The Use of Cold Laser in Conjunction with Traction and Lumbar Extension Exercises for Treatment of Lumbar Disc Herniation: Case Report

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ABSTRACT

Background and Purpose: Over 95% of lumbar disc herniation (LDH) occurs at the L4-5 or L5-S1 levels. There is limited research to support the management of LDH using the cold laser combined with lumbar extension exercises and traction. The purpose of this case study was to discuss the use of cold laser in conjunction with lumbar extension exercises and mechanical lumbar traction to treat patients with acute low back pain (LBP) caused by LDH. **Case Description:** The patient was a 36-year-old male referred to physical therapy with a medical diagnosis of herniated disc at L4-L5 with compression of the L4 nerve root confirmed by MRI. The patient's main complaint was pain over the right lumbosacral area with radiating pain into the right thigh and right lower leg. **Intervention:** The treatment protocol was divided into 3 phases: Phase 1 (visit 1-6) included lumbar extension exercises and mechanical lumbar traction. Phase 2 (visit 7-18) included lumbar extension exercises and mechanical lumbar traction in conjunction with cold laser therapy. Phase 3 (visit 19-21) included back stabilization exercises and patient education 1 visit/ week for 3 weeks. **Outcomes:** The patient was seen for a total of 21visits. The Minimal Detectable Change (MDC) was used to interpret the outcome measures and showed meaningful improvement changes in pain and function. **Conclusions:** The data from this case study shows that using cold laser combined with lumbar extension exercises and mechanical traction appears to be an effective treatment approach for this patient with acute LBP caused by LDH.

Key Words: lumbar disc herniation, cold laser, lumbar extension exercises, mechanical traction

INTRODUCTION

Low back pain (LBP) is a common musculoskeletal disorder associated with a considerable social and economic burden within the working-age population.[1] The causes of low back pain may include muscle strain, tendonitis, herniated disc, and facet dysfunction.[2] Physical therapy treatment for acute LBP caused by lumbar disc herniation (LDH) can include education, exercises, and traction, as well as modalities such as heat, ice, thermal ultrasonography, electrical stimulation, and laser. Studies show that physical therapy treatment including back exercises, traction, and cold laser produced a moderate reduction in pain and improvement in function in patients with acute LBP caused by LDH.[3,4] The same studies recommended that further research is warranted on treatment for acute LBP. The purpose of this case study is to describe the effect of the cold laser in conjunction with mechanical traction and lumbar extension exercises for a patient with acute LBP caused by LDH.

BACKGROUND

Lumbar extension exercise is one of the physical therapy techniques that are used in the treatment of acute LBP caused by LDH. Lumbar extension exercises are used for its pain relief effect and not as strengthening exercises. Luciana and colleagues stated in their studies "With the McKenzie approach exercise is not used to strengthen the back muscles, but to promote rapid symptom relief."[5] Studies have shown that lumbar extension causes an anterior migration of nuclear tissue, and reduces pain by decreasing the forces acting on pain sensitive tissue.[3] The anterior migration of the nuclear tissue that results from lumbar extension has been the basis for the use of lumbar directional movements, especially lumbar extension during rehabilitation to reduce LBP. Two meta-analyses regarding the McKenzie method of physical therapy indicated that the McKenzie method is more effective than other treatments for acute LBP patients.[6,7] A multicenter randomized controlled trial study that was conducted between September 2005 and June 2008 concluded that, the McKenzie method does not produce appreciable improvements in pain, disability, and function.[5] Even though the debate continues over the effectiveness of the McKenzie method; it continues to show immediate reduction in low back pain intensity following lumbar joint mobilization and prone press-ups. Twenty patients with back pain who received extension mobilizations and extension in lying were monitored with MRI before and after, and classified as responders if there was a reduction in pain score of 2 or more. Responders demonstrated a mean increase in diffusion coefficient in the middle portion of the disc compared to a mean decrease in the non-responders.[8]

Traction is one of the physical techniques that are used by the physical therapist for the treatment of the patient with acute LBP associated with radicular symptoms and neurological deficit due to LDH.[9] Correctly performed traction produces reduction in the size of the herniation, increases space within the spinal canal, widens the neural foramina, and decreases thickness of the psoas muscle.[10] Lumbar traction is both effective in improving symptoms and clinical findings in patients with LDH and also in decreasing the size of the herniated disc material as measured by computed tomography (CT) scan.[11] In a single-blind randomized clinical trial comparing interventions for patients with LBP with signs of radiculopathy, 64 patients (mean age 41.1 year, 56.3% female) with LBP, leg pain, and signs of nerve root compression were randomized to receive a 6-week extension-oriented intervention with or without mechanical traction during the first 2 weeks. The study concluded a subgroup of patients likely to benefit from mechanical traction may exist.[12] The Cochrane systematic review concluded, "traction probably is not effective," also pointed out that "we lack strong, consistent evidence regarding the use of traction due to the lack of high quality studies, the heterogeneity of study populations, and lack of power."[13]

Cold laser has been shown to reduce

inflammation and promote healing in disc herniation. Studies have demonstrated that laser therapy is effective in reducing prostaglandin concentrations and demonstrating that inflammation is greatly reduced 75, 90, and 105 minutes after active laser therapy compared to levels prior to treatment.[14] The reduction in inflammation appears to be another method by which laser therapy promotes healing in disc herniation.[15] Another study examined the effectiveness of laser therapy in treating LDH measured by clinical evaluation and magnetic resonance imaging (MRI).The study included 60 patients (18 men and 42 women) with a mean age of 44.5 years (range, 20-60 years) who presented with acute LBP and leg pain that was definitely diagnosed as being caused by LDH. The results found that laser therapy is effective in the treatment of patients with acute LDH, and repeated MRI scans provide evidence of morphological regression of herniated disc mass.[4] A randomized, double-blind, placebo-controlled trial was performed on 546 patients. The study was carried out between January 2005 and September 2008. Group A (182 patients) were treated with nimesulide 200mg/day and additionally with active laser; group B (182 patients) was treated only with nimesulide; and group C (182 patients) was treated with nimesulide and placebo laser. Treatment of acute LBP with radiculopathy at 904nm laser at a dose of 3 J-point, proposed as additional therapy to nonsteroidal anti-inflammatory COX-2 drugs, has shown better improvement in local movements, more significant reduction in pain intensity and related disability, and improvement in quality of life, compared with patients treated only with drugs and a placebo laser procedure, and with no side effects. The results of this study show better improvement in acute LBP treated with laser used as additional therapy.[16] In contrast, the Cochrane study concluded that there is insufficient data to either support or refute the effectiveness of laser therapy for low back pain.[17] There is not enough evidence supporting the use of laser therapy in conjunction with both lumbar extension exercises and mechanical traction for the management of acute LBP caused by LDH.

CASE DESCRIPTION

Patient History

A 36-year-old, male was referred to outpatient physical therapy for evaluation and treatment with a diagnosis of a low back pain secondary to herniated disc at L4-L5. The MRI confirmed a far-lateral disc herniation at the L4-L5 and compression of the L4 nerve root. The patient's employment requires repetitive lifting, bending, twisting, driving, and moving heavy equipments and tools on a regular basis throughout the work day. Onset of the condition was described as immediate back pain and spasm after attempting to catch a heavy object falling from a counter. The symptoms became worse with pain extended over the right lumbosacral and central lumbar region, radiating pain into the right thigh, and numbness and tingling in the right lower leg down to the foot. The patient was referred to physical therapy 2 weeks after the onset of pain. The patient's main goals were to return to work and be able to participate in recreational drumming without pain. On evaluation, the patient's symptoms were described as increased when bending, leaning forward, and when arising from the seat. His symptoms decreased when standing, lying prone or supine, and walking downhill. The patient's medical history included history of back pain but subsided by rest and over-the-counter pain relief. No significant medical history or surgery was reported.

Table 1. Patient's initial and subsequent outcome measures using: Spine range of motion, the Back Pain Functional Scale (BPFS), the Oswestry Low Back Pain Disability Questionnaire (ODQ), and the Numerical Pain Rating Scale (NPRS).

Visit	Lumbar Range of Motion Forward Bending (FB)	Backward Bending (BB)	The Back Pain Functional Scale (BPFS)	Patient score (ODQ)	Pain Level (NPRS)
Initial visit	25 °	15 °	15/60	64%	8-9/10
Visit 3	28 °	18 °	-	56%	7-8/10
Visit 6	30 °	20 °	26/60	48%	6-7/10
Visit 9	45 °	25 °	-	30%	3-4/10
Visit 12	50 °	28 °	48/60	16%	1-2/10
Visit 15	55 °	30 °	-	8%	0-1/10
Visit 18	60 °	30 °	56/60	4%	0/10
Discharge visit	60 °	30 °	58/60	0%	0/10

Physical Examination

Structural observation

The patient is of mesomorph intermediate build with forward head and rounded shoulders, and a flat back posture. The right shoulder appeared slightly dropped. No other deformities or asymmetries were observed.

Palpation in standing

The patient has tenderness on the right lumbar region more at the level L4-5, increased muscle tone on the right side (spasm/guarding). The right iliac crest and right posterior superior iliac spine were slightly higher than left. The skin temperature was warmer to touch in the right lumbar region.

Palpation in prone

Tenderness over L4-5 was present. The muscle tone (spasm/guarding) decreased on the right side. A trigger point was palpated on the lateral-superior margin of the right quadratus lumborum just below T12 rib.

Active motion assessment

Active range of motion was within the normal limit for both upper and lower extremities. Goniometric range of motion measurements of the spine were taken in standing using an inclinometer. To measure the forward and backward bending, the inclinometer base was placed on the T12 spinous process in the sagittal plane, and to measure the side bending and rotation, the inclinometer was placed in the frontal plane on T12 spinous process. Intrarater reliability for forward flexion is (.84–.79); intrarater reliability for backward bending is (.74–.60).[18] Patient's forward bending was 25/60°, backward bending was 15/30°, and side-bending range to the right, to the left, and rotation were within normal limits.

Manual muscle testing

Manual muscle testing was performed to measure the muscle strength of bilateral lower and upper extremities, back, and abdominal muscle. Right hip flexors, right knee extensors, ankle dorsiflexors, and great toe extensors scored 4/5. Abdominal and back muscles scored 3/5. Upper extremities and left lower extremity scored 5/5.[19]

The L4 right knee jerk reflex

The L4 right knee jerk reflex was sluggish (diminished /hyporeflexia) with score of 1out of 4, while the left side was normal. The ankle jerk reflex was normal in both ankles.[20]

Femoral nerve stretch test

The femoral nerve stretch test is used for the diagnosis of mid-lumbar impingement or compression on the L2, L3, and L4 nerve roots and has been shown to be reliable. The patient was positioned in prone on the table with the knee flexed to 90°. The right hip was passively extended by lifting the right thigh off the table.[21] The test was positive, patient expressed irritation, and radicular pain in the anterior thigh rather than a mild feeling of tightness.

Centralization

Centralization is the situation in which referred pain arising from the spine is reduced and transferred to a more central position when movements in specific directions are performed (McKenzie assessment).[22] The patient reported that repeated back bending (extension) 10 times produced significant decrease in pain and tingling sensation. Lumbar flexion increased radicular pain to right leg.

Outcome measures

The Oswestry Low Back Pain Disability Questionnaire (ODQ), the Back Pain Functional Scale (BPFS), the Numerical Pain Rating Scale (NPRS), and the spine range of motion were used to measure and assess pain and dysfunction. The Oswestry Disability Questionnaire is used to measure the patient's permanent functional disability and has shown to be a valid and reliable test in assessing pain related disability in persons with low back pain; the Oswestry has an internal consistency of 0.82–0.90 and a test-retest reliability of 0.88–0.94, higher scores represents more severe disability.[23] The NPRS is a self-report tool to assess pain intensity; the NPRS has test-retest reliability from 0.67–0.96. The patient is asked to describe his pain on a scale of 0–10, 0 being no pain and 10 being the worst pain.[24] The back pain functional scale (BPFS) is used to evaluate functional ability in patients with back pain; the test-retest reliability 0.88 internal consistency 0.93, the total BPFS scores can vary from 0 (the lowest functional level) to 60 (the highest functional level).[25] The spinal range of motion was measured using the inclinometer, which is a tool that objectively measures the spinal range of motion in degrees. Patient's initial and subsequent range of motion measurements are shown in Table 1.

ASSESSMENT

The patient's medical diagnosis was confirmed by MRI. Based on initial diagnosis of far-lateral disc herniation at the level of L4-L5 and compression of L4 nerve root, the patient's history, and clinical findings the following were determined to be the patient's main impairments and limitations:

- Pain in the lumbosacral region, radiating pain, numbness, tingling and squeezing to right thigh, lower leg and foot, rated 8-9/10.
- Weakness; the right hip flexors, knee extensors, ankle dorsiflexors, great toe extensors scored 4/5 abdominal and back muscle scored 3/5.
- ROM; lumbar spine forward bending was 25° backward bending was 15°.
- Sitting without a back support (on a stool/bench) was limited only for 15minutes (for example limited sitting to watch his kid's soccer games).
- Dressing; limited for upper and lower extremity includes putting his shoes and socks on.
- Driving; limited for short distance increase pain and radiating pain with increase distance and vibration, in and out of the car aggravate pain.
- Walking; was limited to 10 minutes then pain and squeezing increase in the thigh and lower leg.

The centralization phenomenon, supported by examination findings as reported by the patient decreased his radicular pain after repeat back extension 10 times. The patient was classified by McKenzie's classification (postural, derangement and dysfunction syndrome) as lumbar spine derangement syndrome.[22] Browder et al support the belief that patients who centralize with extension movements during examination may preferentially benefit from a treatment approach focused on repeated extension movements.[26]

PROGNOSIS

The natural history of back pain is favorable; studies showed that 30% to 60% of patients recover in one week, 60% to 90% recover in 6 weeks, and 95% recover in 12 weeks.[27] Patient's age, motivation, prior level of function and improvement with the repeated back extension are factors contributing positively to the prognosis. Based on the medical diagnosis, physical therapy finding, and clinical experiences, the patient scheduled for physical therapy treatment 3 times per week for 6 weeks and 3 follow up visits once per week for 3 weeks. Pain and function reassessment were scheduled every 3 visits.

INTERVENTION

The treatment protocol was divided into 3 phases. Phase I (severe disability & radiculopathy) included lumbar extension exercises and mechanical lumbar traction 3 times per week for 2 weeks (visit 1-6). Phase II (moderate disability & centralization) included application of cold laser in conjunction with lumbar extension exercise and traction 3 times per week for 4 weeks (visit

Table 2. Phase 1 Intervention Visit (1-6): The Application of Lumbar Extension Exercises and Mechanical Lumbar Traction 3/week x 2 weeks.

Intervention	Visit 1-3	Visit 4-6
Prone extension on elbow	2 minutes	2 minutes
Prone pushups until full elbow extension	3 sets of 10x	3 sets of 10x
Traction type	Continuous	Continuous
Traction position	Prone	Prone
Traction force	85 lb	85 lb
Traction duration	15 minutes	20 minutes
Traction followed by:		
Prone press ups	10 x	10 x
Back extension in standing	3 sets of 10x - 2-3 sec. hold	3 sets of 10x - 5-10 sec. hold

7-18). Phase III (minimal disability & stabilization) 3 follow up visits included back stabilization exercises and patient education for home exercises program once per week for 3 weeks (visit 19-21). The goals of the treatment protocol for phase I, II, and III were: decrease the effect of herniated disc over L4 nerve root, reduce pain through reduction of edema and inflammations associated with the herniated disc, and accelerate the process of healing, and build muscle strength to stabilize the lumbar region and prevent re-injury. In phase I as shown in Table 2, the repetitive lumbar extension exercises as designed by McKenzie were selected to centralize the patient's radicular pain. The lumbar extension exercises included extension while prone on elbow and hold for 2 minutes, then pushes up slowly till extending the elbows. Prone press-ups repeated 3 sets of 10. The mechanical continuous lumbar traction was applied in the first visit for 15 to 20 minutes; the patient was lying in prone position with a pillow under his pelvis for comfort. The intensity of the lumbar traction force (85 lb) was selected to be 40% to 60% of the patient's total body weight (170 lb).[12] Following the traction, the patient performed repeated prone press-ups 10 times, extension in standing (back-bending and hold the bending for 2-3 sec, then return to the starting position) 3 sets of 10. The patient was educated to perform spinal extension exercises at home every 4 to 5 hours. He was also taught modified resting positions (for sitting and standing) and work postures that will maintain centralization and avoid peripheralization. At the end of Phase I, patient made clinical and functional improvements in all areas. Patient's ROM increased 5° in both forward and backward bending. Radicular pain and tingling sensation were centralized. Patient's disability level improved from severe disability (64%) to moderate disability (48%) on ODQ. Even thought patient's pain was decreased from 8-9/10 to 6-7/10, pain remained to be the patient's main problem that interfered and affected his daily living activities. Since the back pain was still considered in the acute stage, application of cold laser as a physical therapy modality and an additional intervention was considered.

Phase II, began in the seventh through eighteenth visit and included the application of cold laser over lumbar region in conjunction with lumbar extension exercise and traction. Laser device, laser diodes Gallium-Aluminum-Arsenide (GaAIAs), the laser diode emitting a wavelength of 875nm, and 3 diodes emitting a wavelength of 660nm, maximum power of 625mW, dose 6 J/cm. One minute treatment was applied over interspinous spaces at level L3 - 4 - 5 and S1 (from 2 to 3 cm laterally of the spinous process par vertebral for each point). The patient positioned in prone position for continuous lumbar traction using 90lb traction force for 20 minutes. Cold laser was applied at same time of traction. Traction and laser were followed by repeated prone press-ups, and extension in standing as shown in Table 3. At the end of Phase II and after the application of cold laser in conjunction with lumbar extension and traction for 12 visits, patient's rate of improvement has increased significantly in all areas. Patient has pain free ROM in all directions. Patient's disability level improved from moderate disability (48%) to minimal disability (4%) on ODQ. Since patient was ready to return to his prior level of function, starting Phase III was necessary to improve lumbar stabilization, strength, and prevent re-injury.

Table 3. Phase II Intervention Visit (7-18): The Application of Cold Laser in Conjunction With Lumbar Extension Exercise and Traction

Intervention	Visit 7-9	Visit 10-12	Visit 13-15	Visit 16-18
Prone extension on elbow	2 minutes	2 minutes	2 minutes	2 minutes
Prone full elbow extension pushups	3 sets -15x	3 sets -15x	3 sets -15x	3 sets -15x
Traction type	Continuous	Intermittent	Intermittent	Intermittent
Traction force	85 lb	85 lb	90 lb	90 lb
Traction position	Prone	Prone	Prone	Prone
Traction duration	20 minutes	20 minutes	20 minutes	20 minutes
Application of laser during traction:				
Laser dose	6 J/*cm*^2	6 J/*cm*^2	6 J/*cm*^2	6 J/*cm*^2
Laser interspinous level of application	L3-4-5-S1	L3-4-5-S1	L3-4-5-4-S1	L3-4-5-S1
Laser duration	I minutes	1 minute	1.5 minute	1.5 minute
Traction and laser followed by:				
Prone press ups	10 x	10 x	15x	15x
Back extension in standing	3 sets of 10x -10-15 sec. hold	3 sets of 10x -10-15 sec. hold	3 sets of 10x -10-15 sec. hold	3 sets of 10x -10-15 sec. hold

Phase III (3 visits once/week for 3 weeks) included stabilization exercises and patient education for home exercises program. Back stabilization exercises included prone gluteal squeezes with alternate arm and leg raises, kneeling stabilization (double knee –single knee). Abdominal exercise for transverses abdominals included abdominal bracing, bracing with bridging supine, bracing with walking, and supine pelvic bracing. Exercises for erector spinae/multifidus included quadruped alternate arm and leg lifts with bracing. Exercises for quadratus lumborum included side support with knees flexed-side support with knees extended. Exercises for oblique abdominals included side support with knees flexed-side support with knees extended. All exercises were repeated 30 repetitions with an 8-second hold. Pain and dysfunction was reassessed in the ninth, twelfth, fifteenth, eighteenth, and discharge visits as seen in Table 1.

OUTCOMES

The ODQ, the NPRS, BPFS and the spine range of motion were used to measures and assess pain and dysfunction throughout treatment course. The patient made significant clinical and functional improvements in all areas (Table 1, Table 4). Patient's muscle strength (measured with manual muscle test) in the right hip flexors, right knee extensors, ankle dorsiflexors, and great toe extensors was 5/5. Abdominal and back muscles muscle strength was 4+/5. The L4 right knee jerk reflex and Femoral Nerve Stretch Test were negative. At the discharge visit, patient reported that he achieved all of his goals. The patient was able to sit, stand, and drive his car for over 30 minutes without pain as compared to 10 to 15 minutes in the initial visit. The patient returned to his job full-time and was able to participate in recreational drumming without pain. The standard error of measurement (SEM) and the Minimal Detectable Change (MDC) were used to interpret the outcome measures and showed meaningful improvement changes as shown in Table 4. The SEM and MDC90 provide (90% confident) that a true change in pain and function occurs

Table 4. Minimum Detectable Change for NPRS, ODQ, and BPFS, FB, and BB.

Outcome Measures		Initial Visit	Discharge Visit	Mean/SD	SEM	MDC90
ODQ		64%	0%	32.3 (24.06)	5.89	13.76
BPFS		15/60	58/60	40.6 (19.126)	6.63	15.46
NPRS		8-9/10	0/10	5.2 (3.3)	1.48	3.45
Spinal ROM	FB	25 °	60 °	44.13(14.55)	5.82	13.58
	BB	15 °	30 °	24.5(6.05)	3.08	7.20

The Standard Error of Measurement (SEM) and the Minimal Detectable Change (MDC), the Standard Deviation (SD)

Table 5. Patient's Rate of Progress Before and After Using Cold Laser: Measured by Oswestry Low Back Pain Disability Questionnaire (ODQ); Numerical Pain Rating Scale (NPRS); Back Pain Functional Scale (BPFS); Forward Bending (FB) and Backward Bending (BB).

	Rate of progress after 6 visits using extension exercises and traction	Rate of progress after 6 visits using cold laser, extension exercises, and traction
ODQ	16%	32%
BPFS	18.33%	36.60%
NPRS	20%	50%
FB	8.4%	33.3%
BB	16.60%	26.67%

after physical therapy treatment.[25,28] Standard errors of measurement calculated using the following equation (SEM = SD x [1- √*r*]). In this equation, SD is the standard deviation of the measure, and *r* is the reliability coefficient (test-retest reliability). Minimal detectable change scores were calculated at the 90% confidence interval. The formula used for calculating MDC_{90} was (MDC_{90} = SEM x 1.65 x√ 2). To show true changes in the patient's function (BPFS) the outcome needs to increase by at least15.46, if the change in function is ≤15.46, then the change is likely due to error in the measurement and not a true change in function ability. The study conducted by Elaine et al stated, the MDC for the ODQ was 16.7 points, and for the NRS is 2.4 points.[29] The study conducted by Ostelo et al stated "for a range of commonly used back pain outcome measures a 30% change from baseline may be considered clinically meaningful improvement when comparing before and after measures for individual patients."30 Comparing the patient's BPFS, ODQ, NPRs scores in the initial visit to the discharge visit, the patient scores improved by 43 points on BPFS, 64% on ODQ, and 9 points on NPRs as shown in Table 4.

DISCUSSION

Over 95% of lumbar disc herniation occurs at the L4-5 or L5-S1 levels.[20] Physical therapy treatments for patient with acute LBP caused by LDH can include various interventions. Supported by studies and evidences each treatment intervention individually had benefits in the treatment of acute LBP. More research is needed to support that the combination between intervention and modalities with specific parameters can maximize benefits and accelerate the process of recovery. In this case study, the combination of lumbar extension exercises, mechanical traction, and cold laser therapy was more beneficial to treat the patient and improve the recovery. The patient responded to lumbar extension exercises and traction by experiencing centralization of pain with repeated and sustained back bending during phase I (visit 1-6) of physical therapy treatment. Even thought the patient demonstrated an improvement on ODQ, BPFS, NPRS, and spine range of motion as showed in (Table 1), the pain remained the patient's main problem and affected all of his activities of daily living. The study conducted by Fritz et al suggested that a subgroup of patients likely to benefit from mechanical traction may exist. It also suggested that extending the duration of traction treatment beyond 2 weeks may be beneficial and future research should examine additional parameters to optimize the effectiveness of traction.[12] The patient required more aggressive intervention to improve the pain and functional level after reviewing the outcome measures from phase I. In phase II, the application of cold laser as an additional physical therapy modality was begun. Although cold laser remains questionable in its effect for treatment of LDH, the studies conducted by Unlu et al, Lim et al, and Konstantinovic et al demonstrated that cold laser had anti-inflammatory and anti-edematous action owing to its influence in reducing prostaglandin synthesis. In particular, its inhibitive effect on prostacyclin has been reported to provide pain and inflammation regression as well as decreasing the size of herniated disc mass. There were significant reductions in the size of the herniated mass on MRI after laser treatment.[4,15,16] The reassessment of pain and function after using the cold laser for 6 visits indicated significant improvement of pain and function (Table 5). For example, the patient scored on ODQ dropped from 48% to 16%. The patient improved from severe disability to minimal disability and he was able to cope with most of his daily living activities. The patient's rate of progress continued to improve significantly in all aspects supported by follow up measures on ODQ, BPFS, NPS, and spine range of motions as showed in Figure 1. The lumbar stabilization exercises to target the spinal extensor muscles, multifidus, abdominals, and obliques were chosen for the patient supported by clinical experience as preventive measures from reoccurrence. Based on the meaningful changes in the all outcomes with the patient in this case study, the use of cold laser in conjunction of lumbar extension exercises and traction for the treatment of acute LBP caused by LDH may be a viable way to improve and accelerate recovery. Even though the use of cold laser in conjunction with traction and lumbar extension exercises showed meaningful changes in all the outcomes in the treatment of lumbar disc herniation in this case study, further research is needed to make definitive treatment recommendations.

There is a lack of research regarding the effect of cold laser combined with lumbar extension in the treatment of lumbar disc herniation. A single case report cannot prove

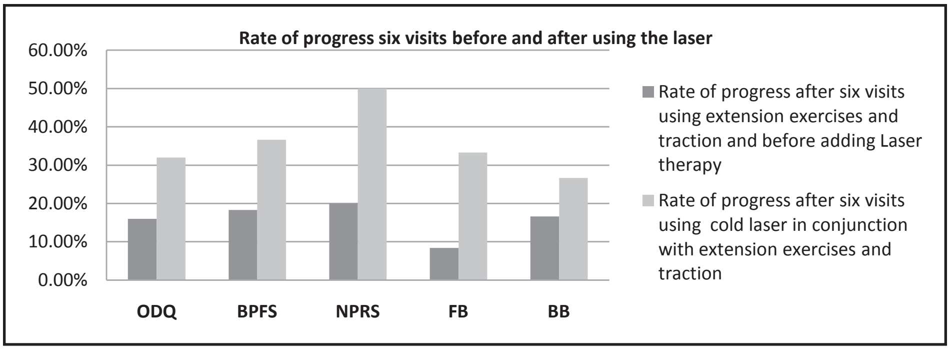

Figure1. The rate of the patient progress before and after using laser therapy.

that the use of cold laser therapy in conjunction with lumbar extension and traction as described in this case study is actually what created and caused the achieved result, only statistical analysis of a larger treatment group, compared to a clearly defined control group can do that. This case study can only provide the basis for more definitive research.

CONCLUSION

In this case study, the use of cold laser therapy in conjunction with lumbar extension exercises and mechanical lumbar traction appears to be a beneficial intervention to reduce pain and improve function for patients with acute low back pain caused by lumbar disc herniation. The outcome measures in this case study showed meaningful changes in all measures. According to the literature, there is scientific evidence that each treatment intervention individually is effective in the treatment of acute low back pain caused by lumbar disc herniation. There is currently a lack of research regarding the effects of this combined treatment regimen. Further research with a large patient population is needed to evaluate the effectiveness of cold laser therapy in conjunction with lumbar extension exercises and mechanical lumbar traction in the treatment of patients with acute lumbar disc herniation.

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