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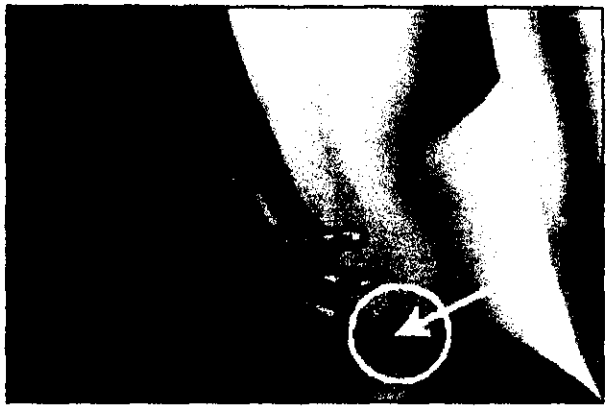
SURGICAL ALTERNATIVES

The Benefits of Spinal Decompression

by Rich Smith

Exploring a procedure that has become an integral part of a comprehensive spinal rehabilitation program.



Time was that a patient with back pain caused by a herniated disc or other disc deformity could look forward only to expensive major spine surgery for relief. Now, of course, he has options, such as minimally invasive endoscopic discectomy or, if a more conservative approach is merited, spinal decompression therapy.

Endoscopic discectomy entails use of an imaging-guided probe inserted between the vertebrae and into the herniated disc space. Microsurgical attachments routed through the endoscope remove a portion of the nucleus tissue of the compromised disc; the amount excised depends on various circumstances but never affects the disc's support structure. It is also possible to use the instrument to manipulate a distorted disc back into place or to purge fragmented disc material and bone spurs.

Upon completion of the work and subsequent extraction of the endoscope, the tiny wound site is covered with a small plastic bandage—no stitches involved. Because it is minimally invasive (and requires only a local anesthetic), an endoscopic discectomy takes only about an hour to complete. Moreover, patients can expect little or no pain. Risk of complications associated with conventional lumbar surgery is drastically reduced—in many instances, altogether eliminated.[1]

LOCKED AND LOADED

Then there is spinal decompression therapy, which has garnered considerable attention in recent years. It is a nonsurgical treatment for low-back pain and pain in the leg, neck or arm that works by reducing loading of the spine.[2] Researchers note that many adults suffer from excessive spinal loading, which is problematic because it promotes premature degeneration of intervertebral discs and leads to a tendency for repeated injury of the disc annulus.[3]

Spinal decompression therapy to address loading customarily involves near-daily, hour-long sessions over a span of roughly 2 to 6 or 7 weeks during which spinal stabilization exercises

are a regular component.[2]

A consideration in spinal decompression therapy sometimes given short shrift is osmotic diffusion of collagen precursors—in other words, disc nutrition. Without good osmotic diffusion of collagen precursors, avascular disc nutrition will not occur and that makes healing in the disc segment an iffy proposition. In a healthy spine, 30% of the collagen precursors—proline, nutrients, and oxygen—diffuse into the avascular disc via the annulus (that is the direct route), while 70% pass through the overhead—and underneath—vertebrae hyaline end-plate; if a single cycle of this diffusion takes roughly 500 days in a normal disc, imagine how much longer and less reliable the process will be for an abnormal disk. Fortunately, however, diffusion is helped by lowering intradiscal pressures, precisely what spinal decompression therapy accomplishes.[3]

Giving encouragement to the proponents of spinal decompression therapy are numerous clinical studies demonstrating that the therapy does indeed cause disc space to decompress, generally by producing and sustaining negative intradiscal pressure. One such study looking at patients with herniated and degenerative disc disease found that 86% of 219 subjects who completed decompression therapy reported immediate disappearance of symptoms, while 84% of the total remained pain-free for 3 months afterward; 92% of the cohort showed varying degrees of physical improvement—those gains were locked in for the vast majority of them 90 days after treatment.[4]

Naturally, spinal decompression therapy is not for everybody. Conditions helped by it are largely confined to sciatica, disc hernia, disc protrusion, spinal stenosis, and radiculopathy.[2] Still, that doesn't stop doctors (and payors) from wishing it could be for everybody: spinal decompression therapy is economical, with costs only about 10% those of lumbar surgery.[4]

TURNING THE TABLES

A common approach to administering spinal decompression therapy finds the patient placed comfortably atop a specially designed table that cycles distraction tension to the lumbar spine in concert with brief relaxation respites. The goal here is to safely isolate the deformed spinal disc and mechanically induce unloading without also triggering counterproductive reflex paravertebral muscle contractions. Most spinal decompression therapy tables do a fine job of meeting that objective.[2]

More and more, though, these tables are going high-tech. For example, among the market leaders is a computerized table system that employs no harnesses, straps, belts, ropes, or pulleys, yet is able to generate ample force to the spine in a remarkably efficient manner. With this increased efficiency, a patient typically requires only about a third as much distraction tension as would otherwise be necessary. According to the manufacturer, this substantially reduced tension requirement improves patient comfort, but also allows a broader base of patients to qualify as candidates for spinal decompression therapy.[3]

Apart from use of tables, yet another way to achieve unloading is with the aid of FDA-approved spinal orthoses, those that work on the intervertebral discs.[5]

There are flexible, rigid, and semi-rigid spinal orthoses made of everything from metal and

fabric to lightweight thermoplastics. But regardless of what goes into their construction, they all share in common the objective of delivering an immobilizing three-point force to stabilize weak or injured structures and thereby provide damage correction or, at the very least, put a halt to further progression of the problem.[5]

Recently, researchers in Italy reported favorable outcomes from a pneumatic custom-made lumbar vest that draws upon the principle of three-point force. Their clinical study involved 41 patients (all with emanations of radicular pain from degenerative discopathy) wearing the pneumatic vest thrice daily for periods of an hour each over the course of 5 weeks. The results showed 32 patients—78% of the cohort—experienced significant subjective and clinical improvement. Quality of life went up for them, and not a one failed to enjoy at least some diminishment of radicular pain.[6]

CAVALCADE OF ORTHOSES

The pneumatic vest is a relatively new addition to the lineup of spinal orthoses. Among the more familiar types are:[7]

- **Thoracolumbar orthotic (TLO).** Used mainly to treat fractures from T10 to L2. Average cost: $460.
- **Thoracolumbosacral orthotic (TLSO).** Also known as a clamshell, this custom-molded plastic body-jacket offers what many contend is the best control in all planes of motion. Average cost: $1,250 to $1,700.
- **Knight-Taylor brace.** Features a corset-type front with lateral and posterior uprights and shoulder straps to help reduce lateral bending, flexion, and extension. Average cost: $540.
- **Jewett hyperextension brace.** Off-the-shelf brace has one posterior and two anterior pads, but offers no abdominal support (the posterior pad keeps the spine in an extended position). Average cost: $460.
- **Chairback brace.** Rigid, short, three-point pressure-system lumbosacral orthotic (LSO) with two posterior uprights, plus thoracic and pelvic bands. Average cost: $440.
- **Williams brace.** Short LSO with an anterior elastic apron to allow for forward flexion, even as it places boundaries on extension and lateral trunk movement. Average cost: $500.
- **MacAusland brace.** LSO brace incorporates two posterior uprights but no lateral uprights to limit flexion and extension only. Average cost: $510.
- **Standard LSO corset.** Comes with cloth-enclosed removable, adjust-to-fit metal bars that increase intracavitary pressure. Average cost: $150.
- **Rigid LSO.** An improved-fit product that is custom-molded over the iliac crest (fit is further abetted by plastic anterior and posterior shells that overlap and hug the body). Average cost: $500 to $700.

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REFERENCES

1. Endoscopic discectomy. Available at: www.spineonline.com/ed.html. Accessed: May

9, 2005.
2. Patient ratings of vertebral axial decompression therapy for back pain. Available at: www.remedyfind.com/rem.asp. Accessed: May 9, 2005.
3. Product description. Cert Health Sciences LLC. Available at: www.certhealthsciences.com/features1.html. Accessed: May 9, 2005.
4. Gionis TA, Groteke E. Spinal decompression. Clinical study evaluating the effect of nonsurgical intervention on symptoms of spine patients. with herniated and degenerative disc disease. *Orthopedic Technology Review*. Nov-Dec 2003;5(6): 36. Available at: novdec03/pg36.htm. Accessed: May 9, 2005.
5. Falk D. Spinal bracing. Available at: www.spineuniverse.com/favicon.ico. Accessed: May 9, 2005.
6. Dallolio V. Lumbar spinal decompression with a pneumatic orthesis (Orthotrac): preliminary study. *Acta Neurochir Suppl*. 2005;92:133-7. Available at: www.ncbi.nlm.nih.gov. Accessed: May 9, 2005.
7. Kulkarni S. Spinal orthotics. Available at: www.emedicine.com/pmr/topic173.htm. Accessed: May 9, 2005.

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