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Years of Excellence*

# U **PROSTHETIC & ORTHOTIC** UPDATE

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No. 43

## The Case for Spinal Bracing

Orthotic management of spinal conditions presents a variety of options and challenges to today's clinicians...options in the wide variety of devices now in use, challenges in selecting the most appropriate one for each patient's specific needs.

Spinal bracing encompasses three primary objectives:

- Control of back pain, by limiting motion and unloading discs, vertebrae and other spinal structures through abdominal compression.

- Temporary stabilization of weak or injured structures, as in spinal immobilization following back surgery, or protection for injured ligaments or muscles.

- Long-term protection, control or correction of a spinal deformity by application of three-point force systems. In children with scoliosis or another spinal deformity, the orthosis is employed to provide partial correction or prevent progression of a deformity (scoliosis, hyper- or hypolordosis, or hyper- or hypokyphosis) during completion of growth and spine maturation.

Virtually all spinal orthoses achieve these objectives by three effects: (1) abdominal compression, (2) restricted trunk motion, and (3) a three-point force system to effect modification or partial correction of a spinal deformity.

### Orthotics Today

How effective are spinal braces at achieving these objectives? Investigators generally agree that a well-fitting orthosis offers effective control of gross spinal motion, but its ability to control intersegmental

vertebral motion is not as well accepted.

Certainly a brace custom-fabricated to a positive model of the patient's anatomy offers the greatest opportunity for success in this regard. However, newer off-the-shelf appliances are becoming increasingly adaptable (see What's New, page 3) with many more customization features than older models and thus offer more potential for a successful outcome.



*OrthoLux™ soft orthosis is one of the new "spacer fabric" semi-rigid orthosis designs.*

*Courtesy Hope Orthopedic.*

*(Continued on page 2)*

## Spinal Orthoses 2005

Our objective in this issue is to present an overview of current-day practice, highlighting the systems that can make a difference for clinicians and patients. We do not necessarily recommend or endorse any of these spinal bracing products for any particular patient or diagnosis but offer them as having significance in certain segments of American practice today.

Of necessity, discussion of individual orthosis designs is cursory. If you would like more detailed information, please call our office.

*Boston Brace TLSO can be used to arrest scoliosis curve progression.*

*Courtesy Boston Brace International.*



## Keeping You Informed

This professional newsletter is published by Nobbe Orthopedics to inform healthcare professionals of current developments in our orthotics and prosthetics facilities.

Nobbe Orthopedics is certified by the American Board for Certification in both orthotics and prosthetics on practitioner as well as facility levels. Your assurance of the highest quality patient care is very important to all of us at Nobbe Orthopedics. We provide the full range of O&P rehabilitation, from simple foot orthoses to complex myoelectric arm systems.

We continue to implement the latest proven techniques and state-of-the-art technology, along with our customary prompt, professional and courteous service. Our ongoing goal is to work with you in a team environment in the pursuit of total rehabilitation, comfort and care for every patient.

We hope you find this publication informative and welcome your questions, comments and suggestions.

# The Case for Spinal Orthoses in Today's Practice

(Continued from page 1)

Spinal orthoses are broadly categorized as flexible, rigid, or semi-rigid. Flexible orthoses consist primarily of cloth belts and corsets. Thanks to innovative application of resilient plastics in the last decade, semi-rigid devices combine the strength and support of traditional rigid materials with the comfort and improved tolerance of fabrics.

## Flexible Orthoses

Flexible belts and corsets are prescribed for relief of low back pain associated with degenerative disc disorders, trauma or postural fatigue and, in certain cases, to provide a measure of biomechanical stabilization. They are typically made of cotton, nylon or rayon fabric.

Corsets serve primarily to unweight spinal structures by increasing abdominal compression. Adding rigid inserts and/or vertical stays can effectively restrict motion, either by physical limitation or as a reminder to maintain proper posture. Sacroiliac belts and corsets are sometimes used for postpartum and post-traumatic stabilization of pelvic joints.

Most flexible spinal orthoses come prefabricated and are custom-fitted and modified to patients' specific requirements. While many health practitioners provide and fit these flexible devices, a certified orthotist is the most qualified and best equipped for addressing the unique needs many patients present.

## Semi-rigid Orthoses

Semi-rigid systems combine a high percentage of the spinal control provided by a rigid brace with the tolerance-enhancing comfort of a flexible orthosis. A new type of semi-rigid design, exemplified by the OrthoLux soft orthosis, incorporates breathable spacer fabrics laminated between layers of foam with semi-rigid moldable panels sewn into anterior and posterior pockets.



**Jewett-type brace helps counter hyperkyphosis caused by osteoporosis and other conditions.**

Courtesy Otto Bock Health Care.

## Rigid Orthoses

A well-trained orthotist's skill and experience is of particular importance in the initial fitting of and progressive adjustments to rigid deformity braces and in providing custom-fabricated orthoses.

**Prefabricated braces**—Among the significant prefab braces:

- Flexion-extension control braces employ one or more three-point force systems to limit flexion and extension, limit rotation to a small degree and somewhat limit lateral bending and increase abdominal compression.

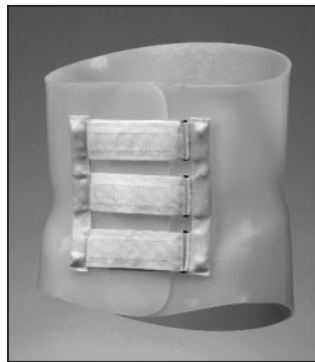
Notable examples include the "chair-back" LSO and Taylor TLSO, which may be prescribed for relief of low back pain and immobilization after back surgery.

- Flexion-extension-lateral control orthoses, such as the Knight LSO and Knight-Taylor TLSO, as the name implies, provides motion restriction for flexion, extension and lateral movement but minimal rotation control.

- Anterior hyperextension (flexion control) TLSOs apply a three-point force system to restrict forward flexion in the thoraco-lumbar

area to counter hyperkyphosis and increase lumbar lordosis, frequent needs of patients with osteoporosis, and to provide support after spinal fractures. Commonly used models include the Jewett and CASH braces.

- Thermoplastic modular TLSOs, such as the Boston Overlap Brace, are typically manufactured in standard sizes



**Boston Overlap Brace**

Courtesy Boston Brace International.

and different curvature contours. With proper fitting, these orthoses have proven effective for treating back injuries, as well as discogenic low back pain and various deformities.

**Body Jackets**—While properly fitted prefabricated systems can be used successfully in a variety of applications, the greatest degree of control is obtained with a custom-molded body jacket.

A body jacket constructed of high-temperature thermoplastic applies firm counter force to spinal motion in all planes (flexion-extension, lateral and rotation) and elevates abdominal pressures. Because a properly molded jacket achieves total contact, pressures are distributed over the widest possible area, increasing patient comfort and compliance. Recent improvements include frontal closures for easier donning and doffing, use of lightweight plastics, use of multiple cutouts to accommodate individual patients' anatomy and improve air circulation, and modern fabrics to wick moisture away from the skin.

Unfortunately, not all patients who require the definitive support and/or correction of a rigid body jacket can begin to tolerate one: Common geriatric complications—

reduced muscle tone, skin conditions, and scar tissue—often render a rigid orthosis unusable. In the past, these patients typically have been given a soft dorsolumbar support, which while effective in mild cases is usually not sufficient to enable patients with advanced deformity to resume a reasonable level of daily activities.



**Soft body jacket is often tolerable for geriatric patients.**

Today, an increasingly common approach is a soft body jacket. This orthosis maintains the total body contact provided by its rigid cousin, dispersing the corrective force over as wide an area as possible. Also like the hard jacket, it is custom-molded to a model of the patient's torso, but in place of the rigid, heavy thermoplastic shell, the soft version is constructed of lightweight plastic and soft inner foam, which combine to make the jacket substantially more comfortable to don and wear and easier to tolerate for extended periods. The challenge is to incorporate the most rigid materials possible and still promote compliance.

The soft body jacket is applicable for geriatric patients requiring external support for long-term spinal problems: osteoporosis, compression fractures and deformities of other origins.

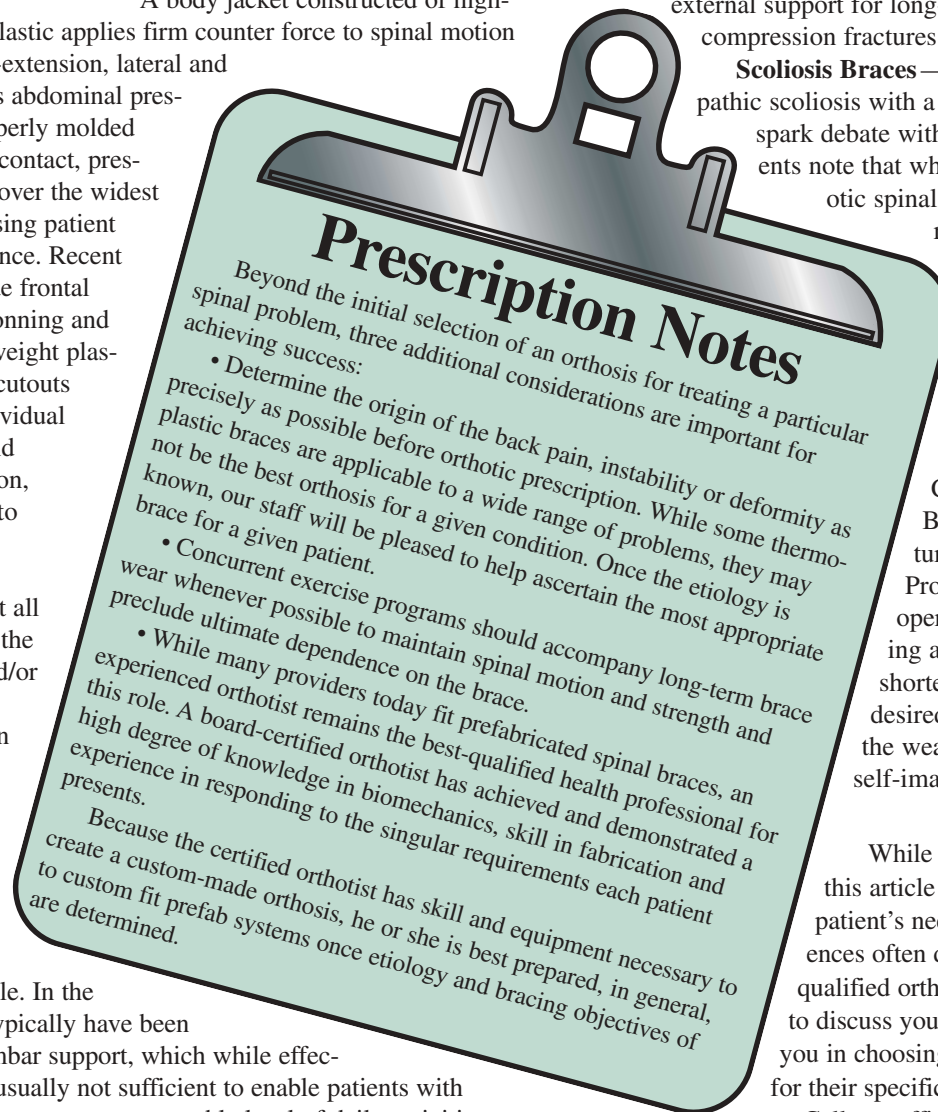
**Scoliosis Braces**—Management of adolescent idiopathic scoliosis with a spinal bracing regimen continues to spark debate within the medical community. Proponents note that while permanent improvement of scoliotic spinal curvature is uncommon as a sole result of bracing, this modality has been proven effective at preventing further progression of abnormal curves until the patient achieves skeletal maturity.

Options range from the time-honored, though sometimes compliance-challenged, Milwaukee Brace CTLSO to the less-conspicuous Boston Brace TLSO to the nocturnal Charleston Bending Brace and Providence Scoliosis System, which operate under the principle that providing a more-rigorous corrective force over shorter periods, i.e. at night, will achieve desired spinal curve change while giving the wearer more freedom and a stronger self-image.

## Ready to Help...

While several different braces discussed in this article may be applicable to a given patient's needs, regional and individual preferences often dictate prescription decisions. Our qualified orthotic practitioners are readily available to discuss your patients' requirements and assist you in choosing the most appropriate spinal orthosis for their specific requirements.

Call our office any time you require assistance.



## Prescription Notes

Beyond the initial selection of an orthosis for treating a particular spinal problem, three additional considerations are important for achieving success:

- Determine the origin of the back pain, instability or deformity as precisely as possible before orthotic prescription. While some thermoplastic braces are applicable to a wide range of problems, they may not be the best orthosis for a given condition. Once the etiology is known, our staff will be pleased to help ascertain the most appropriate brace for a given patient.
- Concurrent exercise programs should accompany long-term brace wear whenever possible to maintain spinal motion and strength and preclude ultimate dependence on the brace.
- While many providers today fit prefabricated spinal braces, an experienced orthotist remains the best-qualified health professional for this role. A board-certified orthotist has achieved and demonstrated a high degree of knowledge in biomechanics, skill in fabrication and experience in responding to the singular requirements each patient presents.

Because the certified orthotist has skill and equipment necessary to create a custom-made orthosis, he or she is best prepared, in general, to custom fit prefab systems once etiology and bracing objectives of are determined.

## An Adjustable Spinal Brace

In the world of spinal braces, three fabrication options predominate: custom-molded to a positive cast, custom-molded from measurements and off-the-shelf precast. A custom-molded body jacket provides a precise fit to the patient's torso and thus typically delivers the most effective performance. However, these orthoses require considerable fabrication time and expertise and sometimes are physically demanding to wear.

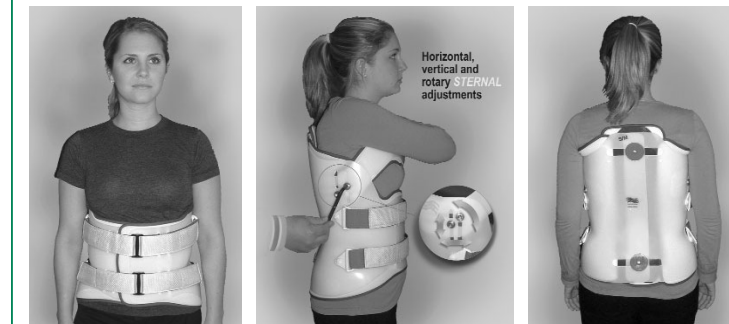
Precast off-the-shelf products, on the other hand, are generally easy to tolerate but lack the intimacy of fit of a custom-molded brace and thus are typically not as effective.

Now comes an interesting hybrid approach that approximates the close fit of a custom spinal brace while maintaining the speed and ease of fabrication of a precast system. This adjustable spinal orthosis from USA Sport & Health incorporates a sliding center back panel linking two torso panels to provide ready adjustability to a wide range of patient sizes and shapes.

But the primary focus of this system is to maintain or achieve a desired degree of lumbar curve. The rear panel is preset at 25 degrees but is thermo-moldable to any desired level of lumbar curvature. Locking mechanisms can be adjusted along the horizontal, vertical and sternal axes for a precision fit. Hook and loop tension straps are secured to the front of the device for easy donning and doffing. The orthosis is available in both TLSO and LSO models.

The posterior panel is available in four heights to accommodate different torso lengths. Unlike custom-molded systems, the device can be placed on a patient immediately and tightened to fit through the use of its many adjustable elements. The brace's adjustability also readily accommodates significant patient weight fluctuations.

With these features, the adjustable spinal orthosis lends itself well to quick and easy orthotic fitting in hospitals and nursing homes.



**LSO**

**TLSO lateral view**

**TLSO posterior view**

Courtesy USA Sport & Health.

## 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:

Boston Brace International • Hope Orthopedic • Össur  
Otto Bock Health Care • USA Sport & Health



## Spinal Bracing Terms

A system of nomenclature has been devised to describe orthoses in terms of the joints they encompass and the desired control for those joints. In this system, spinal braces are described as sacroiliac (SIO), lumbosacral (LSO), thoracolumbosacral (TLSO), cervicothoracolumbosacral (CTLSO), cervical (CO) and cervicothoracic (CTO) orthoses. Control is generally described in terms of spinal flexion, extension, rotation, and/or lateral (bending).

While this terminology is becoming common, some traditional ways of naming and categorizing spinal systems remain in popular use. Orthoses may be classified:

- as to rigidity (i.e. flexible vs. semi-rigid vs. rigid)
- by the presenting diagnosis (e.g. *scoliosis brace*); or
- by details or materials used in fabrication (e.g. *plastic body jacket*).

The specific name of an orthosis may be an eponym (e.g. Knight brace), credit the city or institution in which it was developed (e.g. Boston Overlap Brace), or reflect some other pertinent detail of its construction or application. But because the same orthosis is often known by different names in different disciplines, specialties and geographic regions, the more complete the description when discussing or prescribing spinal braces, the less opportunity for confusion or error.



**Rigid body jacket, bivalve**

Courtesy Boston Brace International.

In particular, when prescribing a spinal orthosis, we recommend including: the diagnosis, generic nomenclature, eponym or common name, and additional specifications (e.g. *plastic body jacket TLSO for spinal stability, bivalved with soft interface*); expected duration of wear; and whether the device is to be worn during sleep or in the shower.

## Knee 'Unloader' May Be Solution to OA Pain

The pain of osteoarthritis affects a significant proportion of patients in the United States, some estimates putting the number of sufferers near 10 million. While a variety of medical and surgical solutions have been posed in recent years to reduce the pain of osteoarthritis—most notably the non-steroidal anti-inflammatory family of drugs—recently revealed cardiovascular side effects are calling NSAIDs' long-term usefulness into question.

Orthoses are available to alleviate osteoarthritic knee pain, and as in the family of spinal orthotic systems, they come in both flexible and rigid types.

Flexible knee braces are generally made of elastic or neoprene materials and are available over the counter. While their effectiveness in slowing the progression of osteoarthritis has not been substantiated, they provide the sensation of support for patients who wish for added stability while engaged in their daily activities.

Unloader knee braces, on the other hand, have been shown to significantly reduce pain and control the symptoms of knee osteoarthritis. An unloader brace acts to maintain a healthy side (medial or lateral) of the knee when the opposite side has collapsed. Patients have demonstrated increased comfortable walking speed and stability while wearing an unloader knee brace. Unloaders have also been shown to postpone the need for knee surgery.

The unloader brace as fitted and managed by an experienced orthotist may well be the alternative to expensive prescription medicines posing concerns about long-term safety in their use.



**GII Unloader knee orthosis**

Courtesy Össur.

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