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CASE REPORT

Imaging

Bedside ultrasound-guided aspiration and corticosteroid injection of a baker's cyst in a patient with osteoarthritis and recurrent knee pain

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Abstract

Baker's cyst accompanying knee osteoarthritis represents a common cause of knee pain presenting to the emergency department. In this case report, a 56-year-old male presented with atraumatic left knee pain and swelling. Radiographically, he had tri-compartmental osteoarthritis and was found to have a baker's cyst on duplex ultrasound. Using point-of-care ultrasound, the cyst was aspirated and corticosteroids were injected. The patient tolerated the procedure well and was discharged with a compression wrap and orthopedic follow-up. Baker's cyst aspiration with corticosteroid injection represents a safe alternative treatment option for patients. In some cases, this treatment may be definitive. Orthopedists currently use this procedure to reduce pain and improve function for patients with chronic knee ailments related to baker's cysts. As demonstrated in this case report, implementing this bedside procedure in the emergency department with orthopedic follow-up expands non-surgical, non-narcotic treatment options for patients with chronic knee pain secondary to Baker's cysts with osteoarthritis.

KEYWORDS
aspiration, bakers, cyst, knee, orthopedics, osteoarthritis, pain, ultrasound

1 | INTRODUCTION

Knee osteoarthritis (OA) is the most frequent form of arthritis affecting the knee with subsequent significant impact on patient functional ability.[1] Knee OA is also the most common knee disorder linked to Baker's cysts. A Baker's cyst (BC) represents a bursa between the gastrocnemius and semimembranosus tendons that communicates with the knee joint and appears as swelling in the popliteal fossa. Its superficial location and the absence of overlying bone structures allows the space to be efficiently imaged by ultrasound. Ultrasound has high sensitivity and specificity in BC diagnosis[2,3] and is considered simple, reliable, and cost effective.[4–7]

Incidental BCs typically require no treatment when asymptomatic. However, BCs can be a source of knee pain and disability. If left untreated, rarely BCs can lead to complications, including deep vein thrombosis, cellulitis, distal ischemia, or septic joint.[8–13] Patients with symptomatic BCs with OA often can benefit from ultrasound-guided aspiration and corticosteroid injection. Studies have shown postprocedural improvement in clinical symptoms with a significant reduction in pain and stiffness resulting in improved physical function, as well as, in some cases, resolution of the BC.[14–20]

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FIGURE 1 Anteroposterior radiograph of left knee demonstrating moderate to severe osteoarthritis greatest at the medial compartment

2 | CASE REPORT

A 56-year-old man with a history of hypertension, diabetes, and OA presented to the emergency department with atraumatic left knee pain and swelling for weeks. The patient's left knee pain was sharp and throbbing, worse with movements and walking. The patient reported that he was on his feet most of the day but had no new activities. The patient denied redness, wounds, fever, chills, weakness, and numbness.

On examination, the patient appeared in no distress and his left knee was diffusely swollen without erythema. The patient had approximately 50% of his normal range of motion of the left knee with the swelling, tenderness along the medial collateral ligament, and a palpable, tender mass posteriorly. Left knee X-rays showed severe tricompartmental OA, greatest at the medial tibiofemoral compartment with bone-on-bone apposition and a small joint effusion. X-rays did not identify any acute fracture or dislocation (Figure 1).

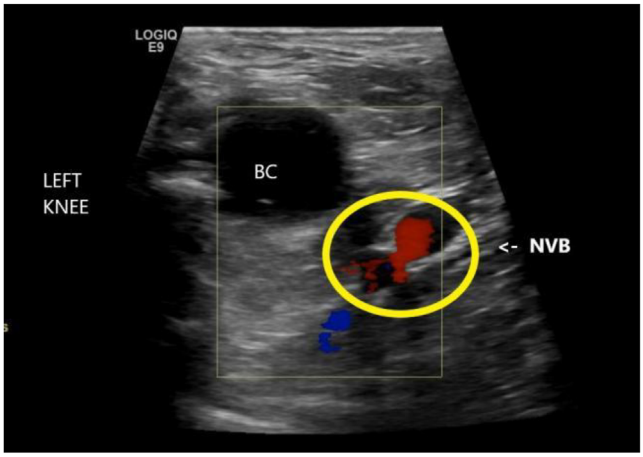
Left leg duplex ultrasound showed no deep venous thrombosis. Ultrasound of a BC characteristically demonstrates a well-circumscribed anechoic structure in the popliteal fossa without flow when color mode is applied. Occasionally, the BC will appear loculated with discrete walled off sections. After discussion of risks and benefits, the patient consented for a sonographically guided left BC aspiration and corticosteroid injection. Risks, which are similar to any knee corticosteroid injection, included localized pain, bleeding, infection, damage to surrounding structures, and recurrence of cyst.[15] The procedure was carried out under sterile technique at the bedside. The emergency physician employed live sonographic guidance with a 12–5 mHz (linear) array transducer using in-plane technique throughout the procedure. A BC measuring up to 6.6 cm was visualized on ultrasound and before initiating the procedure, the physician identified the neurovascular bundle with color flow (Figure 2A). With the patient in a prone position, the physician oriented the probe in a short axis in the axial plane across the proximal popliteal fossa (Figure 2B). Next, the physician delivered 3 mL 1% lidocaine to the subcutaneous tissue using a 25 g needle to achieve local anesthesia (Figure 2C). After anesthetizing the area, a 3.5 in., 18 g needle was used to aspirate 24 mL of yellow tinged synovial fluid (Figure 2D). Syringes were exchanged without removing the needle and a mixture of 1 mL triamcinolone (40 mg) and 2 mL of 1% lidocaine was injected into the BC space.

The patient tolerated the procedure well without complication. After a short observation period, the patient was placed in an elastic bandage and discharged in good condition to follow up with orthopedics. At follow-up in the orthopedic surgery clinic, the patient stated that he had complete, but transient, resolution of his knee pain for several weeks. He was subsequently referred to a subspecialist to discuss total knee arthroplasty.

3 | DISCUSSION

We presented a simple bedside procedure involving aspiration and lidocaine/triamcinolone mixture injection under ultrasound as a novel emergency department (ED) treatment for a symptomatic patient with knee OA and a BC. The management of BCs in adults remains controversial as the cysts rarely occur as isolated pathology. The literature involving non-surgical treatment options for BCs is limited, as is evidence guiding decision making for patients. However, intra-articular knee corticosteroid injections or direct punctures of the BC for aspiration with corticosteroid injections are widely used in the outpatient setting.[15,16,18–20] ED application of this non-surgical procedure allows for avoidance of narcotic and anti-inflammatory medications in selected patients. Many patients present to the ED with symptomatic knee pain after attempting pain relief with over-the-counter medications, such as topical or oral anti-inflammatory drugs. Other ED patients cannot take anti-inflammatory medications, for example, those with chronic kidney disease or a history of gastrointestinal bleeding. Current ED practice discourages use of opiates for chronic pain management. This ED bedside procedure with subsequent orthopedic follow-up provides emergency physicians a safe, attractive alternative treatment option.

One survey of orthopedic surgeons treating BCs in adults identified aspiration of the cyst to be their first therapeutic approach.[21] Compared with knee intra-articular corticosteroid injections, ultrasound-guided aspiration and injection of the BC is considered similarly safe for treatment.[15] Patients receiving direct infiltration of the BC may have the advantage of a reduction in cyst size post-procedure.[14,15,19–20] One longitudinal study comparing intra-articular versus cyst corticosteroid injections after aspiration showed significant reduction in knee pain, swelling, and range of motion at follow-up in both groups. However, the



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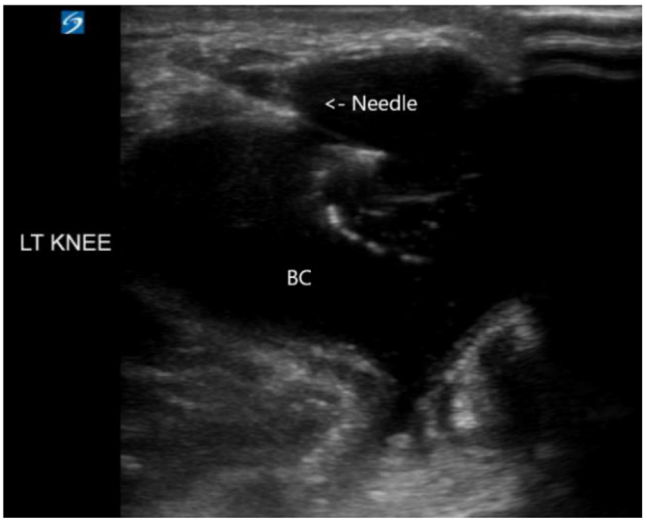

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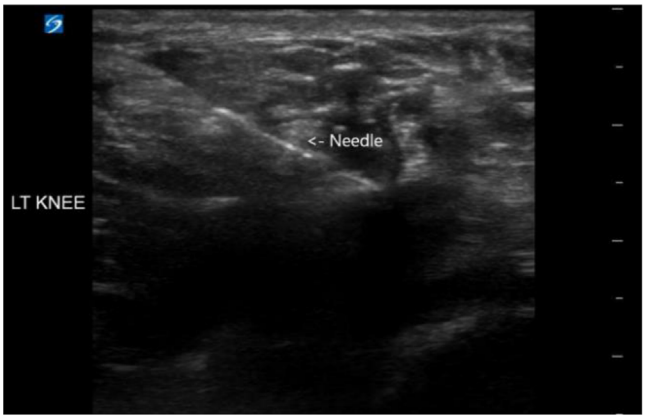

D.

FIGURE 2 Knee ultrasound. (A) Preprocedural image demonstrating a large baker's cyst (BC). The emergency physician obtained images by placing the ultrasound probe on the posterior proximal knee with the indicator to the lateral knee and the probe oriented along the short axis of the limb. Color mode was applied identifying the neurovascular bundle (NVB) deep to the BC. (B) Picture of approach for procedure with a patient in prone position and the ultrasound probe placed over the popliteal fossa, oriented with short axis in the axial plane, marker to lateral knee, and needle in plane. (C) Periprocedural image demonstrating needle in plane puncturing the BC with ultrasound probe, marker indicator on lateral knee and probe oriented along the short axis. (D) Postprocedural image demonstrating resolution of the baker's cyst with the ultrasound still in the same position and needle in plane

group receiving direct infiltration of the BC had smaller diameter cysts via ultrasound at 4- and 8-week follow-up versus BC treated with intra-articular injection.[15]

Using methods similar to the commonly performed ED intra-articular injection, we performed the aspiration and injection of the BC under sterile technique to minimize risk of infection. Also, ultrasound guidance facilitates increased injection precision and routinely improves accuracy of needle positioning.[22,23] The addition of lidocaine to the corticosteroid for infiltration has a theoretical benefit of increasing the collagenous cyst wall permeability to the steroid, controlling postprocedural pain, decreasing inflammation and BC wall thickness, and reducing recurrence; however, this has not been conclusively proven.[20,24] BC injections with corticosteroids in patients with poorly controlled diabetes may be substituted with lidocaine/ketorolac if there are potential concerns for complicating hyperglycemia. Use of ketorolac has been studied in knee OA showing similar improvements in pain and knee function compared with triamcinolone, although its efficacy in BCs has not been established.[25]

Aspiration and corticosteroid injection of BCs have been previously studied specifically in atraumatic patients with a history of arthritis. Patients with lower extremity trauma or knee pain without associated arthritis should not undergo this procedure in the ED.[26,27] Similar to intra-articular injections, if there are concerns regarding possible current infections for a patient, including overlying cellulitis or septic joint, this procedure should not be performed. If patients are on anticoagulants, aspiration and injection may result in hemarthrosis and risks/benefits should be discussed with the patient. If this procedural treatment is implemented in the ED, the patient should still have a follow-up appointment in an orthopedic clinic to reevaluate the efficacy of the treatment. Repeat imaging is also recommended to determine whether the cyst has recurred or if a second procedure is potentially beneficial. Postprocedural compression using an elastic bandage for a minimum of 2 weeks can decrease cyst recurrence. Elastic compression following aspiration and injection helps to prevent reaccumulation of synovial fluid and promotes adherence of the cyst walls, resulting in increased fibrin adhesion and scarring of the space.[19] Installation of irritating substances into cystic, fluid-filled cavities, known as sclerotherapies, have additionally been used in BC treatment by orthopedists but literature to date lacks evidence to support this treatment as safe and effective.[28]

The recurrence rate of BCs with ultrasound-guided aspiration and injection compares favorably with surgical outcomes reported, which range from 5% to 70%.[19,29–30] Although some BCs will reoccur, aspiration can provide significant improvement in pain, stiffness, and flexion for weeks, with a rare increase in iatrogenic infection.[31] One prospective longitudinal study of 32 patients after aspiration-steroid injection showed about an 18.75% recurrence with no other complications, although all the patients with recurrence were classified as complex cysts by ultrasound.[20] Thus, complex BCs seen on ultrasound with septations or multilocularity may complicate draining and hinder the corticosteroid from entering every section. Arthroscopic procedures are the most common surgical procedures used to treat symptomatic BCs and are favored over open excision because it is less invasive with its successful outcomes.[28] In particular, patients who wish to delay definitive arthroplasty or are poor operative candidates could benefit from this bedside procedure being done in the ED, especially when over-the-counter drugs and alternative treatments have been inadequate. In conclusion, ultrasound-guided BC aspiration can be considered an effective alternative and potentially definitive therapeutic option for pain control in patients presenting to the ED who have not responded to standard non-opiate pain management strategies.

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