

## The Treatment of Baker's Cyst in The Presence of Knee Joint Effusion

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### Introduction

A Baker's Cyst or popliteal cyst is a fluid-filled sac that forms at the posterior aspect of the knee in the popliteal fossa between the semimembranosus and medial head of the gastrocnemius [1-3]. Adults between the ages of 35 and 70 tend to be affected more; the incidence is between 10% and 41%, while the prevalence is 5% [4, 5]. Women are more affected than men as they are more likely to develop arthritis [2, 6]. Baker's Cyst is commonly found in association with knee joint disorders such as meniscus tears and osteoarthritis [2, 3, 6]. During its development, a connection between the knee joint and the cyst is formed and a one-way "valve effect" allows for the flow of synovial fluid from the anterior to the posterior aspect of the knee. The valve opens and closes via flexion and extension, respectively; fluid influx occurs during flexion due to negative intra-articular pressure and stops with extension due to positive intra-articular pressure [2, 7]. Common symptoms include a swelling or lump behind the knee; knee/calf pain; fluid accumulation around the knee; and clicking, locking, or buckling of the knee joint [2].

While MRIs are the gold standard for confirming the presence of a Baker's Cyst and differentiating it from other conditions, the main disadvantage is high cost [2, 6, 7]. Ultrasonography is a viable alternative for its very low cost; however, it lacks the differentiation power of an MRI [2, 3, 7, 8]. The general consensus is that ultrasound should be considered as a screening modality if an assessment of intra-articular structures is not required.

The current literature offers a variety of treatment modalities ranging from non-surgical to surgical. Non-surgical modalities include physical therapy/rehab, activity modifications, or aspiration and steroid injection, which may be ultrasound-guided [2, 6, 7, 9]. For non-surgical modalities, the literature appears to suggest that aspiration and injection is the most efficient and safe method. Surgical modalities include arthroscopic debridement, cyst decompression, meniscal repair/meniscectomy, or open cystectomy [2-7]. There

is no consensus on which surgical modality is the best [5, 8, 10].

Most of the current literature on the treatment of Baker's Cyst is limited to retrospective case reports/series. This retrospective chart review aimed to assess the effectiveness of Baker's Cyst management of up to n=225 patients over a five-year span who were referred and/or treated for a diagnosis of Baker's Cyst at Lexier Medical Management Services Inc. The main objective was to determine the efficacy of aspiration and concomitant corticosteroid injection in patients presenting with symptoms of Baker's Cyst and knee joint effusion.

### Methods

Data from patients who were diagnosed with Baker's Cyst at Lexier Medical Management Services Inc. were included in the chart review. This sample provided a representation of Baker's Cyst patients treated in the Greater Toronto Area between Jan 1st 2015 to Dec 31st 2019. Variables collected from eligible charts included age, sex, presence of Baker's Cyst, size of Baker's Cyst, relevant comorbidities, grade of effusion, imaging methods used for diagnoses, amount of fluid/and or blood aspirated, other treatments provided, and cases of recurrence. Each patient was assigned a unique study ID that was associated with their data in order to ensure confidentiality. A descriptive analysis approach was used to summarize study data, find/analyze trends, and address the study objective. Single variable analysis was performed by examining distribution, central tendency, and dispersion. Distribution included frequency (i.e. # of males vs. females affected), and percentage data (i.e. recurrence of Baker's Cyst). Central tendency included mean, median, and mode calculations. Dispersion included standard deviation calculations to measure variation.

### Results

Our study cohort consisted of 225 patients, with an average age of 63.6 (SD 12.8) years, where the condition was observed to be more prominent in females (65%) than males (35%). Of the 225

cases, 198 (88%) were treated with aspiration and corticosteroid injection, while 27 (12%) refused aspiration/injection and opted for alternative conservative treatment. There was a total of 67 confirmed cases of Baker's Cyst of whom 59 (88%) included measurements obtained from imaging results. The average length, width, and depth of the Baker's cyst was 3.6 CM, 2.3 CM, and 1.9 CM. Associated comorbidities included osteoarthritis (51%) and meniscus tears (22%). The remaining 27% presented with knee joint effusion without an underlying cause. The most frequent imaging method used to identify and measure Baker's cyst was Ultrasound (76%) followed by MRI (16%). The average amount of fluid aspirated in mild, moderate, and severe cases of joint effusion was 7.9 CCs, 22 CCs, and 107 CCs respectively. The average amount of blood aspirated in mild, moderate, and severe cases was 5 CCs, 20.8 CCs, and 32.5 CCs. After aspiration and injection treatment, only 6 patients returned with effusion and/or Baker's Cyst and were referred for a total knee replacement.

## Discussion

While this study does not address gaps in knowledge, it does provide added efficacy data from a large sample size of a representative population. This study was not only aiming to evaluate the management of Baker's Cyst at a single clinic site, but to act as an appraisal tool to prompt future prospective study designs.

Despite the absence of a gold standard method for Baker's Cyst management, aspiration with concomitant steroid injection seems to be the most effective choice for non-surgical treatment modalities. One prospective study reported 90.5% recurrence at 1 week and 54% recurrence after repeat ultrasound-guided aspiration with steroid injection at 12 weeks [8]. While our results show 3% recurrence, it should be noted that patients reported back on a PRN basis. Prospective studies are warranted to collect additional data and confirm the efficacy of aspiration with steroid injection. Nevertheless, treating practitioners can still consider aspiration with concomitant corticosteroid injection as a first line of treatment and anticipate positive patient reported outcomes.

Most of the literature recommends arthroscopy for treatment; however, procedures such as cyst wall resection and non-cyst-wall resection are reported to have better success rates [5-7, 10]. One meta-analysis/systematic review, which pooled the results of 7 studies together, reported a 98.2% and 94.7% success rate for cyst wall resection and non-cyst-wall resection respectively [5]. While efficacy data on arthroscopy is scarce, one source cited a success rate of 64% and recurrence of 36% (3). The general consensus in the literature is that arthroscopy can almost guarantee a low recurrence, but potential complications are a strong possibility [2, 6, 7, 9, 10]. Surgical excision is recommended as a last resort due to high recurrence rates [2, 5, 6]. Two of the best ways to approach treatment via surgery include focusing on correcting the intra-articular lesion and enlargement communication of the one-way valve path [5].

Past literature reported an affected population age range of 35 to 70 years and have stressed that women are more likely to be af-

flicted with Baker's Cyst. Our findings show an average age of 63.6 years and women being affected 1.8 times more than men. As mentioned previously, women are more likely to be affected due to a higher tendency of developing arthritis. Again, the presence of a coincident pathology surrounding the knee joint increases the likelihood of a Baker's Cyst forming.

There were several limitations within our study which may affect the reliability and validity of our results. Due to a retrospective design, there is a high possibility that not all relevant risk factors were identified and recorded. Extracting data from clinical archives, which were not intended for research purposes, may not be of high quality. This impacted the ability to record consistent information pertaining to condition severity, relevant comorbidities, and previous treatments. This single clinical site did not have a standard of care which meant that patients were instructed to return on a PRN-basis. There is a possibility that patients who still experienced symptoms did not return for further treatment after treatment. This differential loss to follow-up introduces a bias in our study findings which impacts the power of our treatment efficacy data. Although specific tools are not required, it would be valuable to record a change in effusion severity grade before and after treatment in order to properly measure treatment progress. Additionally, recording change in the degree of flexion would be a useful measure considering the pathogenesis of Baker's Cyst. Finally, the study was piloted at a single site in a major city, potentially limiting the generalizability of our findings.

Despite the lack of literature to make stronger comparisons with our study findings, future research studies should include prospective designs. Future studies should consider including variables such as job occupation, degree of knee flexion, and change in severity of joint effusion. Including objective measures, such as visual analogue scales (VAS) and the Knee Injury and Osteoarthritis Outcome Score (KOOS), would allow for a better evaluation of treatment management. Efforts do not need to be made around improving diagnosis or treatment modalities; instead, proper clinical judgement to find/confirm a diagnosis and treatment of the intra-articular pathology should be the main points of focus.

## Conclusion

Overall, the overwhelming majority of patients responded well to aspiration with concomitant corticosteroid injection by the treating practitioner. Patients should be advised at the time of treatment that they may expect recurrence at 1-2 years following treatment at which point they may decide to opt for another aspiration/injection combination treatment or total knee replacement.

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