Using the MyoKinesthetic System to Treat Bilateral Chronic Knee Pain:

A CASE STUDY

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Journal of Chiropractic Medicine, Volume 15, Number 4. December 2016.

ABSTRACT

Objective: The purpose of this case study was to report the effects of the MyoKinesthetic (MYK) system on pain, functional ability, and psychosocial well-being of a 20-year-old female collegiate softball athlete diagnosed with chronic bilateral knee pain associated with osteoarthritis.

Methods: The patient presented with bilateral chronic knee pain lasting more than 2 years. A clinical examination and radiographic imaging revealed chondromalacia and the beginning stages of osteoarthritis of the knee. No other comorbidities were noted.

Intervention and Outcome: The patient received 4 treatments with the MYK system over 2 weeks. Treatments 1 through 3 were directed at the S1 nerve root; the fourth treatment was directed at the L4 nerve root. Outcome measures included theNumeric Pain Scale, the Patient-Specific Functional Scale, and the Disability in the Physically Active Scale. Pain, function, and quality of life were measured collectively using the Knee Injury and Osteoarthritis Outcome Score. The patient experienced clinical improvements (minimal clinical important differences, minimal detectable changes) for all outcome measures, with the exception of the quality-of-life subscale within the Knee Injury and Osteoarthritis Outcome Score.

Conclusion: The patient in this case study reported a decrease in pain and an increase in function during the course of 4 treatments, which were administered over 14 days and in accordance to the MYK guidelines. Traditional treatment guidelines typically recommend 8 weeks for positive effects to manifest. Manual therapy techniques, such the MYK system, may be a viable treatment option for patients with osteoarthritis of the knee. (J Chiropr Med 2016;15:294-298)

Key Indexing Terms: *Chondromalacia; Osteoarthritis; Manual Therapy; Chronic Pain; Massage therapy*

INTRODUCTION

Osteoarthritis (OA) is widely prevalent across all demographics and is observed in both active and sedentary populations.[1] Moreover, OA of the knee is one of the largest causes of disability on a global scale.[2] Chronic joint pain is the most common symptom of OA and contributes to a wide array of physical and psychosocial disabilities.[3] Distress, dependency, anxiety, depression, and a reduced quality of life are possible side effects of coping with chronic pain.[4,5]

Treatment for OA varies, depending on the severity and progression of the disease. Vague diagnoses and a lack of knowledge of the disease's causes and progression often lead to ineffective rehabilitation and pharmacologic treatments. Although mobilization with movement techniques and a combination of joint mobilization and exercise have both been shown to decrease pain in patients with OA of the knee,[6,7] the time commitment for more conservative therapeutic exercise could be extensive and result in poorer patient compliance and higher associated medical costs.

Traditional conservative therapy may be lacking in effectiveness because pharmacologic interventions treat the symptoms without addressing the underlying cause of pain, and physical therapymostly involves addressing deficits in range of motion and muscle strength.[8-10] In contrast, the efficacy of mobilization with movement techniques and the combination of other joint mobilizations and exercise may lie in the correction ofmisalignment, structural imbalances, or positional

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Paper submitted May 27, 2016; accepted July 28, 2016.
1556-3707

http://dx.doi.org/10.1016/j.jcm.2016.07.002

fault[6,11,12] of joint surfaces, which are thought to contribute to the development and progression of OA of the knee.[13] The MyoKinesthetic (MYK) system, a novel intervention strategy that was designed to treat postural imbalances and compensations, may be useful for treating OA of the knee. TheMYKsystem is based on a manual therapy technique that theoretically decreases and clears nerve nociceptor firing that occurs as a result of joint or tissue movement restrictions.[14]

The targeted outcome ofMYKtreatments is to create bilateral postural balance by treating the neuromuscular system along a specific nerve root, leading to more functional and pain-free movements.15 Treating specific muscles along the nerve root and balancing posture are theorized to decrease muscle spasms and increase range of motion; this treatment quiets nociceptive signals and decreases pain.[14]

Implementation of this system begins by selecting from a list of patient evaluation options.[15] On the basis of the results of the evaluation, a specific nerve root level is identified as the cause of the postural compensation related to the nervous system. The clinician treats the patient by massaging the muscles along the identified nerve root, bilaterally. During the treatment, the clinician moves the joint passively while massaging the involved muscles and then instructs the patient to move the joint actively while continuing to massage the same muscles.[15]

The evidence that postural and biomechanical dysfunctions can lead to OA of the knee,[3,10,12,16] combined with the theoretical design of the MYK system, suggests that use of this system as an evaluation and intervention paradigm may correct postural dysfunctions,[15,17] reduce pain, and improve function and psychosocial well-being in patients with OA of the knee. However, there is currently a paucity of evidence regarding the use of the MYK system. Therefore, the purpose of this case study was to report the effects of the MYK system on a patient diagnosed with chronic bilateral knee pain associated with OA.

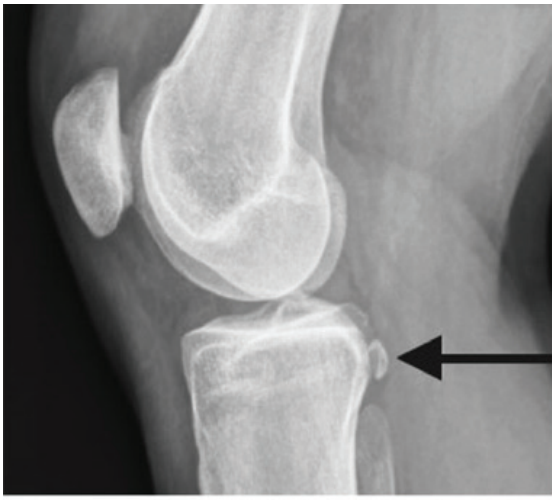

Fig 1. *Tibial plateau bone spur.*

CASE DESCRIPTION

A 20-year-old collegiate softball pitcher presented with chronic bilateral knee pain, although her primary complaint was pain and dysfunction in the right knee. No specific mechanism of injury was reported. The pain was described as constant and gradually worsening over the past 2 years. An initial clinical orthopedic examination was performed to rule out other injuries; positive results of tests for a possible torn meniscus required referral to an orthopedic surgeon.

Magnetic resonance imaging on the right knee did not detect a meniscus tear. The physician's orthopedic examination concluded with a diagnosis of chondromalacia and the beginning stages of OA based on patient history, clinical examination results, knee joint space narrowing, and a tibial plateau bone spur formation noted on radiographic imaging (Fig 1). The physician recommended an initial interarticular corticosteroid injection, along with 8 weeks of a therapeutic exercise program (Table 1), and 420 mg of naproxen sodium twice daily or as needed for 2 weeks; however, the patient did not experience any notable improvements. Because of the ineffectiveness of conservative traditional therapies, the MYK system was considered to be a possible solution

INTERVENTION

A Patient-reported outcome measures (the Numeric Pain Scale [NPS] score, the Patient-Specific Functional Scale [PSFS] score, the Knee Injury and Osteoarthritis Outcome Score [KOOS], and the Disablement in the Physically Active Scale score) were collected prior to the postural assessment with the MYK system (Table 2). The MYK postural assessment was completed, and S1 nerve root treatment was indicated for the first treatment. Each subsequent visit required an additional postural assessment to determine the appropriate nerve root level to treat. During treatment, the muscles were massaged as the joint was moved passively for 8 repetitions and then actively for 10 repetitions. The treatment was performed bilaterally as indicated by the procedure application of the MYK system. The MYK postural assessment on the second and third visits indicated that the patient also needed treatment of the S1; on the final visit, treatment of the L3 was needed. The L3 treatment repetitions were the same as for the S1 treatment. The Texas Woman's University institutional review board approval was obtained prior to collection of data on patient outcome, and the patient gave written consent for the publication of personal health information through de-identified patient data and for the publication of this report.

OUTCOMES

The patient experienced clinical improvement (ie, minimal clinically important difference18) in pain after the first treatment. At her second visit, the patient reported further improvement in pain (1 of 10) and clinically significant improvement (ie, minimal detectable

change19) in function (8 of 10). The second treatment resulted in no immediate changes in pain or function, and the patient did not report any further improvement between the second and third visits. After the end of the third intervention, however, she reported a resolution of pain and almost full function (9 of 10 on the PSFS). Following the patient's final treatment, her pain remained a 1 on the NPS, but her function increased to a PSFS score of 9 (Table 2).

Follow-up outcome measures were collected at 16 weeks following discharge. The patient's pain increased (3 of 10 on the NPS) from discharge to follow-up, and function decreased (4 of 10 on the PSFS). Most subsections scores on the KOOS continued to improve over time; however, pain and sport subsection scores decreased (Table 2).

Table 1. *Traditional Rehabilitation Protocol (Performed 3 Times Per Week for 8 Weeks)*

Mode	Exercise	Prescription
Stretching [a]	Hamstring (supine)	3 × 30 s
	Quadriceps (standing)	3 × 30 s
Strengthening [b]	Quadriceps sets	3 × 25 (5-s hold)
	Straight leg raise (long-sitting)	3 × 15
	Hip adduction (side-lying)	3 × 15
	Isometric adduction	3 × (30-s hold)
	Terminal knee extension (supine)	3 × 12
	Terminal knee extension (standing)	3 × 12
	Knee flexion	3 × 15
Balance Training	Baps board ankle circumduction (sitting) 50 CW/50 CCW	
	AirEx stork stands (eyes open) 3 × 45 s	

CCW, counterclockwise; *CW*, clockwise.
[a] Moist heat was applied for 15 minutes prior to stretches.
[b] Ice bags were applied for 20 minutes after the last strengthen exercise.

DISCUSSION

The patient in this case received 8 weeks of therapeutic exercise with minimal relief. However, with 2 weeks of treatment (4 treatments) using the MYK system, she reported an 83% decrease in pain and an 80% increase in function. Moreover, the patient reported clinically meaningful improvements, as indicated by achieving a minimal clinically important difference on the NPS and a minimal detectable change on the PSFS because of MYK treatments. The clinically meaningful results provided support and a marker for the patient's response of the efficacy of each treatment application. Similar studies examining the effects of manual therapy and exercise on patients with OA of the knee reported only 20% to 40% relief of symptoms after 2 to 3 clinical treatments.[8] The patient's use of pharmacologic drugs was also not effective in significantly reducing pain over an extended period.

Pharmacologic interventions are effective at decreasing pain[20] in short-term time frames but do not offer long-term, effective solutions.[9] Prior to treatment with theMYKsystem, this patient received an interarticular injection into her right knee, and pain decreased after 2 days; however, the pain returned to preinjection levels 2 weeks later. Medications do not correct dysfunctional and abnormally loaded contact areas in the knee, either of which could be the initial, contributing factor for OA of the knee.[10] If normal mechanical arthrokinematics are not restored and balanced, progression ofOAwill continue, even though pain perception is decreased with medication.[10] The patient's MYK postural assessment revealed several imbalances; all of themmay have contributed to increasing pain despite traditional therapeutic interventions. However, after using the MYK interventions, subsequent postural assessments revealed that prior postural imbalances were no longer present.

Table 2. *Patient-Specific and Region-Specific Outcome Measures*

Outcome Measure	Baseline Day 1	Visit 2 Day 4	Visit 3 Day 8	Visit 4 Day 14	Discharge [a]	16-Week Follow-Up [a]
DPAS	35	N/A	24 [b]	N/A	16 [b]	18
NPS						
Before	6	1	1	1	1 [c]	3
After	4 [b]	1	0	1		
PSFS						
Before	5	8	8	8	9 [c]	4
After	5	8	9	9		
KOOS						
Symptoms	25.00				46.43 [c]	53.75
Pain	30.75				63.89 [c]	58.50
ADL	44.25				67.63 [c]	72.25
Sports	0.00				80 [c]	30
QL	31.25				31.25	43.75

ADL, activities of daily living; *DPAS*, Disability in the Physically Active Scale; *KOOS*, Knee Injury and Osteoarthritis Outcome Score; *NPS*, Numeric Pain Scale; *PSFS*, Patient-Specific Functional Scale; *QL*, quality of life.
[a] Nontreatment day.
[b] Minimal clinically important difference.
[c] Minimal detectable change.

The positive effects of the MYK system on this patient were both physical and psychological. She began within the chronic pain range of the Disablement in the Physically Active Scale at her initial visit but was discharged within the healthy normal range.[21] Application of the MYK system involves exclusive one-on-one clinician–patient interaction and contact, which incorporates the components of manual therapy that increase a patient's sense of well-being and may elicit the release of an endorphin that aids in pain relief.[22]

Although the patient's KOOS quality-of-life scores did not change from intake to discharge, they did improve over time. All other areas of the KOOS also improved, as did her PSFS score. The sport subscale score on the KOOS was the most improved of all other subsections. The substantial improvement on the KOOS sport subsection score corresponds with the high percentage (80%) of improvement on the PSFS. The patient's percentage improvements on her KOOS subscale scores were higher than scores attained by patients undergoing manual therapy and exercise treatments reported in the literature.[8]

Although this patient experienced setbacks in her pain level and functionality from discharge to the 16-week follow-up, she maintained and even exceeded many other discharge scores; also, both of these KOOS subsection scores remained higher than the scores reported at baseline (Table 2). The patient continued unrestricted softball activities after discharge, and follow-up outcomes were assessed within a few days of beginning preseason training. Her regression could have been attributed to general delayed-onset muscle soreness caused by the rigors of returning to intense activity after a 6-week winter break.

LIMITATIONS

The case study described in this article was the first to examine the effect of the MYK system on OA of the knee. However, it is a report of outcomes in a single patient. Other individual factors may influence the positive effects of this technique on patients with a similar presentation. The patient in this case was a young, physically active athlete; the effects of the MYK system may not be as beneficial on an older, more sedentary population. Moreover, because OA is a life-long condition and many patients progressively decline in activity-level because of pain, the short-term outcomes of this study are limited.

CONCLUSIONS

The patient in this case study experienced clinical improvements in pain, function, and psychological well-being by undergoing an MYK system treatment protocol. The course of treatment was 4 treatments over 2 weeks; this was compared with the 8-week traditional rehabilitation protocol, as prescribed by her orthopedic doctor, which did not produce significant improvements. Although the MYK system may not be the solution for all patients with OA of the knee, it may be a viable treatment option for patients who present with postural asymmetries or who have not consistently found relief from the symptoms of OA with other types of manual therapy, traditional rehabilitation, or pharmacologic intervention.

FUNDING SOURCES, AND CONFLICTS OF INTEREST

Concept development (provided idea for the research): V.F.S.
Design (planned the methods to generate the results): V.F.S., R.T.B.
Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): V.F.S., R.T.B., J.M., A.N.
Data collection/processing (responsible for experiments, patient management, organization, or reporting data): V.F.S.
Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): V.F.S., R.T.B., J.M., A.N.
Literature search (performed the literature search): V.F.S.
Writing (responsible for writing a substantive part of the manuscript): V.F.S.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): V.F.S., R.T.B., J.M., A.N..

CONTRIBUTORSHIP INFORMATION

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

Practical Applications

- The MYK system offers a unique mode of treating OA of the knee by correcting dysfunctional postural compensations, which may be the leading cause of the disease initially.
- By decreasing pain and increasing function, patients with OA of the knee can have a greater quality of life involving an active lifestyle.
- Therapeutic exercise, while effective in reducing pain and increasing function, requires extensive weekly sessions to obtain positive results, which were achieved in a fraction of the time using the MYK system.

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