

Self-limited healing of a radial tear of the lateral meniscus

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Abstract Radial tears of the meniscus have for decades been treated with partial meniscectomy. However, unstable radial tears usually involve the vascular zones where the circumferential collagen fibers are located. Therefore, in recent years, there has been a great strive to repair radial tears. To the author's knowledge, this is the first case report of a self-limited healing of a radial tear of the lateral meniscus. The patient had a prior injury where he sustained a radial tear to his lateral meniscus and underwent a limited partial meniscectomy. A second-look arthroscopy was performed only after a second injury to the same knee occurred several months later, and it revealed that the radial tear of the lateral meniscus had spontaneously healed. The patient recovered well and returned to full athletic activities.

Level of evidence Case—report, Level IV.

Keywords Lateral meniscus · Radial tears · Mid-body · Meniscal repair · Partial meniscectomy

Introduction

The menisci are an important structure for normal knee function. They are responsible for load-bearing, energy absorption, lubrication of the articular cartilage, and joint stability [2, 12, 17]. The circumferential fibers are responsible for most of these functions and lie in the peripheral red–white and red–red zones [5]. Injury to these zones is

typically seen with radial-type tears and can be quite detrimental to knee function. Over the last several decades, there has been a greater appreciation for meniscal function, specifically concerning radial tears. This has led to more aggressive techniques to treat radial tears that extend into the vascular red–red and red–white zones [3]. These techniques have evolved from open repairs to arthroscopic and arthroscopic-assisted repairs, including the inside-out [11, 13, 16], outside-in [4, 7], and all-inside repairs [3, 9].

However, no case of self-limited healing of a radial tear following a partial meniscectomy was found in the literature. This case report presents a complex radial tear of the lateral meniscus that was deemed irreparable by the author and was found to have self-healed following a second-look arthroscopy for a new injury to the same knee.

Case report

An 18-year-old male American football player presented for the evaluation of left lateral-sided knee pain. He sustained a hit to the anterolateral aspect of his left knee by his opponent's helmet. He denied any catching or locking sensation.

Because of the limitations with his activities and pain along the lateral joint line, a magnetic resonance imaging (MRI) scan was ordered. The MRI revealed a tear of the posterior horn of the lateral meniscus involving a sagittally oriented radial tear of the posterior horn and a free edge tear of the mid-body of the lateral meniscus (Fig. 1). Arthroscopic inspection of the lateral compartment confirmed a complex radial tear at the junction of the mid-body and posterior third of the lateral meniscus approximately 1 cm anterolateral to the popliteus hiatus. The radial tear involved the red–white zone along with an

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Fig. 1 MRI T2 coronal and T1 sagittal image of the left knee demonstrating a sagittally oriented radial tear involving the posterior horn of the lateral meniscus measuring 5 mm

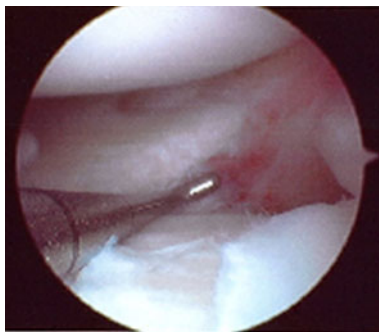
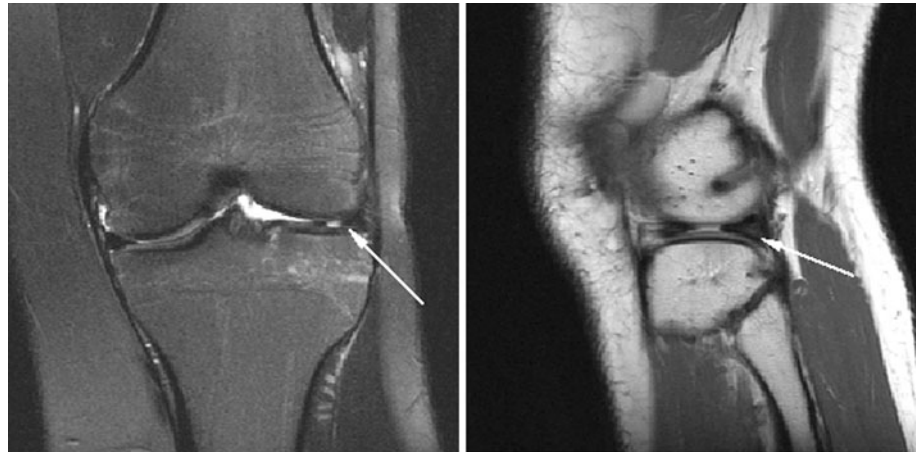


Fig. 2 Arthroscopic photograph of the radial tear described by the MRI in Fig. 1. This is located 1 cm anterior to the popliteal hiatus with a gap/defect making a direct repair impossible

unstable flap tear component. A limited partial lateral meniscectomy was performed to remove any unstable fragments and contour the tear to avoid further propagation. Because there was a significant gap between the posterior edge and anterior edge of the radial tear (Fig. 2), a repair was believed to not be possible.

Recovery included weight-bear as tolerated with the use of crutches in the early post-operative period followed by

increased activities. At 18 days post-operative, he presented with a hemarthrosis where 60 ml of dark sanguinous fluid was aspirated. Subsequently, he was treated with ice therapy with a short course of knee immobilization (5 days) and the use of crutches. Full activities as tolerated were allowed at 6 weeks post-operatively when he had a pain-free left knee and full range of motion.

At 4.5 months post-operatively, he was doing well and returned to football when he was hit again by a defensive lineman's helmet to the lateral side of the left knee. Examination revealed an antalgic gait and lateral joint line tenderness. However, this time he also had pain to palpation proximal to the lateral joint line, and he reported occasional catching. Another 1.5-tesla MRI scan reported no evidence of a re-tear in the lateral meniscus (Fig. 3). Despite conservative management for 4 weeks including physical therapy, the patient did not improve. A repeat diagnostic arthroscopy was performed. An articular loose body without subchondral bone was removed. This measured 1.5×1.5 cm. The origin was from the lateral edge of the lateral femoral condyle. Remarkably, the previous radial tear at the junction of the mid-body and posterior third of the lateral meniscus had self-healed with no gap

Fig. 3 MRI T2 coronal image and T1 sagittal image of the left knee. There is no evidence for a re-tear in the posterior horn of the lateral meniscus

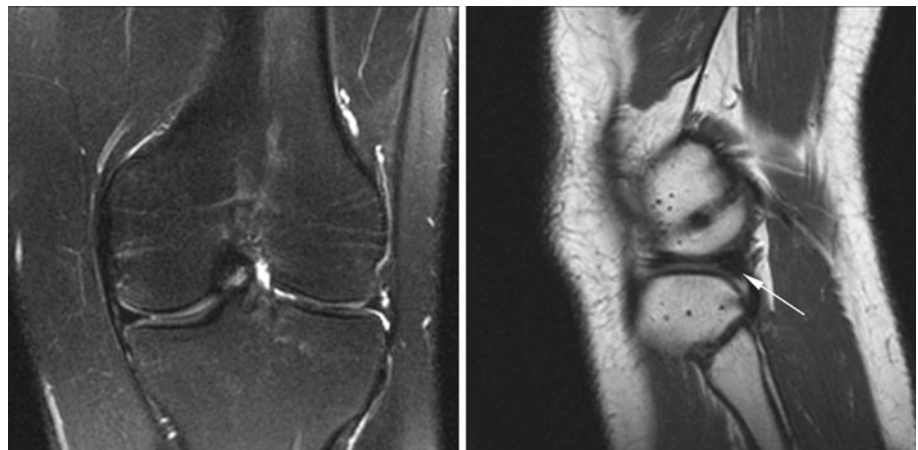
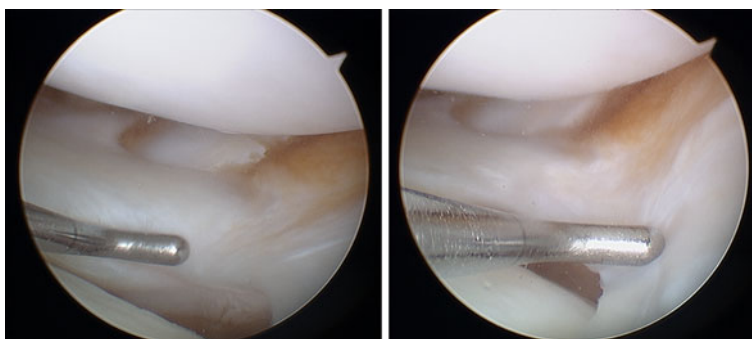


Fig. 4 Second-look arthroscopic photographs of a self-limited repair at the previous location of the radial tear with gap/defect after a partial meniscectomy



or tear (Fig. 4). The patient's symptoms immediately improved after loose body removal and his recovery has remained uneventful. He returned to full activities by 6 weeks and played the last three games of his collegiate season. He remains pain free with normal clinical knee function at 11 months post-second-look arthroscopy.

Discussion

The key finding of this case report was that it brought attention to the issue of a possible ability for self-limited repair of a radial tear of the lateral meniscus that extends into the vascular zone in a healthy young adult. This finding may add more information to our surgical attempts of radial tear repairs and encourage more sports arthroscopists to repair rather than debride these detrimental tears. Perhaps in the near future, repairs of radial tears will be more commonplace.

The complex radial tear of the lateral meniscus in this patient had a unique feature in that there was a significant gap/defect between the free edges of the tear that made direct repair very difficult. The evidence of self-limited repair to the radial tear of the lateral meniscus would most likely have never been discovered had it not been for a re-injury to this individual's same knee. Fortunately, this patient was able to return to normal level of activity and has been symptom-free.

To the author's knowledge, this report is the first to describe self-limited healing of a radial tear of the lateral meniscus. Magee et al. [10] reported that an incidence of radial tears in 14% of the 200 patients who had a knee arthroscopy. The most common location of a radial tear that they found was at the mid-body of the lateral meniscus. This is precisely the location of the radial tear in this patient.

Radial tears of the lateral meniscus are most commonly treated with a partial meniscectomy. Partial meniscectomy has been shown to reduce joint surface contact area by 75% and increase compartment peak load contact stresses by more than 350% in some experimental studies [1, 15].

Also, knees with intact menisci have a 20% higher shock-absorbing capacity compared to knees that have had a meniscectomy [1].

Until recently, radial tears of the lateral meniscus were treated with partial meniscectomy to remove unstable fragments that may cause mechanical symptoms and decrease further progression of the tear, but meniscectomy for radial tears in the vascular zone involving the red-red or red-white area can significantly reduce biomechanical function by disrupting the circumferential fibers in these zones, thus resulting in the inability to dissipate hoop stress [5]. Also, there are studies which have reported that degenerative changes occur more rapidly after lateral meniscectomy over medial meniscectomy [8, 14]. Therefore, repairs of radial tears of the lateral meniscus have become a recent topic of interest [3, 6, 13, 16]. Different techniques have been described in the literature for repairing radial tears of the lateral meniscus such as the outside-in repairs [7, 11], inside-out repairs [11, 13, 16], or all-inside repairs [3, 9]. Haklar et al. [6] reported complete healing by MRI assessment of repaired radial tears of the lateral meniscus using nonabsorbable sutures.

The limitation of this study is the single-patient case report with no long-term understanding of the effects of the self-limited repair. It is not known if the post-operative hemarthrosis from the first surgery played a significant role in the ability of this patient's lateral meniscus to self-repair. Currently, it is believed that radial meniscal tears have a poor ability to self-repair; thus, the increase in interest in surgical repair because of the high risk of the progression of early onset arthritis. However, this case report demonstrated symptom resolution of a potentially debilitating knee injury without the need for repair.

Conclusion

Radial tears of the meniscus have historically been treated with partial meniscectomy, but in recent years, there have been significant attempts to repair radial tears. To the author's knowledge, this is the first case report of a

self-limited healing of a radial tear of the lateral meniscus. This finding may add more information to our surgical attempts of radial tear repairs and encourage more sports arthroscopists to repair rather than debride these detrimental tears.

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