The MyoKinesthetic System, Part II: Treatment of Chronic Low Back Pain

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Low back pain (LBP), both acute and chronic, is one of the most common disabling and poorly understood conditions in health care today. Researchers estimate that LBP in industrialized countries will have a lifetime prevalence of over 70% and will account for substantial health care costs and personal distress.[1–3] In addition, chronic LBP that resolves with treatment is subject to a 90% recurrence rate.[4] A lack of understanding of the source of LBP results in a vague diagnosis of nonspecific LBP in 85–95% of patients who report to a primary care physician with complaints of back pain.[5] Nonspecific LBP is an ambiguous term assigned to patients when an anatomic source or pathology cannot be identified, and the use of this diagnostic classification does not lead to effective treatment.[6–8]

KEY POINTS

- The MyoKinesthetic System evaluation complements the standard clinical examination.
- The MyoKinesthetic System can produce clinically significant improvements in pain and function in patients with chronic low back pain.
- The MyoKinesthetic System treatment can balance posture asymmetries.

Although considerable research has been conducted on different treatment methods for LBP, a majority of the findings conflict with one another. The results of more than 1,000 studies on management of LBP are inconclusive in offering support for one or more techniques.[9] Due to the complex nature of LBP, treatment based solely on pain presentation is not always effective.[10] Treatment-based classification (TBC) systems are used in an attempt to improve patient outcomes by placing patients into subgroups according to specific patterns of signs and symptoms. Delitto et al.[4] developed one of the first TBC systems for patients with acute LBP. The purpose of this system was to match a patient's treatment with their LBP classification, which was based on an examination and specific algorithm for decision making. The success of the Delitto et al.4 TBC system is still under investigation, but support exists for improving LBP patient outcomes through the use of this system.[7–9,11–13]

The interventions used in the Delitto et al.[4] TBC system for LBP are manipulation, specific exercise, traction, and stabilization. The MyoKinesthetic (MYK) System is another TBC system, but it currently has not been studied to determine its effectiveness for treating patients with nonspecific LBP. The MYK System guides a clinician through a comprehensive approach to the evaluation and treatment of musculoskeletal injuries. Treatment strategies are designed to affect the nervous system in a specific way by treating a precise combination of muscles.[14]

Within the MYK System, a clinician utilizes an evaluation of the patient's posture and identifies symptoms and muscle weakness to determine the appropriate nerve pathway treatment. The MYK treatment combines active and passive movement with tactile stimulation of each muscle innervated by one nerve root. The MYK System utilizes several ascending tracts (anterior or lateral spinothalamic, and anterior and posterior spinocerebellar) to improve communication from the central nervous system (CNS) to all of the muscles innervated by one nerve root. The spinothalamic tracts are stimulated by touch, and the spinocerebellar tracts are stimulated with movement.[14] The CNS operates by receiving input from the tissues and environmental stimuli through these ascending tracts, and produces a response to regulate the musculoskeletal system.[15] The primary goal of the MYK System is to balance posture by treating muscles bilaterally along a specific nerve pathway, thereby producing changes in the nervous system.[14]

The purpose of this case report was to assess the effectiveness of the MYK System as a treatment for LBP. While this case study is Part II of a report regarding the MYK System, additional descriptive information about the MYK System can be found in Part I (http://dx.doi.org/10.1123/ijatt.2014-0131).[16] Additionally, in this study, the Stanton et al.[13] algorithm was used to place this patient into the Delitto et al.[4] TBC system to determine if MYK treatment could be included as an intervention

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within one of the subgroups. We documented the outcomes of a single patient who was diagnosed with multiple disc herniations and treated with the MYK System.

CASE REPORT

History

The patient, an otherwise healthy 22-year-old male, presented with LBP of approximately two years duration without previous history of LBP before this onset. Pain was isolated to the lumbar spine and along the quadratus lumborum bilaterally. The onset of symptoms initially occurred when the patient attempted to stand from a seated position on a boat. Before this event, the patient had completed a half Ironman competition and heavy weightlifting workout in the days preceding the initial onset of pain, but did not report any discomfort or pain with these events. When the symptoms arose, the patient experienced severe muscle spasms, which caused him to seek treatment in the emergency department. Initial treatment consisted of medication and physical therapy. The patient completed physical therapy treatments for two years, with minimal relief in symptoms. Massage and heat provided the greatest relief, but the positive effects only lasted a couple of hours. Magnetic resonance imaging (MRI) and radiographs, completed about 10 months postinjury, revealed mild disc herniations at L3–4, L4–5, and L5–S1. Diagnostic imaging did not reveal any signs of inflammation or compression of his nerve roots and there was no evidence of spondylolysis, spondylolisthesis, or degenerative changes.

Due to a lack of progress with physical therapy treatment, the patient decided to undergo a rhizotomy (a surgical procedure designed to relieve chronic back pain by severing the sensory nerve roots17) one year and four months following the initial injury. The patient reported pain relief for two months following the procedure, but pain eventually returned to levels equal to presurgery status.The patient continued physical therapy treatments and denied taking any medications for pain. At eight months postsurgery, the patient reported to our clinic for another opinion.

Examination

During the initial exam, the patient's chief complaint was centralized, constant LBP. The examination did not reveal any swelling or deformity, but the patient was tender to palpation over the following areas: bilateral quadratus lumborum and piriformis, right gluteus medius and popliteus, and left ischial tuberosity. The patient reported the greatest amount of pain during sitting (5 out of 10), no pain at rest (0 out of 10), and current pain with standing (3 out of 10) using the Numeric Rating Scale (NRS). Disability was measured using the Disablement in the Physically Active (DPA) scale and Modified Oswestry LBP Disability Questionnaire (modified OSW). The patient reported a 13 on the DPA scale, which is scored from 0 (no disability) to 64 (maximum disability).18 His modified OSW was 10%, which indicated minimal disability.[19] The patient chose sitting as his limited activity on the Patient-Specific Functional Scale (PSFS), and rated it a 3 out of a possible 10. Activities are rated on the PSFS on a scale of 0 (cannot perform) to 10 (can perform normally at preinjury level).20

All active range of motion (AROM) measurements were obtained by averaging three readings. The same clinician completed all examination and follow-up assessment components. Thoracolumbar flexion and lumbar flexion and extension were measured using the following procedures:

- Fingertip-to-floor distance (FFD): Patient stands on a 20-cm high step with feet together and is instructed to bend forward. The distance from the third fingertip to the floor is measured in centimeters and recorded as a negative value if the patient's hands extend beyond the step.[21]
- Modified-Modified Schober Test (MMST): Patient stands with feet together, while a mark is placed over the sacral spine between the posterior superior iliac spines (PSISs) and 15 cm above the original mark. The distance is measured between the two marks at the end of AROM in flexion and extension.[21]

During the initial evaluation, the patient achieved –12 cm on the FFD (i.e., 12 cm beyond the top of the step closer to the floor). He also displayed 8.5 cm of flexion and 3 cm of extension on the MMST. The patient reported pain-free AROM and passive range of motion (PROM), and demonstrated dysfunctional and nonpainful cervical, upper extremity, squat, and multisegmental flexion and extension movement patterns on the Selective Functional Movement Assessment (SFMA). During the movement assessment, the patient did not demonstrate any aberrant movements. The MYK System posture screen revealed eight lower body imbalances, with the majority of asymmetries at the L4 and L5 nerve root levels. Based on the posture assessment and symptoms, the patient was diagnosed with an L5 imbalance in the MYK System. His lower quarter screen for dermatomes, reflexes, and myotomes was unremarkable. The patient had a positive slump test, with pain radiating bilaterally down both legs with cervical flexion. The patient tested negative on the following tests: prone instability, valsalva, crossed straight leg raise, sacroiliac distraction and compression, thigh thrust, and sacral thrust. According to the Stanton et al.13 algorithm (Figure 1), the patient could not be placed into one of the TBC subgroups because he did not have any symptoms distal to the buttocks or aberrant movements, did not centralize or peripheralize with flexion or extension, did not test positive on the prone instability test, and did have chronic pain.

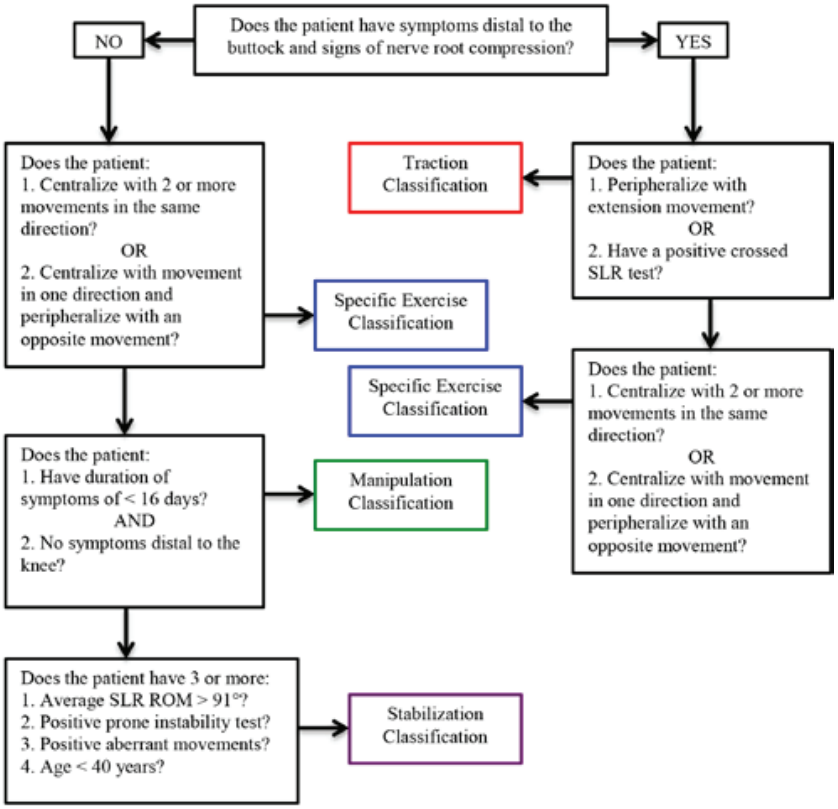

Figure 1 Treatment-based classification system algorithm. SLR = straight leg raise; ROM = range of motion.

Treatment and Outcomes Collection

TThe patient received an MYK L5 treatment following the initial assessment. Each MYK treatment includes tactile stimulation and active and passive movement of every muscle innervated by the selected nerve root level (Figures 2 and 3). Tactile stimulation can be performed with deep or soft pressure anywhere on the muscle, as long as the proper combination of muscles innervated by the appropriate nerve root receives stimulation. The MYK System treatment is always completed bilaterally as the CNS functions bilaterally, and neural components are responsible for the cross-education of muscle strength and motor skills.[22–25] For these reasons, all movements and tactile stimulation are performed bilaterally to increase the transfer of information from the muscle on one side of the body to the other. All movements within the treatment parameters should be pain-free and the treatment can be performed daily. The following measurements were recorded pre and post MYK treatment: FFD, MMST, NRS (standing), and MYK posture imbalances. The DPA scale, PSFS, and Global Rating of Change (GRC) scores were obtained once per week before treatment. The modified OSW score was recorded once every two weeks before treatment. The patient did not receive any additional treatment (i.e., massage, heat), and denied taking any medications. The patient did not alter his normal activity levels during the course of treatment. Discharge criteria were set to when NRS scores remained at 0, the PSFS score was reported an 8 or higher, the GRC score was reported a 4 or higher, and balanced MYK postures were maintained between visits.

Figure 2 The starting (left) and ending (right) positions for MyoKinesthetic System passive treatment of the gluteus medius and minimus muscles. The clinician applies tactile stimulation between the greater trochanter and iliac crest while passively moving the hip into adduction.

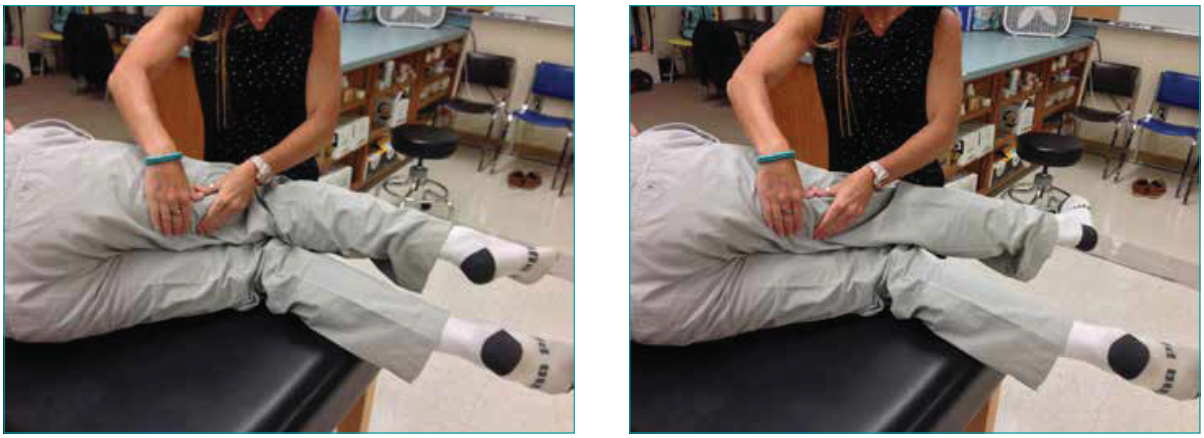

Figure 3 The starting (left) and ending (right) positions for MyoKinesthetic System active treatment of the hamstring muscles. The clinician applies tactile stimulation to the hamstrings while the patient actively contracts the quadriceps.

RESULTS

Following the initial L5 treatment, the patient demonstrated a minimal clinically important difference (MCID) on the NRS26 (Table 1). The patient also exhibited MCIDs on the DPA scale18 and PSFS20 on the first follow-up measurements with these tools at the oneweek mark (Table 1; Figure 4). The patient was treated twice during the first week and, based on changes in the posture assessment and symptoms, the treatment was shifted to target the L4 nerve root level; therefore, the patient received MYK L4 treatments during the third and fourth weeks.

After seven treatments in 14 days, the patient had full resolution of pain. The patient's slump test normalized by the fourth visit, and he was discharged after 10 treatments. Total treatment time during each visit was 15 min. At discharge, the patient reported a 0 on the NRS, a 1 on the DPA scale, a 10 on the PSFS, 2% on the modified OSW, and a 5 on the GRC (11-point scale) (Table 1). On his MYK posture assessment, three of the eight lower extremity imbalances normalized with treatment. The patient also demonstrated functional multisegmental flexion and extension movement patterns on the SFMA.

Table 1. Patient Outcomes With MyoKinesthetic (MYK) System Treatment

	Day 1		Day 8		Day 15		Day 21–Discharge		Day 29
Measurement	Pre MYK	Post MYK	Pre MYK	Post MYK	Pre MYK	Post MYK	Pre MYK	Post MYK	Follow-up
NRS (standing)	3	0*	0	0	0	0	0	0	0
DPA	13	NT	5*	NT	4	NT	NT	NT	1
PSFS (sitting)	3	NT	6*	NT	8*	NT	9.5	NT	10
GRC	NT	NT	3	NT	3.5	NT	4.5	NT	5
Modified OSW	10%	NT	NT	NT	6%	NT	NT	NT	2%
FFD (cm)	–12	–13.5	–5	–8.5	–6	–9	–10.5	–16.5	–7
MMST (flexion)	8.5 cm	8.5 cm	7.5 cm	7.5 cm	7 cm	7 cm	7 cm	7 cm	7 cm
MMST (extension)	3 cm	3 cm	2 cm	2 cm	3 cm	3.5 cm	3 cm	3.5 cm	3 cm
Slump test	(+) B with CF	NT	(–)	NT	(–)	NT	NT	NT	(–)

Abbreviations: NRS = Numeric Rating Scale; DPA = Disablement in the Physically Active scale; PSFS = Patient-Specific Functional Scale (0 = unable to perform, 10 = able to perform at a normal level); GRC = Global Rating of Change; Modified OSW = Modified Oswestry Low Back Pain Disability Questionnaire; FFD = Fingertip-to-floor distance; MMST = Modified-Modified Schober Test; CF = cervical flexion; NT = not tested.

*Denotes minimal clinically importance difference.

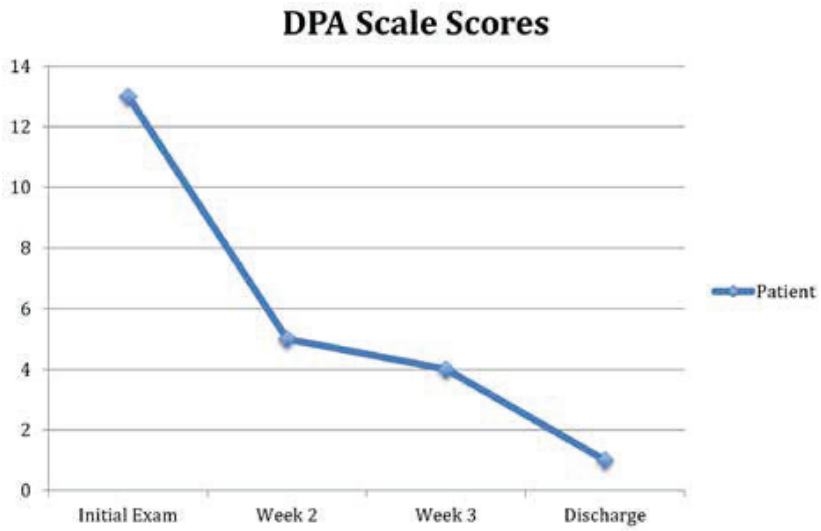

Figure 4 **Changes in the Disablement in the Physically Active (DPA) scale.**

DISCUSSION

Significant improvements in pain, disability, and function in this patient suggest that the MYK System was an effective treatment for this case of LBP and may be effective in other similar cases of chronic LBP. The results of this case report demonstrated MCIDs for the NRS, DPA scale, and PSFS after three treatments (Table 1). The intervention also resulted in normalization of the slump test and achievement of functional movement patterns on the SFMA. As the patient's symptomology and function improved, there was a corresponding decrease in total range of motion on the FFD (Table 1). The patient's thoracolumbar flexion was within normal limits[21] at discharge, suggesting that the patient identified a new movement pattern that was more balanced between mobility and stability. Clinicians currently have many treatment options for treating patients with LBP, but support for effective treatment of LBP is limited.9 Research can be found to substantiate or refute the use of the most popular treatments for LBP.[7,27,28] Based on the evidence currently available, several investigators have suggested that using a classification system for LBP will produce more favorable patient outcomes. One potential problem with classification-based systems is the possibility of a patient not fitting into a subgroup classification or being classified into a subgroup (e.g., "other") that does not match the patient to a treatment strategy. Stanton et al.[13] discovered that patients identified by individual subgroups were mutually exclusive in approximately 50% of the cases. In the remaining 50%, patients met criteria for more than one subgroup or did not meet criteria for any subgroup.[13] Patients that do meet any criteria, as was the case with this patient, are less likely to receive a treatment that is matched to their condition.

The shift toward patient-centered evidence has resulted in numerous studies on the effectiveness of various treatments for LBP. Surgical procedures for LBP are facing scrutiny from health care reformers as a result of their high costs and low levels of effectiveness.[29] Typical management of disc herniations includes spinal steroid injections, muscle relaxants and other medications, physical therapy, and bracing.[29] Nearly one-third of patients with lumbar disc herniations seek surgery after approximately six months of unsuccessful nonsurgical treatments.[29] In this case study, the patient had already experienced failed surgical and conservative treatment, and then experienced outcomes that far exceeded the lengthy outcomes seen in other conservatively managed cases. In addition, the patient only required 10 total treatments over 21 days, with each treatment lasting 15 min. In contrast to some interventions, each MYK treatment was painfree and the patient was able to maintain his active lifestyle without any restrictions. The rapid and lasting changes provide preliminary evidence that the MYK System may be more effective than traditional physical therapy strategies in certain cases.

As with all research, there must be some caution with generalizing these outcomes to all patients. First, the lack of additional patients or a control group limits broad conclusions about the effectiveness of the MYK System in all cases of LBP. In addition, the patient and clinician recording the outcomes were not blinded to the changes, which may introduce bias. Additional research on the MYK System is needed to determine its effectiveness in treating other subgroups of LBP patients and to confirm that the benefit experienced with this treatment exceeds the amount associated with other treatment strategies. Although our findings demonstrated positive short-term outcomes with the MYK System, future research is needed to establish long-term effects of the treatment.

CONCLUSION

The results of this case study demonstrated that the MYK System was associated with clinically significant improvements in pain and function in a patient with multiple lumbar disc herniations. Reduction in pain and disability allowed the patient to progress from sitting for less than 10 min to sitting for an unlimited amount of time without any pain or discomfort. Although our findings indicated that the MYK System was an effective treatment for chronic LBP, future research is needed on a larger sample to determine its efficacy compared with other manual therapy interventions.

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