Nonsurgical Resolution of a Bucket Handle Meniscal Tear: A Case Report

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Abstract

A bucket handle meniscal tear (BHMT) often causes intermittent locking of the affected knee as the displaced fragment flips into the intercondylar notch. Surgical correction is usually required. Rare spontaneous healing of BHMTs has been described, primarily in young patients. This case report describes a 43-year-old man with magnetic resonance imaging–confirmed medial BHMT who received 3 treatments of platelet-rich plasma injections in and around the meniscus within 7 months after the diagnosis of the tear. The patient reported resolution of pain with walking 8 months after the injury. Magnetic resonance imaging 10 months after the injury and arthroscopy 47 months after the injury showed complete resolution of the meniscal tear.

Introduction

A bucket handle tear of the meniscal fibrocartilage (BHMT) is a "longitudinal tear with an attached fragment displaced away from the meniscus" [1]. This type of tear is considered unstable and has poor healing potential [2]. A report that included 272 BHMTs demonstrated no evidence of healing at the time surgery was performed [3]. The standard of care is the surgical inside-out suture repair technique, which may cause injury to the saphenous nerve, peroneal nerve, or popliteal vasculature [4]. Four case reports have described spontaneous resolution of BHMTs, with 2 cases in patients who were 17 and 23 years old with anterior cruciate ligament (ACL)-deficient knees and 2 cases in an 11-year-old and a 71-year-old with intact ACLs [5-8].

Case Report

A 43-year-old man with a history of a traumatic right ACL tear diagnosed with magnetic resonance imaging (MRI) 2 years prior presented to the emergency department in August 2009 with sudden-onset right knee pain and locking. Since the ACL tear occurred, the patient had intermittent episodes of knee “catching” (without locking) and pain that lasted several weeks before resolving. The patient had a normal body mass index, was active, and practiced martial arts on a regular basis during this time. This acute episode started after twisting on a planted right leg. Immediate swelling ensued, and the patient was unable to bear weight or fully extend the knee. The physical examination was limited by pain but demonstrated anterior laxity of the tibia. Radiographs and results of blood work were normal. Right knee MRI was performed the next day and demonstrated a pre-existing complete ACL tear, a new right-sided medial BHMT in the peripheral third, and a mild medial collateral ligament (MCL) sprain. The posterior horn and midbody were subluxed into the intercondylar notch (Figure 1A). Pertinent review of systems, medical history, and surgical history were noncontributory.

The patient was unable to bear weight until the fifth day after the injury when a chiropractor manipulated the knee; afterward, he was able to ambulate without crutches. Two weeks after the meniscal injury, the knee was evaluated by an orthopedic surgeon, and a partial meniscectomy and ACL reconstruction were recommended. The patient reported to our facility 4 weeks after his injury seeking a nonsurgical solution for his meniscal tear. He reported pain levels of 8/10 on the Visual Analog Scale. Physical examination demonstrated mild anterior edema with a positive patellar ballottement test, an antalgic gait, an equivocal Lachman’s test as a result of muscle guarding, and mild medial collateral instability with valgus stress at 30° of flexion. The patient was unable to tolerate McMurray’s test on the
Flexion and extension were limited by 10°. Pain with palpation was noted at the medial and posteromedial joint line and at the MCL with crepitus at the medial joint line. Evaluation with ultrasound was performed to establish a baseline and identify the position of the medial fragment, which was displaced as described in the MRI. As expected, a posterior horn and body medial meniscus tear was identified; the subluxed portion appeared to have returned to anatomic position. Further findings included a moderate joint effusion, a small Baker’s cyst, and a thickened hypoechoic MCL with poor fibrillar pattern.

After evaluation, surgical correction was strongly recommended because of the extensive nature of the tear and mechanical symptoms. The patient refused surgery and inquired about alternative options. After discussions regarding costs, risks, and the available data on platelet-rich plasma (PRP), and acknowledging the recommendation for surgery, the patient chose to pursue PRP injections. Because the medial meniscus tear included the attachment to the MCL, it was recommended that the MCL sprain be included in the treatment with PRP. The patient asked that PRP also be injected into the previously torn ACL.

Figure 1. (A) A magnetic resonance imaging scan showing an anterior cruciate ligament tear, a mild medial collateral ligament (MCL) sprain, and a bucket handle tear of the medial body and posterior horn of the medial meniscus. Left: Coronal oblique proton density image of the medial body subluxed into the intercondylar groove (black arrow). The meniscofemoral and meniscotibial portions of the MCL display high signal consistent with a mild sprain. Right: A sagittal proton density image at the intercondylar groove showing the classic appearance of a “double PCL” sign. The subluxed medial meniscus is imitating the posterior cruciate ligament (PCL; black arrows). The actual PCL is delineated by hollow arrows. (B) A magnetic resonance imaging scan showing a healed MCL tear and bucket handle tear of the medial body and posterior horn of the medial meniscus. Left: A coronal oblique proton density image of the medial body no longer subluxed into the intercondylar groove. The meniscofemoral and meniscotibial portions of the MCL now display normal signal consistent with a healed tear. Right: A sagittal proton density image at the intercondylar groove showing a normal single PCL and adjacent tibial insertion of the posterior horn medial meniscus.
Three sets of PRP injections were performed in the right knee at 6, 16, and 27 weeks after the injury. During each procedure, 7 mL of leukocyte-rich PRP (a 9-fold increase in platelet concentration) were injected into the MCL, peripheral medial meniscus from medial body to posterior horn, and the ACL insertion at the tibia, using ultrasound guidance. After each procedure the patient reported 2-4 days of increased pain and decreased active range of motion. Oral analgesics other than anti-inflammatory drugs and auxillary crutches were utilized as needed. An 8-week follow-up was scheduled after each treatment.

Eight weeks after the first treatment, the patient reported 60% decreased pain at rest and fewer episodes of knee locking. Eight weeks after the second treatment, the patient reported resolution of pain at rest. Eight weeks after the third treatment, the patient reported resolution of pain with walking and performing activities of daily living. His pain increased to a maximum of 3/10 on the Visual Analog Scale when performing Tai Chi and Kung Fu. Ultrasound imaging showed diffuse improvement of tissue organization at 24 weeks and healing of the MCL and medial meniscus tear at 35 weeks after the injury (Figure 2). A follow-up MRI scan 43 weeks after the injury demonstrated complete repair of the BHMT and the MCL tear (Figure 1B) with no change in the ACL.

The patient was released to sports participation at the same level as prior to his meniscal tear. At the last evaluation, approximately 16 months after the injury, the patient reported no pain at rest, during activities of daily living, or after physical activity/exercise. Physical examination of the right knee was normal with the exception of Lachman’s test, which was unchanged. During a phone follow-up, 18 months after the final treatment, the patient reported that he was doing well and had not had any new problems with the knee. During the next 2 years, the patient continued to experience the same anterior instability that he had since the preceding ACL injury 2 years prior to the meniscal tear, but without the episodes of “catching.” To limit further meniscal tears and to optimize stability, the patient underwent surgical correction for ACL reconstruction 4 years later. During the procedure the surgeon probed the superior and inferior aspects of the entire meniscus and according to the operative report, found “no evidence of a medial meniscus tear whatsoever.”

Discussion

Almost 50% of persons with incidental MRI findings of BHMTs have a torn ACL [1]. Initial MRI of the meniscus demonstrated a displaced meniscal fragment into the intercondylar groove, which may not have occurred if a torn ACL did not allow for increased laxity. Chiropractic manipulation and general use may have resulted in the fragment reverting back into place before the PRP injection. Further stability was provided by the intact anterior and posterior attachments of the meniscus. Had the fragment remained displaced or the anterior or posterior attachment been lost, it is unlikely that the patient would have experienced healing of the BHMT.

The menisci are historically described as avascular structures and thus incapable of repair except in the periphery. Microscopic analysis of human menisci has demonstrated vascular synovial tissue covering the anterior and posterior horns of the menisci, which supply vessels to the underlying meniscus as deep as the inner one third [9]. The patient’s tear was within the peripheral third of the meniscus and was likely within a vascularized portion.

The evidence of spontaneously healed BHMTs in 4 other patients suggests that this patient’s BHMT may have healed spontaneously after reduction of the

Figure 2. Ultrasound images showing the medial collateral ligament (MCL) and the medial body of the meniscus before and after treatment with platelet-rich plasma. Left: A coronal image showing the hypoechoic, thickened MCL (thickness indicated by solid white lines) and the irregular, triangular outline of the torn meniscus between the femur and tibia (indicated by the solid arrow). Right: A coronal image in the exact same slice (as confirmed by the hyperechoic, linear signal with acoustic shadowing indicating calcification/small avulsion at the proximal MCL tear that is seen on the pretreatment image) after treatment. The MCL now has normal thickness, a clear fibrillar pattern, and improved echogenicity. The medial meniscus now appears more integrated with the overlying MCL with improved echogenicity and homogeneity.
displaced fragment, without any treatment with PRP [5-8]. PRP is concentrated autologous platelets that are injected directly to the point of degeneration or trauma, and some evidence indicates that PRP might be used to stimulate human chondrocyte proliferation and improve healing of the peripheral meniscus [10,11]. The role of PRP injections in this patient’s healing is unknown.

Conclusion

This case illustrates that reduced BHMTs have the potential to be repaired in a middle-aged population without surgical intervention. Further studies are needed to evaluate nonsurgical healing of reduced BHMTs with and without PRP injections to determine if there is a significant difference in patients treated with PRP.

References


