

Case Report

Bakers Cyst Occurrence Following Arthroscopic Medial Meniscal Debridement in a Recreational Athlete: Some Potential Indications for Ultrasound Guided Needle Aspiration

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ABSTRACT:

Objectives: Though identification of underlying anatomical causation and surgical management of is the mainstay of treatment, needle aspiration with or without injection of corticosteroid is a common conservative management for enlarged and painful Baker's cysts (BC). This report explores some of the circumstances in which ultra-sound guided BC aspiration may be a first-line option.

Methods: A 46 year-old recreational athlete developed marked posterior knee pain and swelling several years after arthroscopic medial meniscal debridement. Needle aspiration of a large & symptomatic BC was performed under ultrasound guidance, and the patient commenced rehabilitation.

Results: Posterior knee pain completely abated post procedure. Increased knee joint flexion, and squatting was sustained, without cyst recurrence on 6 month follow-up.

Conclusion: Ultrasound-guided aspiration of painful or enlarged Bakers cyst may have sustained benefits after knee arthroscopy in the older athlete, particularly in cases when no further surgery is indicated or planned. Diagnostic ultrasound differentiates BC from other types of masses, provides real-time dynamic visualization of the popliteal neurovascular bundle, guides needle placement, and helps to insure complete BC aspiration, accurate injection, and fenestration. BC aspiration, may also be indicated in cases of operative delay, comorbidities contraindicating surgery, to facilitate rehabilitation, or when the underlying causation of BC is indeterminate. Large cysts causing neurovascular compression may require more emergent aspiration. As this case report illustrates, symptomatic relief and functional improvements may be sustained for several months.

Keywords: Baker's Cyst, Aspiration, Ultrasound Guidance

INTRODUCTION

Baker's cysts were first described by Adams.¹

However, it was Dr. William Baker (1839-1896) who first to described these effusions as synovial cysts, linking their occurrence to underlying pathologies of the knee joint.²

Baker's cysts (BCs) are defined as fluid filled synovial membrane lined sacs that form behind and usually below the posterior knee joint line. Their pathogenesis may include a valvular communication between the knee joint capsule and the bursa.³

Typically, BCs arise from between the medial head of the gastrocnemius and the semimembranosus tendons, and are anatomically described as popliteal cysts.⁴

Chronic and subject to reoccurrence, they may also be a marker for inflammatory arthropathies, and underlying knee joint pathologies such as intra-articular derangements.

Usually asymptomatic, BC popliteal vein compression and tibial nerve entrapment may create painful mass-pressure effects. Diagnostic ultrasound (DU) and Magnetic resonance imaging are important diagnostic tools to prevent misdiagnosis. Surgical resection is rarely indicated if underlying pathology cannot be identified.⁵

Needle aspiration with or without injection of corticosteroid is a common conservative management for and enlarged and painful cyst. This procedure may be performed using anatomical landmarks or under ultrasound guidance. In either case, the procedure may be ultimately non-productive in adults, as these cysts are known to reoccur.

However, BC aspiration may in certain cases, offer more long-term relief. This case report describes BC anatomy, some associated causations, and discusses clinical scenarios in which aspiration may be indicated.

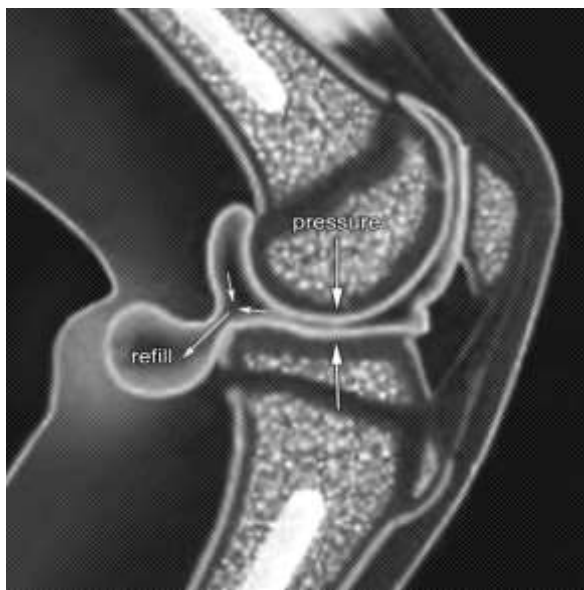
HISTORY

A 46-year-old male with a history of psoriatic arthritis but no specific history of knee injury, presented to a musculoskeletal medicine out patient clinic, complaining of circa two years of posterior right knee pain rated 6-7/10 in intensity, which he perceived was associated with a palpable, tense 'lump-like' mass behind the knee, which limited his ability to full squat. This was on a background of chronic bilateral knee pain, which had 'settled down' since undergoing bilateral knee arthroscopies with medial meniscal debridements 5 years ago. He had no other joint pains, skin rashes, and no ophthalmic, cardiopulmonary, gastrointestinal or genitourinary history. He takes no medications and has no known drug allergies.

On examination the back of the knee demonstrated a focal effusion of 6 x 8 cm, which was fluctuant to palpation and limited double leg squat to 45 degrees.



BakerImage1



Baker Image2

US aspiration was performed using a Logic E US machine with a 4-12 Mhz transducer. The BC was aspirated and the 40 mg of kenalog was injected along with 3 ml of lidocaine. The patient reported immediate relief of pain and pressure behind the knee.

On telephone follow-up 2 months post BC aspiration, the patient reported that the knee pain had completely abated soon after aspiration with his stated perception that the knee has continues to 'almost feel normal.' He reported improved function and was able to squat without difficulty. At 5 month follow-up the patient reported that BC had suddenly returned 3 weeks before. Though the knee remained pain free, flexion and squatting was again limiting activities of daily living.

DISCUSSION

BCs or popliteal cysts are bursal enlargements between the medial head of the gastrocnemius and semimembranosus.⁵

They are formed by overfilling and distension of the gastrocnemius-semimembranosus bursa with synovial fluid through a communication with the knee joint capsule.⁶

They may also be formed by herniation of the synovial membrane through the joint capsule. Baker's cysts formed in this way are usually located at or below the joint line, whereas cysts of semimembranosus bursa are above the joint line. BCs usually found in the medial aspect of the popliteal fossa, and are more common in children; especially boys. Unlike in adults where aspiration-steroid injection may be futile, in children where intra-articular cyst communication and underlying pathologies are rare, this management may work for recalcitrant cases. However, most juvenile BCs are managed conservatively, with an expected natural history of complete resolution [Akagi et al 2013], of 10-20 months.⁷

BCs should also transilluminate, whereas lipomas, xanthomas, vascular tumors, fibrosarcomas do not. DU can differentiate a fluid-filled cyst from a solid tumor.⁸

If the BC occurs in an atypical location a differential diagnosis of tumor should be considered.⁹

BCS are known to occur on a background of severe polyarthritis, due to capsular herniation, or when synovial fluid forms in the normal egress pathway from the capsule into the popliteal bursa.¹⁰

In some studies, rheumatoid arthritis has been identified as the most prevalent underlying disease (52.5%), and cysts were also associated with sero-negative spondyloarthropathy (10%). Pseudothrombophlebitis syndrome was the most prevalent presenting feature of patients with giant Baker's cysts.¹¹

BCs may develop on a background of diverse causations. However, identifying an underlying etiology may sometimes be challenging. A sudden increase in size of lump, change in consistency, increased pain and/or neurovascular compromise are potential markers of sinister pathology necessitating urgent specialist assessment.¹²

BCs are known to routinely present in degenerative, inflammatory, metabolic, and post trauma to the knee joint in keeping with a background of osteoarthritis, rheumatoid arthritis, gout, meniscal & cruciate ligament tears and osteochondral defects. Rupp and colleagues in a 1-3 years post arthroscopic follow up study also concluded that chondral lesions were a relevant prognostic factor in reoccurrence.¹³

Some popliteal cysts are caused by a lesion of the posterior third of the medial meniscus. Posterior horn meniscal tears extending through the joint capsule may pre-dispose a one-way valve formation between the capsular space and the gastro-semimembranosus bursa, with subsequent posteromedially enlargement causing the cyst to dissect a plane between the gastrocnemius and underlying soleus¹⁴

A study by Sansone of 30 patients determined at 90% of

patient with BC had a lesion of the posterior horn of the medial meniscus, with partial meniscectomy and debridement of meniscal tears usually promoting BC resolution.¹⁵

It has been speculated that irritation of the knee joint capsule by some of the above mentioned conditioned somehow linked to the pathogenesis of BCs. Typically, BC's are asymptomatic and may be incidental findings on imaging. However, they may be more symptomatic in active individual such a recreational athletes. Increase in cyst size due to synovial fluid shift may exert pressure on the neurovascular bundle, potentially involving the tibial, sciatic, or common peroneal nerve, as well as the popliteal vein and artery. Clinically, an enlarged BC may cause compression of underlying muscles or a combination neurovascular entrapment of one or more of these structures. Due to the tibial nerve's superficial medial position in relation to other structures of the lower popliteal fossa, it is frequently affected by compression neuropathy, manifesting as lower limb pain, paraesthesia, and even gastrocnemius muscle atrophy.¹⁶

Superior extension of a BC, may also involve the sciatic with further lateral compression involving the common peroneal nerve.^{17,18}

In later development, a double bursa may be located between the semimembranosus tendon and the medial head of the gastrocnemius.⁸

BC compression may also cause intermittent ischemic claudication of the popliteal artery.¹⁹

BC rupture or dissection into the adjacent proximal gastrocnemius muscle belly may be difficult to differentiate from thrombophlebitis. However, this form of pseudothrombophlebitis should be a diagnosis of exclusion as BC has been observed in conjunction with deep vein thrombosis (DVT).²⁰

Compartment syndrome is a very rare complication of ruptured and non-ruptured BC.²¹

BCs also have a unique structural feature, consisting of a one-way valve system between the joint capsule and the cyst.²²

As the cyst fills with fluid, this valve prevents backflow into the joint capsule, which in turn leads to fluid accumulation and pressure build up. Synovial membrane distension and pressure on adjacent structures when the bursa is compressed by mechanical action (weight bearing knee flexion), may be a cause of pain generation. Activities common to recreational athletics such as repetitive squatting and lunging, may cause larger cysts to become pain generators.

CONCLUSIONS

BC's may occur in rheumatoid arthritis, and have been also been associated with psoriatic arthropathy,²³[Lepore et al 1996], as this case illustrates.

Arthroscopic popliteal cyst (BCs) correction of the valvular opening and treatment of the associated intra-articular pathology is effective and safe, and should be the mainstay of

definitive management.^{15,24,13}

BC infection is a rare complication and has been associated with IV drug use.²⁵

BC rupture with typical posterior-inferior tracking can cause excruciating calf pain. Proximal cyst rupture into the soft tissue of the thigh has also been reported.²⁶

DUS & MRI avoids misdiagnosis and inappropriate treatment,⁵ [Trivedi S et al 2015], with some authors considering DUS the imaging of choice.²⁷ Kim et al 2014, concluded that DUS differentiated purely cystic masses from more solid lesions and could exclude a DVT. DUS may also be used to evaluate the cyst's internal structures, exclude other lesions and assess its relationship to other structures.²⁸

DUS may also identify free-floating calcified bodies trapped within a Baker's cyst, which may occur in a background of trauma, arthropathy or synovial osteochondromatosis. Color Doppler imaging can confirm the absence of vascular flow within the mass to exclude a popliteal artery aneurysm or cystic adventitial degeneration of a popliteal artery²⁸

However, the weakness of DUS is its difficulty in sometimes establishing a true connection to the BC to the joint space. Some centers therefore consider MRI to be the diagnostic imaging of choice.²⁹

Nevertheless, confirmation of BC with DUS is economical, and may also prevent unnecessary diagnostic and therapeutic procedures. In identifying fluid behind the calf muscle connected to a popliteal cyst, or calf muscle dissection, DUS useful in confirming BC rupture, and excluding other causations of posterior lower limb pain such as cellulitis, or medial head of gastrocnemius or Achilles tendon tear.²⁶

US-guided aspiration with corticosteroid injection is a well-known and reputedly safe conservative management for symptomatic BC. The steroid appears to be more effective when injected into the Baker's cyst directly compared to injecting into the joint.³⁰ BC aspiration, cyst fenestration and installation of prolotherapy solution may even more effective long-term strategy³¹ [Ongley M 2016], but this approach is at present not as widely utilized.

In case of BC associated with osteoarthritis of the knee, there is evidence that performing BC aspiration in conjunction with other treatments, (physiotherapy/pharmacological remedies), is a more effective management.³²

Though BC aspiration is a transient measure with expected re-filling, the procedure may prevent Giant BC formation. Some known complications of Giant BC include local neurovascular compression, rupture, and pseudothrombophlebitis.^{33,34}

In cases of neurovascular compression, patients may be left with residual numbness post operatively.²¹

BC aspiration may be performed using anatomical landmarks or under ultrasound guidance. In either case, the procedure may be ultimately non-productive in adults, as these cysts usually share a one-way anterograde valvular connection to

the joint capsule and are subject to re-filling once aspirated.

Also, BCs typically herald underlying intra-articular derangements, which in addition to cyst excision, warrant surgical management of the underlying cause. Though BC aspiration is a transient measure with expected re-filling, the procedure may prevent evolution to Giant BC formation, local neurovascular compression, rupture, and pseudothrombophlebitis. ^{33,11} [Katz et al, 1977, Saghafi et al 2008]. BC aspiration may also have utility in post surgical patients, or in whom definitive surgical management is delayed or not possible. As this case report illustrates, symptomatic relief and functional improvements may be sustained for several months.

Indications for Baker's cyst excision may be considered in cases unresponsive to conservative management, (aspiration/physiotherapy), or when underlying pathology is not identified. ³⁵ However, ultrasound-guided BC aspiration may be an effective first line management, particularly in older athletes, and when the cyst is large, symptomatic, or cystectomy will be delayed or is contraindicated. Following aspiration, BC may not reoccur for several months.,

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