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Regaining Function after a Medial Patellofemoral Ligament Reconstruction: A Case Report

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REGAINING FUNCTION AFTER A MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION – A CASE REPORT

by

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Bachelor of Science in Psychology
University of North Dakota, 2013

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine
University of North Dakota

In partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota
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This Scholarly Project, submitted by Talya Lori Tysver in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

(Graduate School Advisor)

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Title Regaining Function After a Medial Patellofemoral Ligament Reconstruction – A Case Report

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ABSTRACT

**Background and Purpose:** Medial patellofemoral ligament (MPFL) reconstruction is a common surgical procedure for the correction of recurrent patellar instability.1 There is a shortage of case reports, systematic reviews, and meta analyses conducted on the rehabilitation process of MPFL reconstructions post-operatively. The purpose of this case report is to look at the role of physical therapy in the course of recovery for a patient who has undergone an MPFL autograft reconstruction.

**Case Description:** The patient was a 21 year-old, Caucasian, English-speaking female. She presented with the chief complaint of R knee pain. She also had decreased core, hip, and R knee strength, decreased R knee ROM, R knee swelling, and gait abnormalities status post R MPFL autograft reconstruction. The patient’s prognosis and potential for achieving her desired outcomes in terms of self-cares, home management, community, and leisure activities were excellent.

**Interventions:** Procedural interventions consisted of therapeutic exercise, gait training, manual therapy (including soft tissue mobilization), and modalities (consisting of a vasopneumatic device and electrical stimulation). Therapeutic interventions closely followed evidence-based concepts and guidelines described in Fithian et al’s *Rehabilitation of the Knee After Medial Patellofemoral Ligament Reconstruction.*10

**Outcomes:** Over the course of the patient’s physical therapy, her functional abilities increased with regard to ADLs, IADLs, self-cares, activity level, and quality of life. The patient made significant increases in R active knee flexion and her level of pain (as measured by the 0-10 Numeric Pain Rating Scale13) decreased from 5 out of 10 to 0 out of 10 over the course of her therapy.

**Discussion:** The patient had successful outcomes and benefitted from the services of physical therapy in her rehabilitation. This case finding is consistent with other MPFL literature, such as that of Deie et al4 and Cheatham et al.7 The patient had no instances of R patellar subluxation or dislocation post-operatively. One limitation of this case report was that the patient received further therapy services beyond the scope of this report, so final outcomes are not known. Additional special tests and functional assessments could have been conducted, both on the post-operative and non-operative knee, as a way to gain more insight into musculature weakness, tightness, or imbalance.
CHAPTER I

BACKGROUND AND PURPOSE

Medial patellofemoral ligament (MPFL) reconstruction is a common surgical procedure for the correction of recurrent patellar instability. This disabling condition is most commonly found in young and active individuals. Direct, high-energy trauma causes primary dislocation to occur, while low-energy dislocations often occur in those with preexisting etiologies, such as increased quadriceps angle, generalized ligamentous laxity, familial history, trochlear dysplasia, and patella alta.\(^1\)

The medial patellofemoral ligament has its origin at the medial aspect of the patella as it is a “condensation” of the medial retinaculum, and its point of insertion is the adductor tubercle of the medial femoral condyle\(^2\) (Appendix - Figure 1). According to Shah et al,\(^1\) within the past two decades, the MPFL has been recognized as one of the most important patellar passive stabilizers, as it prevents the patella from lateral displacement. Consequently, when patellar subluxation or dislocation repeatedly occurs, it is indicative of a dysfunctional MPFL. A reconstructed MPFL helps to balance the tracking of the patella more naturally (medially).\(^3\)

Various autograft or allograft MPFL reconstruction techniques are used for the restoration of natural patellar tracking. An autograft reconstruction uses the patient’s own tissue from a differing anatomical location, whereas an allograft
is tissue taken from a donor source. Common autograft or allograft tendons used to reconstruct the MPFL may include that of the semitendinosis, patella, gracilis, and tibialis anterior. One tendon or a combination of tendons may make up the differing grafts. Moreover, reconstruction techniques used to secure the tendon grafts may consist of patellar drill holes, sutures, suture anchors, or interference screws at the femoral condyle.²

A long-term follow-up study was conducted in 2005 by Deie et al⁴ on the effectiveness of using a transferred semitendinosus tendon for MPFL reconstruction to correct patellar dislocation. In this study, a five-year follow-up was done on 46 knees (43 patients) out of 68 knees (65 patients) that had this surgical procedure. Patients ranged in age from 6 to 43 years old and all suffered from patellar issues. Six patients had patellae that habitually dislocated, 26 had recurrent dislocation, 10 had traumatic dislocation occur, and four had unstable patellae. Patellar dislocation was evaluated pre-operatively and over three times post-operatively. Results showed that none of the patients experienced re-dislocation post-operatively and it was concluded that the reconstruction of the MPFL is recommended for the patellar instability and dislocation.

Another study looking at MPFL reconstruction in patellar instability had 12 subjects (15 knees) with generalized ligament laxity. In this 2012 study investigated by Raghuveer et al⁵ the MPFL was reconstructed by means of doubling the semitendinosus tendon. None of the patients had severe patella alta or trochlear dysplasia. Follow-up Kujala scores, which measured quality of life and pain levels, showed that 10 knees had excellent results, three had good
results, and two had fair results. Overall, it was concluded that this means of reconstruction gives good results for patients with chronic patellar instability.

Furthermore, a 2012 study by Bitar et al\textsuperscript{6} was conducted to compare the effects of non-operative, conservative treatment for patellar instability versus undergoing an MPFL reconstruction using the patellar tendon. In this randomized controlled trial, 39 patients (41 knees) were split into a control group and a treatment group. The control group was treated non-operatively with immobilization and physical therapy. The treatment group was treated with an MPFL reconstruction. The Kujala questionnaire was also used to measure quality of life as well as pain levels. Results showed that the control group had a significantly lower mean of Kujala scores than the treatment group. Additionally, the non-operative group had more recurrences and patella subluxations, whereas the operative group had no reports of such issues. Therefore, results after at least a two-year time period suggest that subjects who received the MPFL reconstruction had better outcomes.

A 2014 case report by Cheatham et al\textsuperscript{7} looked at the rehabilitation of a 23 year-old male who underwent an open reconstruction of the MPFL with a tibialis anterior allograft as well as a right knee arthroscopy. Findings showed an excellent recovery after the completion of a four-phase rehabilitation process, and the patient returned to his previous level of functioning after receiving 22 weeks of physical therapy.

Outside of these findings, there is an overall shortage of case reports, systematic reviews, and meta analyses conducted on the rehabilitation process of
MPFL reconstructions post-operatively. Furthermore, there is a lack of research in terms of autograft versus allograft MPFL reconstructions in relation to protocols for rehabilitation, effectiveness, and recovery time. Thus, the purpose of this case report is to look at the role of physical therapy in the course of recovery for a patient who has undergone a medial patellofemoral ligament autograft reconstruction.
CHAPTER II

CASE DESCRIPTION

This case study describes the post-operative rehabilitation process of a patient who underwent a right (R) medial patellofemoral ligament (MPFL) reconstruction.

Examination

History

The patient was a 21 year-old, Caucasian, English-speaking female. She had a high school diploma and was currently working toward a Bachelor of Science degree at a four-year college institution. She lived on-campus in a college dormitory and her parents and younger brother lived nearby. Her dormitory had stairs and an elevator. Besides being a full-time student, the patient enjoyed dancing, learning new languages, volleyball, working out, and studying religion. Generally, the patient viewed herself as a healthy individual with healthy eating and exercise habits. Her physical functioning was overall normal in terms of mobility, and she reported having normal sleep patterns. Her psychological functioning consisted of good memory, reasoning ability, and occasional non-diagnosed anxiety. The patient had a healthy and close support system of family and friends. The patient denied any drug or tobacco use. The patient considered herself to be a social, occasional drinker. Prior to her surgery, the patient exercised an average of three to four times per week. The patient’s past medical and surgical history was nonsignificant with the exception of severe bilateral
patellar instability and having an MPFL reconstruction on her left (L) knee one year ago.

The patient’s chief complaint was R knee pain status post (s/p) R MPFL autograft reconstruction. The patient sought services of a physical therapist per her doctor’s suggestion to rehabilitate her knee post-operatively. She was most concerned with getting back to running, stair climbing, and physical activities both safely and without pain.

The surgical procedure was performed at the end of June, 2014. The patient began physical therapy services 19 days later (almost three weeks post-surgery) in mid-July. Prior to her surgery, the patient was independent with all transfers, self-cares, activities of daily living (ADLs), and instrumental activities of daily living (IADLs). She was independent in home management and did not use an assistive device. At the time of the initial evaluation, the patient was unable to drive, had difficulty with stair climbing and ambulation, and had not engaged in any sort of strenuous or high impact physical activity since her surgery. The patient also expressed difficulty with transfers, ambulation, sleeping, dressing, and bathing. The patient was taking pain medication as needed and was using a hinged-knee immobilizer at all times post-operatively.

Systems Review

The patient’s integumentary status consisted of healthy skin integrity and minimal redness and warmth noted around the surgical incision sites as well as no apparent signs or symptoms of infection. Moderate swelling and effusion were
noted surrounding her R knee joint, particularly at the medial joint line, but the incision sites were healing well. Anterior, posterior, and lateral postural views revealed an upright posture with minimal forward flexion of the head. The gross range of motion (ROM) of her upper extremities and trunk was within normal limits (WNL), and her bilateral lower extremity ROM was WNL with the exception of R knee flexion. No significant strength deficits were observed grossly in the patient’s upper extremity (UE) strength, though she demonstrated poor core and hip strength. Her body type was mesomorphic.

From a neuromuscular standpoint, the patient’s sitting and standing balance were normal, both static and dynamically. In addition, her locomotion was impaired secondary to the use of a hinged-knee immobilizer and R knee pain, though she was safe and independent with ambulating on level surfaces without the use of an assistive device. She had an antalgic gait and R hip hike with ambulation.

The patient communicated in a socially appropriate manner. There were no communication barriers and she remained oriented to person, place, and time throughout all of her therapy sessions. The patient was fully conscious and was a hands-on learner that retained information via physical demonstration.

Tests & Measures

Range of motion testing revealed that the patient’s L knee active range of motion (AROM) was 0-140 degrees (extension and flexion). The patient’s R knee (involved side) AROM was 0 degrees of extension and passive range of motion
(PROM) was 60 degrees of knee flexion with pain at end range, indicating decreased functional ROM ability. Bilateral hip ROM was WNL. Manual muscle testing (MMT) revealed that L knee flexion and extension measured 5 out of 5. The patient’s R knee flexion and extension strength was not measured secondary to pain. Findings were consistent with the acute nature of her surgery. ROM measurements and MMT of the uninvolved side were necessary for comparison purposes to properly evaluate the severity of the right-sided deficits.

The 90/90 Straight Leg Raise Test to measure hamstring flexibility was screened WNL on the L side. This test was necessary to evaluate her baseline on the opposite extremity and to use for future comparison with the involved extremity. A 1983 study by Gajdosik and Lusin⁸ revealed the high reliability of this active knee extension test. Her quad set ability was poor on the R side, with no elicited VMO contraction. She was, however, able to moderately contract her quadriceps on the right.

A 2010 systematic review by Hart et al⁹ found that quadriceps activation failure is commonly found following knee injuries (such as an ACL reconstruction). Furthermore, her ability to straight leg raise was poor and she needed moderate assistance from the physical therapist due to pain and weakness. Her patellar mobility was not assessed during the initial evaluation due to pain. Palpation of the R knee revealed mild tenderness over the incision sites.
Evaluation

After undergoing a R MPFL reconstruction, this 21 year-old patient presented with the following impairments: R knee pain (her chief complaint), decreased R knee ROM, R knee swelling, decreased core, hip, and R knee strength, and gait abnormalities. It was decided that the patient would benefit from skilled physical therapy to address the above impairments in order to decrease pain and improve function. Physical impairments specifically included deconditioning, loss of ROM, muscle tightness, weakness, and pain. Her postsurgical limitations were to wear a knee brace when walking and to have no R knee flexion unless sitting. Functional impairments consisted of provoked pain and limitations with stairs, walking, running, squatting, sports, and dressing. Her prior functioning was pain free without limitations.

Diagnosis

The medical diagnosis given to the patient was s/p R medial patellofemoral ligament reconstruction. The physical therapy diagnosis given to the patient under the Preferred Practice Pattern was 4I: Impaired Joint Mobility, Motor Function, Muscle Performance and Range of Motion Associated with Bony or Soft Tissue Surgery.

Prognosis and Plan of Care

The patient’s prognosis and potential for achieving her desired outcomes in terms of self-cares, home management, community, and leisure activities were
excellent. The targeted outcomes for therapy included an anticipated frequency of one to two therapy sessions per week or every other week for the duration of two to three months. In terms of goals, the patient’s goal was to be able to return to running 10 minutes without knee pain after 3-4 months.

The short-term goals for this patient were as follows: Patient is to achieve 110 degrees of flexion with 1/10 pain for improved knee mobility required for ambulation in 4-6 weeks. Patient is to achieve 100 degrees flexion to improve sitting with her knee flexed for one hour in 4-6 weeks. Patient is to ambulate without an assistive device or immobilizer in the community with 0/10 pain in 4-6 weeks. Patient is to walk with a normal gait pattern in 4-6 weeks. Patient is to report 0/10 pain during household activities including light cleaning and self-cares in 4-6 weeks. Patient is to ascend and descend stairs with one railing using a reciprocal gait pattern in 6 weeks.

The long-term goals for this patient were as follows: Patient is to tolerate walking with 1/10 pain up to 30 minutes in 8 weeks. Patient is to self-manage symptoms and return to her prior functioning in 8-12 weeks. Patient is to be independent in her home exercise program in 8-12 weeks. Patient is to report 0/10 pain during work activities for improved tolerance during the day in 8-12 weeks.

The patient participated in goal selection and understood the plan of care. The patient agreed to having her therapy discharged when she achieved long-term goals, progress plateaued, or when skilled intervention was no longer to her benefit. Planned procedural interventions consisted of therapeutic exercise, gait
training, manual therapy (including soft tissue mobilization), and modalities as needed (consisting of a vasopneumatic device and electrical stimulation).
CHAPTER III
INTERVENTIONS

During her first therapy session, the evaluation and examination were completed. Findings, anatomy, and the etiology of her condition were discussed at this time as well as the progression of plan of care and therapy goals. The patient was advised on precautions with provoking activities and the patient’s questions were answered to her satisfaction. Interventions consisted of the instruction of a home exercise program (HEP), and the patient was able to correctly demonstrate it prior to leaving the clinic.

The therapeutic exercises in this HEP included: a seated non-weight bearing heel cord stretch (2 x 30 seconds R side), seated knee flexion with the L leg assisting x 10, supine heel slides x 5, supine wall slides x 3, supine straight leg raises x 5, sidelying hip abduction x 20, and seated quad sets x 10 (with cues to decrease gluteal activation). During each therapy session, the patient was directly monitored and re-instructed throughout the treatment with verbal and tactile cues provided as needed to protect the patient and maintain proper positioning during the exercises.

During the second therapy session, the patient’s gait was notably unsteady when walking and standing without her immobilizer. Her R active knee flexion measured 80 degrees (20 degrees more than the PROM measurement taken at her initial session). New therapeutic exercises added to her strengthening plan
consisted of: R plantarflexion against a blue Theraband, prone hip extension, prone hamstring curls, Nu-Step peddling x 4 minutes, and standing weight shifting with 30 degrees of knee flexion to promote knee strength and stability. Transversus abdominus stabilization education was also given to promote core stability during marching in place, heeltaps, and rope climber exercises. A vasopneumatic device called ‘Game Ready’ was used for 15 minutes following the therapeutic exercises performed on visits 2-6 to reduce the inflammatory response to exercises and stretching.

The patient was educated on the importance of continuing her quadriceps and gluteal strengthening exercises to stabilize her knee. Upon receiving this education, she realized the importance of improving her strength prior to being able to remove her brace at night or with walking. She was instructed that she should be able to transition away from her brace by the end of the week during walking activities and sleeping, and that she would not be able to drive until she transitioned off her brace and her R knee range of motion had improved.

On her third visit, the patient’s R active knee flexion was 91 degrees (an 11 degree improvement from her second visit). In addition to the therapeutic exercises performed during her previous therapy sessions, sidelying clams (holding for 60 seconds x 2 repetitions) were added to progress her hip strengthening exercises.

On her fourth visit, the patient was visibly guarded and frustrated with her progress. She had 83 degrees of R active knee flexion, which was 8 degrees less than the measurement taken at her previous therapy session. Moderate swelling
was noted surrounding the R knee joint, and the patient attributed her R knee pain to walking long distances (wearing her brace) the previous day.

On her fifth visit, she returned to 91 degrees of R active knee flexion. Gait training without a brace was implemented throughout her therapy sessions. Her gait revealed a shortened stride with the R weight-bearing phase, hip-hiking during the R swing phase, and lack of R knee terminal extension. Manual therapy interventions consisted of soft tissue mobilization to the R quadriceps and hip abductors in addition to grade III patellar inferior and superior glides to promote knee flexion during visits 5 and 6. On her sixth visit, the patient had 92 degrees of R active knee flexion. Standing terminal knee extension x 15 repetitions was added to her exercise program to focus on gaining control of the quadriceps.

On her seventh visit, the patient had 100 degrees of R active knee flexion. Neuromuscular electrical stimulation to tolerance (25 Hz) was used on the R quadriceps for 15 minutes to work on regaining muscle control and activation. She was instructed to perform supine straight leg raises x 2 reps during the “on” cycle x 10 minutes and seated quad sets x 5 reps during the “on” cycle for the remaining 5 minutes. On her eighth visit, the patient had 111 degrees of R active knee flexion. No new interventions were given to her. On her ninth visit, she had 112 degrees of R active knee flexion. She performed seated knee flexion stool scoots to fatigue as well as the leg press (44 to 88 pounds x 10 reps), which were implemented to promote increased knee range of motion and increase strength.

In subsequent treatment sessions, the following exercises were added to her program: planks x 60 seconds, single leg squats with UE support x 10,
bridging x 10, bridging with steps x 10, standing one legged fire hydrants in hip abduction x 30 seconds, bosu ball functional squatting x 10, dead lifts x 10, and side planking on the knees x 45 seconds. Gait training x 10 minutes on the Alter G antigravity treadmill at 95% of her body weight (working up to 3.0 mph) was performed during visit 11. Cues were given during this activity to increase her base of support and heel strike performance. In addition, gait training on a treadmill was performed during visit 12 for 5 minutes at 3.0 mph. This was performed to help in the progression and normalization of her gait pattern.

Basic therapeutic exercises were phased out as the patient progressed in therapy. Patient educational techniques used during her treatment sessions consisted of individual instruction and written material for the patient’s use at home. Anatomical models were also used to explain body function, anatomy, and rationale behind exercises.

Though no specific protocol was used with this patient, therapeutic interventions closely followed evidence-based concepts and guidelines described in Fithian et al’s Rehabilitation of the Knee After Medial Patellofemoral Ligament Reconstruction. Furthermore, a 2011 systematic review conducted by Imoto et al found that the use of electrical stimulation paired with conventional rehabilitation has been shown to be an effective intervention for increasing strength and function in patients with poor quadriceps control. Since this patient had difficulty regaining quadriceps control post-operatively, this approach was used in her rehabilitation process. This intervention was phased out at visit 14, as
the patient was able to demonstrate adequate R quadriceps control and terminal knee extension.

The accelerated and rigorous nature of the patient’s therapy has shown to be effective and safe in a 2012 systematic review conducted by Kruse et al\textsuperscript{12} in terms of rehabilitation after anterior cruciate ligament (ACL) reconstruction. The research and rehabilitation of ACL versus MPFL reconstruction are very similar, though specific research on the effectiveness of accelerated rehabilitation post-MPFL reconstruction has yet to be conducted.
CHAPTER IV
OUTCOMES

The patient underwent an MPFL reconstruction to address her recurrent patellar instability. Over the course of her physical therapy, her functional abilities increased with regard to ADLs, IADLs, self-cares, activity level, and quality of life. The patient was able to independently drive her motor vehicle and walk around her college campus with no complaints of stiffness or pain. The patient was also able to walk and run on a treadmill and antigravity treadmill, return to ambulating without an assistive device, sleep without disruption from knee pain, and transfer in and out of bed without pain or having to guide her lower extremity through the transfer motions.

The patient made significant increases in R active knee flexion throughout the course of her therapy (Appendix - Table 1). She reached her ROM goal (110 degrees of flexion) during her ninth visit and continued to make gains in R knee flexion in subsequent treatment sessions. Furthermore, the patient’s level of pain (as measured by the 0-10 Numeric Pain Rating Scale\textsuperscript{13}) decreased from 5 out of 10 to 0 out of 10 over the course of her therapy (Appendix - Table 2).

The functional outcome scale used was FOTO—Focus on Therapeutic Outcomes.\textsuperscript{14} This reliable measure was utilized during the initial evaluation and again every 5-6 visits. This tool generates functional scores (FS) on a 0-100 scale, with a higher score implying a higher functioning level and a lower score...
implying a lower level of function. The patient’s initial FOTO FS was 28 (indicating a low level of functioning). At visit 12, her FOTO FS was 52, with a physical FS increase of 32 (Appendix - Table 3). Her predictive discharge FS score was 60, revealing the potential to make additional functional gains. Unfortunately, the patient’s therapy continued past the gathering of information to complete this case report.

The patient made changes to her fitness regiment by recognizing the importance of core stability and the strengthening of musculature surrounding the knee joint in her rehabilitation process. The patient was very satisfied with her outcomes, as the recovery process for the MPFL reconstruction on her L knee was much slower and regaining functional mobility took much more time than her R knee rehabilitation process. The patient planned to receive physical therapy services for an additional two months in order to continue core and hip strengthening and return to her previous level of function.
CHAPTER V
DISCUSSION

The patient had successful results utilizing the services of physical therapy to post-operatively treat and rehabilitate her R medial patellofemoral ligament autograft reconstruction. By engaging in various forms of core and lower extremity strengthening and stretching, gait training, and manual therapy, the patient was able to regain mobility, decrease pain, strengthen surrounding musculature, and return to her ADLs.

Concepts stressed in the patient’s rehabilitation process were similar to that of concepts described by Fithian et al., such as the chief importance of addressing pain, motion deficits, and quadriceps strengthening and control. These components were heavily emphasized with great success throughout the patient’s treatment sessions, increasing the credibility of the chosen approach.

The patient had no instances of R patellar subluxation or dislocation post-operatively. This case finding is consistent with the previously discussed literature by Deie et al. None of the patients in this study experienced re-dislocation post-operatively and the conclusion was made that the reconstruction of the MPFL is recommended for patellar instability and dislocation. The findings of this case study support Deie et al’s conclusion. Furthermore, the patient’s decreased pain levels and increased functional scores support conclusions made by Raghuveer et
al\textsuperscript{5} with regard to reconstruction giving good results for patients with chronic patellar instability.

Additionally, this case report yields findings similar to the 2014 case report by Cheatham et al\textsuperscript{7} which looked at the rehabilitation of a 23 year-old male who had an open reconstruction of the MPFL with a tibialis anterior allograft. However, he also underwent a R knee arthroscopy, limiting the ability to compare cases due to the differences in nature of the surgeries. However, both had very successful recoveries. The 23 year-old male returned to his previous level of functioning after receiving 22 weeks of physical therapy, whereas the patient in this case report was still receiving therapy services after 13 weeks to regain her full previous level of function.

Alternative treatment could have consisted of the use of a differing type of autograft or allograft, or going through conservative, non-operative treatment. The Bitar et al\textsuperscript{6} literature discussed reveals the success of having an MPFL reconstruction versus undergoing conservative treatment for recurrent patellar instability, and overall, the outcome of this patient yielded similar findings as the literature reports. Future research could study the comparison among types of allografts or autografts used in the rehabilitation process. Differing recovery speeds and protocols for physical therapy could be analyzed and compared pre- and post-operatively in future research as well.

There are various potential limitations of this case report. One such limitation was the patient received further therapy services beyond the scope of this report, so final outcomes are not known. Had the patient’s progress been
tracked from initial evaluation to the time of discharge, there would have been more confidence and assurance in her successful outcomes obtained by receiving therapy services. Another potential limitation consists of the lack of knowledge of her exact type of autograft used in the patient’s surgical reconstruction, limiting the ability to compare her success with literature on specific autograft types used for MPFL reconstructions. However, comparisons can still be made with regard to the use of autografts versus allografts and non-operative, conservative treatment.
Reflective Practice

The patient had successful outcomes and benefitted from the services of physical therapy in her rehabilitation. Upon reflection of this patient’s evaluation, examination, plan of care, and intervention process, there are additional factors that could have been implemented. In terms of history obtained during the initial evaluation, it would have been beneficial to learn more about the surgical procedure with regard to the specific type and location of the autograft used. This would have allowed for more direct comparisons with literature. Additionally, it would have been worthwhile to gain more information about her previous L MPFL surgical procedure and rehabilitation process in order to compare and track progress in a more objective manner.

Regarding examination procedures, additional special tests and functional assessments could have been conducted, both on the post-operative and non-operative knee, as a way to gain more insight into musculature weakness, tightness, or imbalance. Specifically, balance testing and transfer ability could have assessed to a greater extent.

The patient’s plan of care could have consisted of modified short- and long-term goals as the patient progressed throughout her rehabilitation process. For instance, the patient achieved her R knee flexion ROM goal of 110 degrees at visit 9. A new ROM goal could have been made to provide another form of motivation for the patient to remain faithful to her home exercise program and achievement of new goals. Additional referrals could have been made had the patient obtained poor outcomes, including a referral or consult with an orthopedic
specialist. This would have been an appropriate step to take to identify underlying causes for limited success (such as re-dislocation or impaired tissue healing). The patient had regular follow-up visits with her referring physician throughout the recovery process.

Areas where further evidence could be sought include the rigorous nature of the rehabilitation process in comparison to other MPFL cases. Moreover, evidence surrounding the combination and timing of differing interventions used could be studied in greater depth. The more that one studies the successful interventions used and the timelines in which they are used (such as that of Fithian et al\textsuperscript{10} and this case report), the more refined the MPFL protocol can become. Thus, the likelihood of achieving excellent outcomes and reaching goals in physical therapy is increased.
Figure 1. Lateral knee anatomy showing the origin and insertion of the MPFL.  

*aImage from Hennrikus & Pylawka’s Patellofemoral Instability in Skeletally Immature Athletes.*

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Table 1. Right Knee Flexion (measured in degrees)

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<tr>
<td>8</td>
<td>105</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Visit 1 was a PROM measurement. All other visits were AROM measurements.

\textsuperscript{b}During Visit 4, the patient was frustrated, guarded, and had significant R knee pain, which she attributed to walking long distances the previous day.

\textsuperscript{c}ROM GOAL MET.

Table 2. Level of Pain

<table>
<thead>
<tr>
<th>VISIT</th>
<th>PAIN</th>
<th>VISIT</th>
<th>PAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>9</td>
<td>0-1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>10</td>
<td>2-3</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3-6</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3-6</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pain was measured using the 0-10 Numeric Pain Rating Scale\textsuperscript{13} and was located at the R knee joint.

0: No Pain - Comfortable
1, 2, 3: Mild Pain - Bothersome, Annoying, Irritating, Nagging
4, 5: Moderate Pain - Aggravating, Grueling, Upsetting, Frustrating
6: Severe Pain - Miserable, Gnawing, Fierce, Piercing
Table 3. FOTO Functional Scores

<table>
<thead>
<tr>
<th>FUNCTIONAL SCORES</th>
<th>INITIAL</th>
<th>VISIT 12</th>
<th>AMOUNT OF PHYSICAL CHANGE</th>
<th>PREDICTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>28</td>
<td>52</td>
<td>32</td>
<td>60</td>
</tr>
</tbody>
</table>

FOTO—Focus on Therapeutic Outcomes\(^{14}\) generates functional scores (FS) on a 0-100 scale. A higher score implies higher functioning and a lower score implies a lower level of function. The patient’s initial FOTO FS of 28 indicates a low level of functioning. At visit 12 (the last visit that she took this assessment), her FOTO FS was 52, with a physical FS increase of 32. Her predictive discharge FS score was 60, revealing the potential to make additional functional gains.
REFERENCES


