

Arthroscopic repair of bilateral popliteomeniscal fascicle tears in a professional football player

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INTRODUCTION

Meniscal tears in football players are among the most common pathologies seen, particularly in the lateral compartment where the athletes subject the meniscus to high valgus loads.^{1,2} The lateral meniscus is an integral biomechanical structure in the knee, bearing 70% of the load of the lateral compartment.³ In patients with lateral meniscal injury, severe and rapid progression of chondral disease has been reported within months after aggressive partial menisectomies.⁴ Long-term follow-up after the same treatment also has shown poor clinical outcomes.^{5,6} A recent study of professional football players found that a history of partial meniscectomy may shorten a player's career.⁷ Poor clinical outcome reports combined with biomechanical evidence of a 200% increase in peak contact stress and shear stress in articular surface cartilage after lateral meniscectomy compared to medial meniscectomy has led some authors to propose that a lateral meniscectomy has more risk for degeneration than a medial meniscectomy.⁸ Therefore, the meniscus should be repaired if possible. Meniscal repair for competitive athletes has been shown to have good results, even if the tears extend into the avascular zone of the central portion of the menisci.⁹ But, this repair has been questioned in the avascular zone of the meniscus within the region of the popliteal hiatus because of the limited blood supply to the periphery of posterolateral meniscus.^{10,11} Traditional treatment for lateral meniscal tears extending into the popliteal hiatus was total meniscectomy.¹¹ However, new studies have advocated alternative techniques of repair with good success, such as augmenting the repair by placing an exogenous fibrin clot across the seam of the suture or wrapping the repair in a muscular fascial sheath.¹²⁻¹⁴

The anatomic position of the popliteomeniscal fascicles in relation to the popliteus tendon and posterolateral meniscus

has been well established.¹⁵⁻¹⁹ More studies have elucidated the biomechanical contribution of the fasciculi to lateral meniscal stability.²⁰⁻²³ Because of the significant contribution of the lateral meniscus to maintaining the integrity of the articular cartilage of the knee, it is vital that these popliteomeniscal fascicles remain intact. Surgical techniques for repair of the popliteomeniscal fascicles have not been widely published. LaPrade²⁴ has advocated open repair of injuries to the popliteomeniscal fascicles with good results in a case series. Others have experienced good results with an arthroscopically assisted, inside-out technique.²⁵ Some argue that in this region performing a subtotal meniscectomy in high level athletes allows quicker return to play, however, the detrimental effects of partial lateral meniscectomy have been well established.^{5,6,26} New all-inside suture meniscal repair devices and techniques have been shown to be safe and effective for lateral meniscal repair prompting us to believe that injuries to the popliteomeniscal fascicles can be repaired with an all-inside technique as well.²⁷⁻²⁹ We present a case of two different injuries to the meniscus and popliteomeniscal fascicle in a single professional athlete in whom an all-inside arthroscopic technique resulted in healing of the injuries, resolution of symptoms, and return to play at an elite level. All investigation and surgical techniques described in this report were performed with informed consent and comply with all institutional review board guidelines.

CASE REPORT

A 28-year-old strong safety injured his right knee while performing a cutting maneuver during a game. The patient could bear weight but was unable to completely extend his leg, and the knee had a moderate effusion. He had lateral joint-line tenderness, but the Lachman and drawer tests were negative.

MRI demonstrated that the substance of the meniscus was intact, but there was a disruption of the fasciculi (Figure 1). He also had some degenerative changes of the lateral facet of his patella and a 10 mm area of partial thickness chondral injury on the medial femoral condyle. He had no other injury within the lateral compartment. A decision was made to treat the injury operatively to provide the best chance of healing and return to play.

When arthroscopy was performed the meniscus could be pulled into the center of the compartment and the fascicle tear seen (Figure 2). The meniscus was then repaired with an all inside technique using four anchoring devices (Figure 3). The bed of the meniscocapsular junction was prepared using an arthroscopic rasp and curved shaver to create a fresh bed

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Financial Disclosure: Russell Warren, MD receives royalties from Biomet, stock options from Ivy Sport, and stock options from Cayenne. The authors report no conflicts of interest.

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FIGURE 1. Sagittal fast-spin echo MRI of torn posterior inferior fascicle in Case #1 (arrow).

of bloody tissue for repair. No biologic augments were utilized. The suture repair device was placed in a horizontal mattress type fashion to secure the meniscus to the capsule and was then tensioned appropriately. The chondral lesions on both the patella and the medial femoral condyle were not full thickness and debrided. Postoperatively the patient was on crutches for 4 wk and toe-touch weight bearing. He progressed to full weight bearing by 6 wk and started bicycling. He was able to return to play at 4 mo; however, because his injury was in the middle of the season, he did not return to high-level competition until the following



FIGURE 2. Arthroscopic image (Case #1) of lateral meniscal fascicular tear and subluxation of the meniscus into the joint when probed.

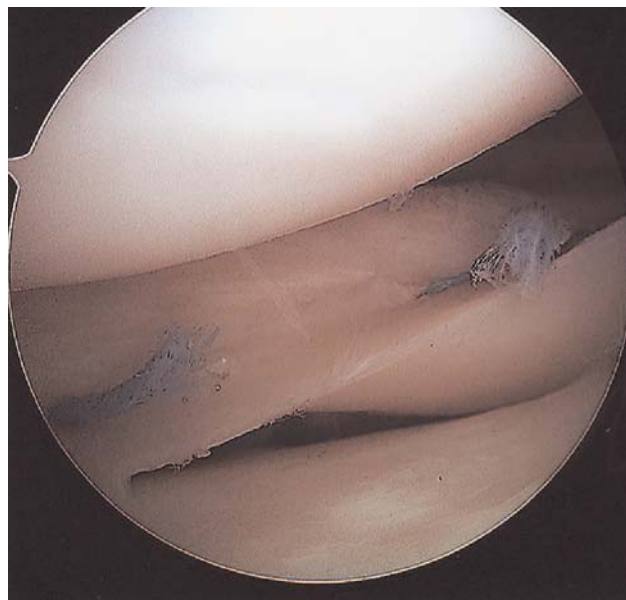


FIGURE 3. Arthroscopic image of lateral meniscal repair with Fas T-Fix device (Smith and Nephew, Andover, MA) (Case #1).

year. Routine MRI was performed at 6 mo postoperatively and showed healing of the fasciculi (Figure 4).

He participated in preseason camp without any difficulty and was able to compete at a level commensurate with his ability before the surgery. He started two games at safety but during the second game he performed another aggressive football maneuver and felt his left knee give way. This was the contralateral knee to his surgically repaired knee. His left knee locked and could not be reduced. The knee lacked approximately 5 degrees of flexion. MRI revealed a tear of both meniscal fasciculi with extension medially and laterally along the meniscocapsular interval. The torn meniscus



FIGURE 4. Sagittal MRI fast-spin echo image of scarred fascicle to posterior capsule at 6 mo postoperatively (Case #1).

had subluxed into the joint and provided a mechanical block to extension.

The patient again underwent arthroscopic surgery to repair his lateral meniscus. He had some grade 2 and 3 changes of the lateral facet of the patella without any full-thickness defects. These were debrided using a shaver. The lateral meniscus had subluxed into the center of the lateral compartment and was reduced using a probe (Figure 5). The bed of the meniscocapsular junction was once again prepared using an arthroscopic rasp and curved shaver to create a fresh bed of bloody tissue for repair. A total of six FAST-FIX devices (Smith & Nephew, Andover, Massachusetts) were placed in a horizontal mattress type fashion to secure his meniscus to the capsule (Figure 6). In addition, at the end of the case a small amount of fat pad was debrided to induce bleeding. No synthetic biologic augments were used. The patient began running after 4 mo and returned to full activity at 6 mo for the start of the off-season conditioning program, and he played the entire following season. He played a full second season after that and then retired after a 9-year career. Two years after his second surgery the patient had full range of motion, no effusion on either knee, and minimal degenerative findings on radiographs.

DISCUSSION

The popliteomeniscal fascicles exist as a cartilaginous connection between the posterolateral meniscus and popliteus tendon and play an important role in lateral meniscal stability.²⁰⁻²³ Simonian *et al.* demonstrated that the translation of the meniscus increases by 78% when both fascicles have been disrupted.²⁰ However, popliteomeniscal fascicle injury can be difficult to diagnose.²³⁻²⁵ Symptoms such as vague lateral knee pain have been described. In both instances, this patient had pain with tenderness laterally upon palpation in the figure of four position. The figure-of-four test produces a varus load on the knee that opens the lateral compartment and stresses the lateral meniscus to

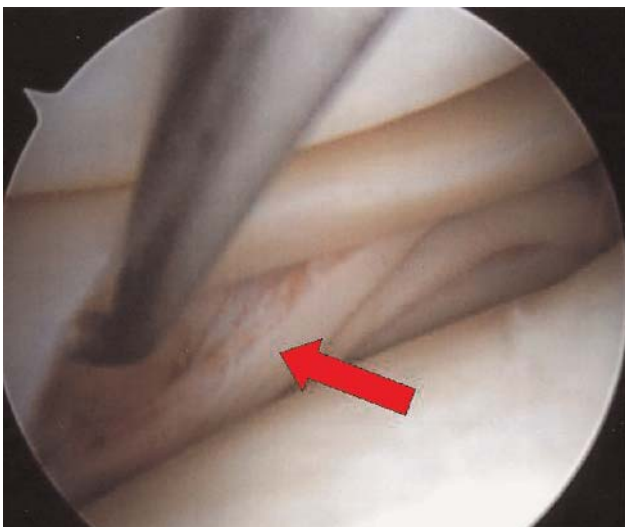


FIGURE 5. Arthroscopic image (Case #2) of lateral meniscal fascicular tear and subluxation of the meniscus into the joint when probed.

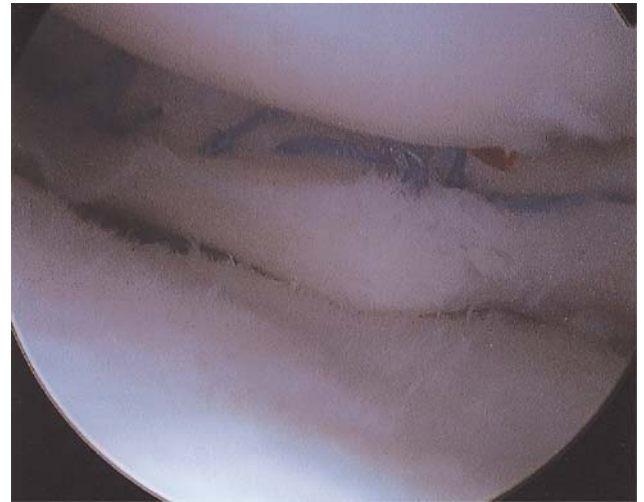


FIGURE 6. Arthroscopic image of lateral meniscal repair with Fas T-Fix device (Smith and Nephew, Andover, MA) (Case #2).

reproduce symptoms by having the remaining meniscus pull on the capsule.²⁴ In both cases the patient reported lateral sided joint pain and tenderness to palpation of the lateral compartment when placed in the figure-of-four position. However, the diagnosis was made easier in one of our cases because the meniscus was trapped in the joint and effectively locked the knee. The mechanical block to extension made either a displaced meniscal tear or loose body seem likely. However, these diagnoses are frequently missed. In one case the diagnosis was made with MRI, which revealed a subtle disruption of the popliteomeniscal fascicles in the absence of a discrete meniscal tear. Furthermore, even MRI cut with 3-mm slices may miss a fascicle tear, so a high index of suspicion should be maintained in patients who present with an appropriate clinical picture.²⁵

Once a popliteomeniscal tear has been diagnosed the treatment options are varied. Because of its limited blood supply, the fascicles are unlikely to heal when treated conservatively and symptoms may persist. While partial or subtotal meniscectomy will effectively eliminate symptoms and hasten return to play it should be strongly discouraged. The repeated valgus loads combined with the absent protective effects of the meniscus in effect may condemn patients who have had a meniscectomy to a degenerative knee at an early age. LaPrade *et al.*²⁴ reported effective treatment of six popliteomeniscal tears with open repair. Others have discussed arthroscopic repair of popliteomeniscal fascicle tear with an inside-out technique.²⁵ With the advent of all-inside devices, these injuries can be effectively treated arthroscopically. This requires multiple sites of fixation to ensure reattachment. Typically, the all-inside devices will penetrate the meniscus and secure it to the fascicles in a horizontal mattress type fashion to return stability and congruency to the anatomic unit.

The patient returned to play at the professional level at 4 mo postoperatively without complications. Of note, in each case the injury ended the player's season. While, in theory, repair of the fascicle provides the optimal treatment modality for the long-term health of the knee joint, this has

yet to be proven. In this study we demonstrate the effectiveness of an all-inside technique in the repair of the popliteomeniscal fascicles to allow return to play in a professional athlete. Larger case series and longer term studies will be required to determine whether degenerative changes in the lateral compartment have been avoided by repair.

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