

The popliteal cyst (Baker's cyst) is a nonphysiologically enlarged fluid space on the dorsal aspect of the knee. The knee joint is the biggest joint in human body. Due to its structure and function, it's susceptible to pathological changes, such as: overloads, injuries and degenerative changes. The knee has 6 degrees of freedom; it's the only joint that fulfills the supportive and locomotor functions in the kinematic chain of the lower limb. When the knee functions normally, the quantity of the synovial fluid in the joint is a few milliliters. When the effusion fluid is overproduced, the general fluid volume in the joint may be elevated. When the fluid quantity is normal, the reduction of the joint capacity during movement doesn't affect the increase of the intraarticular pressure. Yet, when the fluid is overproduced, the elevated fluid pressure leads to limitation of the range of motion and makes it possible for the fluid to escape the joint through minor resistance areas. The fluid can collect when there's a junction in the bursae of the popliteal fossa or cause herniation in weaker areas of the capsule. Due to various scientific sources this pathology occurs in 5-58% of adults who report symptoms.

## **The causes of development of the popliteal cyst**

The causes haven't yet been described unanimously and they seem to differ in accordance to the scientific method applied. The causes also seem to differ due to the anatomical structure, age and coexistence of systemic or intraarticular diseases. The popliteal cyst develops most frequently in children age 4-7 and adults 35-70. Its localisation is in most cases the same: between the medial head of the gastrocnemius muscle and the semimembranosus muscle. Depending on the cause of cyst development, the structure of the cyst may be significantly different. Histopathologically, the popliteal cysts can be divided into the following groups:

1. Fibrous – the wall is well seen and delomorphic, 1-2mm in width; it has a smooth and shiny internal surface. The wall is built of fibrous tissue saturated with hyalin. Inside there can develop rice bodies, the cells are like mesothelial cells.
2. Synovial- less delomorphic, the wall is 2-5mm in width, it's less shiny and has villous structures. The connective fibrous tissue inside is less thick, its surface is covered with cells alike the synovial cells; the cells are of more cubic shape.
3. Inflammatory – surrounded with a very thick (up to 8mm) wall which seems to be plushy, fluffy because of the fibrin-like processes. The wall is infiltrated with lymphocytes, plasmatic cells, histiocytes and polinuclear cells. In this kind of cysts, cartilage- and bone-like elements can be produced.

### **Two factors**

There are two factors that might cause the development of the popliteal cyst. The first one is decisive, both in adults as well as children – excessive quantity of the

**effusion fluid** in the knee.

The production and resorption is normally in a dynamic balance, regulated by the synovial membrane. The balance also seems to be affected by the fluid flow outside the joint. The capacity of the knee changes during movement – it's the greatest at circa 30 degrees and it significantly decreases when the bending angle is wider. A small amount of the fluid which normally fills the joint doesn't increase the pressure during joint movement. The excessive amount of fluid increases intraarticular pressure during flexion. The outflowing fluid produces a popliteal cyst. It produces a hernia of the synovial membrane that goes out through the posterior part of the capsule or enlarges the bursa of the semimembranosus muscle which is connected with the joint. The main cause of the overproduction of the effusion fluid seems to be coexisting **intraarticular diseases**.

The second, by many considered the main one, factor that might cause the development of the popliteal cyst is a one-way flow of the effusion fluid, forced by the **valvular mechanism** of the joint capsule. One third of arthroscopic patients have a connection between the joint and the bursa of the semimembranosus muscle in the posteromedial recess. MRI tests show 99% frequency of the presence of the connection. The connection between the cyst/bursa and the joint is localised in the area of minor resistance of the capsule tissues, between natural strengtheners, that is the arcuate ligament, semimembranosus muscle and the medial head of the gastrocnemicus muscle. The joint capsule together with the synovial membrane are not able to anatomically strengthen the area.

MRI images have shown the presence of the popliteal cyst in 5-38% or even 55% of adult patients reporting clinical symptoms. In patients in early stages of gonarthrosis the morbidity falls around 35.4%.

Widely available, cheap and reproducible ultrasound tests (picture 15), perfect in children, are the most common method of diagnosing the changes in the popliteal fossa. Ultrasound tests have shown presence of the popliteal cyst in 40% of adult patients reporting clinical symptoms.

I have become interested in the treatment of the popliteal cyst because it's a frequent disease and there are no reliable long-term effects of non-operative treatment or its classic open removal especially in young adults and children. The method I've created, of arthroscopic/endoscopic removal of the popliteal cyst together with the treatment of primary intraarticular pathologies of the knee and the removal of the valvular mechanism, gives much better chances of getting rid of the problem for good.

[Popliteal cyst – treatment \(find out more\)](#)

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