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Case Report

Giant Baker's cyst associated with pigmented villonodular synovitis: surgical management of a rare case

Erdoğan Suna[1*]

[1]Department of Orthopedics and Traumatology, University of Health Sciences Kayseri City Training and Research Hospital, 38080, Kayseri, Turkey

***Corresponding author:** Erdoğan Suna, MD, Department of Orthopedics and Traumatology, University of Health Sciences Kayseri City Training and Research Hospital, 38080, Kayseri, Turkey; drerdogansuna@gmail.com

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Abstract

This case report presents a rare instance of pigmented villonodular synovitis (PVNS) in conjunction with a large Baker's cyst. A 48-year-old female patient presented with progressive pain, swelling, and limited range of motion in the right knee. Magnetic resonance imaging revealed a giant Baker's cyst measuring approximately 11.5 ×8 cm. This was consistent with the presence of multiple lobulated and septated cystic structures. The largest of these measured 7.5 × 5 cm and was located in the popliteal fossa. Proliferative synovial changes suggestive of PVNS were also noted in the synovium. Following the failure of conservative treatment, the cyst was excised via a posterior approach and an arthroscopic synovectomy was performed simultaneously. Pathological examination confirmed the diagnoses of a Baker's cyst and PVNS. There were no complications postoperatively, and the patient achieved a full range of motion in her knee and was able to resume her daily activities without pain. This case highlights the importance of considering pigmented villonodular synovitis in the diagnostic process for large, complicated Baker's cysts, and demonstrates that surgical excision combined with arthroscopic synovectomy is an effective, safe treatment approach.

Keywords: Baker's cyst, pigmented villonodular synovitis, knee pain, surgical excision, arthroscopic synovectomy

Introduction

A Baker's cyst, also referred to as a popliteal or parameniscal cyst, is a fluid-filled sac that develops behind the knee joint capsule. It is typically located between the bursa and the synovial joint space, specifically between the gastrocnemius and semimembranosus muscles [1-3]. Baker's cysts most commonly occur in adults with a history of trauma, particularly following intra-articular injuries such as meniscal tears. However, they are also frequently associated with degenerative or inflammatory diseases of the knee joint, such as osteoarthritis, rheumatoid arthritis, infectious arthritis and pigmented villonodular synovitis (PVNS) [4]. In children, popliteal cysts usually develop without intra-articular pathology due to synovial herniation in the posterior part of the knee joint capsule [4]. Cysts observed in children are generally asymptomatic and tend to regress over time, so they are usually managed conservatively.

Baker's cysts are mostly asymptomatic; when they are symptomatic, the most common complaints are palpable swelling and vague pain in the popliteal region [5]. In addition, pressure-related movement restriction and neurovascular findings may be observed [4, 5]. The gold standard diagnostic methods include physical examination, ultrasound and magnetic resonance imaging (MRI) [6]. On examination, a mass is typically palpable on the medial side of the popliteal fossa, most prominent when the knee is extended, with a smooth surface, round shape and a fluid-filled appearance. The mass becomes more prominent during knee extension and may regress or disappear completely during flexion. This finding, known as the Foucher sign, is a clinically significant feature that distinguishes a Baker's cyst from other soft tissue masses due to its position-dependent variability [7].

Conservative treatment options for a Baker's cyst include non-steroidal anti-inflammatory drugs (NSAIDs), physiotherapy, steroid injections into the joint and aspiration of the cyst. However, if symptoms persist or recur, arthroscopic cyst decompression or surgical excision may be necessary [5, 8].

This study presents a case of a giant Baker's cyst that developed in the right knee of a female patient.

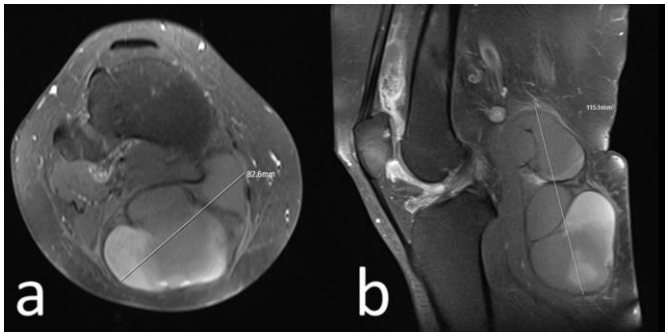

Figure 1. (a, b) Image of a Baker's cyst in the knee joint, taken using T1-weighted axial and sagittal MRI.

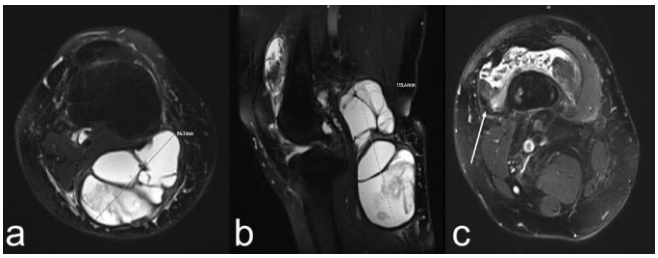

Figure 2. (a) T2-weighted axial image of the Baker's cyst; **(b)** T2-weighted sagittal image of the Baker's cyst and widespread loculated fluid areas in the suprapatellar bursa; **(c)** widespread loculated fluid areas in the suprapatellar bursa and synovial folds within the fluid areas (white arrow).

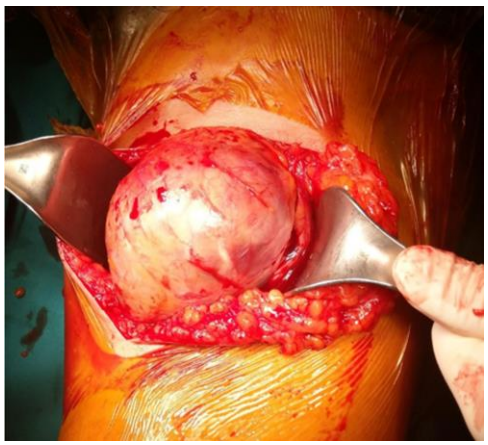

Figure 3. Intraoperative image taken during the removal of a giant Baker's cyst from the posterior aspect of the patient's right knee.

Case report

A 48-year-old female patient attended the orthopaedic outpatient clinic, complaining of increasing pain, swelling and restricted movement in the back of her right knee over the previous six months. She had no previous history of similar symptoms or trauma.

On physical examination, a cystic mass was detected in the right popliteal fossa. The mass was tender, smooth-surfaced and fluctuant. Range of motion of the knee joint was limited, particularly in flexion. Magnetic resonance imaging revealed a cystic structure consistent with a giant Baker's cyst. The cyst measured approximately 11.5 x 8 cm in total. The largest component measured 7.5 x 5 cm and extended posteriorly from the joint capsule in the popliteal fossa. The cyst contained multiple lobulated areas with dense septations. Widespread loculated fluid areas were present in the suprapatellar bursa, with synovial plicae within these areas. Grade II chondromalacia was observed in the patella. Additionally, grade II degenerative changes were noted in the posterior horn of the medial meniscus (Figures 1 and 2). Despite a three-month conservative approach, there was no significant improvement in the patient's symptoms, so surgical treatment was planned.

Under spinal anaesthesia and with the patient in the prone position, a tourniquet was applied at 200 mmHg pressure. The skin, subcutaneous tissue and fascia were then incised anatomically from the posterior aspect of the knee. The vascular and nerve bundles were preserved and the approximately 11 x 7 cm mass was accessed via the muscle clefts. The Baker's cyst, along with its capsule, was excised and sent for histopathological examination (Figure 3). The synovial joint connection was ligated and closed. Bleeding was controlled, the area was irrigated, and the skin and subcutaneous layers were closed according to standard procedures. The patient was then repositioned supine. Access to the joint was gained through standard anterior lateral and anterior medial portals. A pathological sample was obtained from the villonodular synovium and excised with a shaver before being ablated with radiofrequency. The layers were closed, peripheral pulses were checked and found to be present, and a Jones bandage was applied. The initial pathological examination revealed histological findings consistent with a Baker's cyst. The second pathology report was consistent with PVNS. Mobilisation was provided with partial weight-bearing using crutches for the first two weeks after surgery. No infection, haematoma, neurological or circulatory issues were observed during follow-ups. The patient was able to bear full weight by the end of the first month. Full knee range of motion was achieved. The patient was able to perform daily activities without pain.

Discussion

A Baker's cyst is one of the most common cystic lesions of the knee joint. It is usually formed by the enlargement of the bursa located between the semimembranosus and medial gastrocnemius muscles. Unlike other bursae in the knee joint, this bursa communicates with the joint cavity. The incidence of Baker's cyst ranges from 5% to 38%. The literature emphasises that it is more prevalent in older individuals due to the joint capsule losing elasticity with age and an increased incidence of intra-articular pathologies. In adults, however, it mostly occurs alongside intra-articular pathologies, such as meniscus tears, rheumatoid arthritis and osteoarthritis. It has rarely been reported to occur simultaneously with PVNS [1]. In this case, however, a large Baker's cyst that did not respond to conservative treatment was found to be associated with arthroscopically confirmed PVNS.

PVNS is a rare, benign, yet locally aggressive disease characterised by proliferative synovium and hemosiderin deposition [9, 10]. Although it most commonly occurs between the ages of 20 and 40, cases within or associated with a popliteal cyst are rare [10-12]. The knee joint is the

most commonly affected site for PVNS, and clinically, it presents with joint stiffness, pain, recurrent effusion and mass effect [12-14]. Similarly, in this case, both the Baker's cyst and the PVNS caused significant symptoms in the patient, but conservative treatment was ineffective. Studies have recommended the surgical excision of large Baker's cysts due to their compression of neurovascular structures, limitation of joint movement and impairment of quality of life [5, 8]. Additionally, due to its association with intra-articular pathologies, it has been emphasised that simply draining or excising the cyst is insufficient and that any accompanying synovial pathologies must also be identified and treated [10, 12]. Similarly, in our case, arthroscopic synovectomy was performed alongside cyst excision to control symptoms and reduce the risk of recurrence. Cases of PVNS presenting with Baker's cyst have been reported in the literature [10, 13]. Furthermore, intra-articular PVNS can lead to an increase in intra-articular pressure through the proliferation of cells and the accumulation of hemosiderin in the synovium. This can result in the direction of synovial fluid towards the popliteal region via a valvular mechanism, which may also play a role in cyst formation [10, 12]. In this context, synovial pathologies such as PVNS must be considered in the differential diagnosis of large, complex and septated Baker's cysts [10-14].

Conclusions

Large, complicated Baker's cysts associated with PVNS are rare and require a multidisciplinary approach to diagnosis and treatment. Conservative treatment is not always effective, particularly when the patient's quality of life is significantly impacted by symptoms. In such cases, surgical intervention can provide an effective, permanent solution. In this case, a detailed clinical evaluation combined with imaging techniques and arthroscopic synovectomy with ligation of the synovial connection and a posterior approach to cyst excision contributed to an accurate diagnosis and reduced the risk of recurrence. Confirmation of the pathological diagnosis and the absence of postoperative complications supports the accuracy of the surgical strategy. Further reporting of such cases in the literature will contribute to clarifying diagnostic criteria and developing treatment algorithms.

Author contributions

The author confirms sole responsibility for the following: study conception and design, material preparation, data collection, analysis, and manuscript preparation.

Statements and declarations

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Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical statement

The author confirms that this retrospective study was conducted in accordance with the ethical standards outlined in the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from patient.

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