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Adolescent idiopathic scoliosis (AIS) and exercise therapy

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Idiopathic scoliosis is a structural three-dimensional deformity of the spine defined by a lateral curvature of more than 10 degrees;¹ it accounts for 75% to 80% of all scoliosis cases. The younger the age of onset, the worse the prognosis is due to timing of skeletal maturation as well as the gender of the patient; females having a worse prognosis than males. Adolescent idiopathic scoliosis comprises 90% of all idiopathic cases and is seen between 10 to 18 years of age. Factors to help predict risk of curve progression include the magnitude of the curve at presentation, a single versus a double curve, with double carrying a worst prognosis, and the status of puberty and menarche in males and females, respectively.² The purpose of this essay is to briefly discuss the main types of treatments for patients presenting with AIS and to clinically correlate those viewpoints to a recent case encountered at the UBCC Chiropractic Clinic.

Treatment for scoliosis is necessary in approximately 10% of idiopathic scoliosis patients.

Conservative management of AIS includes physiotherapy and bracing, with surgery being the final option. Indication for bracing is a Cobb angle greater than 25° in a skeletally immature patient; the goal being to prevent or slow curve progression. For bracing to be successful, the brace must be worn 18 to 22 hours per day and may carry with it certain social challenges that may affect compliance.²

The effectiveness of conservative care and the approach to management varies among orthopedic surgeons and physicians specializing in conservative management of scoliosis. The variation is based on location and interpretation of the evidence. Therapists in Canada, US, and UK adopt the wait and see strategy while providers in continental Europe, Eastern and Southern Europe advocate conservative treatment.³ The guidelines of the Scoliosis Research Society (SRS) state, "Alternative treatments to prevent curve progression [...] such as chiropractic medicine, physical therapy, yoga, etc. have not demonstrated any scientific value in the treatment of scoliosis. However, these and other methods can be utilized if they provide some physical benefit to the patient such as core strengthening, symptom relief, etc. These should not, however, be utilized to formally treat the curvature in hopes of improving the scoliosis."⁴ These guidelines are in stark contrast to those of the Society of Scoliosis Orthopedic Rehabilitation and Treatment (SOSORT), which state, "Current evidence suggests that conservative treatment for scoliosis is effective at stopping curve from progression, as well as improving the curves at skeletal maturity."⁵ The conservative treatment advocated by SOSORT consists of individually adapted exercises that are personalized according to medical and physiotherapeutic evaluations of the individual's scoliosis curve characteristics.³

During the summer of 2018, a 15-year-old male patient was presented to the UBCC Chiropractic Clinic by his mother for the treatment of adolescent idiopathic scoliosis. The scoliosis was confirmed by plain film radiography, with a double major curve measuring 35° lumbar and 37° thoracic Cobb angles. The curve was discovered in 2016, at that time the patient was given a Boston brace, which he wore for 23 hours per day. While wearing the brace, his scoliosis progressed to the current angles. The patient is a high school athlete in track and field and soccer. Assessment of the patient showed marked increase in muscle bulk of the left lumbar paraspinal and quadratus lumborum muscles compared to his right, as well as his left thoracic paraspinals, left middle and lower trapezius and right rotator cuff muscles, right sacroiliac joint provocation with Laslett's protocol, negative findings with Kemp's and straight leg raise tests, and some discomfort in the thoracolumbar region with lateral flexion during range of motion testing. The patient did not report any pain but did report "tightness" in the thoracolumbar region.

The management plan for this patient included chiropractic manipulative therapy (CMT) combined with therapeutic and strengthening exercises. The patient responded well to CMT, reporting better range of motion. The therapeutic exercises consisted of a birddog progression with emphasis on maintaining hip stability. Kinesthetic awareness of hip stability was accomplished by placing a small foam roller midline on the patient's lumbosacral spine with instructions to not let it fall off. The patient was instructed to perform the exercise 2x/day, 3x/week, with 3 sets of 10 repetitions and use any household object to achieve that same awareness of hip stability. Strengthening exercises were selected to incorporate lateral trunk stability and to resist trunk rotational forces. These exercises included one armed kettlebell suitcase and rack carries. Exercises were performed in office during each visit. The patient was instructed to perform them at home with either a dumbbell, kettlebell, or any household object that would accomplish the intended stimulus.

Throughout the course of care the patient was compliant with his exercises. With each subsequent visit he reported feeling overall better, more agile, and performing better during sport and play. He was also able to suitcase and rack carry a 35-pound kettlebell further each week. On the final visit he shared a story of how his older, and bigger, cousins were impressed with his ability to keep up with them during a game of basketball.

This patient experience is an example of how it is possible to reconcile conflicting treatment guidelines and provide care that is on par with the standard taught at all chiropractic schools. The goal of treatment was not to correct the scoliosis, but to give the patient functional strategies to manage something that will be a part of him his whole life. CMT was a tool used to restore intersegmental joint function until some balance could be achieved with the muscular system. This patient in particular is an athlete and needs to understand that he can still be fast and strong with his scoliosis and, at all costs, prevent medicalizing something that we cannot accurately predict the course of. The most recent US Preventative Task Force recommendations on screening and treatment for scoliosis are inconclusive.⁶ The evidence does not come out in favor of any of the guidelines proposed by SRS or SOSORT. This leaves the ultimate decision on how to approach a patient seeking care in the hands of the clinician. Clinicians must take the best recommendations, guidelines, and evidence to synthesize a management strategy that will produce a positive outcome in any patient seeking our care.

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Getting Rid of Your Low Back Pain: McGill or McKenzie?

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When chiropractic care comes up as a topic of discussion, people think about getting their “backs cracked”. Over the years, chiropractic care has had increasing numbers in research for the benefits of spinal manipulation when concerning the treatment of back pain. In 2017, the American College of Physicians recommended non-drug therapies, such as spinal manipulation and exercise, before relying on drugs and surgery. Chiropractors service the community and patients with back pain with spinal manipulation, especially when in conjunction with corrective and rehabilitative exercises. However, how does any chiropractic physician know which exercises are the best option for their low back patients? There are two different theories when it comes to rehabilitative exercises for low back pain. McGill discusses the importance of stabilizing the core without putting excessive amount of loading onto the spine. In contrast, McKenzie focuses on patient active care where the patient performs self-care with end range loading exercises. These two approaches to back pain are very popular and very effective but consist of different methods of treating low back pain.

Before treating back pain, it is very important to understand etiology of back pain. Murphy discusses low back etiology and tissues involved in the CRISP protocols. The four tissues involved in back pain are discs derangements, joint dysfunction, radiculopathy, and myofascial pain. These four tissues have different approaches to treating them. The majority of back pain is most commonly found to be caused by disc derangements (41%). Once the pain generator has been understood and identified, the next important question when choosing an exercise protocol is which one is the best choice?

When treating discogenic low back pain, McKenzie is one of the first choice of methods. The McKenzie technique practitioners assess the patient and provides them with active care exercises to help treat their condition and help their pain. It is specific for each patient and his or her need. They classified the patients based on their condition and possible syndromes - postural, dysfunction, and derangement. It is very effective on treating intervertebral disc complaints in conjunction with spinal manipulation and other modalities to decrease or centralize the pain. The movements the patient performs may appear painful, but these positions can centralize and ease the pain. Through clinical experience, it appears that McKenzie technique is very beneficial at treating back pain, however, high levels of evidence and research is required to back up the findings. Research has been done to show positive results for short term treatment plans, but unfortunately it does not provide a great amount of relief in the long term. More research with set protocols and parameters is needed to further test the McKenzie technique for back pain in the long term, however, it is still effective for centralizing pain for a short term when simultaneously used with spinal manipulation and other modalities in the treatment plan.

While many practitioners believe and exercise the McKenzie Method, many others also focus on or prefer McGill’s approach. McGill discussed how it is not about strengthening the back muscles, but it is increasing the muscle endurance that helps keep the spine healthy preventing further injury. Excessive strengthening and weight lifting exercises are usually what lead athletes and patients to the progression of the injury. Many patients do not have proper technique while they overexert themselves. In addition, they do not have proper breathing techniques which further fatigues the muscle leading to injuring of the spine stabilizers. The four primary exercises this method proclaims for back stability are Cat-camel, Curl-ups, Bird-dogs, and Side Bridges. These exercises are the foundation to increasing the stability of the back through proper spine mobility and maintaining proper posture throughout the endurance straining. Throughout the treatment plan, progressions can also be added to fit the patient’s needs and tolerance. These were found to be extremely beneficial when performed daily in a pain-free manner. Every patient has a different goal set and they all cannot be

treated in the same manner. It is important to improve the spine's health and improve the positioning and function of the spine's mobility. Similar to McKenzie, there are studies that result in the improvement of a patient's health. There is a study that shows the McGill Method reduces pain and increases stability in chronic pain patients, but the positive results are similar to those of other conventional exercises. There is a need for higher levels of research that show improvement. There are many different therapies and treatment options for low back pain. It is important for the patient's prognosis to understand the pain's etiology and the best possible evidence available for the most efficient and effective treatment choices. Whether it is an issue with the discs, joints, nerves or muscle tissue, as Murphy depicts, they all have different approaches to effectively decreasing the pain and healing the patient. Both the McKenzie Method and the McGill Method are very effective. The McKenzie Method centralizes pain using active care by going through provocative movements. The McGill Method focuses on core stabilization and mobility while maintaining proper breathing and posture. It is unfortunate, while both have many studies resulting in benefit of both methods, they need further research containing better models and parameters with higher levels of evidence comparing the two methods. Although additional research and evidence is still needed, the doctor's knowledge and experience are key. It is up to the doctor to diagnose the patient and figure out where it is originating from. By correctly diagnosing the patient, the correct exercises can be added to the appropriate treatment plan. There are many other exercises to consider and different tissues to approach, but, in the end, it all comes down to the patient's needs and what is most effective for the patient's healing process.

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Chiropractic Rehabilitation in Post-Operative ACL: Case Report and Review

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Abstract:

The objective of this report is to identify criteria for a patient who is post-operative ACL reconstruction. Although a chiropractor may not be the initial health provider to provide rehab for this procedure, a patient may have a past medical history with this condition. It is important for the chiropractor to understand certain criteria before the patient returns to sport.

Introduction: (Lit review)

More than 100,000 new cases of ACL injury occur and about 75,000 reconstructions are performed in the United States¹. Despite patients going through vigorous rehabilitation only 33.4% return to full competition.² One can speculate that athletes are not making full competition status because the athletes are being cleared for activity before they are ready.

Description of the Case Report:

20-year-old patient presents to chiropractor's office, 8 months' post-operative and complains of medial knee pain when playing soccer. The patient is frustrated and has not been able to play their sport at the same level as prior to injury.

Rehabilitation Discussion:

Activation

- 1) Quadriceps contraction with theraband behind the knee in a standing position. Terminal knee extension is stressed here with proper quadriceps recruitment. 10"x10
- 2) Supine bridge for gluteal activation 5"x30
- 3) Side plank abduction with dominant leg on top (maximal voluntary muscle contraction for glute medius)³ 10"x10

Eccentrics

- 1) Lateral step down with 12-inch step to challenge eccentric muscle action of the quadriceps. Patient must be able to control descend with no abhorrent motion (knee valgus or hip drop) 3x6
- 2) Russian lowers 3x10
 - Hamstring exercise that utilizes all phases of contraction
 - Start by working within 25 degrees range of motion
 - Promote slow controlled movements

Strength/Power:

- 1) Hex-bar deadlift (75% body weight, 100% body weight, 125% body weight) 3x6
 - proper squat technique with hip extension and no butt winking or weight shifting
 - Hex bar is favorable because of learning curve. Easier to teach squat mechanics than barbell on the back or front.
 - Even though the athlete may exhibit good strength, neuromuscular control must be emphasized.
- 2) Reverse Lunge
 - Single limb phase of the lunge should be monitored for good hip stability
 - Concentric phase should focus on explosiveness to mimic running stance
- 3) Box Jump
 - Teach counter movement with arms and hip coordination
 - Hips back and soft landing with no knee valgus
 - The take-off should mimic the landing (hold and stick)

Sport specific movements that incorporate proprioception and endurance

- 1) Single leg stands with soccer ball volleying on the non-affected leg. This exercise will challenge the effected leg balance and ability to load the leg while kicking. The chiropractor must take note of any internal rotation on the hip or knee valgus.
- 2) Progressive linear running to stop
 - 50% max speed sprints to a complete stop within 3 steps (chop and stop)
 - Progress speeds as the patient gains confidence
- 3) Agility drills such as T-drill or L-drill
 - Perform drills with cutting to the left and right
 - Recognize deceleration form (patient can drop the hips back to chop and stop)
 - Patient has symmetrical times

Incorporate an inclined treadmill into the warm up as well. This integrates a functional activity and AEMG activity show during the stance phase an increase in quadriceps/hamstrings work rate.⁴

Tests

Single leg hops

- 1) Hop for distance
- 2) Crossover hop for distance
- 3) Triple hop for distance

Grindem et al. showed the single leg tests significantly predicted self-reported knee function 1 year after baseline values.⁵

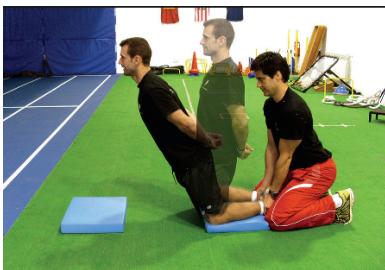
Summary of the case:

Patient must have quadriceps strength and extension within 10% bilaterally with no edema present. Terminal knee extension must be established with proper vastus medialis oblique firing. Single leg hop tests show good clinical outcomes when there is no more than 10 % difference bilaterally. Quadriceps peak torque can be evaluated in the single leg hops. Most importantly, quality of movement is the priority in these therapeutic exercises.

Conclusion:

Normal biomechanics of the knee are altered after injury due to physiologically healing, injury psychology, and structural changes. Exercise prescription needs to address these areas. Once the patient exhibits proper range of motion, strength, stability and motor control, then the chiropractor may consider clearing the patient for full sport activity. Unilateral and bilateral training need to be compared to ensure no compensation. All the exercises and tests in this case study demonstrate criteria that are evidence based for ACLR patients return to activity. With more than 1 in 5 ACLR patients present with OA 10 years post-op, this is an issue that may be lengthy, but needs to be done meticulously.⁶

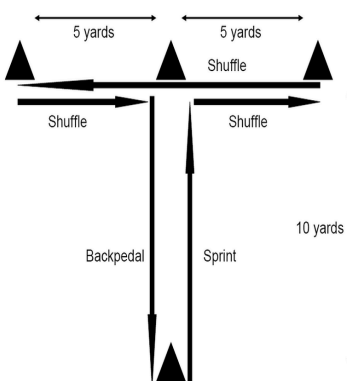
Russian Lowers



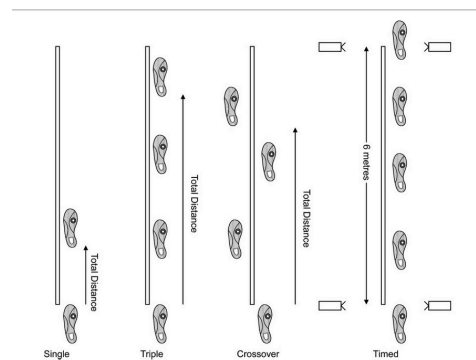
Lateral Step Down



T-Test



Single Leg Tests



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Evaluation of Gait and Station – Assessing and Treating Asymmetry

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Abstract

Often many health care providers perform orthopedic and neurological testing without functional assessment. In depth assessment of acute, and chronic conditions is paramount to forming an accurate diagnosis. Complete assessment is equally important in designing an effective treatment plan. Accurate assessment, and an effective treatment plan enhance the chances of a favorable outcome.

Key Words

Functional assessment, gait, station, mobility, asymmetry, rehab prescription, vibration therapy, core and postural stabilization, functionally integrated training

Introduction

The evaluation of gait and station, which is a component of the musculo-skeletal exam, can reveal significant structural defects. This will help you correctly identify the etiology, or root cause of a patient's acute or chronic symptoms. Further, your ability to identify these defects through objective assessment will provide some of the information necessary to develop an appropriate rehabilitation prescription, and to justify the necessity of care. Your functional analysis, in both acute and chronic cases, should begin with a visual assessment of the lower quarter. One of the most important functional deficits to identify is movement incompetency. One key component of movement incompetency is asymmetry. The importance of identifying asymmetry, and movement incompetency is to avoid building stability over poor mobility. Movement incompetency may demonstrate altered motor control, a neurodevelopmental component, or regional interdependence. Exercising a dysfunctional joint creates greater dysfunction resulting in a poor outcome to treatment. These are important concepts and considerations when designing a treatment plan.

Functional Movement Screen

Functional Movement Screen is a system of seven simple tests designed to evaluate movement patterns demonstrating asymmetry and deficits. The seven tests consist of the Deep Squat, Hurdle Step, In-line Lunge, Shoulder Mobility, Active Straight-Leg Raise, Trunk Stability Push-up, and Rotary Stability. The FMS screens are scored from three to zero. The patient or athlete has three attempts to successfully perform the screen. A score of three is given if the individual can perform the screen without compensation. A score of two is given if the individual can successfully perform the screen with compensation. A score of one is given if the individual is unable to perform the screen. A score of zero is given if pain is precipitate during performance of the screen. If a patient has a score of one or pain during the screen, this would indicate the SFMA or Selective Functional Movement Assessment, to be performed by isolating the functional movement deficit and regional interdependence. The Active Straight-Leg Raise demonstrates tight muscle imbalances of Hamstrings, Gastrocnemius, and Soleus. Positive findings indicate core and pelvic stability deficits. The Deep Squat demonstrates weak or inhibited pelvic, core, and postural stabilizers. Positive findings indicate core and postural stabilization deficits. The Hurdle Step demonstrates instability on the stance leg, side bending with the stick, internal or external rotation of the hip, knee, ankle or foot, or lumbar flexion of the spine. Positive findings would indicate asymmetrical or bilateral mobility. It would also indicate stability deficits of the torso, hip, knee, ankle, or foot. This includes

deficits in stride mechanics, proprioception, balance, or the patient's kinesthetic sense. The In-Line Lunge demonstrates deficits in split stance mechanics, asymmetry, muscle tightness, or weakness. Positive findings indicate deficits in torso, shoulder, hip and ankle mobility, stability, quadriceps flexibility, and knee stability. Rotary Stability demonstrates balance deficits, proprioception deficits, flexibility deficits, muscle tightness, muscle weakness, and pain. Positive findings indicate deficits in neuromuscular coordination, weak or inhibited core, pelvic and postural stabilizers, global muscle imbalances, and deficits in upper or lower extremity motion. Shoulder mobility demonstrates pain, compensation, and flexibility deficits in internal rotation. Including adduction and external rotation with abduction of the shoulder. Positive findings indicate shoulder impingement, glenohumeral mobility deficits, scapular thoracic mobility stability deficits, and thoracic extension deficits. Trunk Stability Push-Up demonstrates pain, global muscle weakness, hyperextension of the lumbar spine, and "winging of the scapula". Positive findings indicate weak or inhibited core pelvic, and postural stabilizers including a lack of symmetrical trunk stability.

Pelvis Assessment:

The first signs of most postural and muscular imbalance usually develop in the patient's static pelvic positioning. Anterior tilting of the pelvis suggests shortening of the hip flexors (iliopsoas, rectus femoris and tensor fascia lata) and/or the lumbar spinal extensors. Posterior tilting of the pelvis suggests tightness of the hamstrings. Lateral pelvic shifts suggests unilateral shortening of the hip adductors, but may also be associated with lumbar motion segment pathology. Thus including weakness of the lateral pelvic stabilizers or leg length inequality. Pelvic obliquity secondary to functional shortening of one leg is common. The muscles, which are most commonly related to leg shortening, are the hip adductors, the iliopsoas, and the quadratus lumborum. A shortened latissimus dorsi may also elevate the pelvis from the trunk and result in a short leg. The piriformis, when tight, lengthens the leg. Primary pelvic obliquity due to structural leg length inequality, is rarely observed in practice as the body usually shifts the pelvis laterally in order to level the sacrum and hips.

Buttocks Assessment

A generalized visual assessment of the glutei musculature should reveal muscles which are well rounded, symmetrical, and contain a horizontal gluteal line. Flattening of the upper, outer quadrant of the buttock, or a loosely hanging appearance of the muscle, suggests weakness of the gluteus maximus. This will suggest inhibition due to tightness of the hip flexors or sacroiliac joint dysfunction as well. In the case of sacroiliac joint dysfunction, a typical pattern of changes in muscle activation occurs. There is arthrogenic inhibition of the gluteus maximus on the side of the blocked joint, and on the contralateral side of the gluteus medius. In addition, painful spasms of the iliacus, piriformis, and rectos abdominis are common.

Lower Extremity

In assessing the hamstrings, focus on the area about two-thirds down the posterior thigh and compare the muscle bulk bilaterally as well as to the gluteal muscles. Increased bulk of the hamstrings suggests hyperactivity compensatory to a weak or inhibited gluteus maximus on the same side, as the muscles are synergists for hip hyperextension. The contour of the inner thigh normally forms a very shallow, S-shaped curve as you activate the hip adductors to tension. A distinct increase in muscle bulk in the upper one-third of the inner thigh suggests tightness of the short, or one joint, hip adductors. The inner thigh, where the fibers of the one and two joint hip adductors cross look for a visible depression. Where this abnormal finding is evident, this is known as an 'adductor notch' and results from long standing tightness of the short hip adductors. A more distal position of an adductor notch suggests poorer function of that hip joint. Thigh adductor tightness may be associated with leg length deficiency, lateral shift of the pelvis or hip joint pathology such as arthrosis. Observe closely the size, shape and symmetry of the

calf muscles and, for each leg, notice any difference in tone between the gastrocnemius and the soleus. Increased bulk in the inner, lower one-third of the calf suggests soleus hypertrophy. This creates a cylindrical shape to the lower leg, which contrasts, with the normal inverted bottleneck shape. Soleus hypertrophy is of paramount importance as it may be the only, hidden cause of low back pain and is also suggestive of ankle or foot dysfunction that should be investigated further.

Lower Back Assessment:

Observing initially the general postural attitude, quality of the lumbar lordosis, symmetry of body landmarks and muscular contours. Compare the quality of the spinal extensors in the lumbar and thoracolumbar region bilaterally. Ideally the sides are symmetrical and the muscle is slightly thicker and broader in the lumbar region. Predominance of the thoracolumbar musculature suggests overactivation in gait, poor stabilization of the lumbar spine and is associated with a weak gluteus maximus. Hip hyperextension, the most important movement for a normal gait pattern, should range from five to fifteen degrees. Normal hip hyperextension takes place in relation to a pelvis stabilized by activity of the abdominal and lumbar extensors. When it is limited due to hip flexor tightness, the patient tilts the pelvis anteriorly, replaces extension of the hip with extension of the low back and activates the thoracolumbar extensors as a point of fixation. This impaired stabilization of the lumbar spine is a poor sign for the lower back. The next step is to perform a visual assessment of the anterior body.

Abdomen:

Postural analysis of the anterior body begins with evaluation of the abdominal wall, whose role in stabilization and protection of the spine is crucial. Compare the upper quadrants of the abdomen to the lower and the rectus abdominis to the obliques. Ideally the abdominal wall should be flat. Increased tonus of the upper quadrants relative to the lower may be associated with a faulty paradoxical respiratory pattern. A groove lateral to the rectus suggests predominance of the obliques over the recti with poor stabilization of the spine in the anteroposterior direction. A bulging, hypotonic waistline reflects poor function of the whole abdominal wall and poor protection of the low back during both normal, physiological and sudden, unexpected movements.

Lower Extremity Assessment

The quality of the anterior thigh musculature may provide further insight into the patient's lumbopelvic posture, and reflect the status of the lower extremity joints. The tensor fascia lata is a slender muscle, and is normally not visualized. The contour of the lateral thigh should be flat in males and rounded in females. Compare bilaterally the contour of the anterior tibialis while observing the posture of the patella, ankle, foot and toes. Normally there should be no movement of the patella or toes, nor should there be tendon play on the dorsum of the foot in standing. A groove on the lateral thigh in males or a flattened lateral thigh in females suggests shortening of the tensor or iliotibial band, and may be accompanied by a superolateral shift of the patella. Where such a groove is apparent, this is commonly known as tibial band syndrome. Superior deviation of the patella alone suggests shortening of the rectus femoris. Tightness of either the rectus femoris or tensor fascia lata, may result in an attitude of hip flexion, and anterior pelvic tilt as previously described. An 'unquiet patella' displays short, jittery up and down movements, due to rectus femoris hyperactivity. This is compensatory to altered proprioception from the knee. Knee joint pathology involving, for example, the medial meniscus or cruciate ligaments is most often responsible for such proprioceptive changes. Hypotrophy of the vastus medialis may also result from altered proprioception from the knee. Unilateral hypertrophy of the vastus may be due to repetitive forced lie extension, or may be a sign of the patient overextending and overstressing the knee during gait. Anterior tibialis precedes

weakness of the toe extensors as a very early sign of L5 nerve root lesion. Regular movements of the dorsi flexor tendons may reflect imbalance between the dorsi flexors, and plantar flexors. This impairs proprioception from the knee, ankle or foot. It may also be observed in S1 root syndromes. Presence of this sign may be helpful in differentiating root lesions from pseudo syndromes such as piriformis syndrome, or tensor fascia lata syndrome. Microgate's Optogait Computerized Human Performance Analysis equipment data is objective criteria that will validate the functional testing results.

Treatment

The treatment progression consists of Passive care, Transitional Care, Core Training, Endurance Training, Functionally Integrated Training, Strength Training, Final and Supportive Care. Passive Care may consist of Manipulation, Applied Kinesiology, Sacral Occipital technique, Active Release Technique, Graston, Neuro Mobilization, Flexion/Distractio, Decompression, McKenzie, Laser, Ultrasound, Interferential, High Volt, Microcurrent, Anodyne Therapy, Cryocuff Compression Therapy, ATM, PIR, and Nutrition support for injury recovery. Transitional Care may consist of Manipulation, Modalities, PNF, Flex Building, Sparring Strategies, Stabilizing Strategies, and Nutrition. Manipulation and therapeutic modalities would be performed on a PRN basis. Sequential therapy might be used to resolve muscle imbalance. Sequential Therapy consists of three types of electric stimulation to reduce pain, inflammation, and muscle spasm. This can be performed on a device unique to the Vitality Depot. The Core Training progression consists of proprioception exercises performed with eyes open and closed. They begin on the floor transitioning to Thera Pads, Rocker Board, Round Board, and Bosu Ball. The next level of training involves core, pelvic, and postural stabilization. This training is performed on the IJOY Board, IJOY Ride, and Zen Pro. The progression is from levels one through four. Nutrition for this training is based on soft tissue development. Passive Care is performed PRN. The ZenPro is used to overcome the neurodevelopment component from pain resulting in abnormal motor patterns. The vibration therapy from the ZenPro creates dynamic stability, increased proprioception, awareness, kinesthetic sense with improved dynamic, and static posture. Now you can integrate Endurance Training. The progression is from HIIT(High Intensity Interval Training), to Aerobic training(20min), followed by weight Loss Training(30min), and Optimization Training(45min). The Nutrition is based on aerobic conditioning. Passive Care is performed PRN.

FIT(Functional Integrated Training) is next on the progression. Challenge the patient with Otis Rings or Bodyblade exercises on the ZenPRO. The Nutrition is based on exercise support. Passive Care is still performed PRN. Strength Training is the final phase of rehab performed with Thera Bands, Kettle Bells, free weights, PACE weight training stations, or Nautilus cable weight stations. Final Care can consist of Home Exercise, Nutritional recommendations, Orthotics, or Passive Care on a PRN basis. Once the functional are identified, active care should begin as soon as possible. The sooner the healthcare provider can transition a patient from passive care to active rehabilitation, the greater the chance for a favorable outcome. The treatment plan initially should focus to resolving asymmetry, movement incompetency, and regional interdependence. Stability should never be created over poor mobility. Once mobility is achieved treatment should focus on core and postural stabilization. Functional Integrated training is performed once mobility and stability are achieved. FIT is designed to turn short term response into long term adaptation. Aerobic conditioning including endurance training can now be performed when core, postural, and pelvic stabilization is established. Strength training encompasses the final part of the treatment plan. Each phase of the treatment plan is performed until progress reaches a plateau. Initially, it may be necessary to begin rehab with Post Isometric Relaxation (PIR). This technique should be performed to the involved (shortened) structures identified in the functional assessment. This phase of treatment will lay the groundwork for an effective joint stabilization rehabilitation program. The goals of PIR should be

to increase physiologic end range, relax tight muscles and activate inhibited muscles. Once these goals have been achieved, the “Flex Building” muscle energy technique, which involves isokinetic resistance to patient comfort throughout the full range of motion in both directions, should be performed if possible. The Flex Building technique increases range of motion beyond the impeded end range, increases the muscle tone in “weak” muscles, stretches “tight” muscles, and activates inhibited muscles hence resolving “Tightness Weakness” syndromes as described by Janda. A contraindication to this technique would be pain or increase of symptoms at one or more discreet points in the range of motion. If this occurs, Proprioceptive Neuromuscular Facilitation (PNF) should be performed prior to utilization of the Flex Building technique, and transition of the patient to Active Care. Ultimately, your goal is to prepare the patient to transition into a comprehensive conditioning program focused on functional restoration. The transition to Active care can occur once asymmetry, regional interdependence, and movement incompetency is resolved restoring proper mobility. Vibration therapy is one of the best methods to achieve this goal. I use the ZenPro to perform core and postural stabilization with Functionally Integrated Training. The transition to FIT can occur when identified muscle imbalances and joint stability are improved. This can be achieved using the ZenPro abdominal and lower body protocols. The rehabilitation prescription throughout the various phases of care should include proprioception, flexibility training, stability training, endurance training, aerobic conditioning, and strength training. This should be performed using all of the ZenPro protocols, integrating otis rings, body blade, medicine balls, and thera-bands. Rehabilitation should always be directed at restoring the patient’s capacity to perform work, recreational or daily activity, and should be terminated when the patient’s functional progress plateaus. The patient should then be released from treatment with instruction. Final instruction should consider maintenance care, and continuation of rehabilitation in a home-based program.

Conclusion

Restoration of function is the key component to development of an effective outcome- based treatment program. Being able to develop an outcome-based treatment program is the key to receiving appropriate reimbursement. To demonstrate appropriate functional outcomes, you must first document functional deficit. In many cases, orthopedic and neurologic assessments fail to reveal the source of the patient’s symptoms. In these circumstances, functional assessment will lead to accurate diagnosis, and development of a treatment program designed to improve the patient’s functional abilities.

The Biopsychosocial Dilemma of Lyme Disease. A case study and Dialogue.

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Introduction

Estimates have shown that costs of managing chronic illnesses ranges in the trillions and continues to grow.¹ Among these numerous ailments is Lyme Disease, whose costs alone are newly estimated to be upwards of \$1.3 billion.² Aside from cost, this infection also affects about 300-400 thousand people annually.

The acute presentation includes symptoms typical to infection like fever, headache, and fatigue, and will often show a characteristic bullseye skin rash called erythema migrans at the site of the tick bite. Caught early, antibiotic treatment can be effective at alleviating symptoms and patients tend to have a full recovery. Yet, left untreated, the infection can spread to other organ systems causing significant complications. Many of those afflicted with Lyme disease are fortunate to receive early diagnosis and treatment for the tick bite infected by the *Borrelia burgdorferi* bacteria, but there are some who's symptoms persist beyond the initial infection.³

These patients suffer from post-treatment (PTLD) or chronic Lyme disease (CLD). Symptoms of PTLD can range from those with the original disease to neurologic and rheumatic symptoms lasting weeks or months beyond treatment. Sometime, patients can have symptoms for years beyond the infection which adds considerable confusion to the diagnosis.

It is not uncommon for patients with symptoms of ongoing illness to develop additional complications based on psychosocial elements. While not every patient who presents with chronic disease will have biopsychosocial overlays it is pertinent to consider how each patient perceives their diagnosis and how it influences other elements of their life. Certainly, the biopsychosocial model assumes that many variables are at play in determining the extent and types of dysfunction presenting a patient experiencing a chronic disease state.⁴ People who present with this chronic lyme disease are no exception and must understand that symptom relief is not always possible. Patients present with many comorbidities that can affect both treatment and outcomes. As such, since a patient's experience of disease is unique to them, we present a case study of one such patient and offer a dialogue of considerations.

Case Presentation

History

A 34-year-old patient presented to the University of Bridgeport Health Sciences clinic with low back pain (LBP). In his early thirties, he was given a medical diagnosis of *chronic Lyme disease* by his primary physician, a Lyme literate medical doctor (LLMD). The patient expressed his belief in contracting Lyme disease at the age of six when he recalls he had a tick bite. He was under the impression the tick bite produced a bullseye rash on his side. The patient has had co-infections with the Lyme's disease including; Babiosa, Bartenela, and Burgderferi. The patient also was diagnosed with Chlamydia in 2015 a few months after which lead to pain with ejaculation.

Regarding his presenting complaint he pointed to his mid lumbar region and stated "yeah the pain is all over here, it just bothers me when I'm trying to do something." The onset of the LBP was 2 years prior to visiting the clinic. His diagnosis of chronic Lyme disease preceded the onset of LBP by six

months. At that time, the patient had left his job at a marketing firm in New York City and had moved into his parents house. The LBP is made worse when he initiates movement, is overactive or is standing for “any long amount of time” and is described as constant, dull, and achy pain. His LBP is better while he rests. He denied increased symptoms with coughing, sneezing, or bowel movements, and there was denial of numbness, tingling, radiations, and paresthesias.

Pertinent social history includes patient’s ability to consume alcoholic beverages pre-diagnosis which is now limited as he experiences nausea and lethargy “after even one drink.” No additional past, family, or social history was pertinent to this case. There was no relevant information provided in the review of systems.

Physical Exam

Initial consultation demonstrated vital signs in normal ranges, lung and abdominal examinations negative for signs or symptoms. Ear, nose and throat exam were unremarkable. Neurologic exam including motor, reflex, and sensory examination of upper and lower extremity showed no deficit or asymmetry and cranial nerves were unremarkable.

Orthopedic examination included Modified Thomas position which revealed tightness in the right psoas compared to the left. Laslett's protocol was negative for pain bilaterally. Yeoman's, Hibb's, Nachlas, Ely's, Kemp's, and sphinx tests were all negative for pain or referral bilaterally. Seated slump 8 series was unremarkable for pain or referral bilaterally.

Chiropractic examination of the lumbar region in active and passive range of motion (O'Donoghue's) were full and pain free except for end range pain with active extension and right rotation. Cervical compression and cervical distraction were negative bilaterally. The postural exam revealed mild internal rotation of the shoulders bilaterally with mild forward head carriage with mild bilateral supination of the feet. The gait analysis revealed no gross abnormalities with the upper or lower extremity. Heel and toe walk bilaterally was unremarkable. Motion palpation revealed restriction of the upper lumbar spine. His soft tissue examination revealed taut bands in the left longissimus lumborum.

A number of outcome assessments were used and recorded including; visual analog scale for pain was 5 cm, numeric pain rating scale was 5/10, Oswestry disability index was 60%, and the Keele STarT back was a total of 7 and subscore of 3; which put the patient in the High Risk category.

Diagnosis and Management

The highest level diagnosis was found to be; chronic low back pain due to segmental dysfunction of the lumbar spine with associated myofascial pain of the left longissimus lumborum and of the right psoas, complicated by chronic Lyme disease.

The patient was currently receiving care from both an acupuncturist and an herbalist referred to by his LLMD. The herbalist provided the patient with a Lyme protocol. The herbalist has also started the patient on a cleanse: Coffee enema 3x and then water and detox baths, Cranstat vitanica for urinary problems, L-glutamine, Green chlorella spirulina and wheatgrass pills, vibrance, coQ10 200 mg 2x day, Smart cleanse tabs 1-2 per day, Magnesium 400-500, Glutathione 10 sprays, Nebulizer resultzrna, L-ornithine 500 mg and Vit E, D3, C 2000mg a day.

Recommended chiropractic treatment included manual and adjustive therapies to restricted muscle and joint complexes at 2x/week. The patient was encouraged to engage in exercises to increase strength and improve quality of life with chronic disease. In addition to a physical approach, the authors developed a cognitive-behavioral approach which focused on motivational interviewing strategies. As the patient was social and engaging it appeared he would be compliant with not only treatment but also the psychological support for his situation.

However, following the first few weeks of care and initiation of the program, he was involved in a motor vehicle accident. Due to the pending litigation, care was transferred to another provider. The

patient was encouraged to return to our care following management of symptoms associated with the MVA.

Discussion

While there was a need to address symptoms associated with musculoskeletal complaints, the larger issue afflicting this patient was his inability to cope with his chronic disease. The patient would talk about how he was unable to work at his job because he couldn't find the energy to do anything. The patient would get "physically exhausted" if he had to do too many movements when getting treated and had become dependent on his 70 y/o parents for physical support. He remarked being unable to "help his girlfriend move to [her] new apartment" because he would have a "flair up." And while gaining ground with compliance, he would not take well to changes in routine or treatments unless he indicated he wanted a change and consistently sought validation to his Lyme disease. Most challenging was how he attempted to relate his LBP to his chronic Lyme diagnosis.

It appears that he had internalized everything to do with his body as undeniably related to his CLD. The patient could not disassociate mundane aches and pains away from the CLD. In addition, his social network provided a constant crutch on which he could rely to support his beliefs. This patient was easily influenced by providers who further reinforced his belief and as such received only temporary relief and never reached a significant therapeutic benefit. Of course, this in turn would then give him further evidence justifying his internalization that he would never get better. Coming full circle to the irrefutable internalization that he was a victim of CLD.

Addressing the mechanical LBP was only one part of the obligation. With this patient the authors made every reasonable attempt to understand the patient's disease experience. Based on his STaRT score and as recommended in the high risk management category, the matched treatment had a specific focus on cognitive, emotional and behavioral responses to pain and their impact on function.⁵ After a few treatments, the patient became receptive to the concept that not everything related to his CLD. Critical to this process was engaging with his social network, current healthcare team, and assuming the role of mentor.

There is neither a currently approved therapy nor relevant systematic studies which address appropriate management of chronic Lyme disease. Yet, patients who have biopsychosocial overlays to their conditions have found that support with biopsychosocial rehabilitation are more effective than usual care.⁶

Patients in these situations do well with group setting rehabilitation, Pilates, motor control exercise, and active group courses for rehabilitation.

One current example is the rehabilitation strategies the Veterans Association has begun developing for patients with biopsychosocial overlays. Strategies include gentle movements, proper movement guidance, and self-applied massage and stretching for body awareness and to get back to activities of daily living. They also include cognitive behavioral therapy with relaxation strategies, self-pacing and restructuring of how patients perceive their diagnosis. The program also requires patients receive education for their chronic condition.⁷

Future investigations should expand on these developing programs and also compare attitudes to therapy and those to current disease states. This element should be considered as some conducted studies have found that adapting positive attitudes increase overall well being and therapies which target specific perceptions of the disease process can be of benefit.⁸ There are also new innovations that explore symptom modification to reduce symptom impact on patient function which could yield additional benefit in chronic disease management.⁹

With the development of programs and subsequent study there is hope that more can be done for patients with chronic disease. While a significant burden on health costs, it's most unfortunate that we've yet to develop sound strategies and guidelines to help our patients live their fullest lives.

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Resolution of Recurrent Acute Episodes of a Chronic Lumbar Disc Herniation Utilizing Chiropractic Rehabilitation Procedures and a Multi-Modal Wellness Model of Care

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Structured Abstract: A Retrospective Treatment/ Management Case Report

Objective: To document and describe a multi-modal treatment method approach, that can be utilized in resolving a case of long term recurrent exacerbations of a lumbar disc herniation, resulting in low back pain and sciatica in a 39 year old construction worker.

Methods: The review of the literature suggests numerous methods for the treatment of lumbar disc herniation; this is including: spinal manipulation, physical therapy methods, rehabilitation, NSAIDS, steroid epidural injections, and surgery. The methods used in this case include non pharmaceutical and non surgical methods available to the chiropractor. Nutritional advice included elimination of corn syrup and sugar drinks, an increase in water intake, a reduction of breads and grains, the addition of supplements(including niacin and omega 3 essential fatty acids) and a daily general supplement pack with enzymes. A heel lift was fit for the patient for an anatomical short right leg. During the passive phase of care, modalities including High Volt Electrical Muscle Stimulation @ 80-150Hz, Interferential Electrical Muscle Stimulation @ 1-10Hz, Ice, breathing exercises, and 910nm LASER, were utilized in the acute stages of treatment along with Chiropractic Spinal Manipulation for the first 8 visits. During the transitional phase of care Post Isometric Relaxation Muscle Energy Techniques progressing to Post Facilitation Stretch, Manual Therapy Soft Tissue Techniques, Foam Roll Maneuvers, Posture Stretches, Side Bridges Progression, Cat-Camel, Dead Bug and Quadruped Bracing Progressions, were introduced with continued 910nm Laser Therapy and PRN Chiropractic Spinal Manipulation over the next 9 visits. During the active phase of care, after a full functional assessment, we began a 20 minute cardiovascular training program and continued progressions of the previous transitional program exercises. We added rehabilitation consisting of: Deep Neck Flexion, Push-ups, Scapulo-Thoracic Facilitation, McGill Curl Up Lumbar Stabilization Exercises, Cook Hip Lift Lumbar Stabilization, Side Bridge McGill Lumbar Stabilization Exercises, Prone Bridge McGill Lumbar Stabilization, Supine Bridges with Progressions to Gym Ball, Standing Lunges, Superman with Gym Ball, Bird Dog, Wall Squat with Gym Ball, and Balance Training on Rocker Board for an additional 10 visits, which were performed for a total of eight weeks. A one month follow-up visit occurred for a total of 28 visits. In this case, the visits were completed within a three month period.

Discussion: Considering that the cause of low back pain is so complex, it would not be efficient to limit the treatment option to one mode. In this case, the patient was brought through the passive, transitional, and active phases of chiropractic rehabilitation. The patient also followed simple nutritional recommendations for weight loss, general health, and to lower blood pressure, inflammation, triglycerides, and cholesterol. He was given a heel lift for an anatomical short leg—to balance the lumbar—spine and improve a lumbar convexity. He improved his cardiovascular fitness in the office and at home, and was taught to strengthen his spinal stabilizing core while being treated with a 250 Watt peak power; this included a 2 Watt average power, and a 910nm wavelength LASER that would have the ability to reach the target tissue of the lumbar facet and discs.

Conclusion: The patient responded well with treatment in a two month time frame, and then with a one month follow-up. There was no longer any residual chronic low back pain or sciatic radiculopathy, which has not been able to be accomplished in nearly 20 years for this patient. A normal strength and flexibility level was reached, using referenced Physical Performance Ability Test Methods and Measurements. There was a near normal BMI accomplished from previous obesity, normal cholesterol from previous hypercholesterolemia, normal glucose from borderline hyperglycemia, 33 pounds of weight loss, a decreased resting heart rate, and a decreased blood pressure. Common outcome assessment tools were utilized, and scores were dramatically improved including: Roland-Morris Low Back Pain and Disability Questionnaire (RMQ), Revised Oswestry Back Pain and Disability Questionnaire, and Health Status Questionnaire/SF-36/Rand 36.

Keywords: Lumbar Disc Herniation, Chiropractic Rehabilitation, 910nm Superpulsed Laser, Weight Loss, Heel Lift, Outcome Assessments, Chiropractic Spinal Manipulation

Introduction:

This case is an example of a common type of patient presenting to a chiropractic office, which includes: a nutrient deficient, obese, de-conditioned, early middle aged male physical laborer, with signs of pre-diabetes, hypercholesterolemia and elevated blood pressure. Along with, a chief complaint of nearly 20 years of recurrent exacerbations of a lumbar disc herniation resulting in chronic low back pain and acute episodes of sciatica. The objective, in this case, is to document and describe a wellness model of care using a multi-modal treatment method, approach for a portal of entry chiropractor that could be utilized in resolving the presenting musculoskeletal conditions of the patient as well as the underlying additional health conditions that are co-morbidities affecting the healing process and the future health of the patient.

Case Report Presentation:

History of Present Illness (HPI) and Chief Complaint/ Symptoms: The patient entered the office explaining that at 8:30 AM he had bent over and lifted a small generator at a construction site, turned, and felt a pop in his lower back. He immediately felt pain in his lower back region, and it progressively got worse throughout the day. As soon as the pain began to radiate to his buttock and posterior thigh, his girlfriend drove him to the office. The symptoms remained to be constant; 100% of the time, they were severe in intensity rated as an 8 to a 9 on a Quadruple Visual Analog Scale, with 8 being the best and 9 being the worst. His current pain levels were at a 9. The symptoms were further described as low back pain, from the bilateral ribs to the top of the crests, and then pain in the right butt cheek, under the butt cheek, and down the back of thigh stopping right before the back of the knee. The patient also described his back as being swollen. He said the pain he felt was sharp, dull, deep, burning and achy. The pain diagram filled in by the patient matched the description. He stated that lying on his back decreased the pain by a little, and putting weight on the right leg—including any movement—increased the pain. Prior to this episode, he has suffered from chronic low back pain, on and off, for 20 years, since high school sports. He also expressed, that he always feels stiffness and tightness in his body, even in the mid back region and neck, but those regions were not as painful in comparison to the pain he felt in his lower back. The patient revealed that 2 years ago he went to a pain doctor who ordered him an MRI; the patient brought in the results of the MRI for my review.

Activities of Daily Living Form revealed that there were no activities that could be performed except sedentary items and those not related to movement.

Outcome Assessment Forms, Red Flag and Risk Factor Assessments: These questionnaires were filled out to assess risks and set up baselines for future comparisons, and to determine levels of improvements; the results can be evaluated below in **Table 1**.

Past Medical History: The patient revealed a history of an appendix and tonsil surgery as a child: a broken right middle finger in high school, lacerated thumb requiring 20 stitches a few years ago, an automobile accident five years ago with no treatment, many traumas to the spine and extremities from high school sports, and he admitted to 8 episodes of this similar problem over the last 10 to 20 years. There was no other history of major illnesses, hospitalizations, or traumas revealed. His last physical examination was approximately two years ago, when he went to the pain doctor for pain medication and had injections. There was no blood work-up performed, according to the patient at that time, and he thinks it has been over 5 years since he's had blood taken.

Current Medication: He took 2 unknown pain pills from a co-worker this morning. For many years, He has been regularly taking two Motrin (400mg) every day, for his low back pain.

Allergies: Pollen; Codeine; no other known allergies were listed.

Family History: The patient revealed that there was no heart disease, blood pressure conditions, cancer, or strokes in his immediate family. However, he revealed that his father has just been diagnosed with diabetes, and his father and mother both have high cholesterol. Since the patient had not had a blood work-up in over five years, further evaluation will occur regarding serum cholesterol and glucose levels.

Social/Occupational History: This patient is divorced, has an occasional two cigarettes a week, and consumes two alcoholic drinks a day with an occupation as a self employed carpenter/construction worker. His duties include construction, carpentry, form work, and framing which is often very strenuous. The highest level of education reached, is the completion of high school. The patient reveals that he does believe he has stress in his life, with some financial worries and trying to find work all the time, but not too high. He rarely takes a multi vitamin and often has fast food, processed food, and soda/sugar drinks at work all day. Prior to this injury, he had exercised less than moderately. He occasionally participates in other sports and activities, and he states that he usually does not get 6 to 9 hours of sleep each night.

Review of Systems: There were no symptoms of weakness, fatigue, fever, night sweats, weight loss, or any indication of vision, hearing, nasal, or throat disorders, coughing, difficulty breathing, chest discomfort, difficulty or loss of bladder or bowel control, rashes, numbness, major mental or hormonal disorders, or other blood, immune, or lymphatic abnormalities. However, he mentioned the feeling of pins and needles in his right leg. There was stuffiness mentioned for the nasal system, contributed to the allergies and construction dust, but there were no other additional symptoms noted to indicate additional organ dysfunction, except muscle/joint pain/back pain/stiffness was listed. However, this is part of the chief complaint, because he also has a chronic intermittent lower back condition.

Clinical Impression/Working Diagnosis: Based on the history, the patient most likely has a sprain/strain in the lumbar spine, with sciatic neuritis and possible disc herniation aggravation. A comprehensive examination will be performed to confirm this working diagnosis.

Physical Findings: This was a 39 year old, 5' 11", 225 pound, slightly disheveled appearance, endomorph body type, afebrile, Caucasian male with blood pressure of 138/89, and a pulse rate of 90 bpm with normal rate, rhythm and amplitude, and respiration rate of 19 breaths per minute. He

would be considered obese based on the Body Mass Index calculation of $(225 \text{ \#/}71 \text{ inches}^2) \times 703 = 31.4$ BMI. This would be considered within the “30 BMI and above” which would be the obese category; 18.5 to 24.9 would be normal category. Observation/Inspection of the skin, revealed no rashes or major scars of the head, neck, trunk, back, or extremities, except the hands, fingers, and forearms had multiple scars from working in construction. The fingernails were normal, there were no tattoos, no contusions, cuts, or discolorations noted on the spine or pelvis regions.

Percussion of the bony structures around the spine and pelvis, using a reflex hammer, revealed all normal findings except that the lower lumbar spinous processes were very tender when being struck with severe levels of increased pain. **This was a suspicious finding**, although hitting the painful areas would typically increase the pain, this level was more than would be expected.

Palpation/Inspection of the head, neck, trunk, back, and extremities(including skin, lymph nodes and thyroid gland) revealed all to be within normal limits except the bilateral lumbar paraspinals, and right quadratus lumborum were in spasm—rated at a 2— which is a spasm existing without provocation. Tenderness of this area would be graded as +4; thus, the patient complained of severe tenderness and withdraws immediately in response to the test pressure, and was unable to bear sustained pressure. The right Gluteals and piriformis muscles were in spasm, rated as a 1, which is triggered with movement or external pressure. These areas would be graded a +3 for tenderness, which is considerable tenderness, and withdraws momentarily in response to test pressure. The hamstring muscles were very tender to palpation, rated as a +2, which is moderately tender. The cervical paraspinal muscles revealed mild trigger points that were tender, graded as +1, which would be mildly tender or annoying.

Peripheral Vascular Evaluation consisted of auscultation of the carotid, subclavian, abdominal aorta, and femoral arteries for which there were no bruits heard. There was no swelling distally in the ankles or feet.

Specialized Testing consideration was appropriate at this point, because there was significant provocation upon percussion of the spinous processes of the lumbar spine, suggesting a possible fracture of the spinous processes, which could occur with some lifting injuries. This was considered, in order to prevent further damage to the patient, by performing more strenuous testing. AP, lateral, left and right posterior oblique x-ray views of the lumbar spine, were taken on this patient before we continued with the examination, in order to rule out the red flag of fracture of the spinous processes. The films did not reveal any fractures or other pathology; thus, the examination proceeded. The x-ray findings will be listed in a subsequent paragraph.

Range of motion of the cervical spine using dual inclinometer method reveals Flexion 45/50, extension 50/60, right lateral flexion 40/45, left lateral flexion 40/45, right rotation 65/85, and left rotation 70/85. There was no pain reported in the cervical spine, just stiffness. The lumbosacral spine ranges of motion were measured at flexion 30/65 (reached 24 inches from the toes) and pain in lumbar and right gluteal/posterior thigh, extension 10/30 with pain at lumbosacral region/right SI joint, and upper gluteal, right lateral flexion 10/25 right gluteal/hamstring pain, and left lateral flexion 20/25 with no increase in pain. Thoracic ranges of motion were flexion 40/60, right rotation 15/30, and left rotation 20/30. These movements increased low back pain. Range of motion of the hip joints, using goniometer revealed flexion to be 120/135 on the left and 50/135 on the right with both movements, resulted with increasing pain in the lower back and down the right posterior thigh. The Extension was 20/30 on the left and 10/30 on the right; both caused low back pain. Abduction and Adduction were too painful for him to complete. Internal rotation was 30/35 on the left and 25/35 on the right, with an increase in pain in the right gluteal. External rotation of the hip revealed 30/45 on the left and 20/45 on the right with increased pain in the right buttock with movement. Knee flexion was 115/135+ on the left and 105/135+ on the right. There was only a mild increase in low back

pain upon knee flexion, no knee pain. The knee could be fully extended and there was obvious abnormal movement patterns noted in the spine.

Posture evaluation revealed: anterior head translation, a left head tilt, a high left shoulder, bilateral internally rotated shoulders, an increase in thoracic kyphosis, a high left ilium, mild left torso translation, a pendulous abdomen, and flattened Gluteals. Gait revealed a mild limp with the patient putting more weight on the left leg, no pronation of the feet, a mild right external rotation of the foot, and a slow cadence of gait were all noted.

Chiropractic evaluation, utilizing motion palpation of spinal joint play, was performed. Ligamentous fixations were noted at C1/C2, C5/C6 and C7/T1, T5/T6 and T12/L1, L4/L5, and Bilateral SI joints were fixated to a moderate degree. These fixations indicated kinesio pathology components of the subluxation complex. There was no crepitation or hypermobilities noted. No contusions were visually evident in these regions. There was obvious hypertrophy of the lower thoracic musculature and tenderness of the lumbar paraspinals as noted above, as well as additional right sided hypertrophy apparent from a lumbar spinal right convexity. There was also inflamed muscle tissue noted with mild edema, palpated along the paraspinals and right iliac crest.

Neurological Examination: The patient was oriented to time, place, and person. The mood was normal. A normal review of the cranial nerves was noted. Peripheral vascular system revealed normal skin temperature, and normal pulses of the upper and lower extremities. The Muscle tone in the upper and lower extremities was normal with no atrophy, fasciculations, spasticity, or flaccidity noted. Dermatome sensation to light, touch, and sharp stimulus was normal bilaterally along both upper and lower extremities(except S1 on the right would be considered hyperesthesia) because it was perceived as an increase in sensation compared to the left S1 dermatome, as well as the right L5 dermatome above, and S2 dermatome below. Muscle strength was 5/5 for all major upper and lower extremity muscle groups. Deep tendon reflexes of the upper and lower extremities were 2+, normal. Tandem Gait was difficult and not completed due to pain. Babinski's Sign was absent with the toes going into plantar flexion. Romberg Sign was absent. Coordination testing of finger to nose was normal. Cerebral function was assessed with the patient being able to count backwards from 35 in intervals of 7. He was able to rapidly move his hand to his thigh, chest, and other hand. The girth of his left calf was 15 inches and the right calf was 15 inches.

Orthopedic Examination: In addition to the above findings, a musculoskeletal examination including inspection and palpation of the bilateral joints, bones, muscles, and tendons with stability/provocative testing, revealed the following: Vertebral Basilar Artery Functional Maneuver was negative for vertebral artery insufficiency. Thoracic outlet syndrome testing was negative. Cervical foraminal compression, Maximum Compression, and Soto-Hall/forced flexion were all negative for any increase in cervical pain or radiation of pain. Shoulder depressor testing was negative but did cause a mild pulling sensation of the trapezius muscles, not pain. Jull's Test with the patient asked to hold their head off the table for 10 seconds, resulted in chin jutting indicating weak deep neck flexors. An increase in intrathecal pressure caused an increase in lower lumbar spine pain. Straight Leg Raise Test caused an increase in low back pain bilaterally and also radiation to the right posterior thigh above the knee at 50° of right passive hip flexion. The hamstrings were shortened bilaterally with 70 degrees on the left and 50 degrees on the right. Bowstring Sign was negative bilaterally. Patrick's Test was performed causing pain on the right side indicating a possible right hip lesion and indicating very tight groin muscles bilaterally. Milgram's Test was performed causing pain in the lower lumbar spine almost immediately and revealed very weak abdominals and/or hip flexors. Thomas' Test revealed shortened Iliopsoas muscles bilaterally. Pelvic compression testing revealed pain in the right SI joint and surrounding regions. Nachlas' Test caused pain in the right lumbosacral region and Sacroiliac Joint. Hibb's Test revealed pain in

the right SI joint and deep gluteal region when pushing away the right leg, also causing the left pelvis to rise, indicating piriformis shortening. There was no pain on the left Hibb's Test. There was tight quadriceps muscles noted bilaterally with the patient unable to reach the heels to the buttocks with a passive stretch. Yeoman's Test was positive on the right for SI joint pain. Kemp's/Quadrant Test caused local low back pain and radiation of pain on the right when rotating the patient posteriorly on the right. Passive Scapula Approximation Test was negative for interscapula pain. There were no deformities, step offs, masses or instabilities noted.

X-rays: The views that were taken included the upright AP lumbopelvic, AP spot, lateral, and left and right posterior oblique x-ray views of the lumbar spine. As discussed previously, the physical exam was discontinued until we ruled out fractures and then we continued with the examination. The films did not reveal any fractures, on any of the projections, within any portion of the spinous processes or vertebral bodies. The AP lumbopelvis view revealed a lumbar convexity with an 11 degrees Cobb's angle to the right, with a pelvic deficiency of 9 mm on the right side, measured at the heads of the femur, indicating an anatomical short leg on the right side. The L4/L5 and L5/S1 facets showed mild arthrosis. There was mild global left spinous rotation noted of the lumbar spine. The lateral projection revealed mild L5 disc space narrowing. The intervertebral foramina were patent. A mild loss in the lumbar lordosis is evident. Mild anterior spondylosis is evident on the vertebral bodies of L2/L3 and L5/S1. The oblique projections show no separation of the pars.

MRI: The patient brought in with him a copy of a lumbar spine MRI report, and compact disc from a local MRI Center that I was familiar with dated 12/18/09, 15 months ago, which was ordered during his last episode of pain similar to this. The report written by a medical radiologist, who was considered reputable in the community, revealed a right paracentral herniation L5-S1 with loss of lumbar lordosis and a very mild dextroscoliosis; I concurred with these findings.

No physical performance testing was attempted on this visit to establish a baseline or weak link, because of the acute inflammatory phase or stage of the patient's condition.

Diagnostic Impression/Assessment: This is an acute new injury over a pre-existing chronic weakness. Primary Diagnoses: Secondary Diagnoses:

- | | |
|---|--|
| 1. 847.2-Lumbar Spine Sprain/Strain | 1. 722.10-Lumbar Disc Herniation/L5 |
| 2. 724.3-Sciatic Radiculitis/S1
Subluxation Complex | 2. 739.2-Thoracic Joint Dysf./Non-Allopathic Lesion/ |
| 3. 724.2-Lumbago | 3. 728.87 Muscle Weakness |
| 4. 728.85-Muscle Spasm; Piriformis | 4. 719.7-Difficulty Walking |
| 5. 739.3-Lumbar Joint; 739.4 SI Joint; Dysfunction/ | 5. 781.92- |
| Abnormal Posture Non-Allopathic Lesion/Subluxation
Complex | |

Complicating Factors: The patient had co-morbidities noted; he was de-conditioned, had a pendulous abdomen, had a 9mm right short leg contributing to a mild right convex lumbar curvature, he was obese by at least 40 pounds, worked a laborious job, had an alcohol intake of two drinks per day, and occasionally smoked.

Prognosis: Fair. He's had this condition for many years, with on and off flare-ups every one to two years. He has never truly addressed the underlying weaknesses contributing to the problem. He works in a job that requires the use of his back. He has a confirmed L5 disc herniation that appears moderate in size, and I opined that the condition could become more stable with proper methods applied. If he chose to follow my directions and treatment plan, this prognosis could be elevated.

Discussion, Decision Making, Treatment Goals and Initial Treatment Plan: The initial treatment

plan was recommended to consist of short term, one to three weeks of ice with compression on the lumbar spine. This includes electrical stimulation of the lumbar spine and right piriformis/gluteal region to decrease pain and tissue swelling, starting with high volt galvanic at 80 to 150 Hz (encephalon release) and then after several visits, interferential at 1-10 Hz (endorphin release). He was instructed to wear an all elastic lumbar support brace for the next five days; it was to be worn only when moving and traveling places, and not when in bed or sitting at home. The brace is not rigid, but semi-flexible. He was required to return the back brace support to the office to assure he did not wear it past five days. The use of this brace was for short term only, to protect the injured area from re- injury while it was healing, to rest the injured tissue and to compress the injured tissue. At the same time, we would try to prevent further weakness and disuse atrophy of the small spinal muscles to occur. Also recommended, was LASER therapy to the lower lumbar region, L5 and SI joint, and right piriformis muscles for the reduction of pain, inflammation, and for the biostimulatory effects on the joint and soft tissue. To reach the facet and disc, which is at least 3.5cm to 5cm deep, a 910nm LASER must be used. Chiropractic Manipulative Treatment/Adjustments/Manipulation was recommended to the thoracolumbar region, lumbosacral and sacroiliac subluxation complex kinesioopathophysiological components as indicated during this initial stage of care. He was also given a soft tissue supplement pak for the inflammation and tissue repair. This would be taken as directed on the box and brochure given, and would immediately be stopped if any nausea occurred. If this occurs try to take it with food. The patient would then be re-evaluated within approximately 3 weeks unless indicated earlier or later. Treatment frequency would be three times a week, but he could be seen daily for the first few days in result of the severity of pain. He was treated on the day of this initial examination.

We would be evaluating for improvement of symptoms and function. Short term treatment goals, by two to four weeks, will be a 50% decrease in the symptoms intensity, elimination of the majority of tissue swelling, the ability to sit, drive, and stand for more than one hour without an increase in pain, and the ability to walk without a limp, and to be able to perform basic functional testing maneuvers to assess his baseline. An additional goal for this patient was to lose 15 pounds in 30 days. He wanted to finally get rid of the chronic back pain that kept returning. The patient was concerned about his elevated blood pressure and wanted me to check his cholesterol, and agreed to listen to my recommendations. The patient would also utilize ice on the lumbar spine and right gluteal region with compression at home, applying a bag of crushed ice on a moist towel over the complaint area for 15 minutes, and then re-apply when the skin is normal to touch. The patient was given a requisition form to go to Quest Labs and have blood drawn for a comprehensive metabolic panel, thyroid panel, CBC, and Lipid Panel to evaluate the fatigue, thyroid, cholesterol levels, and glucose levels; it was done with the consideration of the borderline elevated blood pressure, obesity, and scores on the health status questionnaire.

This was an acute injury/condition with multiple components to the diagnoses. It required a low to moderate complexity of medical decision making, including the reviewing of diagnostic images and reports, low risk of morbidity, as well as the length of time spent face to face with the patient of over 75 minutes, with at least 25 minutes involving counseling. However this was regarding the options for him, including the referral for pharmaceutical intervention or epidural injection consultation, or the following up with a rehabilitation program with this office over the next 3 to 15 weeks. The risks of treatment and the risks of not getting treatment, were discussed with the patient and listed on the separate signed informed consent form, and the patient stated that he understood all elements and wanted to start the treatment plan that day.

Methods/Patient Management:

The patient was able to stand on the platform of a hi-lo table, and the table was then lowered to the

prone position. Four adhesive electrode pads were attached to the four lead wires, and placed over the left and right L5 paraspinal/quadratus regions and the right upper and middle buttock. The high volt galvanic (HVG) (G0283) was set at 80-150 Hz for encephalon release an pain relief to slightly more than patient perception for 20 minutes. Ice (97010) was also applied to the same region with compression for no longer than 15 minutes to prevent an increased reaction of blood flow. After the ice and HVG therapy was complete, a 910nm 250W peak, 2W average power, superpulsed LASER device (S8948) was applied to the patient while in a side lying position at the right side of the interspinous space between L5/S1, the right top of the sacrum, the right SI joint, and the right piriformis muscle with 1344 Joules in a total area of 90 cm² for a dose or energy density of 15 J/cm² at the surface over 15 minutes. The use of ice prior to using LASER is often beneficial because less blood in the capillaries will allow better transmission of photons through the tissue. The patient was given an adjustment/spinal manipulation in the side posture position to the Left SI joint, and T11 fixations/subluxation complex. The right SI joint was too acute to manipulate on the initial visit. He tolerated the adjustment (98940) very well. The patient was fitted with an all elastic lumbosacral support brace to protect from re-injury, rest, and compress the lower back to assist in the reduction of swelling and pain. This is a loan to the patient to assure that he returns it and does not wear it for more than 5 days. He agreed to return it within the recommended time period. The patient was instructed not to wear it when sleeping or when sitting for long periods; he was only required to wear it when standing and walking. He understood that it was our goal to not have him become dependent on the brace, and would be utilized short term during the first phase/inflammatory phase. He was instructed to use ice at home with a moist towel on the skin, use a zip lock bag of crushed ice cubes on top of the wet towel for 15 minutes at a time, and then apply the ice again when the skin returns normal to touch (up to four times a day). The patient was given a three page handout on McKenzie self treatment/stretching and sciatica by Liebenson that he should read and attempt to put his body into the positions on the sheets. We went over his breathing patterns, demonstrated and instructed him that while doing the exercises (and even when standing or lying down) he must practice inhaling with his abdomen and ribs coming outward, and breathing out/exhaling with his abdomen and ribs coming inward; his shoulders and chest should not rise with breathing. I explained that this could be a great exercise for him to start, and that it is not strenuous for his back and will help him have a head start when we begin more exercises in the weeks to come. The patient was instructed to return the next day. This treatment was performed for 4 visits over the next 7 days.

On the third visit the lab results came back. The results are available in **Table 2**. In addition to the soft tissue support vitamin/mineral/enzyme pak he was already taking. He was recommended to go to the health food store and purchase additional 100 mg capsules of niacin (B3) in the form of nicotinic acid. The patient was informed about the flush sensation which feels similar to a sunburn, but disappears in approximately 30 minutes. He should start with 100 mg three times a day for a week if tolerated. Then slowly titrate up to 500 mg three times a day. A slight flush, is the maximum he should feel. If it is more than that, he should back off. After three months, he should decrease the amount gradually and just include it in a multiple vitamin or other supplement packs or B-complex. This is to lower the triglycerides and increase his HDL levels and lower his LDL. He was also recommended to take 3000 mg of molecularly distilled Omega 3 essential fatty acids per day (in 1000 mg separate doses) to help lower triglycerides and possibly blood pressure, LDL cholesterol and increase HDL. He should increase his walnut and almond intake every day with at least a handful of each. Since he requested assistance with weight loss and fatigue; dietary recommendations included the complete elimination of all sugar drinks including electrolyte “ade” type, Cola, Iced Teas, and every other drink with sugar and corn syrup. No diet, energy, or vitamin water drinks, or artificial sweeteners were allowed either. He was instructed to drink as much water as he wants to for thirst. He may have plain green or black teas (cold or hot) with no sweeteners. He was able to use squeezed lemon in liquids. He may have two eggs for breakfast. He may also

have a mixture of steel cut oats, shredded coconut, sliced almonds, walnuts, pecans, cinnamon, chia seeds, pumpkin seeds, and a banana with almond milk. He may have up to four servings of real beef/chicken/fish a day, but no processed cold cuts or jerky. He can have as much fresh or frozen vegetables (salads or steamed vegetables) as he wants to eat in a day, but can only use extra virgin olive oil, vinegar, lemon, Himalayan Salt, pepper, curry, hot sauce, or other seasonings on them. No other liquid dressings or oils were permitted. He may have one sweet potato or white potato a day if he wants and one serving of bread a day (two slices) if he must. For example, he can have a sandwich for lunch but not a full hero/hoagie roll. He may have four handfuls of fruit a day, (i.e. one whole fruit like an apple, orange, banana is each a handful, a big handful of blueberries is a handful) no more. He was permitted to cheat on his diet only one day a week (a Saturday night). Although this was a big change for him, he understood the parameters and promised to stick with it. He understood his lab results and understood that if the levels did not change in three months, he would need to see a medical doctor for pharmaceutical intervention.

On the 5th visit over a 9 day span, the type of EMS was changed to interferential therapy. Interferential therapy (**G0283**) was applied with four adhesive electrode pads with the leads placed properly in a criss-cross pattern over the lower lumbar muscles/quadratus region, and the upper gluteal/piriformis with most of the L5 region pain in the center of the pads vectors attempting to reach deeper in the tissue. The interferential machine was set to 1-10 Hz for endorphin release and continued pain relief, but also to increase circulation and reduce spasm, and set to patient comfort/tolerance for 20 minutes. Ice (**97010**) was also continued; to be applied to the same region with a compression wrap, but for only 15 minutes because of the tissue thickness and to prevent an increased reaction of blood flow. After the ice and interferential therapy application, a 910nm, 250W peak powered, 2W average powered LASER device (**S8948**) was applied to the lower lumbar/L5/and Right SI structures, delivering 1344 Joules in a total area of 90 cm² for a dose or energy density of 15 J/cm² at the surface over 15 minutes. He was given a side posture adjustment (**98940**) to the right and left SI joint fixations/subluxations, and supine adjustment to the lower thoracic segments. Light, passive range of motion was applied to the lower extremity to all muscles and all planes of his tolerance levels, and they were done to not aggravate the sciatica on the right, and just to relieve tension on the left side. He was instructed to try to walk a little more during the day and avoid sitting or lying down at all. He can continue to use ice at home as directed. This treatment was performed from the 5th to the 8th visit in slightly over two weeks. On his 6th visit, wall angel exercises were instructed, and performed to assist with the weak scapula stabilizers, tight pectoralis, and thoracic kyphosis.

On the 7th visit, since his short right leg measurement was 9mm on the standing x-rays previously taken, **he was given a 5mm heel lift to put into his right shoe.** He walked around and did not have any problems with the lift. The patient is instructed to always remember to wear it in all his shoes. The pelvis appeared more balanced with the heel lift in the right shoe. On the 8th visit he was re-assessed/examined and functional and physical performance evaluations were performed, provocative tests were less severe regarding positive signs; some of the functional measurements and findings were noted in **Table 1, Table 2, and Table 3**. The patient then began transitional care on the 9th visit to the 17th visit, for which the next goal was to continue with correct breathing patterns, stretching strategies, and stabilizing strategies. He continued to receive spinal adjustment/manipulations on a needed basis as well as the LASER therapy more regularly each visit. He continued on the diet and nutrition regimen, home exercises previously given, and additional ones. The transitional sessions consisted of **breathing exercises** for 6 to 8 minutes in the office, while stretching supine on a gym ball with the patient's arms extended above his head, and then out to the sides stretching the pectoralis muscles and extending the thoracic hyperkyphosis. **He was explained that with all exercises, the object is to never do a bad repetition and you do not want to create a bad motor pattern. Stop at a bad rep and do more**

sets of fewer repetitions. Next the patient stood looking in the **mirror (for awareness) holding perfect posture and abdominal hollowing with a “small foot”** for 10 seconds at a time and we repeated for three sets. He was then instructed to **lay supine on a foam roll in the vertical position** with arms to the side for 2 minutes and then up above the head for 2 minutes. He was then instructed to **lay supine on a foam roll in the horizontal position** and roll back and forth on the thoracic spine working the myofascial adhesions of the lower thoracic, and the hyperkyphosis of the upper back for 2 minutes. He was instructed that cavitation may occur and that would be fine. **Next the Cat-Camel was performed for 6 to 8 minutes** accentuating the correct breathing and reinforcing the tightening of the core, and assisting the form by holding the low back and abdomen for the patient and having him hold the positions. **Quadruped Bracing**:-on all fours-with chin tucked and neutral spine with a stiffened trunk/core using the “end cough contracted position” technique, and challenging the patient with perturbations when able, was performed. Next a **Side Bridge** on knees was held for 10 seconds each side for three sets. Then the **Dead Bug Beginner**: with arm above head, supine with same leg bent with foot on floor, other knee comes up and touches opposite hand coming from above, then switch, all while abdominal bracing and not holding the breath. 10 times three sets. Then **Post Isometric Relaxation (PIR)** was performed on the quads-hams-adductors- gastrocs-soleus-iliopsoas piriformis and gluteals, with the patient comfortable, with muscle passively lengthened to the slight resistance barrier, patient contracts the muscle with minimal effort against resistance for 10 seconds while breathing in, and then let out and relax. This was repeated 3 to 5 times until no new barrier was met for each group. In addition, Deep muscular manual therapy techniques of ischemic pressure, and stroking massage using the elbow, was applied to the right piriformis and gluteus muscles, and QL for up to 7 seconds. It was then released and repeated at different locations of the tightened trigger points of these muscles. The patient was explained that this deep pressure may be very painful and to not let me pass their tolerance threshold. LASER therapy was applied on the right piriformis muscle, QL on the right and left trigger point areas at L4 and L5 region, and medial superior right SI joint region using a 910nm Superpulsed system, with a 250W peak and 2W average power to stimulates growth factors effecting gene expression, which is necessary for remodeling and formation of healthy tissue. This device also has the ability to penetrate deeper into the tissue because of its power density, wavelength, and delivery properties. We delivered 1344 Joules in a total area of 90 cm² for a dose or energy density of 15 J/cm² at the surface over 15 minutes. (S8948). He is recommended to attempt to do all of these routines and stretches gently at home. He was given a roll for the mid back to take home so he could work on the mid back at home. The patient was confident in doing the perfect form and repetition and was given my cell phone number for any questions. He should use ice as directed previously for any pain or flare-ups.

At the 12th visit-no spinal adjustment was needed, and the patient was ready for additional intensity but still in the **transitional phase of care. PNF techniques of Post-Facilitation Stretch (PFS) were initiated** on the quads-hams/biceps femoris- gastrocs-soleus-iliopsoas-glutes and TFL/ITB. Care was used to assure patient comfort, and although he was instructed to contract with near maximum effort, pain should not increase past his average pain levels of 4. He promised not to go too hard with this stretch technique to avoid straining himself. The patient was then instructed to push against me on each muscle treated, and breathe in slowly (respiratory synkinesis) while resisting on my count of 10 seconds, and have his eyes look (visual synkinesis) into the direction of his contraction. He then was told to completely relax and let go, as I stretched the muscle to the new barrier for 15-20 seconds, and he had his eyes look into the direction of the stretch. We relaxed for another 20-30 seconds and repeated each muscle 4 times. We continued then with **breathing exercises** for 6 to 8 minutes in the office, while stretching supine on a gym ball with the patient’s arms extended above his head, and then out to the sides stretching the pectoralis muscles and extending the thoracic hyperkyphosis. Again, we went over the importance of proper breathing methods through the abdomen extending outward on inhaling, and that the ribs should

come out laterally on inhaling and the shoulders should be relaxed with breathing and not be rising. He was explained that with all exercises, the object is to never do a bad repetition, and you do not want to create a bad motor pattern. Stop at a bad rep and do more sets of fewer repetitions. Next the patient stands looking in the **mirror (for awareness) holding perfect posture and Abdominal Hollowing with small foot** for 15 seconds at a time and we repeated this technique for three sets. **We began with expected and unexpected perturbations while standing in this position. We now did this with the eyes of the patient closed, trying to assist him with proprioception, and balance while standing on two feet with awareness and perturbations trying to maintain the posture.** He was then instructed to **lay supine on a foam roll in the vertical position** with arms to the side for 2 minutes, and then up above the head for 2 minutes. Next, He was instructed to **lay supine on a foam roll in the horizontal position**, and roll back and forth on the thoracic spine working the myofascial adhesions of the lower thoracic, and the hyperkyphosis of the upper back for 2 minutes. I also had the patient rolling with perfect form, and breathing and bracing on the TFL to release some trigger points and tightness of this soft tissue for 2 minutes. **Next the Cat-Camel was performed for 6 to 8 minutes** accentuating the correct breathing, and reinforcing the tightening of the core as described previously. **Quadruped Bracing** was performed as described previously with expected and unexpected perturbations for 4 minutes. Next, a **Side Bridge on the feet (instead of the knees)** was held for **15 seconds** each side for three sets. **Dead Bug Second Progression** was performed with the arm above head, supine with both knees at 90 degrees, other knee comes up and touches opposite hand coming from above, then switch, all while abdominal bracing and not holding breath, 10 times bilaterally; three sets. Deep muscular manual therapy techniques of ischemic pressure and stroking massage (using the elbow) was continued to be applied as previously described. LASER therapy was continued and performed as described above.

A re-evaluation of previous positive maneuvers, as well as a reassessment of functional performance, was performed on the 17th visit of 03/09/11. Some of the results are included in **Table 1, Table 2, and Table 3**. In addition, a Par-Q Form was filled out by the claimant to assess cardiovascular risks for which, allowed us to proceed with the YMCA 3 minute Bench Step Test. He was able to complete the assessment for which, the total visit took 2 hours to complete. On the 18th visit, 03/11/11-we began **Active Care**. The patient was instructed to continue to perform all the previous exercises at home during the off days. He is also asked to continue the cardio routine at home on his off days that we starting him with today in the office, with the same level of intensity and time. He is also to attempt—with perfect form—the new exercises we are teaching him. We started at a 5 minute slow pace on the bicycle, and then increased the pace for 20 minutes maintaining his target heart rate of 142 bpm and then a 5 minute cool down. He was rated as below average on the YMCA 3 minute Bench Step Test on the assessment. Therefore, we decided to start him at 60% for aerobic training for 20 minutes, and we will progress him up slowly to 80% for 20 minutes over the next several weeks as his fitness levels allow.

The Karvonen Method Formula: $(220 - \text{age}) - (\text{RHR}) \times (\% \text{ intensity}) + (\text{RHR}) = \text{HR target}$.

This patient: $220 - 39\text{age} = 181\text{HRmax}$
 $181\text{HRmax} - 83\text{HR rest} = 98$
 $98 \times 60\% =$

58.8 $58.8 + 83\text{HRrest} = \mathbf{141.8 \text{ HR target}}$

By this time, the patient had mastered the Cat-Camel, Dead Bug, Mirror Image Posture, Side Bridging, Quadruped Bracing, Breathing Techniques, and has improved in his flexibility; he was able to explain to me that with all exercises, the object is to never do a bad repetition and you do not want to create a bad motor pattern. Stop at a bad rep and do more sets of fewer repetitions. He

was instructed to continue this routine and use it as part of his warm up before entering the office, and also to perform this routine and all stretches daily. The active rehabilitation routine utilized is listed in **TABLE 4**. This rehabilitation routine was progressed slowly over each visit from the 18th visit to the 27th visit, with increased repetitions, sets, and/or resistance. It includes other increases in challenges such as, eyes being closed as indicated in the routine. He stretched and performed one hour of the exercises, and 20 minutes of cardio on his off days from this office, and used ice after all sessions for 15 minutes as previously directed. He was seen 3 visits a week of Monday, Wednesday and Friday until the 27th visit.

On the Final Evaluation, which was the 27th visit, the patient was discharged from active care and told to return in one month. He was stronger and thinner; had better posture and had nearly no back pain. At this point, I felt that he would do very well continuing to strengthen his back on his own. The patient should continue to perform all the exercises 3 times a week as a home maintenance program that we have taught him, and have performed in the office. This would also include his cardio exercise as well. He was also prescribed a general multiple vitamin pack called UltraPure Pack from Pure Encapsulations. This is in addition to the fish oil and niacin that he was still taking. He was no longer taking the soft tissue support pack for the last four weeks. He was instructed to reduce one fish oil capsule per day that he has been taking, because this new pack has one in it. He will reduce the niacin in four weeks, titrating down. He will visit his MD within the next four weeks, and have a complete physical and blood workup performed. He returned to work, and I recommended that the patient return in four weeks for a check-up to see how going back to work affected his back. He may also return to the office PRN (as needed) for any flare-ups, regressions, or reoccurrence of his lumbar condition.

On the one-month follow-up, the 28th visit, the patient was released and discharge. The patient has done a great job keeping up with the exercises. He looks great and he should return as needed for any tune-ups or flare-ups of any pain. If his condition deteriorates and functions decrease, if his symptoms reoccur, or after his home treatment fails to give relief, he may return for any nutrition purchases. He knows to continue the home plan of exercises with perfect form and proper breathing.

Results/Outcome of Care:

Tables:

Table 1: Pain Assessment and Outcome Assessment Tools Summary of Results					
	02/01/1 1 1 st visit	02/16/1 1 8 th visit	03/09/1 1 17 th visit	04/01/1 1 27 th visit	05/02/1 1 28 th visit
Quadruple Visual Analog Scale*	9,9,8,9	6,6,5,7	2,3,2,5	0,1,0,2	
Health Status Questionnaire- (Rand)/SF 36	PF-60				PF-90
	BP-57.5				BP-90
	EF-40				EF-75
Roland-Morris Disability Questionnaire	18/24	11/24	6/24	1/24	
Revised Oswestry Back Disability Quest.	39/50	22/50	13/50	5/50	

Motrin Medication Intake	14x's/week		2x's/week	1x/week	0x's/week
Key: *right now, average, best, worst listed, PF=Physical Function, BP=Bodily Pain, EF=Energy Fatigue					

	02/01/11 1st visit	02/16/11 8th visit	03/09/11 17th visit	04/01/11 27th visit	05/02/11 28th visit
Height	71 inches				71.75 inches
Weight	225				192 pounds
Blood Pressure	138/89	135/85	132/84	128/84	
Resting Heart Rate	90bpm		83bpm	75bpm	

Karvonen Calculation at 60% and then 80%			HR Target 142 bpm	HR Target 160 bpm	
BMI	31.4				26.22
Total Cholesterol	225/<200				190/<200
HDL	45/>46				55/>46
Triglycerides	235/<150				145/<150
LDL	160/<130				125/<130
Glucose	99mg/dl				85 mg/dl

Table 3: Physical Performance Ability Test Methods or Measurements:					
	02/01/11 1 st visit	02/16/11 8 th visit	03/09/11 17 th visit	04/01/11 27 th visit	05/02/11 28 th visit
YMCA 3 Minute Bench Step Test			116bpm; below average	101bpm above average	
Lumbar Spine Mobility/ROM*	30, 10, 10,10	40, 15, 15, 20	45, 20, 20, 25	55, 25, 25, 25	60+, 25, 25, 25
Over Head Squat Test		Score: 0; Fail; Pain	Score: 1; Difficult	Score 3	
One Legged Standing Test		Score: 0; Fail; 4 secs /open; 0 sec/closed	Score: 1; Difficult; 15 secs /open; 6 secs /closed	Score: 2; some compensation; 30 secs /open; 20 secs /closed	
Lunge Test:		Score: 1; Difficult	Score: 1-2; Borderline	Score: 3; No Compensation	
Janda Hip Extension Test		Score: 0; improper sequence; twisting/weak	Score: 1; Weak Glute	Score: 3; Correct Sequence/Normal Glute Max Strength	
Janda Hip Abduction and Coordination Test		Score: 1; Severe Hip Hike; ext. Rotation	Score: 2; Overactive QL/Piriformis	Score: 3; Normal	
Side Bridge Endurance Test		Score: 0; Pain; 10 secs	Score: 2-35 secs/no LBP/Compensation	Score: 2; held 75 secs; slight compensation **/84.5 ave.	
Sit and Reach Test		Score: 2; 7 inch mark	Score: 2; 9 inch mark	Score: 3; 12 inch mark/10-16 mark	
Trunk Flexor		2/50	10/50	35/50reps ; Ave. 27 +/- 14	
Repetitive Arch Ups		6/50	15/50	30/50reps; Ave. 28 +/- 14	
Squat Endurance/Repetitive		9/50	18/50	40/50reps; Ave. 37 +/- 12.5	
Sorenson's/Static Trunk		30/240	65/240	99/240sec; Ave. 97 +/- 56	
*Lumbar Spine Mobility Listed as Flexion, Extension, Lateral Bending Right, Lateral Bending Left (AMA normal values)					
**Normal Values referenced from Rehabilitation of the Spine, A Practitioner's Manual, 2 nd Ed., Craig Liebenson, Lippincott Williams & Wilkins					

Table 4: Active Care Rehabilitation Routine Performed with Continued Increase in Challenge:

Deep Neck Flexion	Retraction of chin in the prone, seated or standing position to assist with forward head posture; with nodding the head without and then with resistance with a small gym ball and or head harness or band	Sets of 10 to 20 reps to patient abilities
Push Ups	On fists, chin tucked, neutral spine, protraction of shoulders, activate all stabilizers, feet dorsiflexed	5 reps; add reps, add rocking, rotation, and tripod
Scapulo-Thoracic Facilitation	In the side lying position, activate scapula stabilizers, patient brings back scapula and shoulder to where the doctor directs	Start with 10 reps each side and then increase
McGill Curl Up Lumbar Stabilization	no head jutting, only perform after activation of abdominal bracing, breathing and bracing concurrently, hold and breath multiple times starting with the one leg bent, <u>elbows on the floor</u> , hand behind lumbar spine, upper spine moves only, no lumbar spine movement; progress to elbows off floor and/or both legs bent; then fingers curled next to ears, then adding trunk rotation.	Start with 10 reps and increase to multiple sets of higher reps
Cook Hip Lift Lumbar Stabilization	Supine; The focus should be on engaging the hip extensors. Pull one knee towards the chest as much as you can to engage the opposite hip extensors (as opposed to overusing the lumbar extensors)	Hold 10 secs each side; increase secs held /sets
Side Bridge McGill Lumbar	Side lying on feet (top in front) and propped up with forearm, square pelvis so no sag, abdominal brace	3 sets of 10 secs with Roll Over and increase
Prone Bridge McGill Lumbar	Prone; propped up with both forearms, square pelvis so no sag, abdominal brace, chin tuck; progress from two feet to one foot, and lift other leg up and hold	3 sets of 10 secs and then increased over time
Supine Bridge	Maintaining co-contraction including glut max, raising buttocks off the floor, then sacrum, lower lumbar, and upper lumbar spine. Then lower the spine down to the floor with the coccyx last to touch	Hold 10 secs, longer; 2 legs to 1 leg, then ball
Superman	On floor, both feet supporting on wall/floor, brace, keep spine neutral, extending the hips, not spine and lift arms up; both hands out, also sideways; hold 3 seconds/10 reps/3 sets	Progress in hold time, reps, sets, and then to gym ball
Gym Ball Lumbar Extension	Lay prone on ball, feet on floor, torso hanging off; lumbar extensions, 3 sets of 10 reps, hold each rep for 3 secs.	Progress in reps and sets and hold time
Bird Dog	Quadruped; chin tuck, breath, brace and hold, check for abnormal external rotation of hip and lumbar hyperextension, should be neutral then one arm/other leg; hold 3 secs; progress to under touches/ball	3 sets of 10; increase sets, reps, hold time; touches

Standing Lunges	Patient steps forward onto Stability Trainer-(green-firm then blue and then black) with perfect erect posture; knee & hip at 90 degrees, then returns to stand; alternate legs; progress to weights on shoulders	3 sets of 15; progress in sets/ reps/colors/lb's
Wall Squat with Gym Ball	Abdominal Brace; Stand with back, shoulders, and head even and straight, leaning against the ball and look straight ahead. Keep shoulders relaxed and feet 1 foot away from the ball and a shoulder's width apart. Keep head straight, roll down the wall with the ball, lowering the buttocks toward the floor until the thighs are almost parallel to the floor. Hold this position for 10 seconds. Make sure to tighten the thigh muscles as you slowly slide back up to the starting position.	3 sets of 10; progress with time in lowered position, sets, reps, and dumbbells on shoulders
Balance Training on Rocker Board	Small foot and subtalar neutral maintained, abdominal hollowing, patient should maintain controlled rocking on the board with ankle joint without bending at the waist; start with 3 minutes and increase.	Progressing to multiple angles eyes closed and round board

Discussion/Opinion:

The fact that obesity contributes to higher levels of inflammation and to causing additional abnormal forces on the motor and biomechanical systems, cannot be ignored. A leg length deficiency contributes to uneven forces on the spine structure; often a convexity of the lumbar spine on the same side; and in many cases should be progressively leveled to prevent or slow down the process of boney deformation, osteophytes and syndesmophytes. Joint and tissue mobility and flexibility is the foundation of any rehabilitation protocol and must be attained in order to progress into restoring stability to a weakened and unstable lumbar spine. Chiropractic Manipulative Treatment/Chiropractic Adjustments/Spinal Manipulation is the most researched mode of treatment for low back pain. This of course is the staple of the practice of chiropractic in restoring joint mobility and reduction of the kinesiopathophysiological component of the subluxation complex. Proper functional testing and measurements are key components to the documentation process. This testing and measuring will validate that conservative chiropractic rehabilitation protocols is cost effective with outcomes that not only produce resolution of the abnormal spinal condition, and progress a patient to normal status compared with referenced normal data, but also for the resolution of systemic health conditions that if ignored may require the inveterate use of medications. These outcomes will then possibly confirm that chiropractors are more than qualified to be primary care physicians, not only on health plans but on workers' compensation plans, including wellness models of healthcare. Nutritional supplementation and cardiovascular fitness is also imperative when attempting to improve a patient's general health. Proper circulation to the soft tissue with oxygen and micro and macronutrients is required for any successful rehabilitation and conditioning protocol. Finally, with the advances in technology, there are LASER devices which are FDA cleared in the United States that are available with a 910nm wavelength that have the ability to penetrate into the deeper target tissues of the spine with adequate power density to initiate the biostimulatory effects and accelerate the healing process. The practicing chiropractor, depending on his or her practice style, philosophy of practice, state regulatory practice acts, and education have the ability to utilize more than one modality to assist the patient to become well, not just in the spine, but the whole body, and without the need of pharmaceuticals.

Limitations:

This clinical case study did not have a post MRI performed after the treatment was finished. This would have been beneficial to access if the chiropractic manipulation, rehabilitation protocols, and laser therapy assisted in the reduction of protrusion size. Thus, resulting in the beneficial results that were seen or if it was just from the improved stability, mobility, strength and global alignment. Since this patient was self paying for his treatment, ordering another MRI in a pain-free subject may have been difficult. There are also limitations in general when treating this type of chronic condition, because of the amount of treatment time required each visit to accomplish the goal. The typical physician or therapist does not get reimbursed by third party payers enough for the hour or more that these visits actually lasted to make it financially feasible to perform on all patients. Furthermore, instead of being impressed with the provider, the third party payer may interpret the amount of effort by the provider as overutilization, making the documentation of the case much more important. Dedicating an hour of time one on one with the patient can be very difficult in a typical practice, which is why so many therapists and physicians often utilize more passive modalities which do not require constant attendance, but do not usually give a long lasting result.

Conclusion:

In general terms, case reports should not be generalized beyond the context of a particular case for a larger population of patients. Also, the natural progression of a condition or dysfunction may also explain the results experienced in patient care. This case study submitted, that happened to have stellar results for only one patient with long term reoccurring low back pain and sciatic radiculitis

from a documented disc herniation, will hopefully stimulate more large scale studies and utilize multi-mode procedures instead of a single mode procedure. For which, most of these types of case studies attempt to establish the “best” single treatment and the “best” treatment may actually be performing everything that will restore the patient to whole body full function and wellness, not just treating the pain or the assumed source of pain.

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