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Musculoskeletal ultrasound study of Baker cyst prevalence in primary osteoarthritis knee

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Abstract

Background :*Baker's cysts, also known as popliteal cysts, are one of the most common disorders in the knee. These fluid-filled cysts form a lump at the back of the knee that often causes stiffness and discomfort, these cysts commonly arise as a distension of a communicating gastrocnemius- semimembranosus bursa. These cysts usually result from an injury or condition that causes swelling and inflammation inside the knee joint, such as Osteoarthritis, Rheumatoid arthritis ,Meniscus tear, Anterior cruciate ligament (ACL) tear, Other conditions that damage the tissues inside the joint.*

These cysts are important because they may mimic other conditions. The distended bursa or cyst can be appear clinically as a posterior mass, mimicking a true soft-tissue mass, or popliteal artery aneurysm. The frequency of baker's cysts in patients of osteoarthritis of knee is unknown. The musculoskeletal ultrasound (MUS) has emerged in recent years as a reliable, rapid, highly sensitive, noninvasive technique for the diagnosis and evaluation of Baker's cysts.

Materials and Methods : *One hundred and fifty consecutive patients (150) of both genders and of age group >45years, attending the rheumatology & general medicine outdoors of S.N. Medical college, Agra, with unilateral or bilateral primary knee OA according to ACR criteria were included. The relationship between the Baker's cyst and the, synovitis, osteophytes, loose bodies, variables joint effusion, bone cyst and radiological grades of Kellgren and Lawrence were analyzed*

Result: *Baker's cysts were found by MSKUS in 54 (20.7%) of 260 knees 150 patients. Joint effusion, synovitis and osteophytes were detected in 50%, 34.3% and 35% of knees respectively. There was a highly significant correlation between the Baker's cyst with knee effusion and synovitis (**$p<0.001$** and **$p<0.001$**, respectively). There was also a significant correlation of the presence of Baker's cyst with osteophytes, loose bodies and bone cyst and the radiographic grade ($p<0.05$ and $p<0.001$, respectively).*

Conclusion*: The study results shows that Baker's cysts are diagnosed commonly in knee Osteoarthritis patients and they are very often missed clinical examination. Musculoskeletal ultrasound (MSKUS) should be more widely employed by clinicians for diagnosis of Baker's cyst*

Keyword : *Baker's cyst, MSKUS, knee effusion, OA knee*

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I. Introducton:-

Baker's cyst, or popliteal cyst,(1) is a fluid-filled swelling that is a distention of a preexisting bursa in the popliteal fossa, most commonly arise as an distension communicating gastrocnemius- semimembranosus bursa.(2) This bursa is unique in that it communicates with the knee joint and other periarticular bursae, via an opening in the joint capsule posterior to the medial femoral condyle. Many theories shown that this opening creates a valve-like mechanism in the presence of effusion that contributes to the formation of these cysts in adults.. Popliteal cysts rarely found alone and are most often associated with other intra-articular pathology and inflammatory conditions, such as osteoarthritis, meniscus injuries (3-4) and rheumatoid arthritis. The popliteal cysts are only occasionally associated with these conditions and are more often an incidental finding discovered during a routine physical examination in children.

These cysts may presents either as a chronically persistent or relapsing condition or as an acute and dramatic condition that can occur in the case of cyst rupture presenting as pseudothrombophlebitis. These fluid-filled cysts are important because they may be overlooked or may mimic other conditions. The distended bursa

can appear clinically as a posterior mass, mimicking a true soft-tissue mass, or popliteal artery aneurysm.(5) A cyst may cause pseudo thrombophlebitis and cellulitis due to leakage or rupture(6-8) and deep venous thrombosis(9) or ischemia(10) as a result of direct compression of the popliteal vein and artery, respectively. The frequency of Baker's cysts in patients with knee OA is unknown. In recent years, musculoskeletal ultrasound (MSKUS) has emerged as a reliable, rapid, highly sensitive, noninvasive technique for the diagnosis and evaluation of Baker's cysts (11).Ultrasound has proven to be consistent and accurate in the confirmation of popliteal cysts. This review discuss the etiology and anatomy of popliteal cysts, describes the common clinical presentations, reviews the differential diagnoses, and provides guidance for proper diagnostic imaging. It also provides a comparison of current conservative, invasive, and minimal invasive treatment options, along with a discussion of results. Postoperative rehabilitation depends mainly on the condition associated with the popliteal cyst.

Material and method: One hundred and fifty consecutive patients (150) of both genders and of age group >45years, attending the rheumatology & general medicine outdoors of S.N.Medical college, Agra, with unilateral or bilateral primary knee OA according to ACR [12] criteria were included.

Clinical examination : we have done Clinical examination of both knees and also record the demographic data, patients was also asked specifically about symptoms (swelling or pain) from the knee and popliteal fossa. On examination of the with patients knee in laying supine and flat on his/ her back with knee in full extension and in up to 90° of flexion with the examiner's thumb around the anterior of the knee while the fingers palpated posteriorly deeply and firmly into the popliteal fossa. We have noticed round, smooth, fluctuant, transilluminating, often- tender swelling exhibited increased tension on extension and may have softened or disappeared on flexion to 45° (Foucher's sign).

Radiological evaluation: All patients undergo knee radiograph of Weight-bearing anteroposterior (AP) and lateral view and was read by a radiologist who will be blinded to the clinical and MSKUS findings and assessed the severity of OA on the AP view by using the Kellgren and Lawrence (K & L) radiological scale (with scores of 0-4)14.

MSKUS assessment: All patients shall undergo Musculoskeletal Ultrasound examination of the knees by a radiologist who has experience in this technique and blinded to the clinical and radiographic assessments , using a commercially available ultrasound real-time scanner (Model ESAOTE s.p.a) with a multi-frequency linear transducer (8~12 MHz) and Power Doppler ability performed with a standardized scanning protocol15.

Inclusion criteria: Patient fulfilling ACR criteria for primary knee OA.
Exclusion criteria: Patients with clinical history of mechanical knee derangement, inflammatory arthritis, crystal arthropathy, or knee trauma or surgery & patients who received arthrocentesis and/or an intraarticular steroid injection during the last 3 months.

Duration of study : The study is scheduled to completed from March 2020 – August 2021

Sample size: 150 Patients attending the rheumatology & general medicine outdoors of S.N. Medical college, Agra

Type of study: cross sectional study

Statistical analysis: Statistical analysis was performed by using Chi-square test to evaluate the association of Bakers' cyst with effusion, synovitis, osteophytes, clinical findings, and radiographic grade.

II. Result:

We had conducted a hospital based cross sectional study in 150 patients including males and females of age more than 45 with painful primary osteoarthritis of knee and subjected to clinical examination , radiological and MSKUS assessment. Clinical, MSKUS, and radiographic findings in 260 OA knees are presented in Table 1. Baker's cysts were demonstrated by MSKUS in Figure 1. 54 (20.7%) of 260 knees of 150 patients, Cysts size ranges in size from 0.5 to 10 cm in diameter (longitudinal scan). The majority (81.4) of cysts were small to medium (<5 cm). Synovitis and osteophytes were detected 34% and 35% of knees respectively.

Relationships of knee effusion, synovitis, osteophytes, and radiographic grade with the presence of Baker's cyst are presented in Table 2. A high correlation was noted between the presence of Baker's cysts and knee effusion. Figure 2. An effusion was present in 50 (19.23) knees with cysts, compared to 106 of 210

(40.77%) knees without cysts (p<0.001).Synovitis was present in 34 (13.08) knees with cyst compared to 45 of 226(17.31) knees without cysts (p<0.001). osteophytes was present in 35 (13.46) knees with cyst compared to 92 out of 225(35.38) knees without cysts (p<0.05) loose bodies and bone cyst was present in 17 (6.53) and 20 (7.69) respectively (<0.0001).

III. Discussion:

Osteoarthritis is common primary disorder associated with a Baker's cyst [1-4].The Baker's cysts associate with knee osteoarthritis in adults varies ranging from 6% to 45% [1-4]. The prevalence of Baker's cysts in our study group was 20.7 % of knees.The patient population also has an effect on the prevalence of Baker's cysts. Our 20.7 % rate in knee OA patients is within the range of other reports in similar populations [2-4,19,22].

In contrast, studies in patient populations with rheumatoid or other inflammatory arthritis show a much-higher prevalence; a sonographic study of 44 children with juvenile rheumatoid arthritis and other arthriticconditions [22] revealed a 61% prevalence.The presumed cause of Baker's cysts in inflammatory and degenerative arthropathies of the knees is effusion[24-26]. Our data confirmed the relationship between joint effusion and Baker's cysts, while they also suggested statistically significant associations between Baker's cysts and synovitis. On MSK ultrasound in Figure 2 34% patients have baker cyst with synovitis and the difference was statistically significant with p- value <0.0001 The association between osteophytes and Baker's cysts implies that the altered biomechanics resulting from ostephytes may be enough to squeeze even normal amounts of fluid. Our study shows that 13.46% patients have baker cyst with osteophytes and 7.69% patients have baker cyst with out osteophyte and the difference was statistically significant with p-value <0.05.

Our study shows that 29% patients have baker cyst with K&L grade I &II, and 27 % patients have baker cyst with K & L grade III & IV the difference was statistically significant with p- value <0.05. Most Baker's cysts in our series were small to medium (<5 cm), asymptomatic, and clinically in apparent.Patient's complaints of swelling in the popliteal space and physical examination findings were poor predictors of cyst presence.Cyst rupture was found in one of 54 cysts, that was similar with some series which reported low incidences of ruptured Baker's cysts in patients with knee OA Recent studies have indicated that MSKUS is highly sensitive and specific in detecting Baker's cyst [21-33]. Moreover, a study comparing MSKUS scanning with MRI showed a high correlation [34]. In conclusion, Baker's cysts are common in knee OA, but they may not be foundon physical examination. Thus MSKUS should be more widely employed by clinicians in the diagnosis of Baker's cysts, which may sometimes be accompanied by significant morbidity.

Table 1. Clinical, musculoskeletal ultrasound and radiographic findings in 260 osteoarthritic knee

Clinical findings • Knee involved	Age (years) (mean, SD)	59.93 (3.80)
• •	Right knee (n, %) Left knee (n, %)	133 (51.15) 127 (48.85)
MUS findings		
Baker's cyst		
• •	Grade 0: None (n, %) 1: <2 cm (n, %)	206 (79.23) 8 (3.07)
• •	2: 2~5 cm (n, %) 3: >5 cm (n, %)	36 (13.08) 10 (3.9)
Joint Effusion • •	 Grade 0: <2 mm (n, %) 1: 2~5 mm (n, %)	 105 (40) 87 (33.46)
• •	2: >5~10 mm (n, 3: >10 mm (n, %)	50 (19.23) 18 (6.92)

Table 2. Clinical, musculoskeletal ultrasound and radiographic findings in 260 osteoarthritic knee

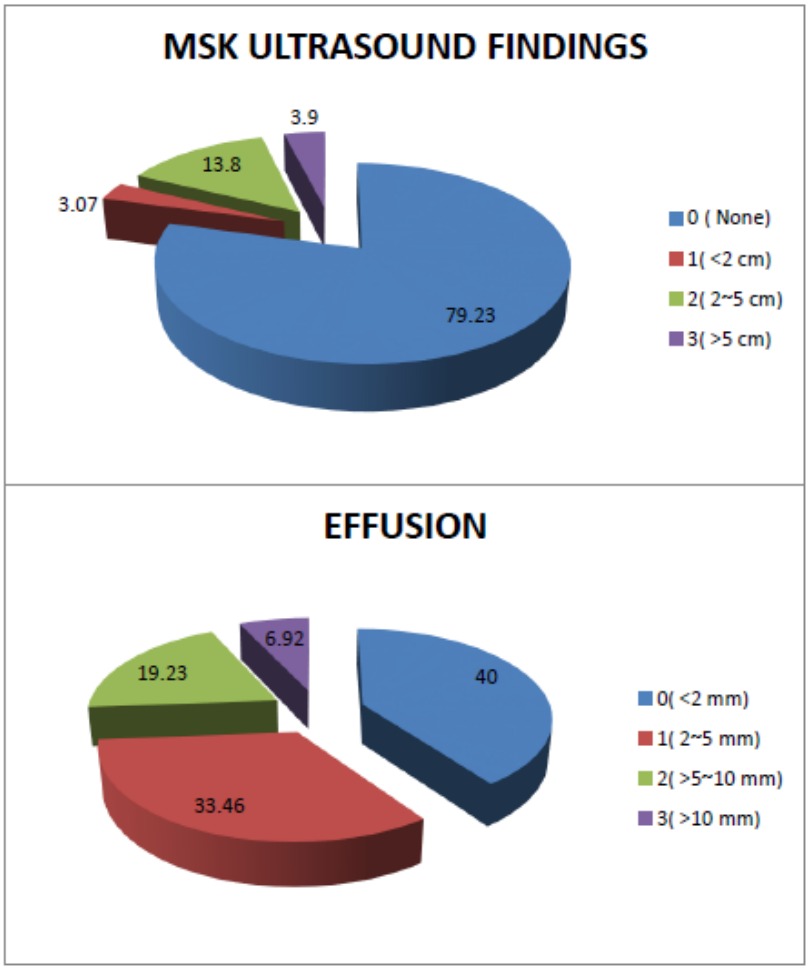
Synovitis (synovial thickness)	
• Grade 0: <2 mm(n, %) • 1: 2~5 mm (n, %)	182 (70) 64 (24.62)
• 2: >5~8 mm (n, %) • 3: >8 mm (n, %)	11 (4.23) 3 (1.15)
Osteophyte, n (%)	
• Absent (n, %) • Present (n, %)	133 (51.15) 127 (48.85)
Radiographic findings	
K & L grade	
• Grade I (n, %) • Grade II (n, %)	61 (23.46) 106 (40.77)

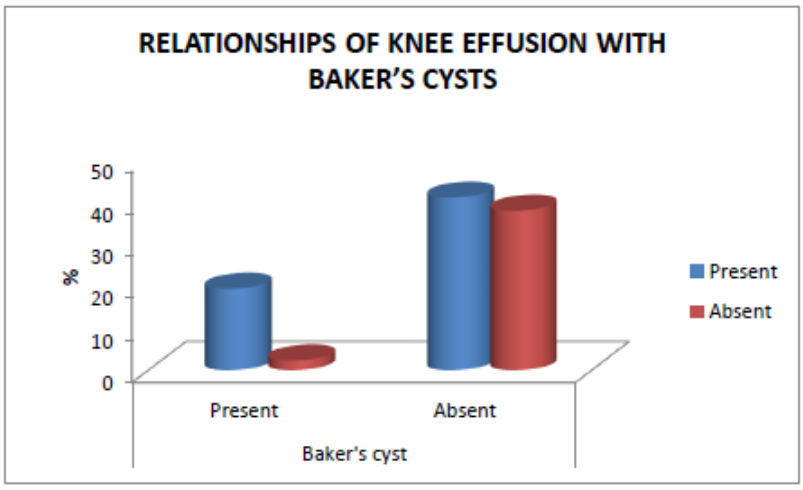
• Grade III (n, %)	75 (28.85)
• Grade IV (n, %)	18 (6.92)

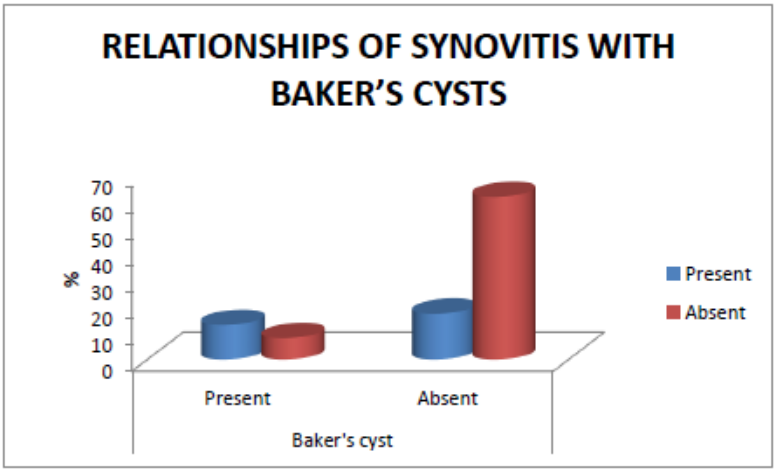
Table3. Relationships of knee effusion, synovitis, osteophytes, and radiographic grade with Baker's cysts

Predictive factor	Baker's cyst		
	Present (n%)	%) Absent (n%)	P value
Effusion			<0.0001
• Present (n, %)	50 (19.23)	106 (40.77)	
• Absent (n, %)	6 (2.31)	98 (37.69)	
Synovitis			<0.0001
• Present (n, %)	34 (13.08)	45 (17.31)	
• Absent (n, %)	21 (8.08)	160 (61.54)	
Osteophyte			<0.05
• Present (n, %)	35 (13.46)	92 (35.38)	
• Absent (n, %)	20 (7.69)	113 (43.46)	
K & L grade			<0.05
• Grade I, II (n, %)	29 (11.15)	138 (53.08)	
• Grade III, IV (n, %)	27 (10.38)	66 (25.38)	
Loose bodies			<0.0001
• Present (n, %)	17 (6.53)	103 (39.61)	
• Absent (n, %)	20 (7.69)	120 (46.15)	
Bone cyst			<0.0001
• Present (n, %)	20 (7.69)	112 (43.07)	
• Absent (n, %)	8 (3.07)	120 (46.15)	

Abbreviation: K & L grade = Kellgren and Lawrence radiological grade


MSK ULTRASOUND FINDINGS
3.9
13.8
3.07
79.23
0 (None)
1(<2 cm)
2(2~5 cm)
3(>5 cm)
EFFUSION
6.92
19.23
40
33.46
0(<2 mm)
1(2~5 mm)
2(>5~10 mm)
3(>10 mm)


RELATIONSHIPS OF KNEE EFFUSION WITH BAKER'S CYSTS
50
40
30
20
10
0
%
Present
Absent
Present
Absent
Baker's cyst



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