CHIROPRACTIC/REHABILITATIVE MANAGEMENT OF POST-SURGICAL DISC HERNIATION: A RETROSPECTIVE CASE REPORT

GARY M. ESTADT, DC, DACRB^a

^aPrivate practice of chiropractic, Estadt Chiropractic Center Inc., Mentor, OH.
Submit requests for reprints to: Dr. Gary Estadt, Estadt Chiropractic Center,
9031 Mentor Ave, Mentor, OH, 44060.
Paper submitted March 21, 2004

ABSTRACT

Objective: To discuss management of postsurgical lumbar disc herniation using a program of chiropractic manipulation and an active rehabilitation program.

Clinical features: The patient was a 54-year-old Caucasian male with a history of acute low back pain and left sciatic pain down the left posterior thigh and lateral calf and numbness in the dorsum of the left foot. Prior medical intervention included treatment with steroid anti-inflammatory drugs and lumbar microdiscectomy surgery, with incomplete resolution of his symptoms. The patient was unable to walk without pain or return to normal activities of daily living. He was antalgic in flexion. His lumbar range of motion was restricted in flexion and extension. He exhibited a positive straight leg raise and exhibited foot drop on the left.

Intervention and outcome: The treatment plan and intervention consisted of patient education on proper posture and proper bending and lifting techniques. Rehabilitative exercise began in the office and progressed to home based therapy and exercises. He noticed a decrease in his signs and symptoms after seven visits. Active rehabilitation was continued with the goal of returning lumbar spinal extensor strength. He was released to home therapy and supportive chiropractic care with continued positive response.

Conclusion: Management of postsurgical lumbar disc herniation with chiropractic and active rehabilitation is discussed. Spinal deconditioning and a weakness of the lumbar spinal extensor muscles appeared to be related to the patient's symptoms. Patient education on proper posture, proper lifting techniques, core stabilization exercises, active strengthening exercise and chiropractic manipulation appeared effective in this case. (*J Chiropr Med* 2004;3:108-115)

Key Words: Intervertebral Disk Displacement; Manipulation, Chiropractic; Rehabilitation; Variable Angle Roman Chair

INTRODUCTION

It has been estimated that 60–80% of Americans will suffer low back pain during their lifetime (1) while 14% of the US population currently experiences lower back pain (2). According to Waddell (3,4), there is a 3 to 5% lifetime prevalence of sciatica (pain below the knee). Despite the fact that the rates of low back pain did not increase from the 1950s to the 1980s, disability increased dramatically (6). In fact, disability increased 14 times the rate of population growth from 1977 to 1981 (1).

Low back pain is the most common complaint in orthopedic, neurosurgical, and occupational medicine practices. It is the second most common complaint in primary care, and the third most common surgical procedure. Yet, 61% of the population with acute low back pain does not seek healthcare during their most recent episode (5).

Lower back pain has frustrated both clinicians and patients alike for decades. Back pain has been viewed as either running an acute or chronic course, but most patients experience recurrent back pain (7,8). The patient often has an unrealistic expectation that his condition can be relieved in one or two treatments and may feel that if this is not achievable, then back surgery will immediately heal the condition and it will never recur.

A herniated intervertebral disc (IVD) can be a frustrating condition to treat. The diagnosis often dooms the patient to unnecessary spinal surgery, or at best, inadequate post-surgical treatment. This has been made worse by the overuse and reliance upon advanced diagnostic imaging, such as lumbar MRI as a diagnostic tool. This has shifted focus away from the art and science of the physical examination. Today's doctor must match sophisticated radiology with improved clinical diagnosis if he is to remain a doctor caring for the whole clinical picture of the patient, rather than a merely addressing radiologic abnormalities (9).

There is disagreement surrounding the nomenclature pertaining to IVD herniation. Terms such as slipped disc, bulging disc, herniated disc, ruptured disc, fragmented

disc are often used interchangeably when discussing this clinical entity. This leads to confusion by both the physician and patient alike. Consensus on nomenclature was recently reached by several prominent spine organizations.

According to the American Society of Spine Radiology and the American Society of Neuroradiology, any displacement of disc material beyond the confines of the IVD space is considered an abnormality. Any displacement occupying 50 to 100% of the disc circumference is called a generalized displacement or disc bulge. This is no longer considered a form of herniation. If the distortion takes up less than 50% of the disc circumference, it is termed a localized displacement, and is considered a herniation. If the distortion takes up less than 25% of the disc circumference is further classified as focal while distortion from 25–50% is termed broad-based (10).

There are two basic types of IVD herniation: annular protrusion (displaced nuclear material causes the outer annulus to bulge), and nuclear extrusion (nuclear material has escaped from the confines of the disc proper) (10). When the displaced material has become detached from its disc of origin, it is said to have lost its continuity and is now called a sequestration.

The treatment for herniated lumbar disc and lower back is widely varied between conservative and surgical treatment. Care runs the gamut from ice to heat, bed rest to exercise, medication (OTC analgesics, topical analgesics, anticonvulsants, tricyclic antidepressants, opioids), spinal manipulation, acupuncture, biofeedback, intervention therapy (trigger point, facet, epidural, nerve block injections), traction, TENS units, ultrasound, and surgery (11,35).

It is estimated that 75% of lumbar disc herniation patients recover within 6 months and that 15–17% undergo surgery (12,17). In a study comparing surgical and non-surgical treatment of a herniated disc with sciatica, it was shown that the surgical group did better after one year, but there was no difference in outcomes at four years (13). There was a positive correlation between physical activity and favorable results (14). Despite these statistics, surgery is frequently recommended for lumbar disc herniation. An international comparison showed that the rate of back surgery in the United States was at least 40% higher than in any other country, and was more than 5 times those in England and Scotland (1,15).

Despite assurances from doctors and unrealistic expectations from patients, surgery is not without risk. There

is a 3% risk of infection, a risk of general anesthesia and an increased risk of subsequent surgery. Fifteen to 20% of patients will suffer a recurrent herniated lumbar disc, and in 74% of those cases, it occurs within 6 months of the first operation (15). Post-operative deconditioning is common (16). It has been suggested that surgery should be undertaken if the patient does not respond after at least two months of conservative treatment (17). Yet, studies have shown that long term results of standard lumbar discectomy are not very satisfying. More than one third of patients had unsatisfactory results and more than one quarter complained of significant residual pain (18,19).

Low physical fitness and inadequate strength and endurance of the back muscles is listed among the risk factors for back trouble. Further, patients requiring lumbar IVD herniation surgery may experience a long period of inactivity before surgery, which causes decreased muscle strength and impairment of the voluntary neural activation rate (16,20,21,22). Another study showed that muscle retraction time during surgery is directly proportional to the severity of damage to the multifidus muscle group, and delaying recovery of the extensor muscle strength. Further, 60% of patients have restricted mobility of the spine and reduced lifting capacity 3 months after surgery (16,20).

A major factor underlying disability from back pain is an actual physical inability to perform certain tasks because of lost muscle strength, lowered endurance and aerobic capacity, or decreased mobility and coordination (23). Studies have shown that the recovery of maximal endurance and explosive type strength characteristics is incomplete in patients with lumbar disc herniation two months after surgery (16). Active strength training is recommended to restore muscle function in these patients.

When dealing with rehabilitation of lower back pain and disc herniation injuries, it is important to establish a baseline by assessing muscular dysfunction in and around the lumbar spine. One muscle that is highly active in flexion, extension, and lateral bending tasks is the quadratus lumborum muscle (24).

The multifidus muscle has been shown to be atrophied in patients with acute low back pain, those recovered from low back pain and those having surgery for nerve root compression (20). Multifidus muscle recovery is not spontaneous on remission of painful symptoms. Lack of localized muscle support may be one reason for the high incidence rate of low back pain following the initial episode (20). When the erector spinae muscles fatigue,

substitution by secondary extensors, such as the internal oblique and latissimus dorsi occurs (25). Decreased endurance of the trunk extensor muscles has not only been shown to correlate with lower back pain, but is a predictor of recurrence of lower back pain as well as first-time onset in healthy individuals (26,27). However, lumbar muscle strength seems to deteriorate more rapidly than endurance with advancing age (28,29).

When an axial load is applied to the spine, there is increased co-activation of the antagonistic muscles (30). It has been shown that a decreased activation of the transverse abdominal/oblique abdominal muscles relative to the rectus abdominis was correlated with lower back pain (31). Studies have shown that the late activation of the transverse abdominal muscle during arm movements distinguishes lower back pain patients from normals (32). Other studies show the relationship between hip and leg movements with their effect on the lumbar extensor muscles (33,50). Decreased quadriceps endurance correlates with stoop lifting replacing squat lifting (34). Thus, it appears that core stabilization, trunk extensor strength, and coordinated movement of the upper and lower kinetic chain are all necessary components for stabilization of the lower back.

The Agency for Health Care Policy and Research recommends conditioning exercises for the treatment of low back pain (35). In fact, 76% of patient who completed a low back pain exercise program had excellent or good results. At 1-year followup, 94% with good or excellent results reported maintaining their improvement (22). Post-surgical patients often exhibit considerable functional deterioration post-operatively. Studies show that many of these patients benefit from rehabilitation including high dosage exercise programs. Exercise programs have been found to be generally free of side-effects (36).

It has been shown that intensive exercise programs are more effective on functional status and a faster return to work as compared to mild exercise programs (15). Although active rehabilitation programs, physical fitness programs, and protocols regarding instruction for patients to return to work after lumbar disc surgery have been suggested, there are still persistent fears of causing reinjury, re-herniation, or instability (37). If fear of pain persists, unless it is specifically recognized and treated, it leads inexorably to pain avoidance and thence to disuse (38). Thus, the challenge to the physician is to reassure the patient while working through a functional restoration program, that pain will improve.

This paper presents a case of successful resolution of back and lower extremity pain following an active and

passive chiropractic rehabilitation program for a patient with a herniated IVD after surgical intervention was attempted.

CASE REPORT

A 54-year-old caucasian male suffered with acute lower back pain. He woke up one morning with lower back pain approximately one week before entering the office. The pain radiated across his lower back down the back of his left posterior thigh, and lateral calf. He also described numbness across the dorsum of his foot to the toes. The pain had become progressively worse, especially when performing any kind of physical exertion. His pain was exacerbated when walking, standing, sitting for any extended period of time or bending forward from the waist. He has not seen any other physician for the symptoms. He had been self-medicating with his wife's Vioxx and had also been using hot compresses on his lower back, both without relief. Prior to this injury he was active as a jogger and ran 5 miles, twice a week. He also performed a moderate degree of exercise daily and denied a prior history of lower back pain.

His history was significant for a heart attack eight years earlier, and bilateral inguinal hernias. He suffered from high blood pressure and had elevated cholesterol levels. He was taking Lopressor twice daily. He had a history of bowel accidents secondary to Crohn's disease. He exhibited no other red flags (42) to conservative treatment. He was an electrical engineer by occupation but presently unemployed.

The patient rated his lower back pain as 8/10 along a numeric pain scale and had an Oswestry Disability Index (39,40,41) of 46%, representing severe disability. He was 72 in. tall, weighed 181 lbs, and had a blood pressure of 125/80 mm Hg. His lumbar range of motion was moderately restricted in flexion 60°/90°, extension 10°/25°, right (10°/25°) and left lateral flexion (15°/25°). He exhibited full strength against resistance of the hip flexor and extensor muscles, knee extensor and flexor muscles, and ankle flexor extensor muscles bilaterally when tested with manual motor testing. The deep tendon reflexes were equal and active in the lower extremities at both the patella and Achilles' regions. No sensory deficits were noted in the lower extremities when using a Whartenberg pinwheel.

A positive straight leg raise was noted at 60° on the left, producing both lower back and left leg pain below the knee. The patient exhibited a positive Milgrams sign, producing lower back pain. Plain film radiographs of the lumbar spine were negative with respect to fractures or

osseous pathologies. Mild osteophytic changes were noted on the L4 and L5 vertebral bodies anteriorly, and L4 vertebral body laterally. There was moderate intervertebral foramen narrowing at the L4/L5 and L5/S1 levels. A mild to moderate retrolisthesis of L5 upon the sacrum was noted using George's line. MacNab's line revealed overriding lumbar facets at the L4/L5 and L5/S1 levels.

The patient was diagnosed with lumbar IVD syndrome, without myelopathy, resulting in sciatica. He was treated conservatively with a variety of passive and active protocols. A combination of flexion-distraction manipulation and side posture manipulation was used, as tolerated by the patient. Interferential current and cold compresses were applied to the lower back region. McKenzie exercises were prescribed immediately to be performed 10 times per day at 3 sets of 10 repetitions each session (43).

The patient noted little change in his lower back pain over the next two treatments and complained of soreness from performing the exercises. By the fourth visit, he began to show improvement with his lower back and leg pain. He became more aggressive with his lower back exercises and initiated anterior and posterior pelvic tilting exercises and Cat/Camel maneuvers. The following week the patient had returned to jogging; he was complaining of some numbness in the foot when running, but his lower back and leg pain had dramatically improved. Two weeks after treatment had commenced, flexibility and strengthening exercises were started to help improve core stabilization in the lumbar spine and improve flexibility.

The patient was re-evaluated three weeks after initiating care. His lumbar range of motion had improved to the following: flexion 80°/90°; extension 20°/25°; right lateral flexion 20°/25°; left lateral flexion 25°/25°. The straight leg raise and Milgram's Signs were no longer present. Deep tendon reflexes were equal and active in the lower extremities. The patient complained of some numbness in the right lateral foot, but did not exhibit sensory deficits. The Oswestry Disability Index at this time had reduced from 46% to 10% (minimal disability) and his numeric pain scale rating was 2.5/10.

Over the next two weeks the patient had two exacerbations of lower back pain. On one occasion, he injured his lower back lifting a computer and the second time aggravated his lower back chopping firewood. With active and passive treatment his condition quickly resolved. The patient was advised to follow-up for care in one month. When he returned for that visit, he stated

that he was having no leg pain, and his lower back pain was dramatically improved. He was released from care at this time and advised to continue with his home based exercises.

The patient returned to the office four months later complaining of severe lower back pain and left leg pain. He was in excruciating pain and was unable to stand or sit in the office. He stated that he injured his back a few weeks earlier, when he slipped on the ice and fell backward, landing on his buttocks. Since then he experienced excruciating back and leg pain that radiated into the left posterior and lateral thigh. He had pain and numbness in the left calf and numbness in the left heel region. He rated his back pain at 10/10. His pain levels were exacerbated when standing or walking. His only relief came from sitting in a straight chair with support, or lying on his right side. He had been taking NSAIDs for his pain and was using a TENS unit but neither of these treatments had helped relieve his pain. He was in severe distress and was unable to control his emotions. He confided that the pain was so excruciating and severe, he was contemplating suicide. He stated that he had resisted returning for care, because he was embarrassed that he had not been doing his exercises regularly.

On the examination he exhibited elevated blood pressure of 130/90. Deep tendon reflexes revealed a diminished (+1) left Achilles' reflex. Manual muscle testing of the lower extremities revealed grade 4/5 weakness of the left ankle flexor muscles. He was unable to stand on his toes. His lumbar range of motion was severely restricted and painful in flexion at 30°/90°, extension at 15°/25°, and right lateral flexion at 15°/25°. A positive straight leg raise at 30° was elicited on the left that produced lower back and posterior leg pain radiating into the left calf. The seated Bechterew test was also positive on the left, producing leg pain and Braggard's sign intensified his radicular pain. Due to the severity of his pain, the patient was referred to a medical physician who prescribed a Medrol Dosepak and pain medication. We arranged an appointment for an emergency MRI scan of the lumbar spine, as well as a neurosurgical consultation.

The patient received an MRI scan of the lumbar spine the following day. T1 and T2 weighted images were performed of the lumbar spine and revealed straightening of the normal lumbar lordotic curve. There was a transitional vertebral body with a lumbarized appearing sacrum noted. Disc desiccation was noted at the L3/L4 through the L5/S1 levels and end plate changes were present at the anterior aspect of the L5 vertebral body.

At L3/L4 there was a left foraminal and extra-foraminal bulging of the disk measuring 5 mm. It appeared to be contacting the exiting left L3 nerve root. The right neural foramen was uninvolved at this level. At L4/L5 there was a minimal disc bulging measuring 2–3 mm, effacing the ventral thecal sac. There was no evidence of disc herniation at this level. There was hypertrophy of the superior articulating facets and ligamentum flavum. At the L5/S1 level there was a bulging disc measuring 3 mm in its AP diameter. In addition, there were extraforaminal components of the disc bulge bilaterally, being larger on the left side and measuring 5 mm in size. There was contact with the exiting left and right L5 nerve roots at the foraminal level.

The patient was diagnosed as suffering from an acute lumbar disc herniation, with myelopathy. He received a neurosurgical consultation two days later and immediately hospitalized and given morphine and IV steroids. Lumbar microdiscectomy was performed on this patient at the L3/L4 and L5/S1 levels. He was released from the hospital the following day. He was later seen by the surgeon but was not referred for any type of rehabilitative care.

Two months following surgery, the patient returned to the chiropractic office. He continued to complain of lower back and left leg pain. His pain level was 6/10. He stated that he had some relief of the symptoms following surgery, but that he was still restricted in his ability to stand, walk, or sit for any length of time. He spent most of this time lying on the floor at home. The patient presented with left sided foot drop, which had not been present earlier. His lumbar range of motion was moderately restricted in flexion at 30°/90°, and severely restricted in extension at 5°/25°. He still exhibited a positive straight leg raise at 30° on the left and was antalgic in forward flexion.

I determined that the patient was suffering from failed lower back surgery, and that spinal deconditioning complicated his condition. He was immediately placed on an active functional stabilization program consisting of aerobic exercises, flexibility and proprioceptive exercises, and ankle extensor strengthening exercises (to address his foot drop). He began walking on a treadmill, performing floor flexibility exercises (hamstring, hip flexor, quadriceps stretches, pelvic tilts in quadruped), balancing on a wobble board (single then multi-planar) and ankle extension exercises with theraband tubing (light resistance) to address his foot drop. These exercises were performed with the functional range (safe and appropriate for the task at hand) (43). Over the next three weeks, he began to show improvement.

A Qualitative Functional Capacity Evaluation was conducted for the patient three weeks after beginning post-surgical treatment. At that time his pain level had reduced to 3/10. His evaluation consisted of flexibility, strength and endurance testing against controls. These tests are age and gender specific. His results are presented in table 1.

The patient was given a physical training program to address key functional deficits (43). It was determined that strengthening and endurance exercises would be necessary for the spinal extensor muscles (multifidus, iliocostalis and longissimus), as well as quadratus lumborum muscles. We initiated a program of low tech floor exercises consisting of alternate arm/leg extensions, horizontal side bridges, and abdominal hollowing to help activate co-contraction of the multifidus muscles that have been shown to improve endurance of the lumbar spinal extensors (44). The patient began performing these exercises with 3 sets of 10 repetitions (progressing to 15 repetitions), 2 days per week for 4 weeks and continued these exercises at home (43). On

TABLE 1.
FUNCTIONAL CAPACITY EVALUATION DATA DURING POST-SURGICAL TREATMENT

	21 DAYS AFTER CARE INITIATED			90 DAYS AFTER CARE INITIATED		
	PATIENT SCORE	CONTROL	% OF NORMAL	PATIENT SCORE	CONTROL	% OF NORMAL
FLEXIBILITY TESTS						
SIT & REACH (CM)	-5	>35	POOR	+15 CM	>35	FAIR
TRUNK EXTENSION	16	50–64	POOR	16	50–64	POOR
STRENGTH TESTS						
REPETITIVE SQUAT	35 REPS	33	100+%	35	33	100+%
REPETITIVE SIT UP	50 REPS	23	100+%	55	23	100+%
REPETITIVE ARCH UP	11 REPS	26	42%	40	26	100+%
ENDURANCE TESTS						
STATIC ABDOMINAL HOLD (SEC)	60	75	80%	90	75	100+%
STATIC BACK ENDURANCE (SEC)	15	89	16%	75	89	83%
HORIZON SIDE BRIDGE (SEC) R/L	50/50	94/97	53%/51%	70R 83L	94/97	74%R 86%L

week 3, we introduced hyperextension exercises (Super Mans) on a gym ball to further challenge the spinal extensor muscles. At week 5, the patient progressed to a Variable Angle Roman Chair. He began exercising at a 30 degree angle, beginning with 3 sets of 10 repetitions, progressing to 15 repetitions (45). He also began lateral flexion exercises on the Roman chair, performing these 2 days per week for an additional 8 weeks (36,43,45).

The functional capacity evaluation was repeated after 90 days on this regimen and demonstrated the findings in table that are presented adjacent to the initial evaluation.

The goal of treatment was to achieve full pain-free range of motion, 10% or less activities of daily living disability (46), and at least 85% of normal when performing functional tests. The patient achieved these goals and was advised to continue on home-based exercises. Since the follow-up testing the patient has returned to running competitively. He recently competed in a stair climbing competition at a downtown high-rise office building. At the time of this writing there were no recurrences of back or leg pain, his pain level was a 1/10, and his Oswestry Disability Index was 16% (minimal disability). His lumbar range of motion was unrestricted in all planes.

DISCUSSION

A basic starting point in any rehabilitative program is to determine the functional 'weak link'. It is important that the practitioner perform physical activity testing to determine functional ability. Any type of functional testing should encompass flexibility, strength, and endurance exercising. Coordination and balance should also be addressed.

Alaranta proposes tests that provide an excellent, easy assessment for the chiropractic physician to determine the functional abilities of the patient. There are six simple tests that can be performed on the subacute patient, or the chronic patient whose pain is controlled. These tests do not require any specialized equipment and can easily be performed in a treatment room. They allow the practitioner to easily evaluate the strength and endurance of the lumbar spinal extensors, abdominal muscles, gluteus maximus, and quadriceps. One major advantage of these tests is that they have published reference values that can be compared to an individual patient's performance and are considered to have satisfactory reliability (28).

The Static Back Endurance (Sorensen) test is an excellent predictor of future lower back pain (26). Asymptomatic individuals with very poor scores (< 53 seconds) are three times more likely to suffer from lower back pain in the next year than those scoring considerably higher (27). When coupled with the repetitive arch up test, the practitioner can quickly assess both strength and endurance of the longissimus thoracis, iliocostalis lumborum, and particularly the multifidus muscles. Weakness in this functional muscle group has been implicated as a common cause of lower back pain.

The Sorensen test is performed by having the patient lie prone with his waist just on the edge of a flat surface. The patient's upper torso is supported in a horizontal position until the test is started. The patient's head is in a neutral position and his arms are at his sides. The patient's back endurance is measured by the time the patient is able to hold this horizontal position while unsupported (28,47,48). For the repetitive arch up test, the patient assumes the same position as the Sorensen's test and then begins to repetitively arch between a 45° semi-flexed position and horizontal, performing 1 repetition every 2–3 seconds. The doctor counts the repetitions until the patient fatigues (28,47,48).

Strength and endurance of the abdominal muscles is determined by the repetitive situp and static abdominal hold tests. For the repetitive situp test, the patient is supine with knees flexed 90° and ankles fixed. The patient sits up until he or she touches the thenar pad of the hand to the patella, and curls back down to the supine position, performing one repetition every 2–3 seconds (28,47,48). The static abdominal hold is performed with the patient supine, hips and knees flexed at 45° and relaxed. The patient places one supported fist under the chin to maintain cervical neutral. The patient lifts the upper torso into flexion while the inferior angles of the scapula are lifted just off a flat surface and held static. The time that the patient is able to hold his position is the measure of performance (48).

For the repetitive squat test, the patient stands with feet 15 cm apart and squats until the eyes are parallel to the floor, then returns to an upright position. The doctor records the number of repetitions to a maximum of 50 (28,47,48).

The horizontal side bridge is an excellent test to determine the endurance capacity of the quadratus lumborum and oblique abdominal muscles. The patient lies on an exercise mat on their right side with the legs extended. For support, the upper foot is placed in front of the lower foot on the mat. Supporting one self with the

feet and elbow, the patient is instructed to lift the hips off the mat and to maintain a straight line of body. The uninvolved arm lies across the chest with the hand placed on the opposite shoulder. The test ends when the hip returns to the mat. The doctor times how long the patient can hold this posture (48,49). This test is done bilaterally.

These tests serve as an excellent baseline to assess both strength and endurance of the abdominal and spinal extensor muscles. They can also be used to determine the strength and endurance of the quadratus lumborum and quadriceps muscles. They are age and sex specific, and they offer the clinician a fast and easy method to monitor patient progression with rehabilitative exercises.

The Variable Angle Roman Chair provides an excellent low tech piece of equipment to help improve lumbar spinal extension strength and endurance. It is an effective alternative if MedX is not available (50) and has shown no significant difference in improvements between these two machines (51). Altering hip position into internal and external hip rotation improves the level of EMG activity in the lumbar paraspinal muscles and gluteal muscles respectively (52).

CONCLUSION

A patient with a clinical diagnosis of herniated lumbar disc with resultant radiculopathy, post-surgical, responded positively to a clinical trial of manipulation and active therapeutic rehabilitation. Firm conclusions from the outcomes of a single retrospective case study can not be derived. However, this study does suggest that chiropractic and rehabilitative care can often relieve the lower back and leg pain from a herniated lumbar disc. If more treatments such as surgery are necessary for resolution of severe symptomatology, conservative measures such as manipulation and rehabilitative exercises should be considered to help restore strength and endurance to the lumbar extensor muscles.

ACKNOWLEDGMENTS

I would like to thank my wife, Joan Estadt and son, Matthew, for their assistance in researching and writing this paper.

REFERENCES

1. Frymoyer JW, Cats-Baril W. Predictors of low back pain disability. *Clin Orthop* 1987;221:89-98.
2. Holbrook TL, Grazier K, Kelsey JL, Stauffer RN. The frequency of occurrence, impact and cost of selected musculoskeletal conditions in the United States. Chicago: American Academy of Orthopaedic Surgeons; 1984.
3. Waddell G. Epidemiology review: The epidemiology and cost of back pain. The Annex to the Clinical Standards Advisory Group's Report on Back Pain. London: HSMO; 1994.
4. Waddell G. The back pain revolution. Edinburgh: Churchill Livingstone; 1998.
5. Carey TS, Evans AT, Hadler NM, Lieberman G, Kalsbeek WD, Jackman AM, et al. Acute severe low back pain: A population-based study of prevalence and care-seeking. *Spine* 1996;21:339-344.
6. Waddell G. A new clinical model for the treatment of low-back pain. *Spine* 1987;12:632-644.
7. Von Korff M, Saunders K. The course of back pain in primary care. *Spine* 1996;21:2833-2837.
8. Jayson MI. Why does acute back pain become chronic? *Spine* 1997;22:1053-1056.
9. Morris EW, DiPaola M, Vallance R, Waddell G. Diagnosis and decision making in lumbar disc prolapse and nerve entrapment. *Spine* 1986;11:436-439.
10. Fardon DF, Millette PC. Nomenclature and classification of lumbar disc pathology. Recommendations of the Combined Task Forces of the North American Spine Society, American Society of Spine Radiology, and American Society of Neuroradiology [monograph on Internet]. Lippincott, Williams and Wilkins. Available from: http://www.asnr.org/spine_nomenclature.
11. National Institute of Neurological Disorders and Stroke. Low back pain fact sheet [monograph on Internet]. Bethesda: National Institute of Neurological Disorders and Stroke; 2003. Available from: www.ninds.nih.gov/health_and_medical/pubs/back_pain.htm.
12. Frymoyer JW, Pope MH, Costanza MC, Rosen JC, Goggin JE, Wilder DG. Epidemiologic studies of low-back pain. *Spine* 1980;5:419-423.
13. Frymoyer JW. Back pain and sciatica. *New Eng J Med* 1988;318:291-300.
14. Weber H. Lumbar disc herniation. A controlled, prospective study with ten years of observation. *Spine* 1983;8:131-140.
15. Ostelo JG RW, de Vet HC, Wadell G, Kerckhoffs M, Leffers P, van Tulder M. Rehabilitation following first-time lumbar disc surgery: a systematic review within the framework of the Cochrane collaboration. *Spine* 2003;28:209-218.
16. Arja H, Tiina, Ulla Pt, Jari Y. Trunk muscle strength in flexion, extension, and axial rotation in patients managed with lumbar disc herniation surgery and in healthy control subjects. *Spine* 2003;28:1068-1073.
17. Postacchini F. Results of surgery compared with conservative management for lumbar disc herniations. *Spine* 1996;21:1383-1387.
18. Birkmeyer NJ, Weinstein JN. Medical versus surgical treatment for low back pain: evidence and clinical practice. *Eff Clin Pract* 1999;2:218-227.
19. Lolpasis GA, Stauos K, Katonis PG, Sapkas G, Korres DS, Hartofilakidis G. Seven to 20-year outcome of lumbar discectomy. *Spine* 1999;24:2313-2317.
20. Hides JA, Richardson CA, Jull GA. Multifidus muscle recovery is not automatic after resolution of acute, the first episode of low back pain. *Spine* 1996;21:2763-2769.
21. Hides JA, Stokes MJ, Saide M, Jull GA, Cooper DH. Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain. *Spine* 1993;19:165-172.
22. Nelson B, O'Reilly E, Miller M, Hogan M, Wagner J, Kelly C. The clinical effects of intensive, specific exercise on chronic low back pain: a controlled study of 895 consecutive patients with 1-year follow up. *Orthopedics* 1995;18:971-981.
23. Smith C, Gatchel R, Herring SA, Hall H et al. Contemporary concepts in spine care: spine rehabilitation - secondary and tertiary nonoperative care. *Spine* 1995;18:2060-2066.
24. McGill SM, Juker D, Kropf P. Quantitative intramuscular myoelectric activity of the quadratus lumborum during a wide variety of tasks. *Clin Biomech* 1996;11:170-2.
25. Sparto PJ, Paarnianpour M, Massa WS, Granata KP, Reinsel TE, Simon S. Neuromuscular trunk performance and spinal loading during a fatiguing isometric truck extension with varying torque requirements. *Spine* 1997;10:145-156.
26. Biering-Sorensen F. Physical measurements as risk indicators for low back trouble over a one-year period. *Spine* 1984;9:106-109.

27. Luoto S, Heliovaara M, Hurri H, Alaranta H. Static back endurance and the risk of low back pain. *Clin Biomech* 1996;10:323–324.
28. Alaranta H, Hurri H, Heliovaara M, Soukka A, Harju R. Non-dynamometric trunk performance tests: reliability and normative data. *Scand J Rehab Med* 1994;26:211–215.
29. Sagendorf KS, Mayer JM, Graves JE, Manini TM, Ploutz-Snyder LL. Lumbar extensor strength and endurance characteristics of young and older patients. *Amer College of Sports Medicine Annual Conference*. Indianapolis: American College of Sports Medicine; 2000.
30. Cholewicki J, Panjabi MM, Khachatryan A. Stabilizing function of the trunk flexor-extensor muscles around a neutral spine posture. *Spine* 1997;19:2207–2212.
31. O'Sullivan P, Twomey L, Allison G, Sinclair J, Miller K. Altered patterns of abdominal muscle activation in patients with chronic low back pain. *Aust J Physio* 1997;43:91–98.
32. Hodges PW, Richardson CA. Inefficient muscular stabilization of lumbar spine associated with low back pain. *Spine* 1996;21:2640–2650.
33. Mayer TG, Polatin P, Smith B, Smith C, Gatchel R, Herring SA, Hall et al. Contemporary concepts in spine care: spine rehabilitation – secondary and tertiary nonoperative care. *Spine* 1995;20:2060–2066.
34. Hagan KB, Harm S, Rigndahl K. Ratings of perceived thigh and back exertion in forest workers using squat and stoop techniques. *Spine* 1994;19:2511–7.
35. Bigos S, Bowyer O, Braen G, Deyo R, Haldeman S, Hart J. Acute low back problems in adults: assessment and treatment. Clinical practice guideline, quick reference guide no. 14, U.S. Department of Health and Human Service, Agency for Health Care Policy and Research, Rockville, MD, AHCPR, Pub. No. 95–0643, December 1994.
36. Manniche C, Lundberg E, Christensen I, Bentzen L, Hesselsoe G. Intensive dynamic back exercises for chronic low back pain: a clinical trial. *Pain* 1991;47:53–63.
37. Donceel P, Bois MD, Lahaye D. Return to work after surgery for lumbar disc herniation: A rehabilitation-oriented approach in insurance medicine. *Spine* 1999;24:872.
38. Troup JDG. The perception of musculoskeletal pain and incapacity for work: prevention and early treatment. *Physiotherapy* 1988;74:435.
39. Von Korf M., Deyo RA, Cherklin D, Barlow W. Back pain in primary care: Outcomes at 1 year. *Spine* 1993;18:855–862.
40. Fairbank J, Couper J, Davies J, O'Brien JP. The Oswestry low back pain disability questionnaire. *Physiotherapy* 1980;66:271–273.
41. Hudson-Cook N, Tomes-Nicholson K. The revised Oswestry low back pain disability questionnaire: thesis for the completion of requirements at the Anglo-European College of Chiropractic. Bournemouth, England: Anglo-European College of Chiropractic; 1988.
42. Klassen AC, Berman ME. Medical care for headaches. A consumer survey. *Cephalgia* 1991;11:85–86.
43. Liebenson CS. Rehabilitation of the spine: a practitioner's manual. Baltimore: Lippincott Williams & Wilkins; 1996. p. 293–317.
44. Verna JL, Mayer JM, Mooney V, Pierra, EA, Robertson VL, Graves JE. Back extension endurance and strength: the effect of variable roman chair exercise training. *Spine* 2002;27:1772–1777.
45. Tucci J, Carpenter D, Pollock M, Graves J, Leggett S. Effect of reduced frequency of training and detraining on lumbar extension strength. *Spine* 1992;17:1497–1501.
46. Reyes D. 1–2-3 Rehab. A simple guide to rehabilitation protocols, coding & documentation. The author; 2002.
47. Rissanen A, Alaranta H. Isokinetic and non-dynamometric tests in low back pain patients related to pain and disability index. *Spine* 1994;19:1963–1967.
48. Yeomans SG, Liebenson C. Quantitative functional capacity evaluation: the missing link to outcomes assessment. *Top Clin Chiropr* 1996;3:32–41.
49. McGill SM, Childs A, Liebenson C. Endurance times for low back stabilization exercises: clinical targets for testing and training from a normal database. *Arch Phys Med Rehabil* 1999;80:941–933.
50. Vie L, Highland T, Thomas T, Dreisinger T. MRI comparison of active lumbar extensors in MedX lumbar extension to a 45i Roman chair. Columbia, MO: Columbia Spine Center.
51. Lee S, Gulick J, Change A, Mooney V, Leggrett S. Comparative analysis of two lumbar strength training apparatuses on low back strength. In proceedings from the University of California, San Diego, Department of Orthopedics Comprehensive Spine and Joint Care From Exercise to Outcomes. La Jolla, CA: UCSD; 1996. p. 213–214.
52. Mayer JM, Verna JL, Manini T, Mooney V, Graves JE. Electromyographic activity of the trunk extensor muscles: effect of hip position and lumbar posture during Roman chair exercise. *Arch Phys Med Rehabil* 2002;83:1543–1546.