

DISC THERAPY RESEARCH

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Topic

Simple pelvic traction gives inconsistent relief to herniated lumbar disc sufferers.

A new decompression table system applying fifteen 60 second tractions of just over one halfbody weight in twenty 1/2 hour sessions was reported to give good or excellent relief of sciatic and back pain in 86% of 14 patients with herniated discs and 75% of 8 with facet joint arthrosis. (Shealy,C.N.,Borgmeyer, V.; AMJ. Pain Management 1997,7:63-65) .

Herniated and degenerated discs can be shown at discography-discomanometry to have elevated intradiscal pressures made even worse by sitting ~d standing, thus preventing proper disc nutrition. Therefore decompressing the over pressurized disc should allow for healing and repair of disc prolapse, herniation and annulus tears.

Serial M.RI imaging of 20 patients treated with the decompression table shows in our study up to 90% reduction of subligamentous nucleus herniation in 10 of 14. Some rehydration occurs detected by 12 and proton density signal increase. Tom annulus repair is seen in all. Transligamentous ruptures show lesser repair. Facet arthrosis can be shown to improve chiefly by pain relief. Follow up studies for permanency or relapses are in progress.

The DRS Mechanical Decompression-Distraktion System was described by Shealy and Borgmeyer (1) to give relief of lumbar herniated disc and facet joint arthrosis superior by 50% to conventional pelvic traction. Twenty DRS treatments produced on midsagittal MRI a 50% reduction in one case, and a .7mm distraction of L5 on SI was shown on lateral x-ray. (2) Clinical improvement in 75 to 85% of subjects was reported.

Does clinical betterment correlate directly to improvement in MRI image and can M.RI shed any light on the mechanism of improvement?

That the abnormal disc has an elevated pressure can be appreciated at discogram. It is postulated that s elevated pressure interferes both with diffusion of nutrients from surrounding vessels into the nucleus and with adequate patching or repair of the tom annulus.

Nacbemson's group has emphasized lowering intradiscal pressure for 30 years. (3) & (4) Neurosurgeons Ramos and Martin (5) at operation on a similar decompression table measured in an L4-5 herniated disc a lowering of intradiscal pressure from 30 to 50 mm above the normal 90 to 100 mmHg into the negative range of minus 100 to 150 mmHg during 90 to 95 LB traction. Will such negative pressures heal the annulus, rehydrate the nucleus?

The aim of the present study was to do before and after MRI to correlate clinical improvement with any MRI evidence of disc repair in annulus, nucleus, facet joint or foramen as a result of DRS treatment .

.A course of 20 DRS Lumbar De-compression treatments were given in 4 to 5 weeks to 18 patients, and a double course of 40 in 10 weeks to 2 more.

Pull of distraction was adjusted to one half-body weight plus 10 lbs.

Each session consisted of 20 repetitions in 30 minutes of full distraction for 60 seconds and 30 seconds of relaxation to 50 lbs.

Distraction angle on pelvic harness was varied from 10% for L5-S1 to 20 to 25% for L4-5 herniations and above.

Subjects comprised 12 males and 8 females from age 26 to 74 .

Radiculopathy in 14 patients was from herniated discs of varying sizes. (L5S1 level in 6, L4-5 in 6, and 1 each at L3-4 and L2-3).

Radiculopathy without disc herniation was present in 6 patients from foraminal stenosis facet arthropathy and lateral spinal stenosis.

EMGs confirmed radiculopathy in all.

MRI's before and after were obtained on high and mid field units.

Clinical status was assessed before, during, and after treatment with standard analog pain rating scale of 0-10 and neuro exam.

Range of motion for spinal mobility (initially impaired in all), myotoma 1 weakness reflex and dermatomal sensory loss were tested.

A) MRI OUTCOMES

a. Disc Herniation: 10 of 14 improved significantly, some globally, some at least local at the site of the nerve root compression. Measured improvement in local or general disc herniation size varied in range of 0% in 2 patients, 20% in 4 patients, 30 to 50% in 4 patients and a remarkable 90 % in 2 patients who had the number of treatments at 40 sessions in 8 weeks.

Fig. 1 shows an example of a local left lateral recess disc herniation reduced over 40% completely relieving root compression when the midline portion was a little changed.

Fig. 2 shows on axial view at L5/S1 retraction of a far left lateral herniated disc pulling it away from impingement on the S1 and probably L5 roots with complete relief of radicular signs and symptoms. Mid sagittal components were unchanged.

Figs. 3 A & B & Fig. 4 show remarkable effects of 90% global disc reduction, perhaps due to extended course of treatments. Note the unique "empty pouches" left by the persistently bowed-out ligament at L4-5. Also some early rehydration of the degenerated nucleus is shown in Figs. 3, A & B and 4 by T2 and proton signals.

b. Facet joint arthropathy and foraminal compression cases showed no demonstrable change save 2 cases with slight increase in height but not in hydration.

B) CLINICAL OUTCOMES

Irrespective of MRI status all but 3 patients had very significant pain relief, complete relief of weakness when present, and of immobility and of all numbness (save in 1 patient with herniation and 2 with foraminal stenosis' without herniation). With disc herniation, 10 patients of 14 had 10 to 90% improvement in pain and disability. Two had 40 to 50%, one had only 20% with foraminal syndrome without herniation, 4 had 70 to 100 % improvement, one had 40 to 50 %, one with severe spinal stenosis had only 25% and was sent for surgery. Degree of clinical improvement roughly followed MRI changes but not totally with full correlation.

Improvement from DRS treatment clinical outcome of radiculopathy whether from disc herniation or foraminal syndromes is more impressive than most improvement shown consistently by MRI, at least with today's techniques and short time of follow-up.

Relief of pain and disability by reduction of disc size is easy to argue in a small majority of this series. A few patients have dramatic anatomic improvement. The others with minimal or no significant MRI improvements are harder to explain. Also, many patients improved very early in treatment, probably before MRI change could be seen.

Nutrient diffusion increase and tom annulus healing resulting from lowering intradiscal pressures are likely causes of clinical improvement when MRI anatomy is not much altered by distraction. Leaking of important sulfates and carboxylates from the nucleus and posterior annulus have been shown in recent studies (6) and (7) lowering of intradiscal pressure by DRS treatment likely can start to reverse these processes by allowing fibroblast repair of the annulus outer layers and some nutrition to the nucleus.

Also penetration of nerves into inner annulus and nucleus of degenerated prolapsed discs has been recently demonstrated and could play a role in pain production. (8) Mechanical intradiscal pressure relief may help this feature as well as giving structural stability.

(1) DRS distraction treatments afforded good or excellent relief of pain and disability whether from herniated disc or foraminal or lateral spinal stenosis.

(2) MRI showed imperfect correlation with degree of clinical improvement but 10 to 90% reduction in disc herniation size could be seen at least at the critical point of nerve root impingement in 10 of 14 patients.

(3) Two patients with extended courses of treatment showed 90% disc reduction and one of these had early rehydration of the degenerated disc at L4-5. An "empty pouch" sign on MRI at the site of previous herniation was seen in these 2 patients.

(4) Foraminal and lateral spinal or facet arthrosis cases causing radiculopathy without herniation also improved but without MRI change.

(5) Annulus healing or patching in the herniated disc can be shown by MRI and is postulated to be a primary factor in clinical and MRI improvement.

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Emerging Technologies:

Preliminary Findings

DECOMPRESSION, REDUCTION, AND STABILIZATION OF THE LUMBAR SPINE:

A COST-EFFECTIVE TREATMENT FOR LUMBOSACRAL PAIN

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INTRODUCTION

Pain in the lumbosacral spine is the most common of all pain complaints. It causes loss of work and is the single most common cause of disability in persons under 45 years of age (1). Back pain is the most dollar-costly industrial problem (2). Pain clinics originated over 30 years ago, in large part, because of the numbers of chronic back pain patients. Interestingly, despite patients' reporting good results using "upside-down gravity boots," and commenting on how good stretching made them feel, traction as a primary treatment has been overlooked while very expensive and invasive treatments have dominated the management of low back pain. Managed care is now recognizing the lack of sufficient benefit-cost ratio

associated with these ineffective treatments to stop the continued need for pain-mitigating services. We felt that by improving the "traction-like" method, pain relief would be achieved quickly and less costly.

Although pelvic traction has been used to treat patients with low back pain for hundreds of years, most neurosurgeons and orthopedists have not been enthusiastic about it secondary to concerns over inconsistent results and cumbersome equipment. Indeed, simple traction itself has not been highly effective; therefore, almost no pain clinics even include traction as part of their approach. A few authors, however, have reported varying techniques which widen disc spaces, decompress the discs, unload the vertebrae, reduce disc protrusion, reduce muscle spasm, separate vertebrae, and/or lengthen and stabilize the spine (3-12).

Over the past 25 years, we have treated thousands of chronic back pain patients who have not responded to conventional therapy. Our most successful approach has required treatment for 10-15 days, 8 hours a day, involving physicians, physical therapists, nurses, psychologists, transcutaneous electrical nerve stimulator (TENS) specialists, and massage therapists in a multidisciplinary approach which has resulted in 70% of these patients improving 50-100%. Our program has been recognized as one of the most cost-effective pain programs in the US (13). The average cost of the successful pain treatment has been cited as less than half the national average(13).

Our protocol combined traditional, labor-intensive physical therapy techniques to produce mobilization of the spinal segments. This, combined with stabilization, helped promote healing. In addition we used biofeedback, TENS, and education to reinforce the healing processes. We wanted to produce a simpler and more cost-effective protocol that could be consistently reproduced. The biofeedback and education could be easily replicated. The problem was producing spinal mobilization to the degree that we could decompress a herniated nucleus and relieve pain. Stabilization would come after pain relief.

The DRS System was developed specifically to mobilize and distract isolated lumbar segments. Using a specific combination of lumbar positioning and varying the degree and intensity of force, we produced distraction and decompression. With fluoroscopy, we documented a 7-mm distraction at 30 degrees to L5 with several patients. In fact, we observed distraction at different spinal levels by altering the position and degree of force.

We set out to evaluate the DRS system with outpatient protocols compared to traditional therapy for both ruptured lumbar discs and chronic facet arthroses.

Subjects. Thirty-nine patients were enrolled in this study. There were 27 men and 12 women, ranging in age from 31 to 63. Twenty-three had ruptured discs diagnosed by MR!. Of these, all but four had significant sciatic radiation, with mild to moderate L5 or S 1 hyperalgesic. All had symptoms of less than one year.

The facet arthrosis patients also underwent MRI evaluations to rule-out ruptured discs or other major pathologies. They had experienced back pain from one to 20 years. Six had mild to moderate sciatic pain with significant limitations of mobility.

METHODOLOGY

Patients were blinded to treatment and were randomly assigned to traction or decompression tables. Traction patients were treated on a standard mechanical traction table with application of traction weights averaging one half body weight plus 10 pounds, with traction applied 60-seconds-on and . 60-seconds off, for 30 minutes daily for 20 treatments. Following the traction, Polar Powder ice packs and electric stimulation were applied to the back for 30 minutes to relieve swelling and spasm, and patients were then instructed in use of a standard TENS use to be employed at home continuously when not sleeping. After

two weeks, the patients received a total of three sessions with an exercise specialist for instruction in and supervision of a limbering/ strengthening exercise program. They were re-evaluated at five to eight weeks after entering the program.

Decompression patients received treatment on the DRS System, designed to accomplish optimal decompression of the lumbar spine. Using the same 30-minute treatment interval, the patients were given the same force of one-half the body weight plus 10, but the degree of application was altered by up to 30 degrees. The effect was to produce a direct distraction at the spinal segment with minimal discomfort to the patient.

Eighty-six percent of ruptured intervertebral disc (RID) patients achieved "good" (50-89% improvement) to "excellent" (90-100% improvement) results with decompression. Sciatica and back pain were relieved. Only 55% of the RID patients achieved "good" improvement with traction, and none excellent."

Of the facet arthrosis patients, 75% obtained "good" to excellent" results with decompression. Only 50% of these patients achieved "good" to "excellent" results with traction.

Table 1. Patient assessment of pain relief secondary to decompression and to traction.

	RID	Facet arthrosis	
Decompression	excellent	7 (50%)	2 (25%)
	good	5 (36%)	4 (50%)
	poor	2 (14%)	2 (25%)
Traction	excellent	0	2 (25%)
	good	5 (55%)	2 (25%)
	poor	4 (45%)	4 (50%)

Excellent = 90 - 100% improved

Good = 50 - 89% improved

Poor = < 50% improved

DISCUSSION

Since both traction and decompression patients received similar treatment (except for the differences in the traction table versus the decompression table) with similar weights, ice packs, and TENS, the results are quite enlightening. The decompression system is encouraging and supports the considerable evidence reported by other investigators stating that decompression, reduction, and stabilization of the lumbar spine relieves back *pain*. The computerized DRS System appears to produce consistent reproducible, and measurable non-surgical decompression, demonstrated by radiology.

Of equal importance, the professional staff facilities required, as well as the time and cost, are all significantly reduced. Since the more complex treatment program of the last 25 years has already been shown to cost 60% less than the average pain clinic, the cost of this simpler and more integrated treatment program should be 80% less than that of most pain clinics-a most attractive solution to the most costly pain problem in the US. In addition, patients follow a 30-day protocol that produces pain relief yet allows them to continue daily activities and not lose workdays.

SUMMARY

We have compared the pain-relieving results of traditional mechanical traction (14 patients) with a more sophisticated device which decompresses the lumbar spine, unloading of the facets (25 patients). The decompression system gave "good" to "excellent" relief in 86% of patients with RID and 75 % of those with facet arthroses. The traction yielded no "excellent" results in RID and only 50% "good" to "excellent" results in those with facet arthroses. These results are preliminary in nature. The procedures described have not been subjected to the scrutiny of review nor scientific controls. These patients will be followed for the next six months, at which time outcome-based data can be reported. These preliminary findings are

both enlightening and provocative. The DRS system is now being evaluated as a primary intervention early in the onset of low back pain-especially in workers' compensation injuries.

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