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Lateral meniscus “PASTA injury”: Partial-thickness radial tear of the lateral meniscus: A case report

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ABSTRACT

INTRODUCTION: We report a relatively rare case of partial-thickness radial tear in the inferior surface of lateral meniscus, while the superior surface is intact. This situation was similar to PASTA rotator cuff tear. Meanwhile, there is a full-thickness radial tear in the edge.

CASE PRESENTATION: A 17-year-old boy twisted the left knee while playing basketball. Magnetic resonance imaging (MRI) revealed radial tear of the lateral meniscus. During arthroscopy, it was found that there was a full-thickness radial tear of about 2 mm located in the edge. Partial meniscectomy was performed to treat radial meniscal tear located in the white area. After that, we found that the superior surface of the lateral meniscus was intact. However, in the inferior surface of the lateral meniscus, partial-thickness radial tear was found extending to red zone. We used FASTFIX (Smith & Nephew) for all-inside suture. As of three months after this surgery, the patient recovered smoothly.

DISCUSSION: Suspect that the force acts on a special position of meniscus and the thickness of the meniscus is uneven. Thus, it leads to partial-thickness radial tear in the inferior-surface, while the superior surface is intact.

CONCLUSION: Partial-thickness radial tears in the inferior surface of lateral meniscus are relatively rare. This situation was similar to PASTA rotator cuff tear. Because the superior surface of the meniscus is intact, it may results in misdiagnosis. It's easy to ignore the inferior surface injury.

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1. Introduction

Meniscus plays an important role in shock absorption, dynamic load distribution, joint congruity, joint lubrication, and proprioception [1]. Meniscal tear is the most common reason of the knee joint disorder. Tear patterns are classified into the following categories: discoid, vertical, bucket-handle, radial, oblique (parrot beak), horizontal, fray, root detachment, or complex [2]. Radial tears extending to the periphery of the meniscus have been shown to be equivalent to total meniscectomy because they reduce the meniscal tensile force [3]. Up to now, the most common anomaly is full-thickness meniscal radial tear. The case of partial-thickness radial tear of the lateral meniscus is relatively rare found in the literature. Here, this case reports a partial-thickness radial tear of the lateral meniscus. This situation was similar to PASTA (partial articular supraspinatus tendon tear) rotator cuff tear [4]. The superior surface of the rotator cuff was intact while the inferior surface was partial-thickness

tear. For the treatment, now a well-known and generally accepted reality is that preserving the meniscus tissue, or repairing it if possible, slows down this degenerative process [5]. This work has been reported in line with the SCARE criteria [6].

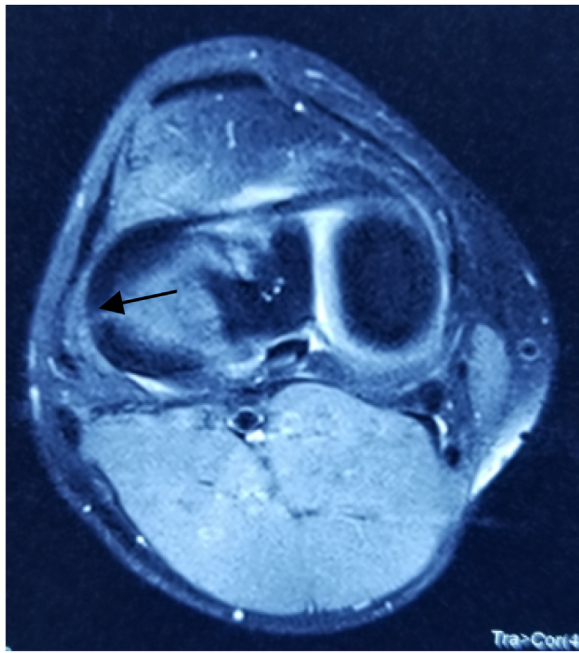
2. Presentation of case

A 17-year-old boy visited our hospital complaining of left knee pain. He had twisted the left knee while playing basketball one month earlier. On physical examination, range of motion in the left knee was 0–120°. The patient showed tenderness on palpation along the lateral aspect of the joint line and a positive result for McMurray's test on the lateral side. Anterior/posterior Drawer Test (-), Pivot Shift Test (-), and Magnetic resonance imaging (MRI) revealed radial tear of the lateral meniscus (Fig. 1).

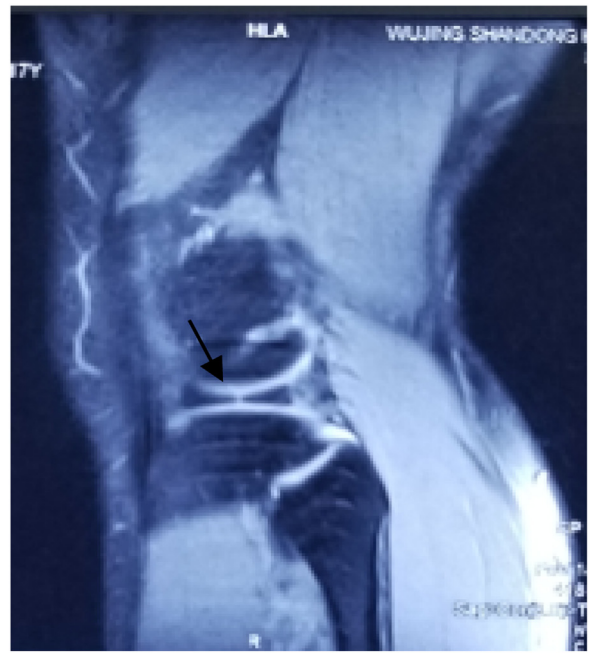
The clinic diagnosis was lateral meniscus tears. There was no significant relief of pain after conservative treatment for 1 month. So it was not suitable for conservative treatment. After that, arthroscopic surgery was performed. Radial tear of the lateral meniscus edge was confirmed on arthroscopic examination, and partial meniscectomy of the lateral meniscus rim was performed (Fig. 2). The lateral meniscus was sutured under arthroscopy. After that, the remaining

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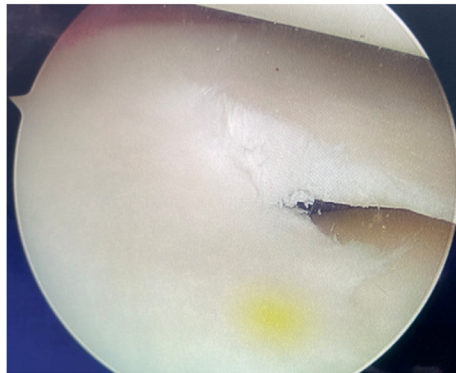


(a)

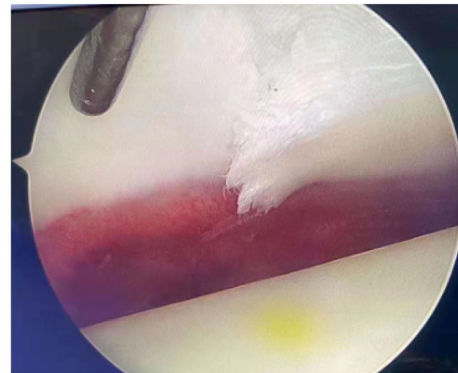


(b)

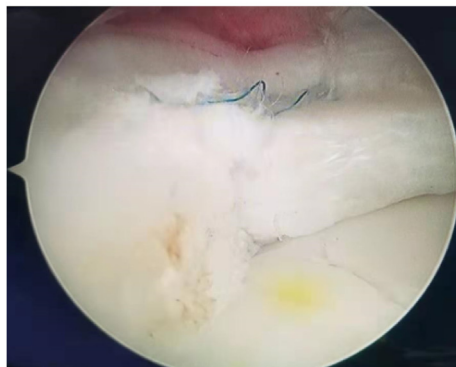
Fig. 1. MRI of left knee joint. Sagittal plane (a) and transverse view (b) images show radial tear of the lateral meniscus. The black arrows in (a) and (b) point to the meniscus radial tear.



(a)



(b)



(c)

Fig. 2. Intraoperative findings. Full-thickness radial tear of edge in white zone, red zone and red-white zone are intact (a). Inferior surface of lateral meniscus, partial-thickness radial tear extends to red zone(b). The meniscus was sutured with FASTFIX (c).

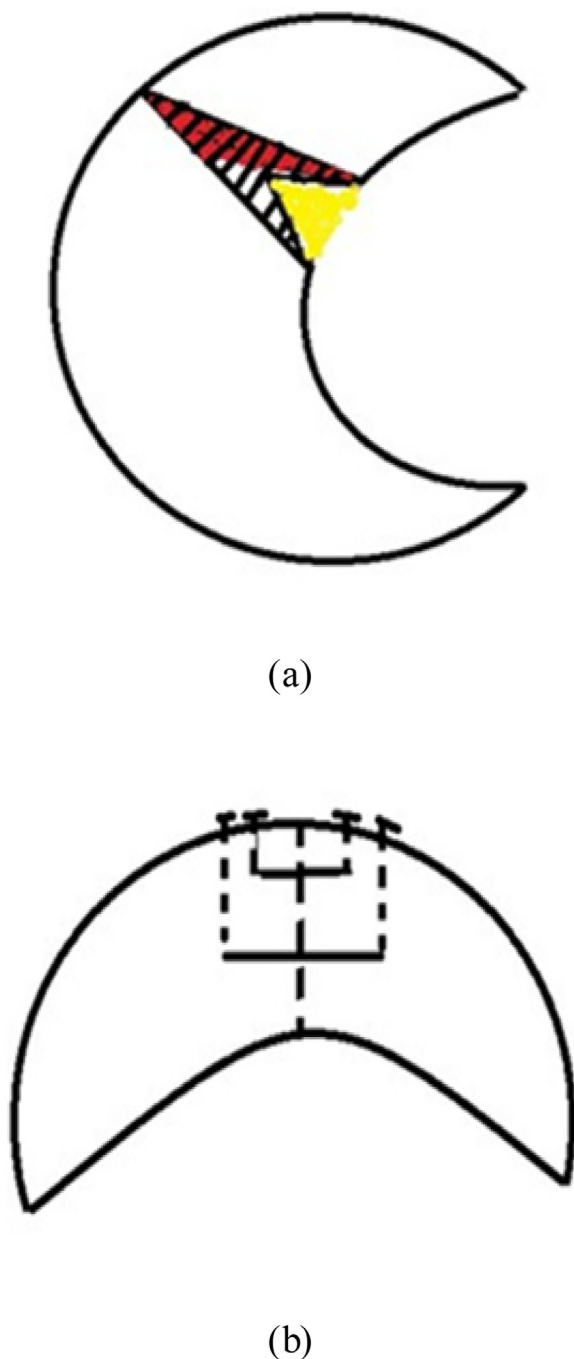


Fig. 3. Graphical representation.

The superior surface of the meniscus is intact and the inferior surface is partial-thickness radial tear, where yellow represents a full-thickness tear at the edge (a). Two stitches of total internal suture were performed using FASTFIX (Smith & Nephew) (b).

meniscus was probed. The superior surface of the meniscus was intact. However, in the inferior surface of the meniscus, partial-thickness radial tear was found extending to red zone (Fig. 2b). The meniscus was sutured with FASTFIX (Smith & Nephew) for two stitches. After suturing, the meniscus was stable (Figs. 2c and 3).

Physiotherapy and rehabilitation protocol include no weight-bearing activity for six weeks. During this time, the patient walked with the help of crutch after wearing adjustable knee braces (0°). Six weeks after the surgery, the patient returned to the hospital for reexamination. The knee brace was removed and weight-bearing

function exercises of the knee were gradually performed. There was no pain or discomfort when the patient did flexion and extension exercises. Three months after surgery, the patient returned to normal activity without any discomfort. Recent follow-up MRI of the left knee has not shown any morphological changes.

Written informed consent was obtained from the patient and his family for publication of this case report and accompanying images.

3. Discussion

Meniscus plays an important role in knee movement. The circumferential orientation of the meniscal fibers greatly contributes to their structural integrity [7]. Radial tears of the meniscus which perpendicularly transect the meniscal fibers, impair the transmission of circumferential hoop stress and are more biomechanically detrimental than longitudinal tears [6].

When we do meniscectomy for radial tears in the red-red or red-white area, biomechanical function will be disrupted [8–11]. Degenerative changes occur more rapidly after meniscectomy. There are different techniques that we can choose to repair radial tears. Outside-in, inside-out and all-inside repairs became widely used.

In this case, the lateral meniscus injury included full-thickness tear at the edge and partial-thickness tear in red-white and red zones. Firstly, partial meniscectomy of the lateral meniscus edge was performed. Then, the remaining meniscus was probed. During this examination, we found that the superior surface of the meniscus was intact. However, when we probed the inferior surface of meniscus, partial-thickness radial tear was found extending to red zone. Two stitches of total internal suture were performed using FASTFIX (Smith & Nephew) (Figs. 2c and 3b). This situation was similar to PASTA rotator cuff tear [4]. The superior surface of the rotator cuff was intact while the inferior surface was partial-thickness tear.

This is a relatively rare phenomenon. We suspect that the force firstly acts on the free edge of the meniscus. Because the free edge is weak, it leads to the full-thickness tear. However, in the red and white-red zones, the meniscus is thicker. Force is not enough to cause full-thickness tear. Thus it leads to partial-thickness radial tear in the inferior-surface extending to the red zone.

4. Conclusion

Partial-thickness radial tears in the inferior surface of lateral meniscus are relatively rare. Because the superior surface of the meniscus is intact, it may results in misdiagnosis. This situation was similar to PASTA rotator cuff tear [4]. The superior surface of the rotator cuff was intact while the inferior surface was partial-thickness tear. It's easy to ignore the inferior surface injury. In this paper, we presented this case. For the treatment, meniscectomy was performed at the edge of meniscus in white zone (avascular zone). Meanwhile, the tears in the red zone and red-white zone were sutured with FASTFIX (Smith & Nephew). The annular fiber in this area was retained, which could effectively retain the function of the meniscus and delay degeneration of articular cartilage.

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We have no sources of funding for our research.

Ethical approval

Since our article is a case report, no approval from the Ethics Committee is required in our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Guoquan Li performed arthroscopic surgery, collected data, and wrote the paper.

Hu Zhang assisted the arthroscopic surgery and helped to write the paper.

Hao Wu assisted the arthroscopic surgery.

Registration of research studies

Not Applicable.

Guarantor

Guoquan Li.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of Competing Interest

We have no financial and personal relationships with other people or organisations that could inappropriately influence our work.

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