Rehabilitative Principles in the Management of Thoracolumbar Syndrome: A Case Report

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ABSTRACT

Objective: The purpose of this case report was to describe the chiropractic management of thoracolumbar syndrome using multimodal therapies.

Clinical Features: A 33-year-old woman with 3 weeks of back pain presented to a chiropractic clinic. Nerve tension tests and local tenderness were present in a pattern described by Maigne, and she was diagnosed with thoracolumbar syndrome (Maigne syndrome) at her initial visit.

Intervention and Outcomes: The Oswestry Disability Index for low back pain (62%), STarT low back screen tool for clinical outcomes (6 points total, with a 2-point subscale), numeric pain rating scale (6/10 constant, 10/10 with provocation), and test-retest exercise audits were outcome measures. She received 3 treatment sessions, each with progressive exercise audits, and discharged with advice. At discharge, the patient scores substantially improved (Oswestry Disability Index: 8%, STarT: 1 point total, numeric pain rating scale: 1/10, 10% of the time), and she exhibited greater confidence in home care. Endurance tests were performed to establish baselines for future care, which included static back endurance test (timed 52 seconds) and side bridge endurance test (timed 43 seconds).

Conclusion: The patient responded positively to chiropractic care. After a short course of care, the patient reported reduced pain, alleviated symptoms, and improved physical function. (J Chiropr Med 2017;16:331-339)

Key Indexing Terms: *Spine; Lumbar Vertebrae; Thoracic Vertebrae; Manipulation, Chiropractic; Rehabilitation; Exercise Therapy*

INTRODUCTION

Back pain consistently ranks highest among conditions resulting in pain and disability. It is the most prevalent musculoskeletal condition¹ and has been noted as having a lifetime occurrence of between 59% and 84%.² With a wide range of reported health costs extending upward of \$100 billion,³ it is necessary to refine management strategies that lead to improved outcomes and reduce the economic burden on health care systems. The literature continues to place chiropractic services as a more cost-effective approach to common back conditions.^{4,5} One such study by Liljedahl

et al concluded that care initiated by a chiropractor (DC) rather than care initiated by a medical doctor (MD) was 20%-40% less expensive to manage.⁶

There are many potential causes of back pain including those that originate from fascial strain and associated entrapment of various muscles and nerves. Entrapment neuropathies are often considered clinically based on their anatomic location and distribution of the nerve. For example, the sciatic nerve (and later the tibial nerve) is derived from the sacral plexus and extends inferiorly down the posterior of the leg. Along this course, it lies anterior to the piriformis muscle, exposes itself at the semitendinosus/biceps femoris split, and falls deep through the tendinous arch of the soleus. Neurogenic symptoms along the course of the nerve can lead examiners to assess not only the originating area (sacral plexus), but also these common entrapment locations for the recreation of symptoms. Specific to this case, there are neural branches from the posterior primary rami of the upper lumbar and lower thoracic nerves that have been found to be affected as they penetrate the lumbar fascia.⁷ Irritation to these nerves, also known as the cluneal nerves, will manifest as referred pain to the cutaneous and subcutaneous areas of innervation to include

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Fig 1. Referral pattern and visual representation of cluneal nerves as they pertain to diagnostic criteria. Numbers indicate referral regions as posterior pelvis (1), lateral thigh (2), and inguinal region (3).

the low back over the upper gluteal region, the ipsilateral inguinal crease, and the lateral hip region (Fig 1).⁷

The cluneal nerves were first explored as etiological agents of low back pain in Maigne's early work from 1980 to 1991, which described the full course of the nerve.⁸⁻¹⁰ It was observed that "constricting fascial rings" occurred in the cluneal nerve pathway through the osteofibrous tunnel between the thoracolumbar fascia and the iliac crest.⁸⁻¹⁰ Based on these findings and associated clinical presentations, Maigne and Doursounian proposed diagnostic criteria to include: (1) pain in the distribution of the nerve (Fig 1); (2) trigger point/tunnel compression pain; and (3) relief of symptoms following nerve block.¹¹ Since then, more recent investigations continue to show examples of cluneal nerve entrapment as a possible cause of not only low back pain, but also gluteal and leg pain.^{12,13} Medical approaches for cluneal nerve entrapment include anesthetic nerve block injections and anti-inflammatory steroid injections and, if these treatment approaches are unsuccessful, then surgery.^{8,11,13-15}

There are few cases in the literature investigating cluneal nerve entrapments^{11,13-15} and even fewer exploring its management with manual therapies.^{16,17} As the evidence base supports chiropractic treatment options for lumbosacral back pain,¹⁸⁻²² this case explored chiropractic care to include manipulative therapy, active care exercise progressions, and soft tissue mobilizations to treat thoracolumbar back pain originating from cluneal nerve entrapment. From a rehabilitation perspective, this case also used a test-retest approach for functional outcomes and exercise prescription.

CASE REPORT

History

A 33-year-old Caucasian woman with a 3-week history of thoracolumbar pain following a motor vehicle accident

presented to the office for evaluation and conservative management. She was initially evaluated by her medical doctor, who ordered radiographs and magnetic resonance imaging (MRI) of her lumbar spine. Imaging demonstrated no acute osseous pathology, dislocation, fracture, or mass. She received an anesthetic nerve block injection in the lumbar spine without experiencing any relief, which was then followed by bilateral gluteal steroid injections that provided "a lot" of relief lasting 3 days. She was also prescribed Flexeril to relax her lumbar musculature and gabapentin to treat nerve pain associated with her back pain and was advised to take an over-the-counter nonsteroidal anti-inflammatory drug. She reported that the medications "helped a little."

Following 3 weeks of medical care, she presented to our office with pain to the left hip and buttock, forward antalgic posture, and an asymmetrical gait with shortened stride length favoring the right. Using a 10-point numeric pain rating scale (NPRS), with 0 being no pain at all and 10 being worst pain imaginable, she reported constant 6/10 pain with periods of 10/10 pain from various activities. Specifically, she noted that bending, sitting, lifting, and standing for more than 10 minutes had become difficult, and any change in body position exacerbated symptoms. Clinical outcome assessments included the Oswestry Disability Index (ODI)²³ and STarT back screening tool.^{24,25} Her Oswestry low back score was 62%, and her STarT low back screen tool scored 6 points total, with a 2-point subscale (medium risk package for biopsychosocial management). She denied increased symptoms with coughing, sneezing, or bowel movements. Past medical history was remarkable for anxiety and headaches. Current medications included clonazepam and Imitrex, as needed. Pertinent social history was a 9-pack-year, everyday smoker. No additional past, family, or social history was deemed pertinent.

At initial presentation, musculoskeletal diagnosis with neurologic and/or disk involvement was suspected. Preliminary differentials included (1) lumbar discopathy; (2) facet syndrome; (3) joint capsulitis (femoroacetabular, sacroiliac, lumbar facet); (4) muscular strain (lumbar and/or pelvic); and (5) ligamentous sprain (iliolumbar and dorsal sacral); with entrapment neuropathy involving sciatic, lateral femoral cutaneous, and cluneal nerves.

Physical Examination

During the initial examination, she presented with forward antalgia, forward rounded shoulders with anterior head carriage, and decreased lumbar lordosis. Neurologic exam was normal.

Orthopedic examination included McKenzie lumbar end-range loading into extension and lateral bending toward the symptomatic side, which revealed restricted motion and pain, but no relief or centralization of symptoms. The Laslett sacroiliac test series was negative for sacroiliac joint involvement. Focused hip exam including flexion, abduction, external rotation flexion, adduction, internal rotation; and active range of motion was noncontributory. The Beckterew test was negative for reproduction of symptoms. The Slump test provoked moderate pain in the left posterior thigh during a modification of crossed knee extension. Standing lumbar extension-rotation test revealed sensitivity of left zygapophyseal joints from L4 to S1, which was later confirmed with motion palpation. Active and passive ranges of motion in the lumbar spine were reduced in all planes of motion, with mild muscular spasms noted throughout.

Active, resisted, and passive motion was assessed in 6 planes (flexion, extension, bilateral rotation, bilateral side bending) through the lumbar spine region (O'Donoghue's maneuver), which confirmed mild muscle strain of the lumbar transversospinalis group. Other pertinent muscle palpation findings included (1) quadratus lumborum negative for gluteal/hip referral; (2) mild palpable spasms in left lumbosacral multifidi and left gluteus medius; (3) palpable fascia restrictions; and (4) exquisite tenderness of iliocostalis and longissimus thoracis.

Discogenic pain was ruled out initially following McKenzie evaluation. Facet and zygapophyseal joint etiology appeared to be involved in the overall pain presentation, yet not likely the primary cause of pain because of the lack of referred pain to left hip and buttock. Muscle palpation contributed to symptoms, but muscle palpation findings were not reproducible to chief complaint. The most provocative physical examination finding was obtained with the modified Slump test, which caused symptoms in the sciatic nerve distribution of the left posterior thigh.

Seated sciatic nerve floss on the left side was performed for 10 repetitions and then repeated on the right side with no

reported change in pain intensity (remained 6/10) or symptoms; however, the patient noted she felt "a little looser" (Fig 2). Cluneal nerve flossing on the left side was then attempted in the typical standing position, but it was stopped after 5 repetitions because of provocation of pain intensity and symptoms (Fig 3). After completion of a modified seated cluneal nerve floss that was performed for 10 repetitions on the left side and then repeated for 10 repetitions on the right side, the patient reported a 30% reduction in pain intensity and symptoms (Fig 3).

Because of improvements noted during cluneal flossing, a pinch-roll test to the region was performed. With the pinch-roll test, an examiner raises a fold of skin loosely between the fingers, and the fold is perpetuated or "rolled" along a region perpendicular to the course of the nerve. This palpation assessment (pinch-roll test) of the osteofibrous tunnel and superficial fascial palpation along the course of the cluneal nerves revealed perfect reproduction of the patient's pain intensity and symptoms, clinically supporting cluneal nerve involvement. After manual fascial release of cluneal nerves and flexion distraction to thoracolumbar region, the patient reported a 50% reduction in pain intensity and symptoms.

Management

The working diagnosis was Maigne (thoracolumbar) syndrome bilaterally, with involvement primarily on the left side and pain referral to the upper gluteal region that was complicated by acute lumbosacral muscle spasms of the transversospinalis group. This collectively resulted in segmental dysfunction of thoracolumbar spine thought to be secondary to poor activation of core muscles.

The treatment plan included 2 sessions per week for 2 weeks (4 visits) and then once per week for 2 weeks (2 visits), for a total of 6 visits. Office care included manual flexion-distraction and/or high-velocity, low-amplitude adjustments to palpated restrictions in the lower thoracic and lumbar regions as tolerated by the patient. Mobilization of soft tissue associated with the cluneal nerves, specifically the thoracolumbar aponeurosis and left osteofibrous tunnel, progressed from manual to instrument assisted, which included massage cupping, as tolerated by the patient. Each visit included audit of exercises to document progressions and the role of exercises in maintaining benefits of the treatment sessions.

Home care included bilateral sciatic nerve flossing exercises (ie, flossing exercises are procedures aimed at restoring motion between nerves and surrounding tissues) and seated left superior cluneal nerve flossing exercises. The clinician instructed the patient to perform each nerve flossing exercise for 5 repetitions, 3 times per day. The clinician discussed restrictions of movements with the patient to include avoiding provocative movements and demonstrated lumbar spine sparing strategies for tying shoes, getting into and out of chairs, and stooping. The

Fig 2. Seated sciatic nerve floss.

patient was also advised for smoking cessation because of the negative impact of smoking on recovery.

Outcome

At the first return visit (second visit, 7 days later), the patient reported a pain of 2/10 on the NPRS. She also reported improvements in her ability to work and perform her activities of daily living. She reported a 75% overall reduction in pain intensity and symptoms from the previous week. She maintained and demonstrated good compliance with home care. Physical examination findings noted significant improvements in gait, active range of motion, and muscle tone. Based on this chiropractic audit, lumbar contraction exercises and side bridge exercises were incorporated into this treatment session. The patient reported reductions in her pain intensity and symptoms that reflected a 20% reduction following lumbar co-contraction exercises (Fig 4) and a 50% reduction while performing side bridges (Fig 5). Both exercises were added to her home care, 10 repetitions, 3 times per day.

At the third visit (1 week after the second visit), the patient reported a pain intensity of 1/10 pain on the NPRS. She noted her pain and symptoms were occurring less than 10% of the time with an overall improvement of 90%. She performed all her home care exercises well, and she noted

that the exercises were getting easier to perform. Because of the amount of clinical improvement, reassessment was performed during this visit. Her ODI score decreased from 62% to 8%. Although not intended as an outcome measure, her STarT screen tool score was readministered and decreased from 6 points total to 1 point total (minimal risk for biopsychosocial management). Positive orthopedic tests were reassessed and were negative, except for mild pain being reproduced with the lumbar plexus test (modified Slump). Timed endurance tests were used to establish baseline values as a reference for future care, if needed. The patient performed the static back endurance test (timed 52 seconds) and side bridge endurance test (timed 43 seconds). Although the patient failed to maintain adequate positions during the endurance tests, her form was only slightly under the standard for proper execution. As all established clinical goals were met at the third visit, the patient was discharged with advice to maintain home care exercise recommendations for at least 2 more weeks, 10 repetitions, 3 times per day, and then to continue to perform the home exercises at least daily, for 1 month. If symptoms returned in the future, she was advised to resume the recommended home care exercises, avoid provocative movements, and use the lumbar spine sparing strategies that were taught. Wellness topics, including smoking cessation, were also discussed with the patient at discharge. Educational materials regarding smoking cessation and daily exercises programs were given to the patient. Referral information to pursue personal training to develop resiliency of core muscles was offered as well.

At the 1-month follow-up phone call after discharge, the patient remained asymptomatic and reported commitment to her home care exercises. She did report 1 flare-up of pain and symptoms, which occurred approximately 2 weeks after discharge. Her pain and symptoms returned following noted inconsistency with her home care exercises and movement strategies. However, she reported that she was able to self-manage her pain and symptoms, which diminished after 2 days by her adhering to the home care exercises recommended at discharge. The patient provided consent for her health information to be published.

DISCUSSION

To the best of our knowledge, this is the first published case report to describe chiropractic management using multimodal care for a patient with thoracolumbar junction syndrome (Maigne syndrome). Back pain is a common musculoskeletal condition that can improve without treatment, but if the pain persists, then there is a possibility of developing chronic back pain.²⁶ Typically, chronic back pain has a poor prognosis and accounts for the majority of health care costs associated with back pain management.²⁶⁻²⁸ One of the factors contributing to high

Fig 3. Standing (A) and modified seated (B) cluneal nerve floss ending position. Likened to a “slumped piriformis stretch.”

health care costs associated with back pain management is that back pain has many causes (disk disease, muscular trauma, tumor, osteoporosis, etc), which makes it necessary to understand subtypes of low back pain and how to stratify patients to render appropriate treatment in a cost-effective manner.^{28,29}

In the presented case, neurologic and orthopedic physical examinations failed to adequately reproduce the patient’s chief complaints. Manual palpation revealed associated structures, while the pinch-roll was best at recreating her symptoms. During a pinch-roll test, the regional tension of fascia as it colligates to superficial and deep structures is assessed by comparing observed

changes in fold thickening, mobility, and/or pain. These changes can indicate autonomic dysfunction, functional pathology, or reflexive changes.³⁰ Ideally, there would be a near-frictionless interface between separate tissues within the body. Observed changes, therefore, may be evoked from unexpected tensional loads on adhesions or aggravation of inflamed tissue. This presentation could also help to explain why findings of examinations, such as the modified Slump test, were initially inconclusive. Beyond the assessment, and as performed in this case, there is literature that supports the use of fold mobilization as part of a patient’s management program to reduce low back pain.³¹

Fig 4. Lumbar spine co-contraction maneuver. Note the chest placement of the hand, which facilitates incorporation of respiratory training. The arrows signify increased and decreased lumbar lordosis as it pertains to pelvic tilting.

Fig 5. Side bridge exercise. Note the model sitting back into the resting position (A) and during the exercise driving hips forward (B).

Next, a test-retest approach to assess mechanical sensitivities was utilized to facilitate development of home management. To begin, the patient performed a movement perceived to be most provocative to symptoms. Then, rehabilitation exercises and stretches were chosen based on their association with hypothesized tissue involvement. Rehabilitation exercises were selected and performed in office until improvement was noted in the patient's symptoms. Although this process of subjective patient rating of movement patterns is not established in the literature as either valid or reliable,³² there are groups that use test-retest approaches to expose valuable clinical information for the diagnosis and management of musculoskeletal conditions including the spine (eg, Functional Movement Approach, Rehabilitation2Performance [R2P], and its clinical arm, International Society of Clinical Rehab Specialists [ISCRS]).³³ Using test-retest strategies also provides predictive value in the overall prognosis of a patient's condition.^{34,35} Not only did a test-retest approach reproduce the patient's symptoms, but it also exposed an exercise strategy that was immediately successful in pain reduction. When patients learn tactics that can be performed at home and exhibit instant symptom reduction, they can be empowered with the confidence to self-manage their pain.

Her presenting STarT score of 6 points total, with a 2-point subscale, indicated that she was at medium risk for biopsychosocial management and the development of chronic back pain.^{25,26} This medium risk score is understandable considering her history of anxiety and previously unsuccessful treatments for back pain. During her initial visit and following the modified seated cluneal nerve floss, this patient experienced a perceived decrease in pain, which she had not been able to experience since its onset. This was likely due to the neurodynamic techniques that released local adhesions on the sensitized structures involving the thoracolumbar aponeurosis and cluneal nerves via nerve flossing exercises.³⁶⁻³⁹ Treatment sessions of manual therapy with recommendations for home care exercise may motivate, reassure, and calibrate patient expectations, which in turn might reduce medicalization, augment self-care, and contribute to the effective management of acute and chronic low back pain.⁴⁰

At the second visit, core stability exercises in the form of lumbar co-contractions and side bridges were performed by the patient and found to be beneficial in reducing her pain and alleviating her symptoms. Although the efficacy of core stability exercises on low back pain still lacks sufficient evidence, lumbar co-contractions and side bridge exercises were added to her home care.⁴¹⁻⁴⁴ This strategy was used because strengthening and increasing the endurance of the transversospinalis group, gluteus medius, and abdominal oblique muscles has the potential to stabilize the core and promote activation of deconditioned muscles.⁴⁵⁻⁴⁷ The discharge recommendation to continue her home care exercises was made to promote long-term improvement in activation of muscles underlying core stabilization and minimize the rate of symptom recurrence. Additionally, Watanabe et al reported that lumbar co-contraction exercises facilitate appropriate activation of lumbar musculature, which may help correct lumbar curvature.⁴⁸⁻⁵¹ These recommendations worked toward addressing her reduced times during endurance tests, which were assessed at discharge, because endurance testing may yield benefit as a predictor of recurrence and chronicity.⁵²

The current case report findings were consistent with the literature and provide a promising example of education, exercise, and manual therapy as initial treatment options for low back pain patients with a medium risk profile for chronicity.^{24-26,53,54} Conservative management prior to medical approaches, injection and surgery, may be considered for treating thoracolumbar back pain originating from cluneal nerve entrapment.^{8,11,13,14} In support of this treatment recommendation, treatment of low back pain of thoracolumbar origin included manipulation in the original research by Maigne⁸ and an early case study by Proctor et al.¹⁶ The number of manipulation treatment sessions used in the current case to reduce pain and alleviate symptoms of thoracolumbar syndrome was consistent with that in the early case study by Proctor et al.¹⁶

Regarding manual therapy, nerve flossing techniques to address neural compression and manual soft tissue release techniques to improve movement of fascia layers align with evidence-informed conservative management of low back pain.^{36-39,55,56} Specific to massage cupping techniques, a resurgence of studies are providing evidence that this technique exerts its effective on musculoskeletal pain by activating the immune response, increasing circulation, and stimulating mechanoreceptors.⁵⁷ Joint manipulation procedures were performed on locally palpated restrictions because there was preliminary evidence of cases of thoracolumbar syndrome responding to manipulation.^{8,16} Meta-analyses support the use of spinal manipulation for low back pain.^{20,58,59}

Cost-effective conservative approaches, including manual therapy and exercise, may be appropriate for some patients with back pain seen in the primary care setting.⁶⁰⁻⁶³ Specifically, manual therapy and exercise may promote musculoskeletal injury-repair processes and minimize factors prognostic of chronicity.^{25,26,53,54,64-69} Chronic presentation of low back pain exhibits a decrease (~20%) in available shear strain movement of thoracolumbar fascia, which may be caused by and/or contribute to tissue pathology.⁵⁵ These findings are important in relationship to fascial injury and pathophysiologic changes within the nervous system and musculoskeletal system that can cause symptoms systemically.⁷⁰ These mechanistic studies, in part, reinforce why chronic back pain can have such a poor prognosis. The multimodal approach, which emphasized manual therapy, rehabilitative exercises, and patient education, expedited recovery for this patient. She was able to successfully manage her symptoms, even when experiencing a recurrence.

Economically, it is a shared priority for both health policy stakeholders and the chiropractic profession to lessen the burden of health care–related costs. Because of her condition, this patient was having difficulty performing work-associated tasks. Lost productivity should be considered part of the financial drain of health care.⁷¹ Also, this patient was assessed and received treatments that failed to work for her. These tests and treatments may not have been necessary, and had this patient initially presented to the chiropractor, substantial health expenses may have been saved.⁷²

Limitations

The effects of treatment on this patient cannot be generalized to other patients. The characteristics of this patient (sex, age, history, clinical course) are not necessarily representative of patients with thoracolumbar syndrome. Additionally, the outcome assessment tools (eg, STarT, ODI, NPRS) used in this study for thoracolumbar syndrome also appear in the literature for other low back pain diagnostic entities, that is, lack specificity of association. Also, a causal relationship between clinical outcomes and treatment cannot be established without including a control group and adequate sample size. Therefore, future case series or clinical

trials are needed to further investigate the positive clinical results reported in this case.

CONCLUSION

The case report described approaches to clinical diagnosis of thoracolumbar syndrome in a chiropractic office. Following a combination of regional adjustments and progressive home care exercises, this patient reported reduced pain, alleviated symptoms, and improved physical function.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): M.E.D.

Design (planned the methods to generate the results): M.E.D.

Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): M.E.D.

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Practical Applications

- Findings from this report support conservative therapy outcomes obtained from prior literature.
- Manual therapists could consider conservative treatments for nerve entrapments prior to invasive interventions.

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