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CASE REPORT

THE USE OF PATELLAR TAPING IN THE TREATMENT OF A PATIENT WITH A MEDIAL COLLATERAL LIGAMENT SPRAIN

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ABSTRACT

Background. The medial collateral ligament (MCL) is one of the most frequently injured ligaments in the knee. The purpose of this case report is to describe conservative management of a 13 year-old soccer player with a one year history of untreated intermittent bilateral anterior knee pain who sustained a grade II MCL sprain while playing soccer and returned to competitive play within four weeks. The use of patellar taping as an adjunct to treatment will be introduced.

Case Description. Based on the physical examination findings, the patient's injury was classified as a grade II MCL sprain. The patient was treated successfully with a combination of modalities, manual therapy, and therapeutic exercise. Specifically, patellar taping was added to the traditional physical therapy regimen. Pain scale ratings, strength assessment, and a variety of functional outcome assessment tools were used to determine progression and outcomes.

Outcomes. Following one session of modalities, manual therapy, patellar taping, and education in a home exercise program (HEP), the patient reported decreased overall left knee pain and increased comfort with knee active range of motion (AROM). Throughout the four weeks of treatment, the patient was compliant with the HEP. During this time, the patient continued to demonstrate improvement in pain, strength, AROM, and functional activities. Upon discharge, the patient was cleared for full return to sports.

Discussion. The novel intervention in this case report was the taping of the patella medially. This patient returned to sports two weeks earlier than the average athlete with a grade II MCL sprain.

Key words: MCL sprain, soccer injuries, knee rehabilitation, patellar taping

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INTRODUCTION

The medial collateral ligament (MCL) is one of the most frequently injured ligaments in the knee.[1,2] Injuries to the MCL are classified into grades I, II, and III based mostly on clinical examination.[3] Currently, treatment of isolated MCL injuries, especially grades I and II, are managed non-operatively.[4] Injuries to the MCL are especially common in young athletes involved in sports which place valgus loads on the knee.[5] Physical therapists who treat these injuries have the challenging task of returning these athletes to their sport as quickly and as safely as possible. The purpose of this case report is to describe the conservative management of a grade II MCL sprain, which included patellar taping as an intervention technique.

Anatomy of the MCL

The medial aspect of the knee joint is quite complex in terms of its functional anatomy. To assure a good understanding of the MCL, the anatomy of the medial aspect of the knee needs to be briefly discussed. Warren and Marshall[6] have identified three distinct layers along the medial aspect of the knee. The first layer consists of the fascia covering the sartorius muscle. The second layer consists of the superficial MCL, and the third layer consists of the knee joint capsule. Since this case report is dealing with an isolated injury to the MCL, only the detailed anatomy of this particular structure will be reviewed. For a more comprehensive detailed anatomy review of the medial aspect of the knee, readers are referred to the article by Jacobson et al.[7]

Based on the work by Warren and Marshall,[6] the MCL can be subdivided into superficial and deep components. The superficial MCL has a proximal attachment along the medial femoral epicondyle and runs distally to the proximal medial tibia.[8,9] The deep MCL has a proximal attachment along the medial femoral epicondyle and runs distally to insert on the tibia, just below the joint line. Additionally, the deep MCL has an attachment to the medial meniscus.[7] Other authors[10] have described the MCL as having an attachment to the fibers of the medial patellar retinaculum.

Table 1: Indelicato's classification of MCL injuries[17]

Grade	Findings
Grade I sprain	Tenderness on palpation and pain with valgus stress testing with no detectable laxity
Grade II sprain	Joint line gapping of less than 5mm with a clinical subjective end-feel as well as pain and tenderness with palpation
Grade III sprain	Joint line gapping greater than 5mm with no subjective clinical end-feel as well as pain and tenderness with palpation.

Biomechanics of the MCL

Given the various anatomical components of the MCL, researchers and clinicians have extensively studied the biomechanics of this important medial stabilizer of the knee. The superficial MCL functions as the primary stabilizer of the medial knee joint against valgus stresses.[7] Brantigan et al[8] have further subdivided the superficial MCL into an anterior parallel bundle of fibers along with a more posterior oblique bundle of fibers. Both Brantigan et al[8] and Mains et al[11] have argued that the superficial MCL fibers remain tight throughout knee flexion. Other authors have suggested that the fibers of the superficial MCL are on slack in knee flexion.[12,13] Still other authors, such as Horowitz[14] and Warren et al,[15] have argued that the anterior fibers of the superficial MCL are tight in flexion, while the posterior oblique fibers remain tight in extension.

Mechanism of MCL Injury

The typical mechanism of injury to the MCL involves a valgus stress to the knee joint. This valgus stress can result from a contact injury such as those seen in football or soccer, or from a non-contact injury secondary to cutting, pivoting, or a sudden change in direction as is prevalent in basketball and soccer.[7,16] When valgus forces are combined with rotatory forces, other structures such as the anterior cruciate ligament (ACL) or the posterior medial corner of the capsule may potentially be damaged. However, even though this case report involved a non-contact, valgus force with a rotatory component to the knee, the result was an isolated grade II MCL sprain.

Classification of MCL Injuries

Clinicians may be called upon to diagnose MCL injuries, which can be detected by physical examination. Various classification systems for MCL injuries based on physical exam exist in the literature.[3,5,17,18] For this case report the authors used the clinical classification system developed by Indelicato[17] *(Table 1)*, which is also described by Giannotti et al[3] when discussing classification of MCL sprains.

Given the complex anatomical nature of this ligament, it is impossible to isolate deep MCL injuries using special tests, therefore requiring the aide of diagnostic imaging.[7] In addition to the clinical classification just described, another classification of MCL injuries based on magnetic resonance imaging (MRI) has been discussed in the literature. Stoller et al[18] have discussed three grades of MCL injuries based on findings observed following an MRI. Grade I sprains are represented by an increased signal intensity medial to the MCL. Grade II sprains are identified with similar characteristics of grade I sprains with additional increased signal within the MCL itself. Grade III sprains are identified as complete loss of fiber orientation with fluid between the torn ligament ends. This classification system can assist with definitive diagnosis if clinical examination techniques are unclear secondary to potential swelling or inflammation.

Outcome Measures

Pain scale ratings, strength assessment, and a variety of functional outcome assessment tools were used to determine progression and outcomes. The Numeric Pain Rating Scale (NPRS) is an 11 point scale ranging from 0-10, with 0 representing no pain and 10 representing the worst pain imaginable.[19] Patients rate the highest pain level over the last 24 hours. Research has shown the NPRS to be both reliable and valid, with a change of two points being clinically significant.[19]

The Lower Extremity Functional Scale (LEFS) is a scale on which patients score their ability to perform functional activities.[20] The LEFS consists of 20 items scored on a five point scale ranging from 0-4.[20] The highest possible score is 80, which represents a high functional level.[20] The literature has demonstrated the reliability of the LEFS20 and its construct validity has been supported in comparison to the SF-36.[20] Both the minimal clinically important difference and the minimal detectable change is a nine point difference in the total score.[20]

Additionally, functional activities were used to assess patient progression. These included shuttle runs,[21] hopping,[4] and figure-8 running drills.[22] These activities mimic some of the stresses and functional demands on the knee during soccer.

CASE DESCRIPTION

History

The patient was a 13 year old soccer player who reported left medial knee pain after planting her left foot and turning right during a soccer game. The patient reported icing her knee immediately after the injury with no significant improvement in pain or function. The patient was seen by a sports medicine physician three days post-injury and was diagnosed with an MCL sprain. Physical therapy was prescribed and the patient was evaluated by a physical therapist five days after the injury.

Activity Level

The patient lived with her family in a private house, with a bedroom on the third floor. She was a member of a soccer travel team and attended practice 4-5 times per week for 1.5-2 hours a practice session.

Numeric Pain Rating Scale (NPRS)

The patient subjectively rated her pain level at a 6/10.

Chief Complaints/Functional Level

The patient reported difficulty with ambulation, dressing (donning and doffing pants, socks, and shoes), stair negotiation (descending more than ascending), transferring in and out of a tub, sitting, squatting, balance, and anything required to play soccer. The patient reported an inability to fully extend her left knee due to extreme pain. A specific NPRS score for the pain experienced during end-range active knee extension was not obtained.

Lower Extremity Functional Scale (LEFS) Score

The patient's LEFS score was 31/80.

Past Medical History

The patient reported a previous ankle fracture on the ipsilateral side about eight months prior to injury, and intermittent bilateral knee pain for one year, which the patient was not experiencing at this time.

PHYSICAL EXAM

Girth/Edema

Mid-patella circumferential measurement revealed a 0.3 cm difference in girth, with the right circumference measured at 33.8 cm, and the left circumference measured at 34.1 cm. This 0.3 cm difference may have been due to swelling; however, the difference could also have attributed to measurement error.

Active Range of Motion

Knee AROM was measured with the patient positioned prone on a plinth, with the trunk and femur supported by the plinth, and the lower leg unsupported by the plinth.

Knee flexion on the right was 5º-0º-136º, and on the left was 4º-110º (with pain).

Strength Testing

The patient's overall lower extremity strength was assessed to be in the good to normal range with manual muscle testing *(Table 2)*. The patient complained of pain with resisted hip adduction, knee flexion, and ankle plantarflexion.

Positive Special Tests

Valgus Stress Test

This test is designed to assess the integrity of the MCL as well as other medial stabilizers of the knee. Based on the patient's history and description of her mechanism of injury, the treating clinician performed this test. The test was painful at both 0 degrees and 30 degrees of knee flexion, with a firm end-feel without gapping at 0 degrees, and a firm end-feel with mild gapping at 30 degrees. According to Dutton,[23] a positive test at 30 degrees indicates at least a grade II MCL sprain.

Table 2: Manual Muscle Test

	Right	Left
Hip flexion	5/5	4/5
Hip abduction	5/5	5/5
Hip adduction	5/5	4+/5 with pain
Knee flexion	5/5	4/5 with pain
Knee extension	5/5	5/5
Dorsiflexion	5/5	5/5
Plantarflexion	5/5	4/5 with pain

Apley's Compression Test

This test assesses for potential meniscal tears. Given the rotatory component of the mechanism of injury and the patient's complaint of inability to fully extend her knee, the treating clinician performed this test to evaluate the integrity of the meniscus.[23] The test was positive only with tibial external rotation. Given the denial of catching or clicking in the knee by the patient, in combination with the poor diagnostic accuracy of the Apley's compression test and negative findings of other meniscal tests, the treating clinician did not suspect a torn meniscus.[24]

Step-down test

This test has been used in patients with patellofemoral pain to objectively measure knee pain while descending stairs.[25] It should be noted that this test is not specific to the patellofemoral joint and is useful following knee ligamentous injuries or other sports-related injuries.[25]

The intra-rater reliability of this test has been determined to be high (intraclass correlation coefficient 0.94) by Loudon et al.[25] To the best of the authors' knowledge, research documenting the validity, as well as the specificity and sensitivity of the step-down test have not been reported. The treating clinician also used this test to assess eccentric quadriceps muscle control, which is a necessary component of many functional and sports activities. The test was positive based on the patient's report of pain and inability to control knee flexion while descending a standard clinic 8 inch step-stool.

Tenderness to Palpation

The following structures were tender when palpated: left MCL (mid and distal/tibial portions), distal quadriceps muscle and quadriceps tendon (suprapatellar tissues), left distal medial hamstrings muscle, and left proximal medial gastrocnemius muscle.

Posture

In standing, bilateral subtalar joint pronation (left more than right) was observed. In addition, decreased left lower extremity weight-bearing and less left knee flexion were present when compared to the right.

Gait

The patient was ambulating with one axillary crutch, decreased left stance time, decreased left knee flexion during swing phase, and without full knee extension during terminal swing phase.

Neurological Sceening

Since the patient presented with no significant past medical history and did not report any radicular or neurological symptoms, a complete neurological exam was not conducted.

Diagnosis

Based on the grading system of Indelicato,[17] the treating therapist diagnosed this patient with a grade II MCL sprain.

INTERVENTION

Session 1/Initial evaluation (5 days post-injury)

The patient's treatment consisted of medial patellar glide taping *(Figure 1)* as described by McConnell[26] and ice to the left knee with the patient positioned supine while rolling a physioball by moving the involved leg in and out of hip and knee flexion and extension (pain-free range) *(Figure 2)*. For the patient's home exercise program (HEP), see Table 3. The patient was instructed to wear the tape until the night prior to the next scheduled session unless skin irritation, discomfort, or an increase in symptoms was experienced.

Session 2 (10 days post-injury)

The patient's pain level was a 3-4/10 on the NPRS at the beginning of the session, and the patient reported being able to straighten her knee into full extension. The patient presented with AROM 0º-135º with minimal discomfort, and 0º-138º with pain; and continued tenderness to palpation to the mid- and distal portions of the MCL. For treatment session details, see Table 3. Immediately following the session, the patient rated her pain level with ambulation at a 1/10.

Session 3 (13 days post-injury)

The patient rated her pain in general at a 0/10, with "occasional twinges" with excessive or sudden activity. The patient presented with continued, though decreased, tenderness to palaption to the MCL, and continued poor eccentric quadriceps muscle control (step-down test). For treatment session details, see Table 3.

Session 4 (16 days post-injury)

The patient continued to rate her pain at a 0/10 with "occasional twinges" at 4/10.

The patient presented with AROM 8º-0º-138º; continued tenderness to palpation to the MCL, decreased postural control with rotatory and multi-planar movements compared to the uninvolved side, a positive left valgus test (at 30º only), a positive left step-down test (though patient demonstrated improved quadriceps control). For treatment session details, see Table 3.

Session 5/Last Visit (30 days post-injury)

The patient rated her pain at 0/10 and reported an increase in her activity level without difficulty or pain. The patient presented without swelling in the left knee. Her AROM was 6º-0º-143º. Manual Muscle Test of the left hip flexors was a 4+-5/5; knee flexion, extension, and dorsiflexion were 5/5; and plantarflexion was a 4+/5. Special tests revealed a positive left valgus test at 30º yielding laxity without pain and a negative step-down test. There was mild tenderness to palpation to the proximal and distal portions of the MCL. The patient's LEFS score increased to 77/80. The patient was able to run figure-8's and shuttle runs without difficulty, but had a mild decrease in balance while hopping clock-wise and counter clock-wise.

Figure 1. *Medial patellar glide taping*

Figure 2. *Ice with ball rolling*

For treatment session details, see Table 3. The patient returned to her physician two days after the last visit and was cleared for full return to sports.

Treatment Techniques (Table 3)

Musculoskeletal injuries require a variety of treatment interventions. Interventions are selected by the clinician based on the patient's presentation that session, being mindful of the goals of the rehabilitation program.

Modalities and Manual Therapy

Modalities, such as heat and ice, were used as adjuncts to the rehabilitation program. The treating clinician selected the appropriate modality based on the patient's presentation during each session.

Table 3: Exercises and Treatment Techniques

	Session 1	Session 2	Session 3	Session 4	Session 5
Intervention					
Heat			Left knee 15 minutes		X
Cold	Left knee 10 minutes (Fig 2)	X		X	
Transverse friction massage MCL	X	X	X	X	X
Patellar taping	X	X	X	X	
Distraction knee joint in sitting with Mulligan strap		X			
Rhythmic stabilization					Left lower extremity
Retro treadmill 5 minutes		1.1mph	1.4mph with grade 3 incline	1 minute warm _/_ and 2 minute run	
Unilateral leg press with ball squeeze		40lbs 10 x 3 (90°-45°)			
Wall squats			10 x 3		Left unilateral 10 x 3
Left lateral dips 4" step			5 x 3 with a mirror		
Left LAQ with ball squeeze			10 x 3		
Fitter				Contact guard 10 x 2	Independent 10 x 3
Single limb stance (SLS)					SLS on a balance pad with ball catch (to fatigue)
Home Exercise Program	BID: Left quad sets and SLR with ER 10 x 3, ice with wall slide 10 minutes	X	Add 1x/day right hip hikes and left LAQ with ER and ball squeeze 10 x 3	X	Add 1x/day left hip adduction with red theraband 10 x 3

Transverse-friction massage was performed to the MCL in an effort to decrease pain, improve blood flow, and promote desired collagen alignment.[23] In addition, joint distraction of the tibiofemoral joint was performed to decrease pain and improve joint mobility.[23] Rhythmic stabilization was used by the treating clinician to facilitate neuromuscular control of the knee.

Therapeutic Exercises

Various therapeutic exercises were implemented into the rehabilitation program for this patient. These exercises are described in complete detail in the discussion section of the paper. For a list of exercises, their parameters, and time of implementation, please see Table 3.

OUTCOMES

At the conclusion of the first session, the patient reported decreased overall left knee pain, less pain with movement, and improved total knee AROM. By the beginning of the third session, the patient reported no pain except "occasional twinges" with excessive or sudden activity. However, the patient continued to demonstrate poor eccentric quadriceps muscle control. At the last session, 25 days after the initial examination, the patient's pain had improved from a 6/10 to 0/10 (NPRS), her LEFS had increased from 31/80 to 77/80, and her overall functional capacity had improved *(Table 4)*.

DISCUSSION

Sports involving valgus loading of the knee contribute to the frequent occurrence of MCL injuries.[2] Annually, tremendous growth in pediatric soccer participation occurs in the United States, estimated by the American Academy of Pediatrics to be between 11.4%-21.8%.[27] It is logical to conclude that as the participation in sports that yield a high incidence of MCL injuries increases, so will the absolute number of MCL injuries. Given the assumed increase of MCL injuries, physical therapists

Table 4: Outcome Measures

Measurement	Initial Examination	Discharge
NPRS	6/10	0/10
LEFS	31/80	77/80
Functional Activities	Ambulation with axillary crutches, sports activities unable to be assessed	Normal gait, figure-8, shuttle runs no difficulty, mild decreased dynamic balance with hopping activities

must identify efficient treatment techniques to minimize lost playing time.

A thorough search of the literature did not yield any articles discussing the relationship between MCL sprains and patellar taping. To the best of the authors' knowledge, this case report is the first paper that evaluates the effects of patellar taping when implemented into the rehabilitation of an athlete with an MCL sprain. While the healing time frame for a grade II MCL sprain is variable, a range of 3-8 weeks is average.[4,22] The consensus seems to be a minimum of 6-8 weeks for sports, such as soccer, that place more stress on the MCL.[4,22] The patient in this case report was cleared for full participation in soccer in just four weeks. The authors recognize that while currently no evidence exists to support the use of patellar taping in individuals with MCL sprains, the implementation of this technique may potentially increase the rate of recovery in these individuals. Additional research is required to thoroughly investigate the potential positive effects of patellar taping.

As discussed in the literature, the initial phase of MCL injury rehabilitation focused on the elimination of pain and swelling.[3-5,22] Additionally, emphasis was placed on normalizing quadriceps muscle function. During this phase, some clinicians are of the opinion that the knee should be braced, though this is not necessarily recommended across the board. When bracing is utilized, debate exists regarding the position of the knee in the brace – whether the knee should be in full extension or in 15˚-30˚ of flexion.[4,28] This difference may be due in part to differences of opinion regarding the biomechanics of the MCL. Slocum and Larsen,[13] as well as Last,[12] state that the superficial fibers of the MCL are on slack in positions of knee flexion. If this is the case, following principles of tissue healing and biomechanics, bracing the knee in flexion should place the healing tissue on slack, and prevent further stress to the collagen and connective tissue that comes with immobilizing the MCL in positions of terminal extension.

As the goals of minimizing pain and swelling, and achieving full weight-bearing were met, the focus shifted to achieving full pain-free ROM and lower extremity strength.[3-5,22] In the final phase of rehabilitation, the patient was progressed to higher-level functional activities. Plyometric exercises, as well as sport-specific activities, were implemented to prepare the athlete for return to play.[4,22]

Several therapeutic exercises were included in the program for this patient *(Table 3)*. Retro-treadmill walking was utilized to improve concentric quadriceps muscle strength.[23] Additionally, since the patient had a history of intermittent PFPS, and research has documented the decrease in patellofemoral joint compressive forces when compared to forward walking, the treating clinician felt this exercise was appropriate for this patient.[29] Unilateral leg press with a ball placed between the knees was used to increase co-contraction of the quadriceps, hamstrings, and hip adductor muscles. The range of motion was restricted to a range of 90-45º to decrease stress to the MCL during the acute phase of healing.[22]

Other closed-kinetic chain (CKC) strengthening exercises were incorporated in an effort to improve both strength and motor control of the knee. When necessary, visual feedback was given with the use of a mirror. The Fitter™ was used to incorporate a complete lower extremity strengthening program to enhance neuromuscular control and dynamic stability.[23] Single limb stance (SLS) activities were incorporated to improve lower extremity balance and proprioception. A program consisting of both CKC and open kinetic chain (OKC) exercises was implemented, although greater emphasis was often placed on CKC exercises.[23] The OKC exercises of long arc knee extension with hip external rotation and an adductor ball squeeze was used to simultaneously target adductor and quadriceps muscles firing with emphasis on the vastus medialis oblique muscle (VMO).

Plyometric exercises are generally implemented into the rehabilitation program in preparation for return to sport as previously described. This progression was not appropriate for this patient by the fourth session. A two week gap occurred between the fourth and fifth treatment sessions due the patient being away. The patient continued to perform her HEP during this time. Therefore, at the beginning of the fifth session, a reassessment was performed in preparation for the patient's upcoming appointment with her physician. Sport-specific tasks were used to evaluate her functional status, which were satisfactorily performed. Plyometric exercises were not implemented since she was returned to full competitive participation by her physician and physical therapy was discontinued.

While the basic rehabilitation guidelines were followed while treating this patient, the component of patellar taping was implemented. The primary author's hypothesis was that the taping would accelerate the initial phase of the healing process, thereby minimizing the overall recovery time. The theoretical constructs for this intervention were to minimize the stress on healing tissues and to improve VMO firing.[30,31]

Rationales for Patellar Taping

Minimizing Tissue Stress

Although the literature presents inconsistent findings, some research has shown that patellar taping can be utilized to affect patellar positioning.[32] While the authors recognize the current gap as to the exact mechanism patellar taping has in rehabilitation of PFPS, sufficient acknowledgement exists in the literature that patellar taping does decrease anterior knee pain immediately upon application.[31,33,34]

The recent study by Herrington[32] demonstrated with the use of MRI, a small, but potentially important change in patella position with the use of patellar tape. In addition, Crossley et al[35] in their review article found a change in patella position radiographically following the application of patellar tape. This change in patella position will place fibers of the medial patellar retinaculum on slack. An argument can be made that this, in turn, will place fibers of the MCL on slack due to the anatomical attachment of some of its fibers into the medial patellar retinaculum.[10] This slack could take some of the stress off those fibers of the MCL, thus creating a better healing environment for the injured MCL fibers.

Vastus Medialis Oblique (VMO) Muscle Activity

Patellar taping is commonly used by clinicians to treat patients with patellofemoral pain.[33,34] In the past few years, studies utilizing electromyography (EMG) have demonstrated that taping improves the timing of the firing of the VMO.[30,31,36-38] It has been established that capsular distension due to effusion inhibits muscular contraction, and can lead to a long-term shut down of the quadriceps muscle.[39,40] The VMO is particularly sensitive, requiring less joint effusion to be present before it shuts down than is required for the rest of the muscles in the quadriceps muscle group.[39] Keeping the effects of swelling on the VMO in mind and extrapolating from the findings of these studies on EMG firing patterns, the treating clinician decided to utilize patellar taping to improve the timing of VMO firing. Although not specifically measured in this case report, research has documented the importance of restoring correct firing patterns to the VMO as quickly as possible. This enhancement in firing pattern may help achieve the appropriate balance between medial and lateral structures of the knee, thereby restoring correct biomechanics to the knee.[41] It is especially imperative for anyone involved in higher level activities, such as sports, to have correct biomechanics restored.

Improved firing of the VMO may have an added benefit. The improved firing may help reduce the present edema. Voluntary muscle contraction will produce an increase in muscle pumping which can improve venous return.[42] Any decrease in swelling can potentially decrease the reflexive inhibition of the quadriceps muscle. The increased quadriceps muscle activity will, in turn, continue to decrease the swelling via muscle pumping.

The patient's immediate change in pain and functional levels during the first session can be attributed to factors other than the effects the tape had on the MCL. Two potential causes are the effects the tape had on her PFPS or those that ice can have on the inflammatory response. The authors recognize the immediate effect patellar taping is reported to have on patients' pain and functional levels due to PFPS.[31,33,34] With a potential co-morbidity of bilateral PFPS causing similar limitations, it is plausible that the application of patellar tape may have caused these positive changes in the patient. However, even though this argument cannot be completely ignored, two counter arguments can be made. First and foremost, the patient reported that her bilateral PFPS was intermittent, and she was not currently experiencing an exacerbation. Second, her symptoms were not severe enough for her to seek medical intervention since their onset. Given the patient's improvement with unilateral taping, pain and functional limitations secondary to bilateral PFPS would not have changed as drastically.

Even though the application of ice could have influenced pain and functional levels in a positive manner, the immediate application of ice by the patient following the injury did not produce similar results of increased pain-free active knee extension, an overall decrease in pain levels, and improved weight bearing tolerance. Therefore, even though an argument can be made that the application of ice improved pain and motion during the first session, it is just as likely that the application of patellar tape yielded similar results. With a case report design, determining the true cause of the improvement is not possible.

CONCLUSION

This case report provides a novel component for the treatment of isolated MCL injuries. However, the results are a reflection of the treatment of one patient. For this treatment to be considered efficacious, more research needs to be conducted in this area. Future studies should consist of a case series approach with progression to a randomized clinical trial. This process will establish any cause and effect relationship that this component may have on MCL treatment.

While this patient's return to play time was shorter than the average time frame, no conclusion can be made as of yet of the effects of patellar taping on the rehabilitation time frame for patients with MCL sprains. This case is a starting point into the investigation of the effects of patellar taping on isolated MCL rehabilitation.

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