



CASE REPORT

Rare presentation of Baker's cyst in an infant: A case report

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ABSTRACT

We report a 15-month-old girl with right knee pain for 15 days. Physical examination revealed limited range of motion in the right knee. A three-phase bone scan showed asymmetrically decreased tracer uptake in the right knee. Bone scan findings raise suspicion of altered joint biomechanics and reduced physiologic use secondary to pain or a pathology surrounding the right knee that may cause attenuation effect. Subsequent MRI revealed a complicated Baker's cyst in the right knee. This case underscores the significance of indirect findings on bone scans, such as decreased uptake, which in this case was theoretically attribute to reduced regional blood-flow due to compromised microvascular perfusion OR altered joint biomechanics and reduced physiologic use secondary to pain. It also emphasizes the need to consider atypical causes of knee pain in infants.

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INTRODUCTION

Baker's cysts, or popliteal synovial cysts, are fluid-filled sacs that form in the gastrocnemio-semimembranosus bursa [1]. While these cysts are relatively common in adults, particularly among individuals with underlying knee pathologies, their occurrence in the pediatric population is notably rare [2-4]. In children, Baker's cysts are often idiopathic or associated with minor trauma, and they may also arise in the context of inflammatory conditions such as juvenile idiopathic arthritis (JIA) or hemophilia [5]. The clinical presentation of a Baker's cyst can vary significantly, ranging from asymptomatic cases to those mimicking infectious arthritis, characterized by swelling, pain, and limited range of motion [6]. The diagnostic approach to Baker's cysts typically involves imaging modalities, with magnetic resonance imaging (MRI) being the gold standard for both diagnosis and differentiation from other pathologies [1]. However, nuclear medicine techniques, such as bone scintigraphy, can provide valuable insights, particularly in complex cases where atypical presentations may obscure the diagnosis. This case report presents a 15-month-old girl with right knee pain and swelling, ultimately diagnosed with a complicated Baker's cyst associated with synovitis. The findings from a three-phase bone scan and subsequent MRI highlight the importance of considering Baker's cysts in the differential diagnosis of pediatric knee pain, particularly when conventional inflammatory markers are unremarkable. This case underscores the need for heightened awareness of rare causes of knee pain in the pediatric population and the role of advanced imaging techniques in guiding diagnosis and management.

CASE PRESENTATION

A 15-month-old girl presented with right knee pain and swelling for 15 days. Physical examination revealed low-grade fever, tenderness, and limited range of motion in the right knee. Septic arthritis was ruled out due to normal complete blood count and C-reactive protein levels. She was referred for arthritis evaluation, and a three-phase bone scan was performed using 148 MBq (4 mCi) of [^{99m}Tc]Tc-MDP. The scan showed significant decreased blood-pool activity (Figures 1A and 1B) and mild decreased delayed MDP uptake in the right knee (Figures 1C and 1D). This asymmetrical uptake was concerned to be due to rotational position; however, it was ultimately deemed not to be a contributing factor, as this reduced uptake was also evident in the posterior-view images. Diminished tracer uptake due to reduced physiologic use of the joint secondary to pain was also considered. The scan demonstrated markedly decreased tracer activity in the blood-pool of the right knee, with near-normal tracer distribution on delayed images; this pattern was also suggestive of a predominantly soft-tissue pathology with no significant MDP uptake, which may reduce regional perfusion through mechanisms such as mass effect or vascular compression, as seen in fluid collections or soft-tissue masses. Alternatively, a soft-tissue lesion surrounding the right knee could theoretically produce attenuation affecting both anterior and posterior projections. Given the lack of anatomic detail in planar bone scintigraphy, these differential diagnoses could not be definitively assessed without correlation with cross-sectional imaging. Accordingly, anatomical correlation with MRI was performed in this case. MRI of the right knee was conducted for accurate characterization of the underlying pathology.

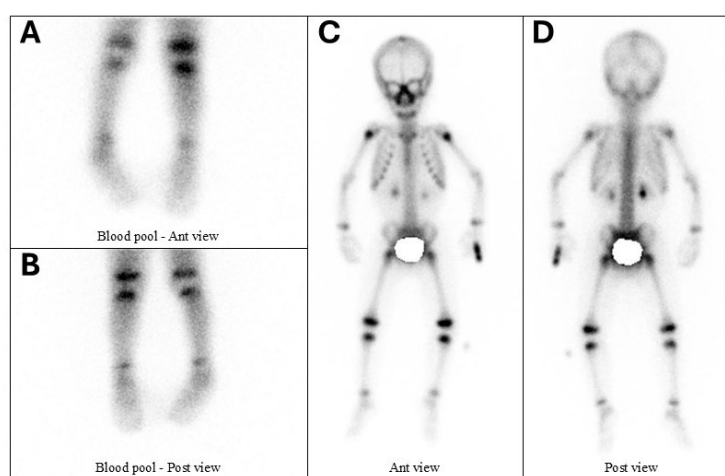


Figure 1. A three-phase bone scan showed normal perfusion but significant decreased blood-pool activity (A-B) and mild decreased delayed MDP uptake in the right knee (C-D)

T2-weighted images revealed an area of high-signal intensity with internal low-signal components showing enhancement in the medial head of the gastrocnemius muscle (Figure 2, arrows). Additionally, there was edema and enhancement in the synovium and adjacent soft tissue (Figure 2, dotted arrows). These findings indicated a complicated Baker's cyst associated with synovitis. Given the posterior location of the Baker's cyst, soft-tissue attenuation is unlikely to account for the decreased radiotracer uptake on the bone scan. The observed pattern can be attributed to altered joint

biomechanics or reduced physiologic use secondary to pain. Additionally, complicated Baker's cysts, particularly those containing debris, internal septations, or inflammatory wall thickening, may show reduced regional blood-flow due to compromised microvascular perfusion [7, 8], resulting in decreased tracer uptake in the blood-pool phase. The patient underwent supportive and medical treatment for complicated Baker's cyst and joint pain was resolved.

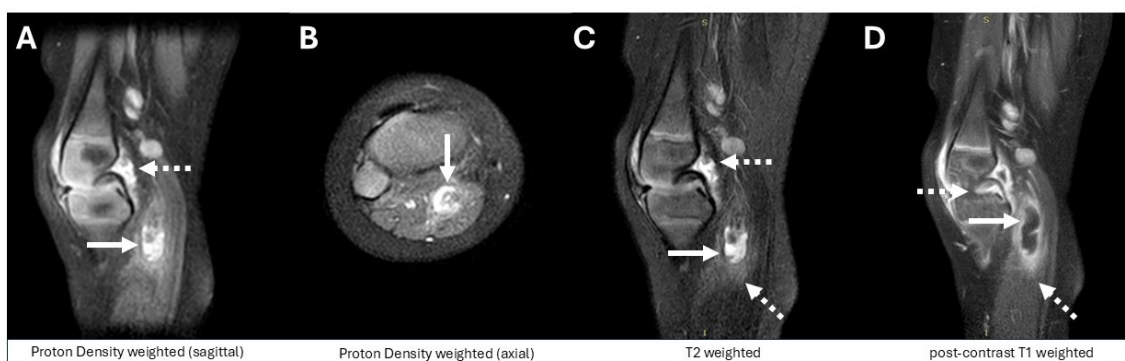


Figure 2. MRI of the right knee. T2-weighted images revealed a focal area of high signal intensity with internal low signal components showing enhancement in the medial head of the gastrocnemius muscle (arrows). Additionally, there was edema and enhancement in the adjacent soft tissue and evidence of synovial enhancement (dotted-arrows). These findings indicated a complicated Baker's cyst associated with synovitis

DISCUSSION

Popliteal synovial cyst, also known as baker's cyst (BC), arises from fluid accumulation in the gastrocnemio-semimembranosus bursa, mostly present in up to 40% to 54% of adult knees aged 35-70 years [1, 9]. BCs are usually asymptomatic but can present with symptoms from mild swelling, resembling infectious arthritis, to significant swelling causing rupture and lower limb ischemia. In adults, BCs are often secondary to underlying pathological internal knee derangements and effusion [6, 10] primarily associated with osteoarthritis and rheumatoid arthritis. For developing BC, communication must exist between the knee joint and the gastrocnemio-semimembranosus bursae. The valve-like communication allows fluid to flow into the cyst but not the other way around, resulting in cyst expansion. This communication is almost nonexistent in children but increases with age [4, 11]. Thus, BC has a rare incidence in the pediatric population [3]. Pediatric BCs are often idiopathic or arise from minor trauma but can also be related to conditions such as juvenile idiopathic arthritis (JIA) and hemophilia [4, 5]. Popliteal cysts are usually asymptomatic but can become complicated. A case

series of pediatric BCs suggested that even in children with inflammatory arthropathy, ruptured BC is relatively uncommon [2]. MRI is the gold standard for diagnosis of BCs and distinguishing them from other conditions, however, nuclear imaging modalities can assist in diagnosing BC as in ruptured cases, the "arch sign", the visible distribution of the radiopharmaceutical in the medial posterior calf, has been reported as a pathognomonic sign in a [^{99m}Tc]Tc-MDP bone scan [12]. Increased [^{18}F]FDG has also been noted in BCs [13, 14].

CONCLUSION

Although MRI remains the gold standard for the diagnosis of Baker's cysts, meticulous evaluation of all findings on bone scintigraphy is essential when such imaging is performed. As demonstrated in this case, bone scan may reveal indirect or atypical findings, such as regional decreased tracer uptake, which—when recognized as abnormal—can provide diagnostic clues and help guide subsequent imaging and clinical management. In this case, decreased uptake was the abnormal finding of the scan and theoretically was attributed to reduced regional blood-flow due to compromised

microvascular perfusion OR altered joint biomechanics and reduced physiologic use secondary to pain. To our understanding, this is the first reported case of complicated BC in an infant, underscoring the need to consider rare causes of undiagnosed knee pain.

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