designed and trimmed for patient's unique needs

Function: Provide proper alignment, limit or encourage ankle motion

Anti-Adduction Orthosis

Courtesy Fillauer Inc.

Application: Tight hip adduction secondary to spastic diplegic cerebral palsy

Description: Custom-molded thigh cuffs connected to adjustable aluminum joint

Function: Control adductor tightness, leg scissoring

B-Hip Abduction Orthosis

Application: Children age 3-12 months with hip dysplasia or a hip subluxation

Description: Lightweight plastic orthosis consisting of an abdominal strap and thigh cuffs connected to a posterior plate by straddle bars

Courtesy Fillauer Inc.

Function: Maintains hip at 90 degrees of of flexion and 60 degrees of abduction to promote proper femoral head and hip development

Cranial Remolding Orthosis

Application: Positional or deformational plagiocephaly, brachycephaly, scaphocephaly

Description: Custom-molded plastic-foam helmet

Courtesy Orthomerica

Function: Redirect cranial growth to correct facial and skull asymmetry

DAFO - Dynamic Ankle Foot Orthosis

Application: Cerebral palsy, hemiplegia, spastic diplegia

Description: Thin, flexible molded thermoplastic orthosis covering the entire foot; custom-contoured footplate; designed to distribute weight-bearing forces over large area

Function: Reduce ankle hypertonicity, increase ankle stability and provide proper alignment

Floor Reaction Orthosis

Application: Cerebral palsy "crouch gait," knee instability

Description: Rigid thermoplastic or laminate AFO with neutral ankle position and a broad anterior panel just below the knee

Function: Apply knee extension moment during stance phase to prevent knee buckling and excessive flexion associated with crouch gait

Courtesy Orthomerica

Knee-Ankle-Foot Orthosis (KAFO)

Courtesy Ultraflex Systems

Application: Hemiplegia, diplegia, lower-limb instability and deformities

Description: Primarily thermoplastic laminated brace extending from thigh to footplate, typically incorporating a knee and/or ankle joint

Function: Control motion and alignment of the knee and ankle

Maple Leaf Hip Abduction Orthosis

Application: Cerebral palsy, ages 4-12.

Description: Anatomically contoured thermoplastic lumbar-pelvic section connected to thigh cuffs by adjustable locking joints

Function: Maintain length of involved musculature and control or prevent recurrence of deformity after soft tissue release or related hip surgeries

Courtesy Becker Orthopedic

Courtesy Becker Orthopedic

Non-Invasive Halo Vest

Application: Positioning of structurally stable spine after complications of standard halo immobilization, C1-C2 rotary instability, torticollis

Description: Pinless, MRI-compatible HALO headpiece and vest with rigid or semi-rigid back post component

Function: Cervical spine immobilization and control

Parapodium

Application: Paraplegic patients 3 years and older, spastic cerebral palsy, myelomeningocele

Description: Aluminum frame incorporating thermoplastic footplate, foam knee block, hip and knee locks, and chest and back panels. Three-point system keeps patient upright.

Courtesy Fillauer Inc.

Orthotic Considerations for Children

(Continued from page 1)

• **Weight.** Plastics and other synthetic materials are typically chosen over metal and other heavier choices to make the orthosis as absolutely lightweight as possible. Minimizing weight while incorporating sufficient durability to withstand the stresses imposed by an active child adds to the challenge.

• **Finishing Enhancements.** Colorful, creative finishing, as with cartoon or action figures, can make orthosis wear significantly more acceptable to a younger child. Other techniques—designing braces to be worn under clothing or to fit into normal-appearing shoes—enhance body image and therefore acceptance among older, appearance-conscious pre-teens and adolescents.

• **Family Support.** Though a child's abilities, viewpoint and responses will vary significantly from infancy to adolescence, active parental and family participation in the orthotic intervention remains critical throughout. Few pediatric patients can be expected to carry out the at-home portion of the orthotic plan independently.

Our orthotic staff is well-trained and experienced in working with pediatric patients. We invite your inquiries and referrals.

Function: Enable paraplegic children to stand without crutches; prevent or reduce flexion contractures. Those with good torso control can achieve pivot gait and independent mobility.

Pavlik Harness

Application: Hip dysplasia, including congenital hip dislocation, in infants of pre-walking age

Description: Shoulder harness with anterior and posterior straps extending from chest strap to stirrups

Courtesy Fillauer Inc.

Function: Hold hip in flexion-abduction attitude while allowing for movement within acceptable limits

Courtesy Fillauer Inc.

Reciprocating Gait Orthosis

Application: Lower-body neurologic impairment: Indicated in L1 to L3 lesions in children with functioning iliopsoas and hip adductors

Description: HKAFO incorporating cable system or similar method of mechanically translating hip extension on one side into hip flexion on the contralateral side

Function: Provide standing and ambulation ability, thereby raising physical and psychological horizons

Scoliosis Jacket

Application: Idiopathic scoliosis

Description: Thermoplastic TLSO

Courtesy Boston Brace Inc.

Function: Limit curve progression and need for surgical correction

Scottish Rite Orthosis

Application: Legg-Calve-Perthes disease

Courtesy Fillauer Inc.

Description: Lightweight orthosis consisting of metal pelvic band, plastic thigh cuffs, aluminum hip joints with thrust-bearing hip joints or a telescoping spreader bar (older design)

Function: Maintain hips in abduction containing femoral head in the acetabulum

SWASH - Standing, Walking and Sitting Hip Orthosis

Application: Cerebral palsy; any child whose adduction and/or internal rotation at hip joint interferes with function or induces lateral migration of the femoral head

Description: Plastic padded waist band and two joint assemblies connected by shaped leg bars to adjustable plastic thigh bands

Function: Stabilize hip and oppose excessive adduction and internal rotation; reduce scissor gait while walking and improve balance while standing

Torticollis Orthosis

Courtesy Fillauer Inc.

Application: Congenital muscular torticollis/sternomastoid torticollis

Description: Custom-molded helmet and shoulder sections connected by multi-planar adjustable joint

Function: Maintains head in any desired position, including rotational and longitudinal adjustments, post-sternomastoid release surgery

Wheaton Brace - KAFO (Tibial Torsion Orthosis)

Application: Metatarsus adductus, clubfoot, tibial torsion; used in place of serial casting or corrective shoes

Description: Molded thermoplastic and Velcro knee-ankle-foot orthosis

Function: Applies direct corrective rotational force on the tibia without any torque on the femur or hip

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 for use with 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 resources used in compiling this issue:

Becker Orthopedic • Boston Brace Inc.
Fillauer LLC • Orthomerica Products Inc.
Ultraflex Systems Inc.

2 New Options for Treating C.P. Spasticity

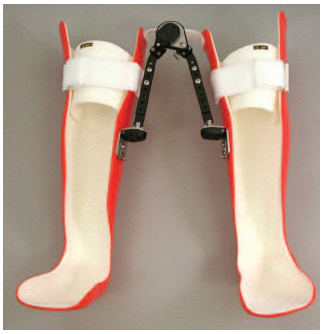
For nearly two decades, Ultraflex custom orthoses have provided the rehabilitation community with conservative management options for severe neuromuscular and/or orthopedic dysfunction. Recently, the company introduced two new joint mobilization systems for managing cerebral palsy-induced spasticity.

The **HOPe1 (Hip Orthosis, Pediatric)** is a variation of the traditional A-Frame brace incorporating an Ultraflex joint mounted to solid knee orthoses or knee-ankle-foot orthoses at mid-calf with swivel brackets. It can be used for pediatric patients needing night bracing post-multilevel Botox for spastic cerebral palsy or where abduction of the hip is needed.

The joint unit provides:

- a 7.5 degree-increment abduction or adduction stop,
- 7.5 degree-increment don/doff locks,
- adjustable dynamic tension for abduction assist, and
- adjustable internal/external rotation position.

What's New



HOPe1 Orthosis

Courtesy Ultraflex Systems

The solid KO or KAFO sections minimize point pressure, and patellar counter force strapping keeps knees in full extension (as cast). Components gently abduct to stable full maximum abduction, and bar length adjusts to achieve maximum abduction and allow for growth.

The HOPe1 is easier to don and provides better compliance than traditional A-frames. Quick release components add to this brace's flexibility of use.

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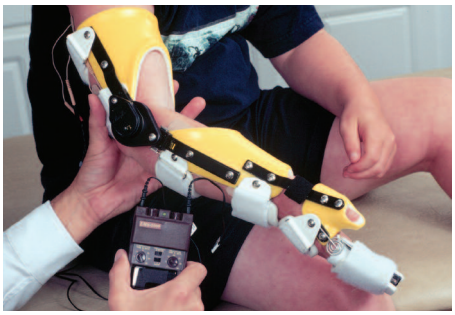
First*Flex*™ is a conservative treatment protocol combining custom bracing and neuromuscular electrical stimulation for select children with upper-extremity C.P.-induced spastic hemiplegia. Patients, age 3-20, with mild-to-moderate spasticity in the scapula, shoulder and elbow and moderate-to-severe spasticity in the wrist and fingers who have been treated with First*Flex* have achieved significant gains in posture, strength and control of global arm-hand function without pharmacological injections or surgery.



First*Flex™ *System

Courtesy Ultraflex Systems

The First*Flex* custom orthosis provides precise dynamic input to the complete spastic elbow-wrist-hand musculature, including pronator isolation. The dynamic extension MCP finger pan postures, lengthens and strengthens the intrinsic hand musculature needed for grasp and pinch functions.

Patients treated with First*Flex* demonstrate improved reach, grasp and pinch with carryover improvement in daily activities: hair combing, dressing, and play.

A retrospective study covering seven years and a prospective study conducted over two years revealed marked improvement in appropriate patients. The research points to patient cognition, motivation and parental support as crucial ingredients in the treatment's success. Research details are available through the Ultraflex internet site, www.ultraflexsystems.com.

First*Flex* is not recommended for children with fixed capsular elbow or wrist contractures; extremely poor sensation; or prior wrist fusions, tendon transfers, or selective neurectomies.

To be effective, First*Flex*™ program requires an extensive daily time commitment on the part of both patient and caregivers. Considerations also include psychosocial family issues as well as the daily logistics of scheduling two 30-minute treatment sessions and of donning the brace at bedtime.

For further information on these and other orthotic options for C.P. management, contact our office.

OAC: Your Lymphedema Therapy Solution

Orthopedic Appliance Company (OAC) is pleased to provide North Carolina physicians and patients a complete lymphedema management solution by stocking a comprehensive range of JOBST® compression products for MLD (manual lymphatic drainage) therapy.

Bandages such as Comprilan® and Artiflex® provide compression for patients between therapy visits. Once a patient has completed the decongestive phase of the MLD process, we can provide compression garments to maintain the affected limb. Elvarex® custom-made compression products are known as the global standard for lymphedema maintenance. Although lymphedema is a chronic condition, Elvarex garments help prevent an increase in extremity dimensions and thus help patients improve their quality of life.

For more information on JOBST lymphedema products, contact OAC at **(828) 254-6305**.