Clinical Case Report Competition

West Coast College of Massage Therapy

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First Place Winner

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Effect of massage therapy on chronic low back pain from degenerative disc disease

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Abstract

Background
Low back pain (LBP) is a prevalent and costly health problem, and the primary complaint of patients seeking complementary and alternative health care such as massage therapy.

Objective
To assess the effects of manual therapy combined with therapeutic exercise on an active 35 year-old male experiencing chronic low back pain from degenerative disc disease.

Methods
Five 60-minute treatments were performed over a six week period. Treatments started with instruction on therapeutic exercises; the patient then performed them under supervision and advised to continue them. This was followed by manual therapy to increase range of motion. Progress was evaluated through health status questionnaires, functional tests, and postural observation.

Results
After the treatment series, the patient reported a significant decrease in low back pain and increased lower limb flexibility. He continued to practice the prescribed therapeutic exercise program for 2.5 months after the treatment series ended. Three months after treatment ended, LBP had slightly increased but remained much improved compared to pre-treatment.

Conclusion
For this patient, a therapeutic exercise program of stretching, strengthening, and postural modifications resulted in a decrease of symptoms. From doing the exercises, the patient reported increased awareness of back posture -- that may stand as the most enduring benefit.

Key words
chronic low back pain, degenerative disc disease, therapeutic exercise, massage therapy

Overview of Chronic Low Back Pain

Prevalence and Impact

Low back pain (LBP) is a common and costly health problem in modern society, affecting 70-85% of the population at some point in their lives (Furlan, Imamura, Dryden, & Irvin., 2009) and the leading cause of disability in adults under the age of 45 (Georgilopoulos, 2011). Among those affected, 60-80% will still suffer chronic pain and disability a year after the initial onset (Hay et al., 2008). The economic impact is huge, as every year 5-10% of the workforce will miss work due to LBP (Furlan et al., 2009).

After the common cold, LBP is the most common reason for physician visits (Browder, Childs, Cleland, & Fritz, 2007). It is the primary complaint of patients seeking complementary and alternative health care, including massage therapy (Hurwitz, Morgenstern, & Chiao, 2005). About a third of all massage therapy treatments in the US are for neck and back pain (Cherkin et al., 2011).

Etiology

Disc degeneration is a significant contributing factor in chronic LBP. Degeneration leads to loss of normal structure and weight bearing properties in the lumbar spine; normally, lumbar facet joints carry 20-25% of the axial load of the spine, but with disc degeneration that increases to 70% (Magee, 2008). This altered structure allows abnormal motions that increase pain with weight bearing movements, as well as stimulate nocieptors in the disc that relay pain sensations to the nervous system (Brisby, 2006).

The importance of the lower limbs in transmitting forces to the lumbar spine cannot be understated. Hypomobility of ankles, knees, and hips inhibit the lower limbs' ability to absorb shock in closed-chain activities, such as landing from a jump. The shock of such ballistic movements is transferred superiorly and can cause pain in already degenerated spinal joints. Lumbar disc disease is also correlated to trigger points in the myotome at the level of the lesion (Samuel, Peter, & Ramanathan, 2007); in the case of a L3-4 lesion, trigger points are likely to manifest in the quadriceps and tibialis anterior. This creates a cycle: lumbar pathology gives rise to trigger points that inhibit lower limb function, and inhibited lower limb function increases load on degenerated lumbar joints. Addressing tight extraspinal muscles (hamstrings; hip flexors, rotators, and extensors) is an important focus when the goal is lumbar pain reduction (Bono, 2004).

Common Medical Intervention

The most common therapy for LBP is medication, with 80% of patients given a prescription of one or more medications after the initial visit (Chou & Huffman, 2007a). The main classes of medications used are non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, skeletal muscle relaxants, antidepressants, antiepileptics, benzodiazepines, opoid analgesics, and systemic corticosteroids.

A review of current evidence shows positive results for NSAIDs, acetaminophen, and skeletal muscle relaxants for treating acute, short-term LBP. No one medication is clearly superior due to the complex benefits and harms of each (Chou & Huffman, 2007a). Long-term NSAID use can damage the gastrointestinal system, while skeletal muscle relaxants have side effects on the CNS (drowsiness).

For chronic LBP, the only medication with good evidence of efficacy is tricyclic antidepressants. However, they have a long list of possible side effects including: drowsiness, dry mouth, dizziness, constipation (Chou & Huffman, 2007a).

Research for Massage Therapy Treatment of LBP

With so many possible causes for LBP, it's not surprising that research has shown that a comprehensive massage treatment – combining frictions, trigger point release, neuromuscular techniques (NMT), stretching, remedial exercise, and patient education – to be more effective than soft tissue manipulation or exercise alone (Preyde, 2000). An interdisciplinary rehabilitative approach that incorporates exercise, manual therapy, and joint manipulations has the best results for functional restoration (Chou & Huffman, 2007b).

Massage therapy can be helpful in treating chronic LBP – reducing pain, improving function, decreasing disability time -- with benefits lasting over 6 months after treatment (Cherkin et al., 2011; Bogefeldt, Grunnesjö, Svärdsudd, & Blomberg, 2008). Among the measurable effects are an increase in dopamine and serotonin and a decrease in stress hormones, with the net result of reducing a patient's experience of pain (Hernandez-Reif, Field, Krasnegor, & Theakston, 2001).

Exercise plays a key role in long-term management of chronic pain. Evidence-based guidelines show that extended bed rest is actually detrimental to long term recovery, thus resumption of activity should be a primary treatment goal (Nicholas & George, 2011; Norlund, Ropponen, & Alexanderson, 2009). Reducing a patient's fear of movement is crucial to restoring health, so psychological factors such as patient education and encouragement are important elements of a complete treatment plan (Hill & Fritz, 2011).

Home and self care must be included in the management plan. Without modifications to activities of daily living (ADLs), such as job modifications, any improvements gained through therapy will be quickly lost (Shaw, Main, & Johnston, 2011). Poor posture is one of the primary contributors to chronic pain, so educating the patient and increasing their postural awareness is imperative in preventing future recurrence. In patients with discogenic pain, lumbar extension (lordosis) posture tends to be a more comfortable than flexion (Bono, 2004). Other home care techniques such as self-traction on an exercise ball and heat wraps are consistently effective in pain relief (Georgilopoulos, 2011; Chou & Huffman, 2007b).

Assessment

Patient History

The patient is a physically active 35 year-old male with chronic low back pain, localized to the area around L3-4 spinous processes. Initial onset of symptoms was 10 years ago; the patient does not remember a specific cause but there was no external trauma. The pain is described as a constant dull ache. Patient denies any numbness, tingling, or weakness in thighs and legs. Pain decreases with rest in a supine position, and increases with: prolonged sitting without back support, sitting on the floor, sleeping in a side-lying position.

In January of 2010, the patient experienced a period of acute LBP when landing from a jump during a plyometrics training session. The pain persisted for more than 3 weeks and he sought medical attention. Robaxacet and non-steroidal anti-inflammatory medications provided temporary relief but did not resolve pain. An X-ray on February 11, 2010 showed a mild thoracic convex right scoliosis, and mild degenerative disc disease with osteophytosis at the level of L3-4.

The patient's occupation consists of ~8 hours/day of seated computer work. He notes that he often slouches forward into thoracic and lumbar flexion in his chair at work. His primary physical activity is ultimate frisbee -- played for 3 hours once a week, along with two weekly practice sessions of two hours, and biweekly tournaments consisting of two consecutive days of 6 hours of play. The main motions in ultimate frisbee consist of sprinting, cutting (sudden direction changes), and jumping on grass fields that are not uniformly flat.

Previous lower body injuries include:

- Left anterior cruciate ligament rupture in March 2000 when landing from a ski jump. Arthroscopic reconstructive surgery in June 2001.
- Medial tibial periostitis, bilateral with left tibia affected first and more painful. Patient believes the cause to be gastrosoleus hypertonicity.
- Left lateral collateral ligament sprain in 2003, grade 2.
- Fracture of right 5th metatarsal in 2003. Surgery within 2 weeks of injury; pin inserted into metatarsal.

Observations

Patient presented with a retracted and depressed right scapula, pectus excavatum with right ribs depressed into thorax and left ribs protracted anteriorly. Lumbar was hypolordotic. Left iliac crest was slightly elevated, with the pelvis slightly rotated to face to the right. Bilateral genu varus, foot pronation, and Morton's toe with shortened 1st metatarsal.

Palpation

Scoliosis present, with spinous processes in cervical region deviated to the left; in thoracic region, deviated to the right; in lumbar region, deviated to the left. Hypertonicity noted in left lumbar erector spinae muscles, bilateral quadriceps and hamstring groups, and gastrosoleus. Fascial adhesions were discovered in the lumbar spine (obliquely and longitudinally), quadriceps (intermuscular), and compartments of the posterior leg (intermuscular).

Movement

Joint examination was done on the lumbar spine, hips, knees, and ankles.

Lumbar:
Patient presented with pain on the left side around L3-4 with active lumbar extension. Range was full and passive movements were asymptomatic. Patient performed "sphinx" posture (passive spinal extension) without any complaints of discomfort or pain.

Hips:
Active extension of right hip produced pain in left lumbar around L4, as hip extension requires co-contraction of lumbar muscles for stabilization. Passive movements were asymptomatic, with slightly decreased hip extension. On isometric resisted ROM testing, right hip extension again caused pain at left L4. Hip flexion was slightly weak; manual muscle test for psoas major passed the break test with tremors and was graded 4+ for left, 4+ for right.

Knees:
Active and passive flexion was decreased bilaterally. On passive overpressure for knee flexion, right side had a soft tissue stretch endfeel, left side had an empty endfeel as patient reported pain. Two days prior to initial assessment, the patient re-aggravated a grade 1 strain to left rectus femoris.

Ankles:
Decreased dorsiflexion in active and passive. No pain in any movements. Resisted ROM was strong in all ranges.

Neurological

At the initial interview, and before and after treatments, the patient was asked if he experienced any numbness, tingling, or weakness. The patient denied experiencing any such neurological symptoms over the course of this case study.

Referred Pain

Mild, bilateral trigger points present in psoas major (referring to lumbosacral area), vastus lateralis (referring distally to the knee), vastus medialis (referring distally to the knee), soleus (referring distally to Achilles tendon), and tibialis anterior (referring distally to anterior-superior talus).

Special Tests

Region	Special Test	Result
Lumbar	Straight leg raise	-, no neurological symptoms reported
Lumbar	Segmental instability	-, no pain or spasm noted
Lumbar	Facet motion assessment	Hypomobility in left L3 on trunk flexion
Lumbar	Schober's	4.5 cm gain in first segment, 2 cm gain in second, WNL
Lumbar	Joint play – anterior glide	anterior glide WNL, no report of pain
Hips	Thomas test	L+ R+, with greater contracture on left
Hips	MMT – psoas major	L4+ R4+, passed break test with tremors
Ankles	MMT – tibialis anterior	L5 R5

Treatment Overview

Hypothesis

Therapeutic exercise and manual therapy to increase ROM in lower body joints (hip, knee, ankle) and postural exercise to encourage normal lumbar lordosis decreases load on degenerated lumbar joints, and thus decrease the severity of chronic LBP.

Treatment Goals

Each treatment focused on a specific region of the lower body. Short-term goals were to decrease pain, increase active and passive range of motion, and increase fascial mobility.

Tx #	Date	Area of Focus	Treatment Goals
1	May 24, 2011	Ankles, anterior and posterior leg	Increase active and passive ankle dorsiflexion
2	May 31, 2011	Knees, anterior and posterior thigh	Increase active and passive knee flexion Increase active and passive hip flexion
3	June 7, 2011	Hips, hip flexors and gluteals	Increase active and passive hip extension and internal rotation
4	June 14, 2011	Lumbar fascia, left quadriceps	Increase lumbar fascial mobility Increase active and passive left knee flexion
5	June 28, 2011	Posterior leg	Increase fascial mobility in deep posterior compartment of leg Increase active and passive ankle dorsiflexion

Long-term goals were to encourage lumbar lordotic posture, strengthening lumbar stabilizer muscles, and prevent recurrent lower body injuries that resulted in pathological posture.

Management Plan

Each treatment targeted a specific region in the lower body, starting distally at the ankles. The patient's primary aggravating activity was ultimate frisbee which involves closed-chain loading of the lower body. By treating distal joints first, the aim was to decrease the stress being transferred superiorly to the lumbar spine during actions such as running and jumping.

The treatment series consisted of a 1-hour patient history interview, 1.5 hour orthopedic assessment, and 5 treatments. Each treatment consisted of 10 minutes of assessment, 20 minutes of exercise instruction and practice, and 30 minutes of manual therapy. Treatments occurred every Tuesday at 6 pm for six consecutive weeks, with a two-week break between treatments 4 and 5 when the patient was away at an athletic tournament. These treatments were scheduled to allow 1-2 days of rest post-treatment before the patient's weekly athletic activities. A graduated postural exercise and stretching program was given to the patient to be incorporated into his daily life.

Treatment Protocol

Every treatment, the patient was given a set of therapeutic exercises that included stretching, strengthening, and postural modifications. The therapist demonstrated these exercises, then gave written instructions to the patient and asked him to demonstrate them. The therapist palpated and observed to ensure that the correct structures were targeted by the exercise and made corrections to the patient's technique as necessary. For stretches and some strengthening exercises, the therapist intervened with resistance or to allow passive movement, and instructed the patient on how to perform the techniques at home alone with the aid of tools or gravity.

Each treatment focused on a specific area and joint in the lower body (hip, knee, and ankle). Manual therapies such as joint mobilizations, NMT, and myofascial release (MFR) were used on the area of focus to complement the goals of therapeutic exercise. For example, to increase knee flexion, MFR

was used to decrease adhesions in the anterior and posterior thigh, NMT was used to decrease quadriceps hypertonicity, and the tibia was glided posterior on the femur with joint mobilizations; the exercises of hamstring strengthening and contract-relax quadriceps stretching were completed during treatment under the supervision of the therapist, and continued at home by the patient.

Therapeutic Exercise

A graduated, cumulative therapeutic exercise program was designed for the patient. Emphasis was placed on choosing exercises that were simple and accessible. Post-activity stretching was an important focus, for the purposes of maintaining ROM and injury prevention – multi-joint stretches were assigned that could easily be done on a grass field without aid or tools.

The patient was instructed on how to incorporate contract-relax techniques into every stretch, with a 5 second submaximally isometric contraction of the target muscle at its passive end range followed by a 10 second period of taking up tissue slack. The following is a description of exercises taught to the patient:

Stretches

Frequency: 3x/week and immediately post-exercise. If muscle strain present, abstain from stretching for 72 hours, then resume light pain-free stretching for 2 weeks until strain symptoms subside, then resume regular intensity.

Intensity: move joint to the end of PROM where tissue resistance begins, apply slight overpressure but pain free.

Duration: 30-60s or 10 deep breaths

Post-activity, multi-joint stretches:

Stretch position	Muscles targeted	Procedure
Sit and reach	Gastrocnemius, Hamstrings group	Seated on the ground with knees in front and bent. With hands, reach over toes and grab forefoot. Actively extend knees, dorsiflex ankles, and anterior tilt pelvis. Avoid excessive trunk flexion; visualize bringing umbilicus towards the ground to emphasis pelvis rotation over trunk flexion.
Kneeling warrior with knee flexion	Iliopsoas, Rectus Femoris	From kneeling, put one foot forward on the ground, hip and knee flexed to 90°. Move the knee on the ground backwards until a stretch is felt in the anterior hip near the groin. To intensify stretch, posteriorly tilt pelvis and drop it down towards the ground. To target rectus femoris after psoas is stretched, bend the knee on the ground and reach back with ipsilateral hand to grab ankle. Use a towel wrapped around ankle if reach is insufficient. This stretch can also be done in side lying if the kneeling position is unstable or puts too much pressure on the knee.

Stretch position	Muscles targeted	Procedure
Squat-sit	Soleus, Quadriceps group, Lumbar Erector Spinae	With feet shoulder width apart, squat down until knees are in full flexion, weight on balls of feet and heels as close to the ground as possible, torso passively flexed forward, holding knees with arms for stability. This is not intended to be an aggressive stretch. Recommended as an alternative to sitting in chairs while waiting on the sideline during ultimate games.

Patient was also instructed on specific stretches to the following muscles: gluteus maximus, hip adductors, gluteus medius, gluteus minimus, and piriformis.

Strengthening
This is a lumbar extensor stabilization exercise taught to the patient.

Frequency: 2x/week
Intensity: 3 sets of 8 repetitions, until muscle fatigue
Duration: 20s, 5 deep breaths

Lying prone, lift one leg about 5 cm off the ground with knee extended. Hold this position for 20 seconds or 5 deep breaths before letting the leg drop back down. Repeat with opposite leg. That completes one repetition.

Postural exercises
To encourage passive lumbar extension and traction, the patient was instructed to make use of a large exercise ball he owns. He was instructed to lie supine with the ball under his lumbar and maintain that position for 10 minutes a day, 3 times a week.

The patient's occupation and daily activities involved seated computer work. In this seated position, he would often slump forward into flexion. As a postural exercise, the patient was directed to incorporate more of a kneeling posture, with knees inferior to the hips to induce a slight anterior pelvic rotation and lumbar lordosis. The patient switched to a kneeling-style chair at work instead of a conventional office chair with back rest. The therapist demonstrated to the patient how a proper kneeling posture engages lumbar muscles and results in a lordotic posture.

Hydrotherapy

The patient experienced recurring symptoms of medial tibial periostitis and was directed to perform cold baths to his legs after activity. The goal was to control inflammation to the area.

Cold leg bath
Frequency: post-activity
Intensity: 5-10ºC, stop when area feels numb
Duration: 10 minutes
Surface area: legs up to the knees

For acute LBP, research showed that superficial heat to the area is effective at alleviating pain (Chou & Huffman, 2007b). If acute LBP symptoms appeared, the patient was advised to apply a hot compress to the lumbar area.

Frequency: during acute episodes of LBP
Intensity: 36-37ºC, hot but not burning
Duration: 15 minutes
Surface area: lumbar back

Results

Since a large area of the body was treated over the course of this study, reassessment focused on holistic and functional changes. The metrics used were self-reported questionnaires, functional tests, and postural observation. The patient was evaluated 3 times: before the treatment series started, immediately after the treatments ended, and 3 months after the last treatment.

In the 3-month follow-up, the patient was asked to what extent he continued to practice the prescribed therapeutic exercise program. He stated that he continued the stretching and postural exercises for 2.5 months after treatments ended, until an acute knee injury forced him to stop. He intends to resume once able. He did not continue with lumbar stabilization exercises.

Self-Reported Health Questionnaires

The patient completed a series of 3 health status questionnaires.

SF-36 Health Survey
The Short Form Health Survey (SF-36) is a commonly used measure of health status. It asks 36 questions of vitality, physical function, emotional function, bodily pain, general health perception, and mental health. Below is a summary of the changes reported by the patient.

Questions (all compared to a week ago)	**Pre-Treatments**	**Post-Treatments**	**3 Month Follow-up**
Rate health	3/5 – about the same	2/5 – somewhat better	2/5 – somewhat better
How does your health limit you in these activities: Lifting or carrying Bending, kneeling, stopping	 2 – limited a little 2 – limited a little	 3 - not limited at all 2.5 – between "limited a little" and "not limited at all"	 2 – limited a little 3 – not limited at all
Has your physical health cut down on the amount of time you spent on work or activity	No	No	Yes
To what extent has physical or emotional problems interfered with normal social activity	2 – slightly	1 – not at all	2 – slightly

Questions (all compared to a week ago)	Pre-Treatments	Post-Treatments	3 Month Follow-up
How much bodily pain have you had	4 – moderate	2 – very mild	2 – very mild
How much did pain interfere with normal work	2 – slightly	1 – not at all	1 – not at all
How much have you felt calm and peaceful	4 – some of the time	4 – some of the time	3 – a good bit of the time
How much did you feel worn out	4 – some of the time	4 – some of the time	5 – a little bit of the time
How much did you feel tired	3 – a good bit of the time	4 – some of the time	4 – some of the time
How much of the time has physical or emotional problems interfered with social activities	4 – a little of the time	5 – none of the time	5 – none of the time
I seem to get sick a little easier than other people	2 – mostly true	2 – mostly true	4 – mostly false
I expect my health to get worse	4 – mostly false	5 – definitely false	5 – definitely false
How bothersome has LBP been	Moderately bothersome	Slightly bothersome	Slightly bothersome
If you had to spend the rest of your life with current symptoms, how would you feel about it	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied
How would you rate your overall medical care	N/A	Very satisfied	Very satisfied

Roland-Morris Back Pain Questionnaire

The Roland-Morris Back Pain Questionnaire asks the patient to indicate what back conditions they are currently experiencing. In the pre-treatments questionnaire, the patient indicated the following:

Pre-Treatments	Post-Treatments	3 Month Follow-up
• I change positions frequently to try to get my back comfortable • Because of my back I lie down to rest more often • I sleep less well because of my back pain	none	• I change positions frequently to try to get my back comfortable

Visual Analogue Scale for Pain

On a scale of 0-10, with 0 meaning no pain and 10 meaning the as bad as it can be, the patient notes how bad their pain has been in the past 24 hours.

Pre-Treatments	Post-Treatments	3 Month Follow-up
3 / 10	0-1 / 10	1 / 10

Functional Tests

Two of the multi-joint stretches given to the patient were used as functional tests: sit and reach, and squat-sit. Both stretches are described in the Therapeutic Exercise section. In the squat-sit, patient was instructed to squat down with shoulders over hips, ASIS vertically in line with superior border of the lateral malleolus. The distance between the superior border of the lateral malleolus and the ground was measured.

Stretch	Pre-Treatments	Post-Treatments	3 Month Follow-up
Sit and reach	~30º knee flexion Limited by gastrocnemius and hamstring tightness	~15º knee flexion Limited by gastrocnemius tightness	~15º knee flexion Limited by gastrocnemius tightness
Squat-sit	13 cm	11 cm	11 cm

Postural Observation

The patient's standing posture was observed before treatments and 3 months post-treatment. The patient was instructed to stand in a relaxed position: feet shoulder width apart, head facing forward. No significant change was observed in lumbar lordosis; however, shoulder forward posture and glenohumeral internal rotation was decreased.

Conclusion

The outcome of this study supports the hypothesis that therapeutic exercise, complemented by manual therapy, can be effective in decreasing the severity of chronic LBP. In all three health status questionnaires, the patient reported a significant decrease in symptoms after the treatment series ended. He continued to practice the stretching and postural elements of the therapeutic exercise program for 2.5 months after treatment. Three months later, symptoms had slightly increased but were still markedly better than before treatment.

However, it remains to be seen whether chronic LBP will return. A 12-month follow-up would be invaluable in evaluating the sustained efficacy of this treatment series; of particular interest would be the patient's ongoing adherence to the prescribed therapeutic exercise program. Additional studies with a larger patient population are also needed to confirm this study's findings.

LBP is a common yet complex problem with a multitude of contributing factors. No single modality can treat a condition with so many different causes. Through the practice of stretching and postural exercises, the patient reported greater awareness of his lumbar spine and its movements in daily activities and sport. More than any symptomatic relief, that self-awareness will likely stand as the most enduring benefit of this study.

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