

Treatment of disc herniations with the distraction pump

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ABSTRACT. Objective: To evaluate the effectiveness and use of the vertebral distraction pump in the treatment of disc herniations. **Clinical Features:** Three cases are presented in which patients suffered signs and symptoms characteristic of disc herniations. Magnetic resonance imaging taken confirmed the diagnosis in each case. **Intervention and Outcome:** The vertebral distraction pump, a hand-held instrument, was effectively applied in the three cases having disc herniation as the primary finding. Upon completion of treatment, all cases reported at least a 90% reduction in the initial signs and symptoms, with each individual able to go through their daily routine with no restrictions or increase in symptomatology. **Conclusion:** The hand-held vertebral distraction pump may be an effective tool in the treatment and management of low back disc herniations.

KEY WORDS: Chiropractic Manipulation—Intervertebral Disc Herniation

INTRODUCTION

This paper discusses a newly developed manipulative tool used for treating low back pain with and without radicular pain. The manipulative tool—the vertebral distraction pump (VDP)—uses the flexion-distraction technique via a hand-held instrument to effectively treat the two basic causes of low back

pain and leg pain: dysfunction in the intervertebral disc and/or the articular facets, herein referred to as facet syndrome [1].

This paper examines the intervertebral disc as a cause of low back pain with radiculopathy. Intervertebral disc pathologies of the posterolateral and posterocentral type occur when the annulus fibrosus of the disc stretches or tears, allowing part or all of the nucleus pulposus to move beyond its normal boundary into the central spinal canal, putting pressure on the spinal cord and/or nerve roots.

The VDP is a novel new treatment for low back pain and/or leg pain because it allows the flexion-distraction technique to be applied to the patient via a hand-held instrument. It can be applied to the patient on the first visit (regardless of the severity of the pain) because there is minimal stretching of the soft tissues and peripheral nerves associated with the pain. This stretching of the peripheral nerves (and associated soft tissues) can cause additional irritation to an already painful condition. The patient is placed in the prone position with sacro-occipital technique (SOT) blocks placed under the anterior superior iliac spine bilaterally, creating the desired 10 degrees flexion. The VDP is then applied to the area of involvement and its technique used. The technique involves separating (approximately 1–2 mm) only the posterior aspects of the vertebrae that the herniated disc is between while maintaining the distance between the anterior aspects of those same vertebrae. The distraction is accomplished via the hand-held VDP. The distraction or separation that is created by engaging the VDP is held for 20 sec, then slowly released. The posterior aspects of the same vertebrae are distracted again via the VDP for 20 sec then slowly released once more so the posterior aspects of the vertebrae return to their pre-distraction position. This procedure is repeated five times minimum and eight times maximum, depending upon patient tolerance. Certain research studies have shown that distraction of the vertebrae bordering a herniated disc creates a hydrostatic pressure change within

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that disc; these are discussed below. This decrease in the hydrostatic pressure creates a centripetal force within the disc, causing a suctioning effect that pulls the herniated portion of the disc back toward its normal anatomical position. It also relieves any jamming or distortion in the apophyseal joints and thus reduces pressure on the nociceptors of the three-joint complex. The VDP was developed to use the distraction technique in a hand-held instrument to help reduce disc herniation and relieve facet syndrome [1].

While the disc herniations were addressed via the distraction technique, the malposition sublaxations were addressed via an Activator Adjusting Instrument (AAI). Correcting the malposition sublaxation is necessary in the care of discs because research has shown that any disruption in the disc must be accompanied by altered mechanics of the three-joint complex [2, 3]. We use the AAI adjustments with the patient in a neutral prone position without torquing or tension on articulations. This markedly reduces the risk of injury to paraspinal supportive tissue. There are other reasons for using the AAI that will be described in the discussion portion of this paper and that will show that the AAI is the obvious tool of choice for the correction of the malposition sublaxations. The results of these three cases help demonstrate the utility of the vertebral distraction pump used in conjunction with the AAI for the treatment of low back pain and/or leg pain caused by the intervertebral disc.

CASE REPORTS

Three case reports are included to demonstrate the effectiveness and response of the VDP in the treatment of disc herniations. One case involves the response to treatment of a patient with several years of chronic disc problem that had been treated unsuccessfully with back surgeries. Another involves the response to treatment of a patient with an acute disc problem who was treated with the vertebral distraction pump within 72 hr of injury. The third involves the response to treatment of a patient with chronic disc herniation in which treatment was administered while the patient continued to work using the symptomatic extremity.

Treatment Note

Upon locating the level of herniation via examination and MRI/computed tomography (CT) scan, the patient is placed in prone position with approximately 10 degrees flexion to the area of involvement using SOT blocks in the lumbar spine and a movable head section to the cervical spine. In cases in which the patient is in severe pain, cold hydrotherapy is used; in most chronic cases, hot hydrotherapy is used. This is followed by low-volt stimu-

lation and/or ultrasound. The distraction technique via the VDP is performed followed by the correction of the malposition sublaxation via the AAI. A daily glucosamine sulfate supplement is given in addition to light daily home stretching exercises to be done within the limits of pain. Lumbosacral support is recommended until the disc herniation can be reduced and the patient can go through the day without substantial pain. Patients are also given postural instructions to promote the healing of the involved structures.

The case studies below are selective case studies used to illustrate the types of subjects I see in my practice, with their outcomes using the VDP in their treatment protocol reported.

Case Report 1

Case report 1 involves a patient who had suffered from low back pain for the last 15 years. The patient had received conventional diversified chiropractic care off and on over the 15-year period. Her condition continued to deteriorate to the point where surgery was performed after an MRI revealed two disc herniations—one 6 mm at the L5–S1 level posterocentral, and one 4 mm at the L4–L5 level posterolateral left. The surgery performed at the L5–S1 level was a bilateral laminectomy with 25% posterocentral discotomy. Surgery at the L4–L5 level was a bilateral laminectomy. Following the surgery, a physical therapy program was instituted involving ultrasound, deep tissue massage, hot-cold therapy, exercise, a low back support belt with molding pad, and ergonomic changes. She was released to return to work with the following symptomology: moderate low back pain, grade two active myospasms of the lumbar paraspinal muscles, pain radiating down both lower extremities—posterior aspect of both legs to the heels—of a burning nature. As she worked, the symptoms continued to worsen until the patient was again diagnosed via MRI as having the same two discs herniated, this time the L5–S1 disc being herniated 12 mm and the L4–L5 disc 6 mm. She agreed to a second surgery, which also proved unsuccessful. She was unable to sleep even 2 hr at a time and was unable to walk 50 feet without stopping and leaning on something for support until the burning sensation in her legs and feet subsided. She could not sit or stand for over 5 mins without a severe increase in her symptomology. She took daily prescriptions of narcotic pain medication, muscle relaxants, anti-inflammatories, and anti-depressants. While on the medications, her Oswestry rating was 65%. To get an Oswestry rating without the effects of the medications, the patient was asked to complete the Oswestry questionnaire immediately upon waking up in the morning. Without the medications, her Oswestry rating was 100.

My examination at this point revealed decrease in

all ranges of motion with pain present on all motions and exaggerated pain upon flexion and right and left rotation. Positive tests included: Valsalva/Bechterew's with pain down the posterior aspect of both legs to the heels; Kemp's left with pain down posterior leg to heel and down posterior and lateral leg to the top of the left foot; Kemp's right produced pain down the right leg posterior to the heel; SLR right produced pain down right leg posterior to heel, SLR left produced pain down both legs posterior to the heels and pain posterior and lateral to the top of the left foot. Achille's reflexes were grade one bilaterally, with hyperesthesia of the S1 dermatomes bilaterally, and hyperesthesia of the L5 dermatome left. The visual analog scale (determined by the patient) ranged from 10 (100), which was extreme pain, to 0, which was absence of pain (Fig.1).

As we began the treatment, she had continuous sharp burning pain down both legs upon and standing or sitting. Lying down decreased the symptoms. By the fourth treatment, her low back pain had decreased even while sitting, with the pain dull but constant. The leg pain was now intermittent with a decrease in the severity. By the seventh treatment, the low back pain was mild, but there was still minimal intermittent pain in the legs upon increased activities of sitting, standing and walking. At this point, she was still taking all the aforementioned medications. By the ninth treatment there were no sharp, burning pains down the legs, the low back pain was mild, and she had begun decreasing all her medications. After the thirteenth treatment, she went on a prolonged drive to a wedding with no increase in back pain and no radicular leg pain at all. At this point, she was placed on an increased exercise program and also increased her daily activities, with no leg pain or moderate low back pain resulting from the increase in activities. After the sixteenth treatment, she was placed on once-a-week

treatments. From the eighteenth treatment on, she was seen once a month for 3 months, then put on PRN basis thereafter.

Case Report 2

The second case report involves a patient seen during a house call; he was bedridden with excruciating pain in his low back radiating down the posterior and lateral thighs bilaterally to the knee. (He had reportedly lifted a car transmission without any aid). He was in too much pain to be properly examined. I treated the patient in the prone position in his bed by distracting the L4-L5 and L5-S1 disc locations. After the treatment, I recommended a CT scan be taken to determine the exact location and extent of the injury. The CT scan revealed a 3-mm diffuse disc herniation at the L4-L5 level. When the patient was first seen at our office, he was unable to stand or walk without help. Sitting also produced severe pain radiating from the low back into the buttocks and lateral thigh bilateral. His Oswestry score was 100. Our treatments began on 7/29/96, with the patient's date of injury on 7/26/96. The visual analog scale (VAS) determined by the patient was ten on his 7/29/96 visit (Fig. 1). On the second treatment date, the patient reported he was able to sleep continuously for 6 hr following the initial office visit. However, there was severe pain still present, with the patient unable to walk without support. The VAS on the second visit was put at 7.0. Before our treatment of the patient the third time, he walked into our office without aid and stated he was feeling much better. His VAS at this time was 6.2. On the subsequent visit, the VAS was put at 4.6, with the radicular pain minimal. However, there was continual low back pain with occasional sharp pain across low back area. With each

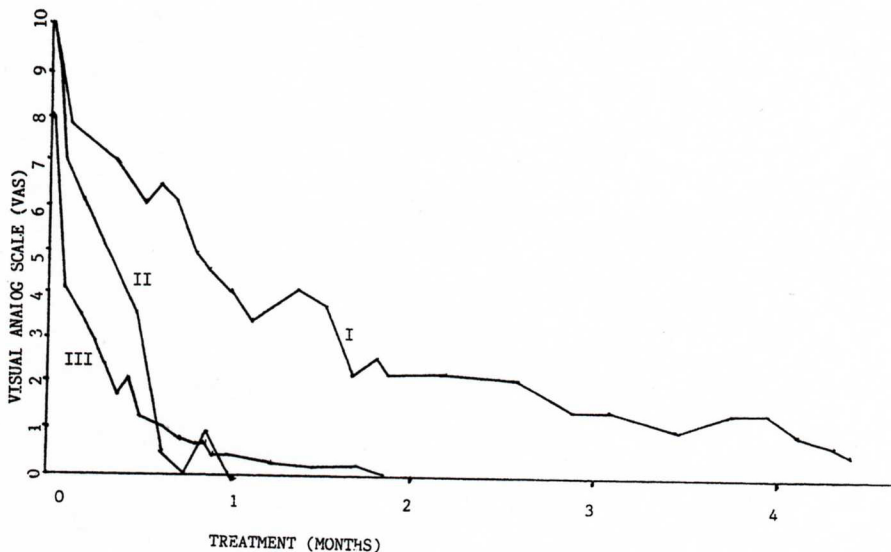


Fig. 1. Visual analog scale (VAS).

treatment, the leg pain decreased in intensity and frequency until the sixth treatment, when there was no leg pain at all whether sitting, standing or walking. The VAS at this point was 0.5. At this time the patient was put on the Cox low back exercises and it was recommended he take 1500 mg per day of glucosamine sulfate for 3 months; then 1000 mg per day for three additional months to strengthen the annular fibrosis of the herniated discs. At this point, the patient dismissed himself as "cured," with our warning of not aggressively working the low back, as well as continuing with the exercises and glucosamine sulfate. We did see the patient eleven days after he put a rear end in an automobile. There was no sharp pain across low back or radicular pain, but he was concerned enough to get rechecked. We saw him again 4 days later, at which time he stated he was completely asymptomatic.

It is my belief the patient's quick response to the treatments was a result of addressing the disc herniation within 3 days of the injury. Other cases have confirmed this; the sooner the injury is addressed after the injury occurs, the faster the response to treatment.

Case Report 3

The patient visited on 3/25/96 complaining of neck and moderate to severe right arm and hand pain. There had been a gradual onset of pain, over the last year, of a non-specific, non-provoked nature. An MRI revealed disc herniations at the C5-C6 and C6-C7 levels. Her Oswestry rating prior to treatments was 54%. On the initial date of service, the patient put her VAS at 8.0 (Fig. 1). There was neck to right arm and hand pain, with right hand swelling. The subsequent visit had the patient report a decrease in neck, arm, and hand pain with a decrease in right hand swelling. She put her VAS at 4.2. The following visit the patient noted that with work stress or anger, her pain increased. I recommended there be no repetitious usage of her right upper extremity as this would irritate and exacerbate the condition. She explained she had children and no other means of support, so she had to continue to work while being treated. On the sixth treatment, she put her VAS at 1.7 and stated there was no more sharp or burning pain in the neck, arm or hand and no apparent swelling in the right hand. The symptomology at this point was mild. Subsequent to the sixth visit, she reported a flare-up after the previous visit. She reported right middle finger pain with mild hand swelling. By the ninth treatment, the patient put the VAS at 1.0, stating there was mild neck pain with no extremity symptoms. In the month of treatments that followed, the patient reported no symptoms or neck soreness. During this month the VAS never exceeded 1.0 and averaged 0.3.

It took one treatment to lower the VAS to below 5.0. It took nine more treatments to get the visual analog scale down to 1.0, at which point it took nine more treatments to get the visual analog scale down to zero. This was done while the patient continued to work while at the same time using her symptomatic extremity. I believe the patient's response from one to zero on the VAS was slowed by her continual usage of the right upper extremity. Normally, in other cervical cases, the response rate is quicker with proper patient compliance. Despite limited patient compliance, the MRI study performed on 4/30/96 showed complete reduction of the disc herniations. This case shows stabilization of disc herniations can be maintained despite continual usage of the extremity affected by the disc herniations.

DISCUSSION

In the treatment of low back pain caused by intervertebral disc herniation, we have applied distraction technique using a hand-held instrument—the vertebral distraction pump.

In using a table for flexion distraction, there is the stretching of the soft tissues associated with the disc herniations. This stretching, especially of the peripheral nerves, irritates an already painful condition. The VDP can be used on the initial visit since, when properly placed upon the back, it contacts the tissues over the vertebrae involved, excluding pressure exerted on the peripheral nerves and associated tissues. When distraction is then introduced, there is minimal, if any, stretching or pressure put on the nerves. There is a release of the pressure on the pain receptors with no stretching.

Several studies have shown the effectiveness of distraction in the reduction of disc herniations. Cox [1] showed in 576 patients with low back and/or leg pain that 75% had good-to-excellent response to the Cox Flexion/Distraction Technique. Mootz and Waldorf [4] also supported the use of flexion distraction for discogenic low back pain industrial back injuries.

Onel et al [5] showed that at 45 kg of traction, the herniated nuclear material retracted in 78.5% of medial, 66.6% of posterolateral, and 57% of lateral herniations. Onel states the following about distraction of the lumbar discs: 1) Static lumbar traction applied with a 45 kg load effectively opens the disc space, apophyseal joint space, and reduces the herniated nucleus pulposis; 2) the opening of the disc space drops the intradiscal pressure and probably creates a centripetal force that sucks the herniated disc back into its normal anatomical position; and 3) the anterior and posterior ligaments are stretched under distraction. The stretching of the posterior longitudinal ligament may push the herniated disc towards the disc space. Therefore, the herniated

nucleus pulposis is reduced by the combination of the lowered intradiscal pressure, sucking the disc back into its normal anatomical position as well as the pushing back of the disc by the retraction of the posterior longitudinal ligament.

Neugebauer [6] reported symptom relief after treating 30,000 patients with disc protrusions. He felt that distraction allowed the disc to be reduced, the intervertebral foramen to be increased in size, allowing the escape of nerve root compression, and the posterior longitudinal ligament to be stretched to bring the disc back to its normal anatomical position.

Kramer [7] states the most important factor in traction is the reduction of intradiscal pressure, which will facilitate a normalization of dislocated disc fragments.

Alf Nachemson showed that a widening of the disc space decreases the intradiscal pressure by demonstrating that the intradiscal pressure was reduced from 30 to 10 kg in the L3 disc under a tractive load of 30 kg.

Quellette [8] agrees with this and states that distraction allows the vertebrae to separate, thus creating a negative pressure in the intervertebral joint. The nucleus, which is infiltrated in the fissure, is drawn by suction into its proper place.

Stephens and O'Brien [9] studied the morphological changes in the lumbar spine intervertebral foramina in normal and abnormal motion segments after distraction and found the foramen is increased in cross-sectional area by approximately 20% after the traction.

It is evident from the research that distraction is a very effective means of treating disc herniations. The Mercy Conference also marked it as only one of the two established techniques in chiropractic [10]. As important as distraction is in the treatment of disc herniations, another integral part is the addressing of the alteration in the three-joint complex.


Farfan [2] states that any disruption in the disc must be accomplished by altered mechanics of the three-joint complex. Unfortunately, many patients with disc herniations are adjusted without consideration for the underlying disc derangement. The potential danger of worsening a disc protrusion by rotational maneuvers is related to axial torsion damage of failure [1]. Side posture techniques are no longer necessary and are to be avoided.

Jull [11] states that scar tissue must be laid down in the direction of stress and normal physiological range of motion of the joint, or else the patient will be left with a mixed matrix of scar formation, which will not allow full range of motion and will further result in painful mobility. Jull further states that the use of strong, gross manipulative thrust techniques in the management of acute disc lesions should be avoided in favor of the more controlled application of passive movement by graded mobili-

zation techniques. This does not mean, however, that disc patients should not be manipulated.

Clinical experience has shown that intervertebral disc displacements are manageable lesions [12]. The omission of the adjustment in treatment of many cases of disc herniations likely results in unnecessary patient suffering. What is needed is an efficient non-traumatic adjustment that does not create axial torsion. This is why the AAI is the tool of choice in addressing the alteration in the three-joint complex. Because all AAI adjustments are performed in a neutral prone position without torquing or tension on articulations, the risk of injury to paraspinal supportive tissues is markedly reduced. The Activator technique, because of its controlled force and displacement, is widely considered to be a safer, non-traumatic method of chiropractic care. It was chosen as the safest technique by chiropractors in a 1986 nationwide survey [13]. Plaugher advocates specific, short lever adjustments, primarily in the posterior to anterior direction for posterior disc displacements whenever possible [14]. The AAI, a short-lever adjusting instrument, delivers a controlled and repeatable force [15]. Another aspect that is very important in the treatment of disc herniations via the AAI is its ability to complete its thrust before the stretch reflex of the intrinsic muscles of the spine are able to contract. This reduces the functional tissue resistance, and therefore there is less inertia to overcome in order to initiate movement into a motion segment [15]. Essentially, the AAI, when used properly, can be more consistent than manual manipulation in which fatigue, muscle strain and elbow injury to the DC are a few of the variables involved that make it difficult for consistent manual manipulation [16]. Cases treated with and without the AAI have clearly shown the response to treatment to be quicker when the AAI is used for VDP vs. without it.

CONCLUSION

In conclusion, the newly developed tool VDP has been shown to help treat and reduce disc herniations. It allows the distraction technique to be applied to the patient via a hand-held instrument, making it easier in its application to the patient. This allows the distraction technique to be applied to patients who are bedridden or have painful conditions that restrict their travel. 

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