Cerrahpaşa Med J 2022; 46(2): 172-174 CASE REPORT

Giant Popliteal Synovial Cyst Associated with Rheumatoid Arthritis

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Cite this article as: Duman E, Acar A, Atlı OY, Çevik HB. Giant popliteal synovial cyst associated with rheumatoid arthritis. *Cerrahpaşa Med J.* 2022;46(2):172-174.

Abstract

Popliteal synovial cyst is an enlarged bursa, which communicates with the knee joint and is frequently encountered in daily orthopedic practice, is unlikely to be seen as a space-occupying lesion throughout the entire extremity. The main complaints of the patient were pain, limited range of motion of the knee, and a swelling behind the leg. On magnetic resonance imaging, a cystic lesion with 471 cm^3 volume was detected in the popliteal region in the posterior of the gastrocnemius, with lobulated contours and containing extensive synovial pannus from mid-thigh to mid-calf. Total excision of the cyst was performed, and the connection between the cyst and the knee joint was tied and pursed. We present a case of giant popliteal synovial cyst that was the largest popliteal synovial cyst associated with rheumatoid arthritis, which impaired the patient's quality of daily life with limitation of knee range of motion. Popliteal synovial cyst excision with the posterior approach and blockage of the connection between the cyst and the knee joint may provide satisfactory clinical results.

Keywords: Baker's cyst, giant cyst, popliteal synovial cyst, rheumatoid arthritis

Introduction

Popliteal synovial cyst is an enlarged bursa that was first reported by Guillaume Dupuytren[1] in 1829. In 1840, Robert Adams[2] explained the correlation between rheumatoid arthritis and swelling of this cystic mass. Popliteal synovial cysts, also known as Baker's cysts, are a common occurrence in adults and children.[3,4] They present as swelling in the popliteal fossa due to enlargement of the gastrocnemius-semimembranosus bursa, which lies between these 2 muscles on the medial side of the fossa slightly distal to the center crease in the back of the knee.[5,6] Known to communicate with the knee joint, synovial cyst is the most common cause of non-vascular swelling in the popliteal region.[7] Synovial cyst etiology includes joint trauma, degenerative and inflammatory diseases (rheumatoid arthritis, etc.), and excessive production of synovial fluid. These cysts are known to reach large dimensions in synovial hypertrophy and inflammatory joint diseases that cause pannus formation and may cause symptoms including pain and limitation of joint range of motion (ROM).[8] To the best of our knowledge, the case presented in this paper is the largest popliteal synovial cyst associated with rheumatoid arthritis (RA), which impaired the patient's quality of life with limitation of knee ROM and pain. The presentation of this present case was prepared in accordance with the SCARE criteria.[9]

Presentation of Case

A 38-year-old female presented at the orthopedics clinic with a 9-month history of right knee pain and swelling behind the knee. The patient stated that the pain increased on palpation and knee flexion was seen to be limited. She had RA disease known for 13 years and had been receiving certolizumab (Cimzia® 200 mg/mL S.C. 1 × 1 per 2 week), oral prednisone (Deltacortril® 5 mg 1 × 1 per day), and oral leflunomide (Reumil® 20 mg 1 × 1 per day) for 8 months for the RA. There was no previous history of trauma. Upon physical examination, a large mass was observed behind the right knee, from mid-thigh to mid-calf. There was no warmth or redness on the swelling. The mass was immobile, soft, and had indistinctive borders when palpated. The ROM of the right knee joint was flexion/extension 90°/0° and painful. The McMurray test could not be performed due to limited knee joint motion and the patellar ballottement test was positive. There were no varicose veins or abnormal neurovascular findings in the right lower extremity. Homans sign was negative. There was no pulsation on the mass and no murmur was detected with auscultation.

There were minimal degenerative changes in the medial joint space on plain radiography. Subsequently, ultrasonography (USG) was performed and a pre-diagnosis of synovial cyst was considered. On magnetic resonance imaging (MRI), a complicated popliteal synovial cyst of approximately 30 × 6 × 5 cm in size was detected in the popliteal region at the posterior of the gastrocnemius, between the muscle planes, with lobulated contours and containing extensive synovial pannus (Figure 1). The cyst volume was calculated using the formula for a hemi-ellipsoid: volume = $\pi/6 \times$ length × width × height and was analyzed on magnetic resonance images before surgery. The approximate volume of the cyst was 471 cm^3. No additional pathology (meniscus tear, chondral lesion, etc.) was observed.

Two-step surgical treatment was planned for the patient; the first step was cyst excision with the posterior approach (Figure 2), and the second was arthroscopic knee joint debridement for synovial hypertrophy and excess pannus formation. First, the cyst was reached with a posterior approach and released from the surrounding soft tissues, excised, and sent for pathological examination.

Received: May 3, 2021 **Accepted:** February 22, 2022
Available Online Date: May 25, 2022
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DOI: 10.54614/cjm.2022.21044

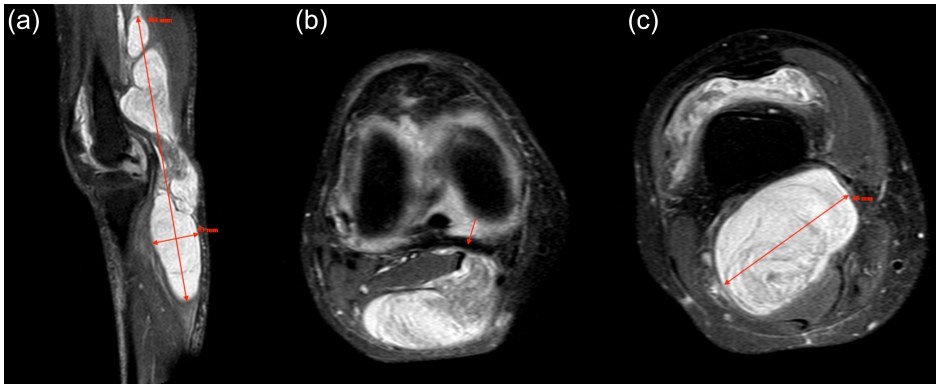

Figure 1. Sagittal plane MRI of popliteal synovial cyst (a). Axillary plane MRI of the connection between the knee joint and popliteal synovial cyst (b). Axillary plane MRI of popliteal synovial cyst (c). MRI, magnetic resonance imaging.

Extreme pannus formation was detected in the cyst. The knee joint was aspirated from the connection of the cyst with the knee joint and the connection was tied and pursed with non-absorbable sutures. Histopathological analysis showed fibro-hyalinized tissue covered with synovial epithelium which supported the diagnosis of synovial cyst (Figure 3). The patient's knee ROM was 120°/0° of flexion/extension immediately postoperatively. With the improvement in knee joint ROM and the relief of pain, the patient did not want the second-step surgical treatment of arthroscopic knee joint debridement. In the follow-up of the patient, a synovial cyst of smaller dimensions (3 × 5 cm on ultrasound) recurred 3 months after the surgery. However, the patient did not want any surgical intervention because there was no knee pain and no restriction in ROM despite the synovial cyst recurrence.

Discussion

Synovial hypertrophy and consequently an increase in the amount of synovial fluid is known to develop in diseases that cause inflammation in joints, such as RA. In cases where the increased synovial fluid in the knee joint exceeds the tolerance level at which the joint capsule can expand, it may lead to the formation of synovial cysts. It is thought that the synovial fluid passes into the synovial cyst with a 1-way valve system.[8] During flexion, the connection between the knee joint and the bursa opens, and during extension, this valve closes due to the tension of the posterior muscles.[10] In 1856, Foucher[11] reported a case of recurrent popliteal synovial cyst which becomes prominent in knee extension and disappears in flexion, leading to the conditions being subsequently coined "Foucher's Sign." Popliteal synovial cysts, which generally occur secondary to degenerative and inflammatory changes in the knee joint, often present with asymptomatic swelling in the popliteal fossa.[12] In this present case, the underlying etiology of the popliteal synovial cyst was RA.

It has been reported that popliteal synovial cysts are found at a rate of 4% in the adult population, and this increases even more with age and in the presence of degenerative joint diseases.[13] In popliteal synovial cysts, which are generally asymptomatic, further evaluation is required in the presence of pain and limitation of knee ROM, as in this present case. The differential diagnosis of symptomatic popliteal synovial cysts includes deep vein thrombosis, popliteal artery aneurysm, cyst rupture, and malignant tumors.[14] History and physical examination are usually sufficient for diagnosis. However, US and MRI are useful to exclude other diagnoses, to define the relationship of the cyst with the joint and surrounding soft tissues, and to plan surgery.[13] Swelling, pain, redness, or discoloration on the skin, and a feeling of warmth in the popliteal region and calf may indicate a diagnosis of deep vein thrombosis. It has even been reported that a rarely seen rupture of popliteal synovial cysts may result in a DVT-like picture.[15,16] Furthermore, MRI or US imaging may be required to differentiate between isolated popliteal synovial cyst and DVT. Magnetic resonance imaging in the current case indicated a popliteal synovial cyst, and when evaluated together with the patient's history and clinic, the diagnosis of DVT was excluded.

Minimally invasive and surgical treatment options for the underlying etiology have been described for the treatment of popliteal synovial cyst. The most common minimally invasive treatment methods are knee joint aspiration, cyst aspiration, and intra-articular or intra-cyst corticosteroid injection.[17] Hofman-Gonzalez et al[18] applied chemical synovectomy with methotrexate as an alternative to the surgical method in a popliteal synovial

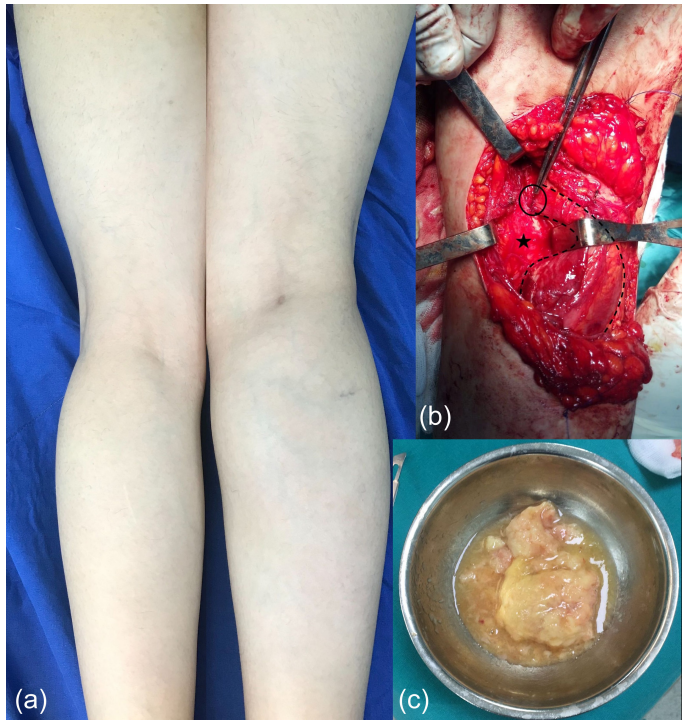

Figure 2. Clinical photograph shows swelling of right knee (a). Intraoperative photograph of extended posterior approach to knee (b); dashed line shows medial gastrocnemius; star shows popliteus; oval-shaped area pointed the passage between synovial cyst and joint space. Resected specimen (c).

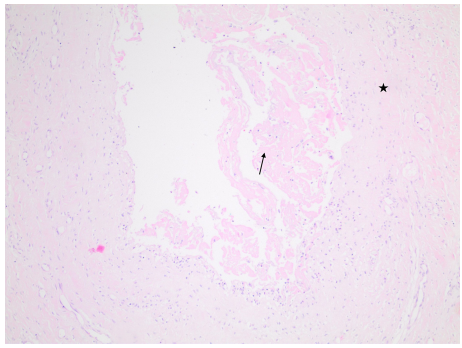

Figure 3. Photomicrograph of the surgical specimen showing synovial cyst formation. The proteinaceous material (arrows) is surrounded by dense fibro-hyalinized tissue (star) with the presence of synovial epithelium (×100, H&E).

cyst with RA etiology. In the present case, surgical treatment was preferred due to the giant size of the popliteal synovial cyst and excessive pannus formation within the cyst.

Medial meniscal tear and chondral lesions are known to accompany popliteal synovial cyst, and it has been stated that these accompanying pathologies may regress popliteal synovial cysts with arthroscopy treatment.[19,20] Successful results have been obtained with arthroscopically tying to choke the 1-way valve, which is connected to the knee joint of popliteal synovial cysts.[8] In literature, arthroscopic excision of the connection between the knee joint and popliteal synovial cyst is an accepted method.[7] In the present case, popliteal synovial cyst excision was performed primarily with a posterior approach because of the giant size of the cyst, the presence of an excess of organized pannus, and the absence of intra-articular chondral and meniscus pathologies. However, the planned second-step surgical intervention of arthroscopic synovectomy was not accepted by the patient as the patient's complaints were resolved. The patient continued with the follow-up and medical treatment for RA after the surgery.

In cases of popliteal synovial cyst accompanied by pain and limitation of knee ROM, cyst excision with the posterior approach and blockage of the connection between the cyst and the knee joint may provide satisfactory clinical results. However, the persistence of intra-articular synovial hypertrophy may increase the recurrence of popliteal synovial cysts.

Informed Consent: The patient was informed that data from her case would be submitted for publication, and an informed consent was obtained.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.A., H.B.C.; Design – A.A., H.B.C.; Supervision – H.B.C.; Materials – E.D., A.A., O.Y.A., H.B.C.; Data Collection and/or Processing – E.D., A.A., O.Y.A., H.B.C.; Analysis and/or Interpretation – A.A., H.B.C.; Literature Review – E.D., A.A., O.Y.A., H.B.C.; Writing – A.A., H.B.C.; Critical Review – H.B.C.Declaration of Interests: The authors declare that they have no competing interest.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declare that this case report has received no financial support.

References

1. Rauschning W. Popliteal cysts and their relation to the gastrocnemio-semimembranosus bursa. Studies on the surgical and functional anatomy. *Acta Orthop Scand Suppl*. 1979;179:1-43. [CrossRef]
2. Adams R. Chronic rheumatic arthritis of the knee joint. *Dublin J Sci*. 1840;17:520-522.
3. Fritschy D, Fasel J, Imbert JC, Bianchi S, Verdonk R, Wirth CJ. The popliteal cyst. *Knee Surg Sports Traumatol Arthrosc*. 2006;14(7):623-628. [CrossRef]
4. Handy JR. Popliteal cysts in adults: a review. *Semin Arthritis Rheum*. 2001;31(2):108-118. [CrossRef]
5. Goto K, Saku I. Ultrasound-guided arthroscopic communication enlargement surgery may be an ideal treatment option for popliteal cysts - indications and technique. *J Exp Orthop*. 2020;7(1):93. [CrossRef]
6. Wilson P, Eyre-Brook A, Francis J. A clinical and anatomical study of the semimembranosus bursa in relation to popliteal cyst. *JBJS*. 1938;20(4):963-984.
7. Kim KI, Lee SH, Ahn JH, Kim JS. Arthroscopic anatomic study of posteromedial joint capsule in knee joint associated with popliteal cyst. *Arch Orthop Trauma Surg*. 2014;134(7):979-984. [CrossRef]
8. Adiyeke L, Bılgın E, Duymus TM, Ketencı İE, Ugurlar M. Giant Baker's cyst associated with rheumatoid arthritis. *Case Rep Orthop*. 2017;2017:4293104. [CrossRef]
9. Agha RA, Borrelli MR, Farwana R, et al. The SCARE 2018 statement: updating consensus Surgical Case Report (SCARE) guidelines. *Int J Surg*. 2018;60:132-136. [CrossRef]
10. Lindgren PG, Rauschning W. Radiographic investigation of popliteal cysts. *Acta Radiol Diagn*. 1980;21(5):657-662. [CrossRef]
11. Canoso JJ, Goldsmith MR, Gerzof SG, Wohlgethan JR. Foucher's sign of the Baker's cyst. *Ann Rheum Dis*. 1987;46(3):228-232. [CrossRef]
12. Artul S, Jabaly-Habib H, Artoul F, Habib G. The association between Baker's cyst and medial meniscal tear in patients with symptomatic knee using ultrasonography. *Clin Imaging*. 2015;39(4):659-661. [CrossRef]
13. Fielding JR, Franklin PD, Kustan J. Popliteal cysts: a reassessment using magnetic resonance imaging. *Skelet Radiol*. 1991;20(6):433-435. [CrossRef]
14. Tseng KF, Hsu HC, Wang FC, Fong YC. Nerve sheath ganglion of the tibial nerve presenting as a Baker's cyst: a case report. *Knee Surg Sports Traumatol Arthrosc*. 2006;14(9):880-884. [CrossRef]
15. Dunlop D, Parker PJ, Keating JF. Ruptured Baker's cyst causing posterior compartment syndrome. *Injury*. 1997;28(8):561-562. [CrossRef]
16. Volteas SK, Labropoulos N, Leon M, Kalodiki E, Nicolaides AN. Incidence of ruptured Baker's cyst among patients with symptoms of deep vein thrombosis. *Br J Surg*. 1997;84(3):342. [CrossRef]
17. Smith MK, Lesniak B, Baraga MG, Kaplan L, Jose J. Treatment of popliteal (Baker) cysts with ultrasound-guided aspiration, fenestration, and injection: long-term follow-up. *Sports Health*. 2015;7(5):409-414. [CrossRef]
18. Hofmann-González F, Hernández-Díaz C, Solano-Ávila C, López-Reyes AG, Peña-Ayala A, Pineda-Villaseñor C. Giant Baker's cyst treated with intralessional methotrexate. *Cir Cir*. 2013;81(1):64-68.
19. Rupp S, Seil R, Jochum P, Kohn D. Popliteal cysts in adults. Prevalence, associated intraarticular lesions, and results after arthroscopic treatment. *Am J Sports Med*. 2002;30(1):112-115. [CrossRef]
20. Saylik M, Gökkuş K. Treatment of Baker cyst, by using open posterior cystectomy and supine arthroscopy on recalcitrant cases (103 knees). *BMC Musculoskelet Disord*. 2016;17(1):435. [CrossRef]