

Epidermal Cyst Instead of Baker's Cyst in the Popliteal Fossa: A Case Report and Literature Review

Arowa H Alansari^{1,*}, Mohammed S Beshr^{2,*}

¹Faculty of Medicine, Gharyan University, Gharyan, Libya; ²Faculty of Medicine and Health Sciences, Sana'a University, Sana'a, Yemen

*These authors contributed equally to this work

Correspondence: Mohammed S Beshr, Faculty of Medicine and Health Sciences, Sana'a University, Sana'a, Yemen, Tel +967 770771741, Email mbeshr2020@gmail.com

Background: Epidermal cysts are usually found in the head, neck, and trunk, and they are very rare to be found in the popliteal fossa. Baker's cyst is the most common cause of popliteal fossa swelling. To our knowledge, this is the seventh reported case of an epidermal inclusion cyst in the knee area.

Case Presentation: A 39-year-old male presented with popliteal swelling that had been present since 2016. It was not associated with pain or restriction of movement. On examination, the swelling was firm, well-capsulated, freely mobile, and not fixed to the underlying structure. There was no tenderness, warmth, or any signs of inflammation. The MRI revealed a 1.5×3 cm circumscribed subcutaneous lesion with low T1 and intermediate T2W signal, with normal adjacent joint structures. A total excision was performed, and the pathology report confirmed the diagnosis of epidermal inclusion cyst.

Conclusion: Popliteal fossa masses are commonly due to Baker's cysts. Other pathologies should be considered when the presentation is atypical, unclear, or not supported by imaging. Our literature search highlighted the rare occurrence of epidermal cysts around the knee joint. Long-standing asymptomatic popliteal swellings that are either stable or progressive should raise suspicion of alternative pathologies.

Keywords: epidermal cyst, inclusion cyst, popliteal fossa, Baker's cyst, popliteal swelling

Introduction

Cystic lesions in the popliteal fossa are most commonly due to Baker's cyst. Other less common causes that can be seen are ganglion cysts, meniscal cysts, lipoma, lymphadenopathy and arteriovenous fistula.¹

Baker's cyst is a synovial fluid collection from the knee joint. This condition is often seen with degenerative disorders such as osteoarthritis, rheumatoid arthritis, or in cases of meniscal tear.¹ Baker's cyst can be confirmed with an ultrasound or a Magnetic Resonance Imaging (MRI) imaging.² They are often asymptomatic and usually picked up incidentally during physical exams or by images obtained for other joint pathologies.¹

On the other hand, an epidermal cyst, also known as an epidermal inclusion cyst, is the most common type of skin cyst. It mostly presents as an asymptomatic, skin-colored lesion and is usually located on the face, scalp, neck, and back. They often have a central punctum on their surface.³ Their size can be stable or progressively enlarge.⁴ If they become inflamed, they tend to be associated with pain and inflammatory changes in the surrounding area.³ They are mostly benign, with no malignant potential, and they do not recur after total excision.⁴

In this paper, we present a rare case of an epidermal cyst in the popliteal fossa, as these cysts are rarely found in the lower extremities, let alone around the knee area.

Case Presentation

A 39-year-old male presented to the orthopedic clinic complaining of left posterior knee swelling since 2016. It started as a small swelling that gradually increased in size over the past eight years, with more significant growth in the last two years. There was no redness or changes in color over the swelling. He denied any pain associated with the lesion or upon walking, only mild pain with complete knee flexion. There was no restriction of movement. He reported a history of being hit by a stone in the same area of swelling back in 2011, without any skin laceration or signs of inflammation afterward. The patient has no history of previous similar swelling, and no similar cases in the family history. His medical history is unremarkable, with no chronic illnesses.

On examination, a firm rounded mass, well-capsulated, freely mobile in both planes vertical and horizontal. The swelling has a normal-looking skin with no redness, discharge, tenderness, warmth, or signs of inflammation. Additionally, no visible overlaying dilated vessels, no pulsation upon palpation, and no bruit upon auscultation. The examination of the lower limb lymph nodes and vasculature was unremarkable. The pre-operative view of the mass is shown in [Figure 1](#).

No punctum was identified on the surface of the lesion, which contributed to the initial clinical impression of a Baker's cyst. Given the patient's request for removal of the mass and the need to exclude other possible etiologies of a popliteal fossa mass, a Magnetic Resonance Imaging (MRI) of the left knee was ordered to confirm the diagnosis, and assess communication with the underlying structures. The MRI revealed a 1.5×3 cm circumscribed dermal/subdermal lesion, it has low T1 and intermediate T2W signal. The remaining adjacent knee structures such as tendons, ligaments, muscles, and bones appeared normal, with no remarkable findings. The pre-operative MRI images are presented in [Figure 2](#).



Figure 1 Preoperative view of left popliteal swelling, round in shape, with no inflammatory signs.

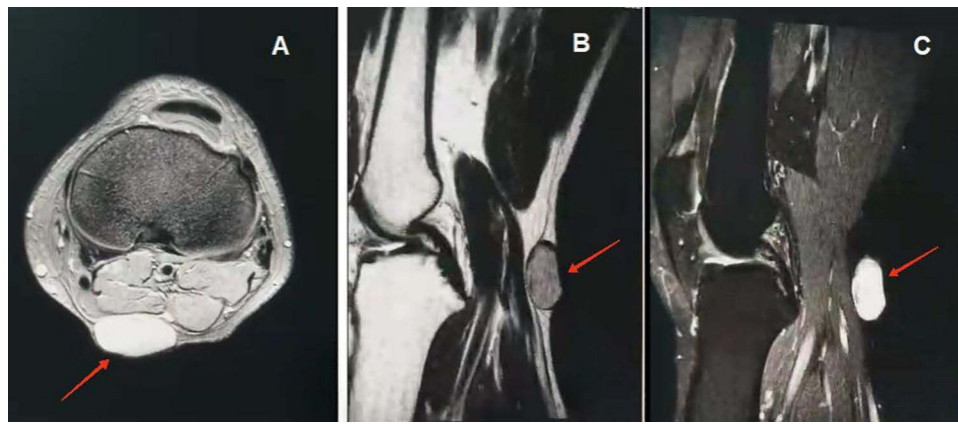


Figure 2 MRI images of the left knee. (A) Axial imaging demonstrates a T2 hyperintense lesion (red-arrow), centered within the subcutaneous fat. The lesion abuts both the skin and the underlying muscles without evidence of invasion. (B) The well-defined cystic lesion (red-arrow) appears isointense, suggesting proteinaceous content (T1 sagittal view). (C) The hyperintense lesion (red-arrow) in the T2 Fat-Saturated sequence.

Due to cosmetic concerns, recent growth in the last two years, and to confirm the diagnosis, a shared decision was made to surgically excise the lesion and send it to histopathology. In prone position, the cyst was resected under local anesthesia. The procedure took about half an hour and was completed without complications. The patient was discharged two hours after the procedure with pain medications and antibiotics, along with instructions for wound care and a scheduled follow-up visit in three weeks to remove the sutures. An intraoperative view of the mass presented in Figure 3, and it shows well-circumscribed mass with intact cystic wall that separates it from the surrounding structures. The patient had a good recovery without any complications.



Figure 3 Intra-operative view of the left popliteal mass undergone complete excision.

The sample, after total excision, was submitted to the histopathology lab. Grossly, it appeared as a well-encapsulated grey-white cystic mass measuring 3×2.5×2 cm, covered with a 2.5×2 cm area of skin. On cut section, the cystic cavity was filled with soft, friable tissue. Microscopically, it revealed fibro-fatty tissue enclosing a unilocular cyst lined by bland, flattened cells, without cytological atypia or evidence of malignancy. The conclusion of the histopathology study was that these findings are suggestive of a benign epidermal inclusion cyst.

Discussion

Cystic swelling in the popliteal fossa is most often due to Baker's cysts.^{5,6} They can be associated with joint pathologies such as osteoarthritis, rheumatoid arthritis, or meniscal tears.¹ Baker's cysts usually present as asymptomatic small swellings that are incidentally picked up during physical examination or imaging.¹ Baker's cyst becomes more prominent on knee extension and less prominent or disappears with knee flexion (Foucher's sign), unlike solid masses, which typically remain unchanged. If ruptured, they can mimic the symptoms of deep venous thrombosis, including calf pain, tenderness, and distal edema. Diagnosis is usually made by ultrasound, especially if the cyst is ruptured, or by plain radiograph.¹ Ultrasound typically shows a well-defined anechoic or hypoechoic fluid between the semimembranosus and medial gastrocnemius tendons.⁷ If diagnosis still uncertain or if surgical intervention is considered, magnetic resonance imaging (MRI) may be offered. MRI shows a homogeneous fluid-filled mass with high signal intensity on T2W, and a thin fluid-filled neck connected to the semimembranosus and the medial head of the gastrocnemius muscles.⁸ Treatment is usually aimed at addressing the underlying pathology. If the cyst is bothersome, intra-cystic glucocorticosteroid may be offered, and aspiration may be considered if it is significantly large. If the cyst is asymptomatic, usually no intervention is needed.¹

Ganglion cysts are usually seen in the hand and wrist, but on rare occasions, they can be found around the knee. They are filled with gelatinous fluid, usually herniated from the joint or may also arise from tendon sheaths. They typically appear smooth, rounded, and rubbery. They can also be tender and may change in size over time. They transilluminate under light and are easily identified by ultrasound. MRI can also be used to differentiate them from other masses, it typically shows a clear fluid with high intensity in T2W. Usually, they are left alone and resected only for cosmetic reasons, if they are associated with pain, or if they have impinged on a nerve or vessel.⁹

Meniscal cysts are another cause of swelling in the knee. They are located at the periphery of the meniscus; they are nearly always associated with meniscal tears.¹⁰ They contain synovial fluid and may be associated with pain. These cysts can be fluctuant, changing in size with knee flexion/extension. MRI is used to diagnose the cyst and the associated meniscal tear, making it the diagnostic modality of choice.¹¹ MRI shows a well-defined cystic mass with high signal intensity on T2-weighted images.⁸ Treatment involves either cyst decompression or open cystectomy, along with arthroscopic repair of the meniscal tear.^{11,12}

On the other hand, epidermal inclusion cysts are most commonly seen on the face, scalp, neck, and back. According to the National Ambulatory Medical Care Survey (2007–2016), epidermal cysts were among the five most common skin diagnosis in the United States.¹³ They can occur at any age but typically appear in the third or fourth decade of life.¹⁴ It is very unusual to be seen around the lower extremities, especially in the popliteal area. They are mostly asymptomatic swelling, often with a punctum, and their size can be stable or may progress with time.³

They can develop after trauma due to the implantation of follicular epithelium in the dermis, which leads to the development of secondary epidermal cyst. If they become inflamed or infected, they may become fluctuant, erythematous, and painful, and they may rupture with intense inflammation.³ Usually this demonstrated by the sudden increase in the mass size, along these inflammatory symptoms. They are benign without the potential for malignant transformation, and only on exceedingly rare occasions may they transform into squamous cell carcinoma (0.011–0.045%).¹⁵

The diagnosis is usually clinical, often identified by the presence of a punctum in the center and a freely mobile mass, and if they are found in their typical locations, usually no additional diagnostic modality is needed. If there is uncertainty about the diagnosis, or to exclude other types of masses, ultrasound or MRI may be considered.³ Ultrasound typically shows a well-circumscribed hypoechoic cyst, usually not associated with vascularity. MRI typically shows a slightly hypointense signal intensity on T1-weighted images and an intermediate to high signal on T2-weighted images.^{16,17} These are the same MRI characteristics seen in our case, and two cases included in our literature.^{18,19}

Histopathology usually done after the excision. It typically shows stratified squamous epithelium and laminated layers of keratinous material. If the material reaches the dermis layer, a granulomatous reaction may occur, leading to the development of a keratin granuloma.³

For asymptomatic epidermoid cysts, usually no treatment is needed. If it becomes inflamed, an intralesional injection of triamcinolone may be tried to improve the symptoms quicker. If excision is considered, the cyst should be surgically excised as a whole, taking all of the cystic wall; otherwise, recurrence may occur.³

Our review of the literature highlights the rare occurrence of epidermal inclusion cysts in the knee area. To our knowledge, this is the seventh reported case in the knee area, as they are rarely located in the lower extremities. Four cases occurring in the popliteal fossa,^{18,20,21} including our case, and three in the frontal knee area, specifically in the prepatellar or suprapatellar region.^{19,22,23} Most of these cases were asymptomatic. Only three were related to trauma, and one had a history of arthroscopic surgery. All of them were treated with total surgical excision, which is the treatment of choice for epidermal cysts, if removal is considered. We have summarized the cases that have reported epidermal cyst around the knee in Table 1.

Our case presented with swelling in the popliteal fossa that had been present for over eight years. Initially, a Baker's cyst was at the top of the differential diagnosis list due to its location, asymptomatic nature, and free mobility in all planes. The MRI imaging showed a well-circumscribed subdermal mass, without any connection with underlying structures, and MRI results has ruled out baker's cyst as a possibility. Because of the unusual location and lack of a central punctum, an epidermal inclusion cyst was not considered among the early differentials. The patient went ahead with the surgery and the histopathology report confirmed the diagnosis.

Table 1 Summary of Reported Cases of Epidermal Cysts Around the Knee Joint

	Karacal 2004 ²⁰	Mayo 2013 ²²	Rizkallah 2017 ²³	Vanhoenacker 2020 ¹⁹	Bashaireh 2019 ²¹	Gupta 2020 ¹⁸	Presented Case
Duration	For 3 years	For 5 years	For 2 years		For 10 years	For 12 years	For 8 years
Gender	Female	Male		Male	Male	Male	Male
Age	60	42	58	47	60	40	39
Site of lesion	Left popliteal fossa	Right prepatellar	Left prepatellar	Right suprapatellar	Right popliteal fossa	Left popliteal fossa	Left popliteal fossa
Size of lesion	3x2x2cm by examination	5x5x3cm after excision	6x4cm by examination	3.5x2.5x1.5cm after excision	4x6cm by examination		1.5x3cm by MRI
Sign and symptoms	Asymptomatic, with dark keratin spot on center	Pain and limitation on full flexion	Painless swelling, and knee tenderness on full flexion	Painful swelling	Asymptomatic, red purple skin, with limitation of full flexion	No tenderness, but decrease range of movement, limited knee flexion	Asymptotic, only Mild pain on full flexion
History of trauma	No	Yes	Yes	History of arthroscopy, no direct trauma	No	No	Yes
Adherence to the underlying structure	Immobile, well capsulated	The Stalk of lesion connected to patella anteriorly	No	No MRI: Intact adjacent structures	Yes attached, with no vessel correlation	No MRI: only adjacent to GC and SM bellies	No MRI: Intact adjacent structures
Lesion by MRI		Cystic lesion, lies on antero-inferior side of the patella and its tendon, Enhanced on T1 and T2		Oval nodule in suprapatellar recess, FSPD: moderate high intensity, TW1: hypointense but hyperintense to the synovial fluid and muscles	Cystic lesion, well defined, in subcutaneous tissue, consisted of debris, septations extend to the GC. Subchondral edema with knee effusion	Cystic lesion, well defined, multilobulated, in subcutaneous tissue, TW1: low TW2: high but low at rim	Oval, well defined, in subcutaneous tissue, low T1 and intermediate T2 signal
Treatment	Surgical Excision	Surgical Excision	Marginal Excision	Surgical excision	Surgical excision		Surgical Excision

Abbreviations: GC, gastrocnemius; SM, semimembranosus; TW, T weighted; FSPD, fat saturated proton density.

Conclusions

Popliteal fossa masses are commonly due to Baker's cysts. Other pathologies should be considered when the presentation is atypical, unclear, or not supported by imaging. Long-standing asymptomatic masses should raise the suspicion of an epidermal inclusion cyst, especially with previous history of trauma, although these rarely occur in the popliteal area.

Ethical Considerations

Written informed consent for publication was obtained from the patient after the purpose of the report and the intended use of the information were explained. The patient consented to share the case, including images and reports, for publication. No identifiable personal information has been included.

The case was managed at Ghadames General Hospital, Ghadames, Libya. Our institution does not require ethical approval for the publication of individual cases or case series, provided that general ethical reporting standards are followed. This publication is intended solely for educational and clinical purposes.

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Author Contributions

All authors made substantial contributions to this work, including conception, design, and contextual development of the work. All authors were involved in drafting, revising, and critically reviewing the manuscript. All authors approved the final version for publication, agreed on the journal to which the article was submitted, and accepted responsibility for all aspects of the work.

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Disclosure

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