



## **Posterior knee swelling (literature view)**

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(يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ)

صدق الله العظيم

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# **Dedication**

To my family, thanks to be there, and to everyone who fights for us.

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## **Abstract**

### **Background**

Backer's cyst and popliteal artery aneurysm are common causes of posterior knee swelling.

### **Aim of the study**

- 1-to study the most common causes of posterior knee swelling
- 2-to see outcome of surgery treatment on these conditions

### **Patient and method**

Regarding the causes of posterior knee swelling we took the most common ones which are the popliteal cyst and the popliteal artery aneurysm.

### **Results**

We reviewed (6) articles about these two conditions, 4 articles compared the outcome of surgery on one group patients with popliteal cyst while the outcome of decompression only on the other group. 2 articles showed the mean age and sex about popliteal artery aneurysm and outcome of surgery on the rupture of aneurysm.

### **Conclusion**

Cystectomy with arthroscopic decompression treatment for popliteal cyst reduce the recurrence compared with decompression only but it took more time and higher risk of postoperative complication, popliteal artery aneurysm occur mainly in male and old people, rupture is a rare complication and surgery is treatment of choice for it.

# Introduction

## Anatomy and biomechanics

The knee functions as a modified hinge joint consisting of the tibia, femur, and patella. The primary plane of motion is extension and flexion; however, when pathology is present abduction, adduction, internal and external rotations, and anterior and posterior translations may occur [1].

The distal femur and proximal tibia form the two largest points of contact in the joint. Between these two bones exists the lateral and medial menisci. These fibrocartilaginous disks contribute to joint stability by functioning as shock absorbers, increasing congruency between tibia and femur, and aiding in the distribution of synovial fluid [1].

The lateral and medial menisci differ in their sizes and attachments. The medial meniscus is smaller and attaches to the joint capsule on its entire peripheral edge, while the lateral meniscus is larger and does not attach to the capsule on the posterolateral region; this makes the medial meniscus less mobile and prone to tearing [1].

There is also a complicated network of muscles, ligaments, and other soft tissues around the knee that contributes to the structure and support of the joint. These include both passive and active stabilizers. Examples of passive stabilizers include the medial collateral ligament (MCL), lateral collateral ligament (LCL), anterior cruciate ligament (ACL), and posterior cruciate ligament (PCL), while examples of active stabilizers consist of the hamstrings, extensor mechanisms, and the popliteus muscle [1].

The important ligaments of the knee are the ACL, PCL, LCL, and MCL. The ACL connects the medial border of the lateral femoral condyle to the anterior aspect of the tibia, while the PCL connects the lateral border of the medial femoral condyle to the posterior aspect of the tibia. Thus, the main actions of the ACL and PCL are to prevent anterior and posterior translations, respectively. The lateral collateral ligament resists varus stress. The MCL has superficial and deep divisions that resist valgus stress [1].

The lateral collateral ligament is part of the posterolateral corner or posterior complex (PLC) of the knee. The other major components of the posterior lateral complex are the popliteus and popliteofibular ligament (PFL). The PLC resists posterior, varus, and external rotating forces [2]. Posterior laxity is most pronounced when there is also an injury to the PCL [2].

The popliteus tendon is an important cause of posterior knee pain because of its involvement in the PLC and its location on the floor of the posterior fossa. The popliteus originates from the lateral femoral condyle, the proximal fibula, and lateral meniscus and attaches to the proximal tibia superior to the soleal line [3]. The popliteus resists posterior displacement and internally rotates the tibia [4]. It is responsible for unlocking the knee during flexion from full extension [5]. It also withdraws the meniscus preventing impingement [6]

The other two sets of muscles important in posterior knee anatomy are the gastrocnemius and the hamstring complex. The gastrocnemius crosses two different joints. It originates from the posterior aspects of the femur on the medial and lateral condyles and inserts on the calcaneus [7]. The hamstring extends the hip and flexes the knee, which is important for the gait cycle [8]. The hamstring muscle group consists of the medially located semimembranosus and semitendinosus and the laterally located biceps femoris [9]. The semitendinosus and semimembranosus originate from the ischial tuberosity and insert onto the posterior medial tibia. The semimembranosus fusiform configuration and tendency to perform eccentric contraction make it susceptible to strain.

## *Swelling at the back of knee*

### Causes

#### **1-SEMIMEMBRANOSUS BURSA**

Gastrocnemius may become enlarged in children or adults. It presents usually as a painless lump behind the knee, slightly to the medial side of the midline and most conspicuous with the knee straight.

The lump is fluctuant but the fluid cannot be pushed into the joint, presumably because the muscles compress and obstruct the normal communication. The knee joint is normal. Recurrence is common if excision is attempted and, as the bursa normally disappears in time, a waiting policy is the treatment of choice.



## **2-POPLITEAL 'CYST'**

Bulging of the posterior capsule and synovial herniation may produce a swelling in the popliteal fossa. The lump, which is usually seen in older people, is in the midline of the limb and at or below the level of the joint. It fluctuates but is not tender. Injection of radio-opaque medium into the joint, and X-ray, will show that the 'cyst' communicates with the joint.

The condition was originally described by Baker whose patients were probably suffering from tuberculous synovitis. Nowadays it is more likely to be caused by osteoarthritis, but it is still often called 'Baker's cyst'. Occasionally the 'cyst' ruptures and the synovial contents spill into the muscle planes causing pain and swelling in the calf – a combination which can easily be mistaken for deep vein thrombosis.

## **3-POPLITEAL ANEURYSM**

Popliteal artery aneurysms (PAAs) are the most common form of peripheral arterial aneurysms. The popliteal artery is the continuation of the femoral artery and represents the major source of blood to the leg. Thrombus formation as a result of PAA may reduce blood flow, leading to limb-threatening ischemia and potential limb amputation. Popliteal artery aneurysms are predominantly seen in males (95-99% of cases), presumably owing to their predisposition for arteriosclerosis, which is also a major factor for PAA predisposition. Additionally, it is not uncommon to see an abdominal aortic aneurysm associated with a PAA (30-50% of cases) or bilateral presentation of PAA (approximately 50% of cases).

A consequence of a PAA and thrombus located in the popliteal fossa is an inflammatory reaction, potentially involving adjacent structures in the fossa. This may present clinically as pain in the leg and/or edema. Treatment of PAA involves either a conservative management protocol or a more aggressive intervention such as surgery. Proponents of conservative management will regulate the diameter of the aneurysm by ultrasound,

while those in favor of surgical intervention will repair the aneurysm through a number of open surgical methods or by endovascular stent grafting. This review summarizes the historical points related to PAA and analyzes the pertinent anatomical implications, clinical findings and treatment methods for PAA.

### **Aim of the study**

- 1- to study the most common causes of posterior knee swelling
- 2- to see outcome of surgery treatment on these conditions

## ***Article 1***

### **Clinical outcome of arthroscopic management of popliteal cysts with or without additional posterior open cystectomy [10/11].**

#### ***Purpose***

The aim of this retrospective study was to compare the clinical outcomes of arthroscopic decompression of popliteal cysts and simultaneous management of intra-articular pathologies alone or in combination with posterior open cystectomy.

#### ***Materials and methods***

This study included 65 consecutive patients with the diagnosis of popliteal cysts. Of the patients 31 received arthroscopy alone (arthroscopic decompression of cysts and management of intra-articular pathologies, AA group) and 34 received arthroscopy combined with open cystectomy (AO group). At the last follow-up after a mean of 33.3 months, magnetic resonance imaging (MRI) scans were performed to assess the outcomes of cysts and functional scores. The **Lysholm** score and **Rauschnig** and **Lindgren** grade were used for clinical evaluation.

#### ***Results***

The procedure in the AA group took less time to perform and resulted in less postoperative complications in the perioperative period. At the last follow-up, no significant differences were observed between the groups in terms of the **Lysholm** score or **Rauschnig** and Lindgren grade ( $P > 0.05$ ). The results of MRI showed that the cysts disappeared in 17 (55%) patients, reduced in 9 (29%) patients and persisted in 5 (16%) patients in the AA group, and disappeared in 29 (85%) patients, reduced in 4 (12%) patients and persisted in 1 (3%) patients in the AO group, which was significantly different ( $P < 0.05$ ). In the AA group 6 patients and 1 in the AO group were grade 2 or 3 and needed a second operation (arthroscopy combined with open cystectomy), which was significantly different ( $P < 0.05$ ).

## ***Conclusion***

In comparison to arthroscopic decompression of cysts and management of intra-articular pathologies alone, the additional posterior open cystectomy reduced the recurrence of popliteal cysts, although it took longer to perform and brought more perioperative complication.

## ***Article 2***

**Popliteal (Baker's) Cysts in the Setting of Primary Knee Arthroplasty [12\13].**

## ***Background***

Popliteal (Baker's) Cysts are rare complications of knee arthroplasty. Enlargement, irritation, or rupture of the cyst can lead to significant pain, tightness, and tenderness. The literature regarding popliteal cysts occurring following knee arthroplasty is limited and does not report prevalence, natural history, and treatment of popliteal cyst in the setting of knee arthroplasty.

## ***Methods***

Following Institutional Review Board approval, 2,025 primary total and partial knee arthroplasties by four surgeons at one institution from 2011-2016 were reviewed for occurrence of popliteal cysts. Twelve cases occurring after arthroplasty were identified, including four unicompartmental knee arthroplasties and eight total knee arthroplasties. Demographic data were evaluated and symptoms, time of onset following arthroplasty, attempted treatment strategies, and success or failure of attempted treatments or interventions were recorded.

## ***Results***

The mean age of patients that presented with a popliteal cyst was 63.6 years old (range = 45 - 78 years). There were 5 males and 7 females. The mean BMI was 26.32 (range = 19.0 - 35.0). In 2,205 primary knee arthroplasties

performed from 2011-2016 (including 175 partial and 1850 total), the prevalence of popliteal cysts following surgery was 0.6% (n=12). All popliteal cysts were discovered between six weeks and two years following surgery, with the majority occurring during the first year.

Twenty-five percent (3/12) of patients presented with minimal symptoms. These were managed expectantly. Seventy-five percent (9/12) were symptomatic. One patient had only a diagnostic ultrasound, two patients underwent ultrasound-guided aspiration and steroid injection, three underwent simple aspiration. Two underwent surgical excision. One cyst ruptured. All cases went on to symptomatic resolution. There was no association with diabetes, smoking, or body mass index. A disproportionately high number (25% or 4/12) occurred in partial knee arthroplasty.

### ***Conclusion***

While popliteal cysts following primary total knee arthroplasty are rare, they can become a persistent and even disabling problem for arthroplasty patients. Given the lack of formalized recommendations in the existing literature, we propose a treatment algorithm that has been successful in our clinic, including observation initially, ultrasound-guided injection/aspiration if symptomatic, and surgical excision as a last resort.

### ***Article 3***

## **Arthroscopic Treatment of Popliteal Cysts with and without Cystectomy.**

**A Systematic Review and Meta-Analysis[14\15\16\17\18]**

### ***Purpose***

To compare the clinical outcomes of the arthroscopic treatments for popliteal cysts with and without cystectomy.

### ***Methods***

PubMed/MEDLINE, EMBASE, KoreaMed, and Cochrane Library were searched from the earliest available date of indexing through August 2016. The methodological quality of all articles was assessed according to the Coleman methodology score (CMS). Studies were grouped according to the surgical method, and a meta-analysis was conducted to identify the unsuccessful clinical outcome and complication rates.

## ***Results***

Nine studies were included; the mean CMS was 67.33 (standard deviation, 8.75 points). Cystectomy was reported in five studies; cystectomy was not performed in four studies. The odds ratio of unsuccessful clinical outcomes evaluated by Rauschnig and Lindgren score was 122.05 ( $p < 0.001$ ) with cystectomy and 58.12 ( $p < 0.001$ ) without cystectomy. The effect size of complications was 0.16 ( $p < 0.001$ ) with cystectomy and 0.03 ( $p < 0.001$ ) without cystectomy. The recurrence rate was 0% with cystectomy and 6.4% without cystectomy.

## ***Conclusion***

All the currently available studies showed satisfactory outcomes in both with and without cystectomy groups. However, arthroscopic cystectomy concurrently performed with management of intra-articular lesions was associated with a relatively low recurrence rate and a relatively high incidence of complications.

## ***Article 4***

**Clinical prospective comparative study on short-term effectiveness of arthroscopic treatment of popliteal cyst between cystectomy and internal drainage combined with cystectomy[19\20]**

## ***Objective***

To compare the short-term effectiveness between arthroscopic cystectomy and internal drainage combined with cystectomy in popliteal cyst.

## ***Methods***

Between March 2014 and March 2017, 56 patients with symptomatic popliteal cyst were enrolled in the study, randomized block design was used to divided the patients into trial group (arthroscopic cystectomy combined with internal drainage group, n=28) and control group (arthroscopic internal drainage group, n=28). Excluding those who had incomplete follow-up and received surgery for other diseases postoperatively, 26 patients in the experimental group and 27 patients in the control group were finally enrolled in the study. There was no significant difference in gender, age, side, course of disease, maximum diameter and grade of popliteal cyst, and associated diseases between two groups ( $P>0.05$ ). The operation time, duration of popliteal ecchymosis and the middle back of calf tenderness were observed postoperatively. The circumference of calf at 1 day, 1 week, and 2 weeks after operation were measured and the differences were calculated with the measurement before operation. Lower extremity venous thrombosis was observed by color doppler ultrasonography at 1 week after operation. The effectiveness was evaluated by Rauschnig and Lindgren grading criteria. And MRI was used to observe whether the popliteal cyst disappeared or decreased and measured its maximum diameter at 1 year after operation.

## ***Results***

Patients in both groups were followed up 12-14 months, with an average of 12.5 months. The operation time, duration of popliteal ecchymosis, and the middle back of calf tenderness of the trial group were all longer than those in the control group ( $P<0.05$ ), the differences of circumference of calf at 1 day, 1 week, and 2 weeks after operation of the trial group were greater than those in the control group ( $P<0.05$ ). Color doppler ultrasonography of the lower extremity at 1 week after operation found that the intermuscular venous thrombosis occurred in 2 cases of the trial group, while no lower extremity thrombosis was found in the control group; and the difference between two groups was not significant ( $P=0.236$ ).

According to the **Rauschnig** and **Lindgren** grading criteria, there were 16 cases of grade 0, 6 cases of grade 1, and 4 cases of grade 2 in the trial group, and 17 cases of grade 0, 4 cases of grade 1, and 6 cases of grade 2 in the control group at 1 year after operation. There was no significant difference between 2 groups ( $Z=-1.872$ ,  $P=0.078$ ). Nine cases (34.62%) of the trial group and 13 cases (48.15%) of the control group still have residual cysts by MRI, the maximum diameter of which was less than 2 cm. The cysts disappeared in the remaining patients in both groups, and



there was no recurrence during the follow-up. There was no significant difference in cyst residual rate between 2 groups ( $\chi^2=2.293$ ,  $P=0.852$ ).

## ***Conclusion***

Compared with arthroscopic internal drainage, the short-term effectiveness of the arthroscopic internal drainage combined with cystectomy had no significant improvement, and the operation time was prolonged, the postoperative complications were obviously increased.

## ***Article 5***

### **Clinical outcome in patient who had surgery for rupture PAA**

## ***Background***

Popliteal artery aneurysms (PAAs) are generally complicated by thrombosis and distal embolization, whereas rupture is rare. The aim of this study was to describe the clinical characteristics and outcome in a cohort of patients who had surgery for ruptured PAA (rPAAou).

## ***Methods***

Operations for rPAA were identified from the Swedish Vascular Registry, Swedvasc, 1987–2012. Medical records and imaging were reviewed. Comparison was made with patients treated for PAA without rupture.

## ***Results***

Forty-five patients with rPAA were identified. The proportion with rupture among those operated on for PAA was 2.5 per cent. Patients with rPAA were 8 years older (77.7 versus 69.7 years;  $P < 0.001$ ), had more lung and heart disease ( $P = 0.003$  and  $P = 0.019$  respectively), and a larger mean popliteal aneurysm diameter (63.7 versus 30.9 mm;  $P < 0.001$ ) than patients with PAA treated for other indications. At time of surgery, 22 of 45 patients were already receiving anticoagulants, seven for concomitant



deep venous thrombosis (DVT) in the affected leg. There was extensive swelling of the whole leg in 20 patients.

In 27 patients, the initial diagnosis was DVT or a Baker's cyst. All patients underwent surgery, all but three by the open method. There were four amputations, all performed within 1 week of surgery. One year after surgery, 26 of the 45 patients were alive. Among these, the reconstructions were patent in 20 of 22 patients.

### ***Conclusio***

The diagnosis of rPAA is difficult, and often delayed. The condition affects old patients, who often are on anticoagulation treatment and have large aneurysms. The immediate surgical results are acceptable, but the condition is associated with a high risk of death within the first year after surgery.

### ***Article 6***

**Popliteal Artery Aneurysms: Literature Review and presentation of case[21].**

### ***Introduction***

The popliteal artery aneurysm (AAP) is localized and irreversible walls of the popliteal artery dilation. It is rare pathology is the second most common location of true aneurysms after aortic, and the first location within the peripheral aneurysms. It is characterized by affecting mainly men at an average age of 65, whose manifestations are mainly ischemic, finishing lower limb amputation in a frequency ranging as appropriate between 7 and 20 percent. Our goal is to make the presentation of a case of AAP with subacute arterial ischemia, along with a literature review of the topic.

### ***Case presentation***

The case of a 63 year old who consulted for lower limb pain 96 hours of evolution, with absence of pulses is presented a diagnosis of advanced subacute ischemia was performed resvascularizable not in the context of a

clinically unstable patient. emergency amputation is decided. In dissecting the presence of PSA objective.

### *Discussion*

The AAP have an incidence of 0.1 to 1%, have variable clinical. Arteriography is the gold standard for diagnosis. The treatment of choice is surgical, presenting new therapeutic options. The anatomical variations of the branches of the PA are variable to consider. Aneurysms are most commonly associated with contralateral popliteal (57.1%).

## ***Results***

We reviewed (6)articles regarding commenst causes of posterior knee swelling. Popliteal cyst with (4) articles which compare between outcome of treatment by Arthroscopic decompression alone and arthroscodcompression combined with Posterior open cystectomy. In first study taked 65 diagnosed with popliteal cyst 31 of them made arthroscopic decompreisson(AA) and 34 combined with posterior open cystectomy(AO) and in last follow up The results of MRI showed that the cysts disappeared in 17 (55%) patients, reduced in 9 (29%) patients and persisted in 5 (16%) patients in the AA group, and disappeared in 29 (85%) patients, reduced in 4 (12%) patients and persisted in 1 (3%) patients in the AO group, which was significantly different ( $P < 0.05$ ). In the AA group 6 patients and 1 in the AO group were grade 2 or 3 and needed a second operation (arthroscopy combined with open cystectomy), which was significantly different ( $P < 0.05$ ).

In second study nine cases was performed five with cystectomy and four withot cystectomy and the result was the odds ratio of unsuccessful clinical outcomes evaluated by Rauschning and Lindgren score was 122.05 ( $p < 0.001$ ) with cystectomy and 58.12 ( $p < 0.001$ ) without cystectomy. The effect size of complications was 0.16 ( $p < 0.001$ ) with cystectomy and 0.03 ( $p < 0.001$ ) without cystectomy. The recurrence rate was 0% with cystectomy and 6.4% without cystectomy.

In third study 56 patient was taken 28 with cystectomy while 28 without cystectomy and the result was Patients in both groups were followed up 12-14 months, with an average of 12.5 months. The operation time, duration of popliteal ecchymosis, and the middle back of calf tenderness of the trial group were all longer than those in the control group ( $P < 0.05$ ), the differences of circumference of calf at 1 day, 1 week, and 2 weeks after operation of the trial group were greater than those in the control group ( $P < 0.05$ ).

About popliteal artery aneurysm( 2) articles in the first article study about complication of PAA which is the rupture of it and the result was Forty-five patients with rPAA were identified. The proportion with rupture

among those operated on for PAA was 2.5 per cent. Patients with rPAA were 8 years older (77.7 versus 69.7 years;  $P < 0.001$ ), had more lung and heart disease ( $P = 0.003$  and  $P = 0.019$  respectively), and a larger mean popliteal aneurysm diameter (63.7 versus 30.9 mm;  $P < 0.001$ ) than patients with PAA treated for other indications. At time of surgery, 22 of 45 patients were already receiving anticoagulants, seven for concomitant deep venous thrombosis (DVT) in the affected leg. There was extensive swelling of the whole leg in 20 patients. In 27 patients, the initial diagnosis was DVT or a Baker's cyst. All patients underwent surgery, all but three by the open method. There were four amputations, all performed within 1 week of surgery. One year after surgery, 26 of the 45 patients were alive among these, the reconstructions were patent in 20 of 22 patients.

In second article study reveal that surgery is mainstay treatment for the symptomatic patient.

## *Discussion*

The studies of popliteal cyst about the outcome of treatment regarding either arthroscopic decompression or decompression with cystectomy the studies show no significant about age;sex;BMI and in the follow up both outcome are acceptable but the difference is that cystectomy took longer time to perform and high risk of postoperative complication which is DVT;tenderness;stiffness but cystectomy reduced risk of recurrence.

While about popliteal artery aneurysm the studies show that it occur in older people predominately in men and its associated with aortic aneurysm in 30% and its bilateral in 50% of cases.aneurysm generally complicated by thrombosis and distal embolization while Rupture of it is a rare complication occur mostly in patient with large size aneurysm and took anticoagulant medication immediate surgery results are acceptable but the condition associated with high risk of death after surgery.

## ***Conclusion***

When combined cystectomy with orthoscopic decompression in treatment of popliteal cyst it reduce the rate of recurrence but taked longer time to perform and associated with postoperitave complication .

Popliteal artery aneurysm occur more commonly in male and old people ,rupture is a rare complication of it occur mostly in large size aneurysm and patient taked anticoagulant medication, surgery is the treatment of choice but associated with higher risk of death after surgery.

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