

# Recurrent Baker's Cyst in a Pediatric Athlete: A Case Report

Gaurav Singh, BA<sup>1</sup>; Calandra Jones, MS<sup>1</sup>; Rebecca Peebles, DO<sup>2</sup>; Justin Bartley, MD<sup>3</sup>

<sup>1</sup>University of Texas at Tyler School of Medicine, Tyler, Texas

<sup>2</sup>The University of Texas Health Science Center at Tyler, Tyler, Texas

<sup>3</sup>Azalea Orthopedics, Tyler, Texas

**Corresponding Author** Gaurav Singh, BA. University of Texas at Tyler School of Medicine, Tyler, TX 75708 (email: gsingh2@patriots.uttyler.edu).

**Funding** The authors received no financial support for the research, authorship, or publication of this article.

**Conflict of Interest** The authors report no conflicts of interest.

**Informed Consent** Informed consent was obtained from parent for use of de-identified images and case information for the purposes of medical education.

## ABSTRACT

Also known as popliteal cysts, Baker's cysts are fluid-filled lesions found in the popliteal fossa, typically originating from the gastrocnemius-semimembranosus bursa. While these cysts are relatively common in adults, with a prevalence ranging from 5.0% to 41.0%, they are extremely rare in children, showing an incidence of just 2.4%. In most cases, Baker's cysts result from intra-articular knee pathologies that lead to an increased production and sequestration of synovial fluid. The authors present the case of an athletic 16-year-old adolescent boy with a recurrent left-knee Baker's cyst with magnetic resonance imaging showing no intra-articular pathology. Despite conservative treatment, including non-steroidal anti-inflammatory drugs, and several cyst aspirations, knee instability and pain persisted. Subsequent arthroscopy revealed a longitudinal tear of the posterior horn on the left medial meniscus, which was repaired. Following surgery, Baker's cyst was resolved. Two months postoperatively, the patient regained 88.0% of his pre-injury strength and successfully returned to sports.

**Keywords:** Arthroscopy; Baker's Cyst, Meniscus; Knee; Pediatrics

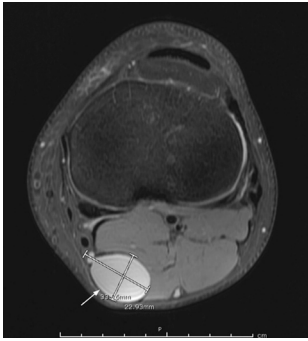
## INTRODUCTION

Also known as popliteal cysts, Baker's cysts are fluid-filled lesions that develop in the popliteal fossa, typically originating from the gastrocnemius-semimembranosus bursa. While common in adults, accounting for 5.0% to 41.0% of the population and often associated with degenerative joint conditions (eg, osteoarthritis, rheumatoid arthritis, meniscus tears, ligament injuries), these cysts are relatively rare in children, with an incidence of only 2.4%.<sup>1-3</sup> Unlike in adults, Baker's cysts in children are frequently a primary condition, arising from a herniated posterior knee joint capsule rather than being secondary to intra-articular pathologies.<sup>3,4</sup> Interestingly, research indicates that children who participate in sports are more likely to develop Baker's cysts, with one study reporting a prevalence rate of 60.7%.<sup>2</sup> This suggests that the repetitive stress placed on the knee during athletic activities may play a role in their formation.<sup>5</sup>

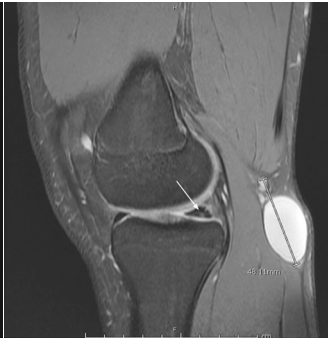
Despite their usual benign nature, Baker's cysts can cause significant discomfort and disability, particularly when they become large or rupture.<sup>3,6</sup> Ruptured Baker's cysts can mimic the clinical presentation of deep vein thrombosis.<sup>7</sup> Furthermore, a physical exam may not distinguish a Baker's cyst from other posterior knee

masses, such as soft-tissue tumors, hematomas, or lipomas.<sup>8</sup> This potential for misdiagnosis underscores the importance of accurate and timely evaluation.

The treatment approach for Baker's cysts depends on the presence and severity of symptoms, as well as the underlying cause.<sup>9</sup> Conservative management is often the first line of treatment for asymptomatic or mildly symptomatic cysts.<sup>2,3</sup> This typically involves rest, activity modification, non-steroidal anti-inflammatory drugs (NSAIDs), and physical therapy focusing on strengthening the muscles surrounding the knee.<sup>1,2</sup> For patients with persistent pain or functional limitations, aspiration of the cyst fluid followed by corticosteroid injection into the joint or cyst may provide relief.<sup>2,10</sup> However, it is essential to address the underlying cause of Baker's cyst to minimize the risk of recurrence. Surgical intervention is generally reserved for cases refractory to conservative measures with the intent of addressing the underlying condition that caused the effusion leading to the Baker's cyst. Studies have shown favorable outcomes for both non-operative and operative treatments.<sup>1-3,10</sup> For example, intracystic corticosteroid injection with cyst fenestration has been found to be effective in conservative management, while arthroscopic treatment of associated intra-



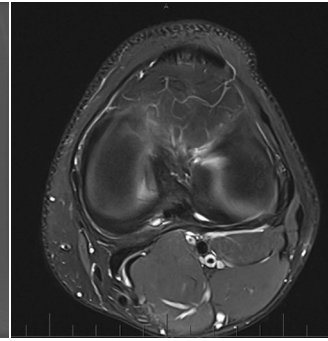
**Figure 1.** Initial Baker's cyst observed on T2-weighted axial MRI scan - pre-aspiration.



**Figure 2.** Sagittal MRI images showing cyst and slight signal change in the posterior horn of the medial meniscus, but no discrete tear.



**Figure 3.** T2 coronal image through the posterior horn of the medial meniscus, demonstrating no discrete meniscus tear.



**Figure 4.** T2-weighted axial MRI following second cyst aspiration reveals synovial fold with resolved cyst.

articular pathologies often leads to reduction or resolution of the cyst.<sup>4,9,11</sup> Despite positive results, it is important to note that recurrence rates can vary depending on the treatment approach and the continued presence of underlying conditions.

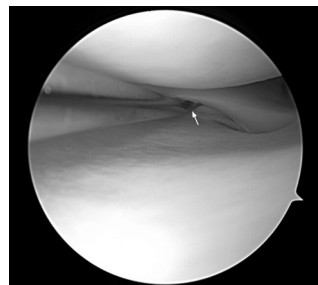
## CASE REPORT

An athletic 16-year-old adolescent boy presented to the clinic with left knee pain that had been present for approximately one year. He described the pain as pinching and aching, with a pain scale rating of 7 out of 10, which is exacerbated by physical activity and prolonged sitting. The patient noted subjective knee instability with frequent episodes of knee buckling during football practice. His physical restrictions included sports activities, squatting, pivoting, and carrying heavy objects. He did not report any recent injuries or trauma. The patient was previously treated by a primary care provider who provided a steroid injection and naproxen; however, no diagnostic tests or studies were conducted. His medical history was negative for smoking, alcohol, and illicit drug use. On physical examination of the left knee, tenderness was noted along the posteromedial and medial joint lines, accompanied by a palpable, mobile soft-tissue mass in the popliteal fossa. There was no evidence of soft-tissue adhesions, warmth, or erythema. McMurray's test was positive. The patient demonstrated full strength (5/5) on the straight-leg raise. Vascular assessment revealed good circulation with normal capillary refill time.

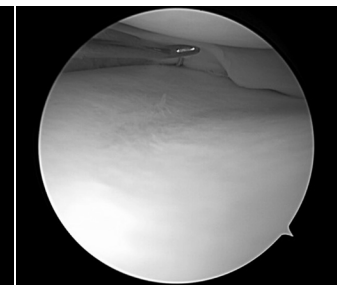
X-rays revealed no fracture or malalignment. Magnetic resonance imaging (MRI) confirmed the diagnosis of a large Baker's cyst dissecting posteriorly into the soft tissue superficial to the medial gastrocnemius muscle, measuring approximately 3.4 centimeters x 2.3 centimeters x 4.8 centimeters, with a large effusion in the knee (Figure 1). Of note, there was no evident underlying meniscus tear, ligamentous injury, cartilage lesion, or other specific cause of the knee effusion (Figures 2 & 3).

A stepwise approach was taken, which included non-operative care such as physical therapy, a home exercise program, over-the-counter NSAIDs, ultrasound-guided aspiration, and a steroid injection. The Baker's cyst initially resolved following aspiration and steroid injection; however, it reappeared within two weeks in the posterior knee, accompanied by pain, instability, and intermittent swelling. The cyst was re-aspirated to provide symptomatic relief and subsequently resolved (Figure 4). Despite this, the patient developed another Baker's Cyst with more severe pain in the posterior knee, indicating the need for surgical intervention to rule out any intra-articular pathology. Arthroscopic evaluation revealed a longitudinal tear of the posterior horn of the medial meniscus (Figure 5). An all-inside meniscus repair was performed with microfracture of the notch to augment healing (Figure 6).

Two months postoperatively, the patient was able to perform physical activities with minimal limitations and regained 88.0% of the left knee strength and endurance compared to the contralateral knee. Six months postoperatively, he showed significant improvement in knee function and pain. Single assessment numeric evaluation score increased from 40/100 to 90/100, visual analog scale score decreased from 75/100 to 30/100, and knee injury and osteoarthritis outcome score for joint replacement indicated reduced stiffness



**Figure 5.** Intraoperative arthroscopy revealing medial meniscus tear.



**Figure 6.** Intraoperative image of arthroscopic meniscal repair.

and symptom severity. Patient-reported outcome measures pediatric scores reflected stable mental health and improved quality of life. These findings suggest a successful recovery with better joint function, pain relief, and overall well-being.

## DISCUSSION

This case highlights the challenges of diagnosing and managing recurrent pediatric Baker's cysts, particularly when initial imaging is unclear. Unlike adults, where cysts often result from degenerative issues, pediatric cases are often idiopathic.<sup>3,4,12</sup> While the exact mechanism remains unclear, it is possible that repetitive microtrauma from sports could lead to increased synovial fluid production, promoting cyst formation in children.<sup>5</sup> Furthermore, sports-related injuries, such as meniscal tears, can contribute to the development of Baker's cyst, as the increased fluid production associated with these injuries may lead to cyst formation.<sup>12,13</sup> This case emphasizes the importance of conducting a comprehensive evaluation for intra-articular pathology when initial imaging studies are inconclusive and symptoms persist despite conservative measures.

The patient's MRI did not reveal any overt meniscal tear, prompting an initial conservative management approach.<sup>2</sup> While MRI is a valuable diagnostic tool, its sensitivity in detecting subtle or small intra-articular pathologies, such as meniscal tears, can be limited.<sup>1</sup> This limitation highlights the need for clinical vigilance, a high index of suspicion, and consideration of further diagnostic modalities, such as arthroscopy, when symptoms persist despite normal imaging results.<sup>14,15</sup> The arthroscopic procedure ultimately identified a medial meniscus tear that had been missed on MRI, underscoring the importance of direct visualization in cases of diagnostic ambiguity.<sup>14</sup>

The presence of the meniscal tear likely led to chronic joint inflammation and increased synovial fluid production, which contributed to the formation and recurrence of the cyst.<sup>3</sup> Repairing the meniscal tear addressed the underlying cause of joint irritation, effectively halting the cycle of fluid accumulation and cyst formation.<sup>3,12</sup> Ultimately, early and targeted intervention can significantly improve outcomes and quality of life for pediatric patients with recurrent Baker's cysts, especially when conservative treatments fail and imaging findings are inconclusive.

## REFERENCES

1. Kim DK, Lee KC, Kim JK, et al. Assessment of imaging factors associated with Baker's cyst rupture on knee MRI. *J Belg Soc Radiol.* 2023;107(1):77. doi: 10.5334/jbsr.3258.
2. Mansour MA, Shehata MA, Shalaby MM, et al. Baker's cyst in children: conservative management versus surgical excision according to clinical and imaging criteria. *Ann Pediatr Surg.* 2021;17(1):4. doi:10.1186/s43159-021-00071-1.
3. Baker's Cyst - StatPearls - NCBI Bookshelf. Accessed October 20, 2024. <https://www.ncbi.nlm.nih.gov/books/NBK430774/>
4. Demange MK. Baker's Cyst. *Rev Bras Ortop.* 2015;46(6):630-633. doi: 10.1016/S2255-4971(15)30317-7.
5. Abid A, Kelley JF, Flemming DJ, et al. A young male runner with a posterior knee mass--not just your typical Baker's cyst. *BMJ Case Rep.* 2016;2016:bcr2015213750. doi: 10.1136/bcr-2015-213750.
6. Mizumoto J. The crescent sign of ruptured baker's cyst. *J Gen Fam Med.* 2019;20(5):215-216. doi: 10.1002/jgf2.261.
7. Jamshed S, Snyder LM. An intact dissecting Baker's cyst mimicking recurrent deep vein thrombosis. *J Investig Med High Impact Case Rep.* 2016;4(2):2324709616650703. doi: 10.1177/2324709616650703.
8. Stacy GS, Kapur A. Mimics of bone and soft tissue neoplasms. *Radiol Clin North Am.* 2011;49(6):1261-1286, vii. doi: 10.1016/j.rcl.2011.07.009.
9. Frush TJ, Noyes FR. Baker's cyst: diagnostic and surgical considerations. *Sports Health.* 2015;7(4):359-365. doi: 10.1177/1941738113520130.
10. Mortada M, Amer YA, Zaghlol RS. Efficacy and safety of musculoskeletal ultrasound guided aspiration and intra-lesional corticosteroids injection of ruptured Baker's cyst: a retrospective observational study. *Clin Med Insights Arthritis Musculoskelet Disord.* 2020;13:1179544120967383. doi: 10.1177/1179544120967383.
11. Nanduri A, Stead TS, Kupsaw GE, et al. Baker's cyst. *Cureus.* 2021;13(12):e20403. doi: 10.7759/cureus.20403.
12. Abate M, Di Carlo L, Di Iorio A, et al. Baker's cyst with knee osteoarthritis: clinical and therapeutic implications. *Med Princ Pract.* 2021;30(6):585-591. doi: 10.1159/000518792.
13. Bhan K. Meniscal tears: current understanding, diagnosis, and management. *Cureus.* 2020;12(6):e8590. doi: 10.7759/cureus.8590.
14. Kongmalai P, Chernchujit B. Arthroscopic treatment of popliteal cyst: a direct posterior portal by inside-out technique for intracystic debridement. *Arthrosc Tech.* 2015;4(2):e143-e148. doi: 10.1016/j.eats.2014.12.002.
15. Ohishi T, Takahashi M, Suzuki D, et al. Unusual presentation of popliteal cyst on magnetic resonance imaging. *Case Rep Orthop.* 2016;2016:1214030. doi: 10.1155/2016/1214030.