



American Brain Tumor Association

## CYSTS

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Just like a cyst elsewhere in your body, a cyst in the brain is a sphere filled with fluid, similar to a miniature balloon filled with water. Cysts may contain fluid, blood, minerals, or tissue. Although cysts tend to be benign growths, they are sometimes found in parts of the brain that control vital functions, or they may be found inside malignant tumors.

The symptoms associated with a cyst in the brain depend on where the cyst is located. Each part of the brain controls a function somewhere in the body. Some parts of the brain are relatively “silent,” allowing a cyst to grow quite large before it causes symptoms. Other parts of the brain control functions such as swallowing, dexterity, or balance; a cyst growing in those locations may be noticed sooner than other locations. We offer extensive information about each part of the brain, what it controls, and what you might see when a tumor or cyst is present. If you would like that information, please visit our web site at [www.abta.org](http://www.abta.org) or call us at 800-886-2282.

CT and MRI scans are used to diagnose brain cysts. CT scans show the detail of the skull bones, and provides a visual image of mineral content in or around these masses. MRI scans complement CT scanning by providing a picture of the location of the cyst in relation to the blood vessels and vital structures of the brain. When a cyst is found in the brain, there is usually only one; however, multiple tiny cysts may be found inside a malignant tumor. On a scan, a cyst has well-defined edges, as opposed to malignant tumors which have irregular borders.

There are specific types of cysts. They are named for the type of tissue from which they arise and for their contents. The most common cysts found in the brain are arachnoid, colloid, dermoid, epidermoid, and pineal cysts. Each is described below.

### **Arachnoid Cyst also called Leptomeningeal Cyst**

An arachnoid cyst is an enlarged sphere containing cerebrospinal fluid. Arachnoid cysts are found in the “subarachnoid space” -- the space between the arachnoid and pia mater layers of the meninges. Those layers form a membrane-like covering around the brain and spinal cord. Arachnoid cysts are thought to represent a duplication or split in these normal membranes, which creates a localized pouch of trapped cerebrospinal fluid. Arachnoid cysts can occur in

both adults and children, but are most often found in infants and adolescents. They affect more males than females. Arachnoid cysts tend to be located in the area of the Sylvian fissure (a deep fold which separates the frontal, temporal and parietal lobes of the brain), the cerebellopontine angle (the “corner” at which the upper parts of the brain meet the lower parts), the cisterna magna (a fluid-containing space near the brain stem) or the suprasellar region (the area above the “sella” – a bony pouch near the center of the skull).

Treatment for an arachnoid cyst may be “watchful waiting,” or it may be surgery. If the cyst is small and is not causing problems, your doctor may suggest “watching” the cyst for a while to see if it grows. During that time, it is important to keep your appointments for follow-up scans on a regular basis, as these cysts may slowly continue to enlarge. After each scan, your doctor will compare the new scan to the old scan to monitor the size of the cyst. Some arachnoid cysts never enlarge.

If the cyst is causing symptoms or is located in a part of the brain where continued growth would cause a problem, your doctor may suggest surgery to remove the cyst. The usual procedure is to drain and attempt to remove the entire cyst, including its outermost lining. Sometimes, when this is not feasible, the surgeon will open the cyst wall to drain the contents into the normal cerebrospinal fluid pathways. If the cyst is blocking the flow of cerebrospinal fluid through the brain, a shunt may be used to help move the fluid and open these passageways. If the fluid in the cyst is aspirated through a needle, without the cyst wall being addressed, the fluid generally reaccumulates rapidly.

## **Colloid Cyst**

Although scientists are not sure exactly which cells give rise to colloid cysts, they do agree that this type of cyst begins during the embryonic formation of the central nervous system. These grape-like spheres contain a thick, gelatinous substance called colloid. As the colloid filling of the sphere increases, the size of the cyst increases. These cysts may quietly sit in the brain during childhood, not making their presence known until the adult years when they finally reach a large enough size to cause symptoms. In addition to the colloid filling, they may also contain blood, minerals, or cholesterol crystals.

Colloid cysts are typically found growing along the roof of the third ventricle (a space in the center of the brain which holds spinal fluid) or in the choroid plexus (the lining of the third ventricle). Cysts in these locations may block the flow of fluid through the brain, causing a fluid backup called hydrocephalus. As the fluid builds up in the ventricles, increased pressure occurs and causes headaches. Other symptoms may include confusion, difficulty walking, and brief interruption of consciousness.

Continued, untreated pressure from a cyst in this location may cause brain herniation or sudden death. For that reason, the first goal of therapy for a colloid cyst will be to relieve the pressure buildup. A shunt may be used to drain fluid, or surgery may be done to remove or drain the

cyst. Removing the entire cyst can be challenging because of its location on/near the third ventricle. Some surgeons are exploring the use of endoscopes for operating in the ventricles; others are exploring computer-assisted surgical navigation tools for tumor removal in this area. The "best" treatment is still under discussion and study.

### **Dermoid Cyst also called Dermoid**

Dermoid cysts most likely form during the very early weeks of fetal growth. As an embryo is developing, the neural tube – the cells which eventually form the brain and spine - separate from the cells destined to become the skin and bones of the face, nose, and vertebrae. A dermoid cyst results when cells predestined for the face become entrapped in the brain or the spinal cord. Consequently, the inside of a dermoid cyst often contains hair follicles, bits of cartilage, or glands which produce skin oils and fats. On very rare occasions, a dermoid cyst may spontaneously open, releasing these oils into the brain or spinal cord. This event can cause a situation called chemical meningitis, in which the released contents irritate the meninges.

Dermoid cysts located in the brain are relatively rare; more often, they are found in the ovaries, spine, face, neck, or scalp. Outside the brain, they are sometimes referred to as sebaceous cysts. In the brain, these benign masses tend to be located in the posterior fossa (the lower back portion of the brain) or the neighboring meninges (the thin membranes which form the covering of the brain and spinal cord).

Dermoid cysts in the brain tend to be found in children under 10 years old. In older children and young adults, they are usually located at the lower end of the spine. The cavity of the fourth ventricle and the base of the brain, under the surface of the frontal lobes, are also common sites.

The standard treatment for a dermoid cyst is surgical removal. If the lining of the cyst (the complete outer wall of the sphere) is unable to be completely removed, it will likely regrow. But that growth may be very slow, and it could be years before symptoms again return.

### **Epidermoid Cyst also called Epidermoid, or Epidermoid Tumor**

Epidermoid cysts, also referred to as epidermoid tumors, develop in the same manner as dermoid cysts. These masses arise when embryonic cells meant to be skin, hair or nail tissue become entrapped in the cells forming the brain and spinal cord. The distinction between dermoid cysts (discussed above) and epidermoids is that epidermoid cysts do not contain hair or sebaceous glands. These cysts contain a thick yellow substance that may also contain hair, skin oils, or cholesterol crystals. As with dermoid cysts, on very rare occasions, an epidermoid cyst may spontaneously open, releasing these contents into the brain or spinal cord.

Epidermoid cysts are benign masses, occurring more frequently in the brain than in the spine. They are most often found in middle-aged adults. These cysts tend to be located near the cerebellopontine angle (the area where the top part of the brain meets the brain stem), near the pituitary gland, or along the skull where they may actually grow through the skull bone.

Standard treatment of epidermoid cysts is surgical removal. If the complete cyst (including the sac-like lining of the cyst) is able to be removed, the cyst may be considered cured. If the complete lining cannot be removed, however, the cyst may begin to grow. Regrowth tends to occur slowly, often with years passing before symptoms again return. There are a few, albeit extremely rare, cases of these benign tumors transforming themselves into squamous cell cancer. If this were to occur, surgery and radiation therapy may be suggested.

### **Pineal Cysts**

Cysts in the pineal gland are found in 1-4% of people undergoing MRI for other causes. Why they develop remains unclear. They may be developmental in origin, or they may arise when the pineal gland begins the normal process of shrinkage following puberty. It is rare for pineal cysts to cause neurologic problems. When this does occur, problems arise either because there has been increased cerebrospinal fluid production or bleeding into the cyst. Symptoms may include headache and difficulty looking upwards; if hydrocephalus (blockage of fluid pathways in the brain) occurs, patients may experience sleepiness, confusion, trouble walking, and double vision. Most patients with asymptomatic pineal cysts (cysts not causing symptoms) will never experience cyst enlargement or the development of symptoms. Pineal cysts are rarely associated with underlying tumors, and typically an associated tumor is readily identified with MRI scanning. Some doctors obtain repeat scans of pineal cysts over time to make sure there is no associated tumor or cyst enlargement. Once it has been determined that there is no associated tumor, some doctors continue to recommend periodic scans to look for cyst growth. Others advocate getting further scans if, and only if, the person develops symptoms.

### **Tumor-Associated Cysts**

The cysts discussed above are generally not considered “neoplasms” or “tumors” because they originate as developmental abnormalities. Both benign and malignant tumors, however, may be associated with cysts (sometimes known as “tumor cysts”). When a cyst is associated with an underlying tumor, the tumor is usually obvious because CT or MRI scan shows a nodule or lump adjoining the cyst. Certain benign tumors -- including hemangioblastomas, pilocytic astrocytomas, and gangliogliomas -- are commonly associated with cysts and are usually treated with surgery. Malignant tumors may also be associated with cysts; these tumors may require radiation and/or chemotherapy in addition to surgery, when feasible.

## ***Frequently Asked Questions About Cysts***

### **I've been told to wait to see if my cyst grows. Should I worry about this?**

Very often, cysts do not produce any symptoms and do not enlarge over time. If a cyst is not

causing symptoms and is not thought to be associated with a tumor, that patient might never develop a problem from the cyst. An operation to remove the cyst might carry a greater risk than living with the cyst. Your doctor can help you weigh the risks of “watching and waiting” with the risks of undergoing surgery.

### **Can my cyst explode if it isn't removed?**

Cysts rarely produce explosive symptoms; much more commonly, a gradual increase in fluid inside a cyst leads to progressive symptoms. As mentioned above, some cysts (such as dermoids and epidermoids) contain fluid that if released may be irritating to the brain or meninges. On the rare occasions that such cysts spontaneously burst and release their contents, patients may experience fever, headache, or neck stiffness.

### **How can the doctors tell this is a cyst, and not some type of cancerous brain tumor?**

A CT, or particularly, an MRI scan of a cyst generally shows no solid or nodular components which could suggest an associated malignant tumor. Sometimes, when a cyst appears benign but the doctor cannot be 100% certain, repeated radiological studies over time will be recommended. A malignant tumor would be expected to grow over time, whereas a benign cyst might not.

### **What is the difference between a cyst and a tumor? Why are epidermoid cysts also called epidermoid tumors?**

The term “cyst” refers to a fluid-filled structure, whereas a tumor consists of a mass of abnormal cells with abnormal growth potential. Cysts not associated with tumors typically have a very thin rim surrounding the fluid. When a tumor has an associated cyst, there is generally a mass, or at least a thickening of the rim, visible on CT or MRI scan. Since the growth rate of the skin cells in an epidermoid cyst is generally the same as that of normal skin, from a technical standpoint, epidermoids are more accurately classified as cysts than tumors.

### **It appears that surgery may, or may not, be suggested. What are the guidelines a neurosurgeon uses to make this decision?**

There are no rigorous guidelines. If the cyst is causing symptoms, or it is a size that it is likely soon to cause symptoms, surgery will generally be recommended. If the cyst is associated with an undiagnosed tumor, this may be grounds for surgery. If a cyst is asymptomatic (the patient has no symptoms) and the neurosurgeon believes growth potential is low, the surgeon may recommend observation with surveillance brain scanning.

### **Is radiation therapy ever used to treat a cyst?**

In general, radiation is used to kill dividing cells. The fluid inside a cyst does not contain dividing cells, and the cells forming the walls of most cysts (including arachnoid, colloid, dermoid, epidermoid, and pineal cysts) are not dividing. Targeting the fluid or the cyst walls would therefore not be of use.

If the cyst is associated with a tumor, radiation is sometimes directed (usually from outside the

body) at the tumor plus or minus the cyst wall. Rarely, in tumor-associated cysts such as craniopharyngiomas, particles emitting radiation may be injected into the cyst fluid to deliver a very high dose of radiation to the cells comprising the wall of the cyst.

**What are the odds of a cyst regrowing?**

It depends on what is causing the cyst. In general, if the wall of the cyst is completely removed, the chance of cyst recurrence is quite low. If the cyst is drained but the wall is left intact, the odds of fluid reaccumulating are much higher.

**Can cysts be prevented?**

There is nothing specifically to be done to prevent development of cysts.

**What does it mean when a cyst is an “incidental finding” ?**

This means that the cyst is unlikely to be causing any symptoms, and the cyst is unrelated to what the doctor who ordered the brain scan was looking for.

**Can a cyst affect your white blood cell count?**

As a general rule, it would not.

**Can you tell a cyst from a tumor on MRI?**

A cyst may be part of a tumor, or it may exist without a tumor. Sometimes it is easy to tell if a cyst is associated with a tumor, particularly if there is a lump of excess, abnormal tissue next to a cyst. Sometimes it is very clear that a cyst is not associated with a tumor. Occasionally, it is hard to be sure-- even with an MRI.

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