

Osteochondroma

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An osteochondroma is a benign (noncancerous) tumor that develops during childhood or adolescence. It is an abnormal growth that forms on the surface of a bone near the growth plate.

Growth plates are areas of developing cartilage tissue near the ends of long bones in children. Bone growth occurs around the growth plate, and when a child becomes full-grown, the growth plates harden into solid bone.

An osteochondroma is an outgrowth of the growth plate and is made up of both bone and cartilage. As a child grows, an osteochondroma may grow larger, as well. Once a child has reached skeletal maturity, the osteochondroma typically stops growing, too.

In most cases of osteochondroma, no treatment is required other than regular monitoring of the tumor to identify any changes or complications.

Osteochondromas can develop as a single tumor (osteocartilaginous exostosis) or as many tumors (multiple osteochondromatosis). Because symptoms and treatment options may vary depending on which form a patient has, this article discusses them separately.

Solitary Osteochondroma

Solitary osteochondromas are thought to be the most common benign bone tumor, accounting for 35% to 40% of all benign bone tumors. A benign bone tumor is not cancer and does not spread (metastasize) to other parts of the body.

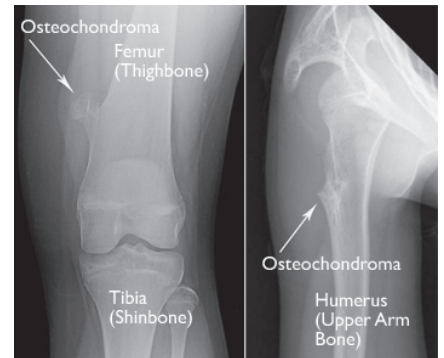
As a child grows, a solitary osteochondroma may develop if bone grows out from the growth plate instead of in line with it. Solitary osteochondromas are commonly found at the end of long bones where they meet to form joints, such as the knee, hip, and shoulder.

This bone outgrowth may have a stalk or stem that sticks out from the normal bone. If the tumor has a stalk, the structure is called pedunculated. If the tumor outgrowth is attached to the bone with a broader base, it is called sessile.

Cause

The exact cause of osteochondroma is unknown. It does not result from injury. Both males and females are equally likely to develop it.

Osteochondromas are thought to be associated with a gene called EXT 1. How a defect in this gene may cause the tumors is currently poorly understood. Researchers are investigating it.



(Left) This x-ray taken of the front of the knee shows a typical pedunculated osteochondroma on the femur.

(Right) This x-ray of the shoulder taken from the side shows a sessile osteochondroma on the humerus.

Because the cause of solitary osteochondroma is unknown, doctors have not been able to find a way to prevent it.

Symptoms

In many cases, solitary osteochondromas do not cause any symptoms, or symptoms may arise long after tumors develop. Osteochondroma is most often diagnosed in patients aged 10 to 30 years.

Symptoms of an osteochondroma include:

- **A painless bump near the joints.** The knee and shoulder are most often involved.
- **Pain with activity.** An osteochondroma can be located under a tendon (the tough, fibrous tissue that connects muscle to bone). When it is, the tendon may move and “snap” over the bony tumor, causing pain.
- **Numbness or tingling.** An osteochondroma can be located near a nerve, such as behind the knee. If the tumor puts pressure on a nerve, there may be numbness and tingling in the associated limb.
- **Changes in blood flow.** A tumor that presses on a blood vessel may cause periodic changes in blood flow. This can cause loss of pulse or changes in color of the limb. Changes in blood flow resulting from an osteochondroma are rare.

In some cases, an injury can cause the stalk of a pedunculated osteochondroma to break. This will cause immediate pain and swelling in the area of the tumor.

Doctor Examination

Because many osteochondromas do not cause any discomfort or other symptoms, they are often discovered by accident when an x-ray is done for an unrelated reason.

If you do have symptoms that cause you to seek a doctor's care, your appointment will begin with a medical history and a physical examination.

Medical History and Physical Examination

Before a physical examination, your doctor will talk with you about your general health, as well as your symptoms in order to get a good history of the problem. During the physical examination, your doctor will look for tenderness over the bone and check your range of motion in the area of your pain.

Tests

In order to diagnose osteochondroma, your doctor will order imaging tests.

X-rays. These tests create clear pictures of dense structures like bone, and will show the bony growth of an osteochondroma.

Other imaging scans. Doctors may also request computed tomography (CT) scans or magnetic resonance imaging (MRI) scans to help further define the tumor. These scans can provide more detail, especially of soft tissues. They can also provide cross-sectional images.

An MRI scan may be used to look for cartilage on the surface of the tumor. Although it is rare for an osteochondroma to change into a cancerous tumor, it is possible. In adults, a thick covering of cartilage over the tumor is one sign of such a change. A tumor in an adult patient should be checked for cancer if it is enlarging or has become painful.

A biopsy is necessary to check for cancer. In a biopsy, a tissue sample of the tumor is taken and examined under a microscope. Your doctor may give you a local anesthetic to numb the area and take a sample using a needle. Biopsies can also be performed as a small operation.

Treatment

Nonsurgical Treatment

In most cases of solitary osteochondroma, treatment consists of careful observation over time. Your doctor may want to take regular x-rays to keep track of any changes in the tumor.

Surgical Treatment

Your doctor may consider surgery if the osteochondroma:

- Causes pain
- Puts pressure on a nerve or blood vessel
- Has a large cap of cartilage

To completely remove an osteochondroma, your doctor will perform a surgical procedure called excision. In this procedure, the tumor will be removed at the level of the normal bone.

How long it takes to return to daily activities will vary depending on the tumor's size and location. If you have any pain or discomfort, you may want to limit some activity. Your doctor will provide you with specific instructions to guide your recovery.

Multiple Osteochondromatosis

Multiple osteochondromatosis is also referred to as multiple osteochondromatosis, multiple hereditary exostosis (MHE), familial osteochondromatosis, multiple hereditary osteochondromatosis, or diaphyseal aclasia.

The number and location of osteochondromas varies. Both pedunculated and sessile tumors may develop. In more severe cases, multiple osteochondromatosis can cause bones to grow abnormally. For example, many patients have short stature, knock-knees and ankles, and deformities of the forearms.

Due to these more obvious signs, children with severe multiple osteochondromatosis are often identified early. However, like solitary osteochondroma, mild osteochondromatosis may not be diagnosed until early adulthood. Multiple osteochondromatosis is more common in males than females.

The risk of these benign tumors changing to cancer (malignant transformation) is greater than solitary osteochondroma.

Cause

About 70% of the time, multiple osteochondromatosis is inherited. The other 30% of cases occur randomly.

Like solitary osteochondroma, alterations in genes called EXT genes are thought to be the cause of this disease, and research is being conducted.

Symptoms

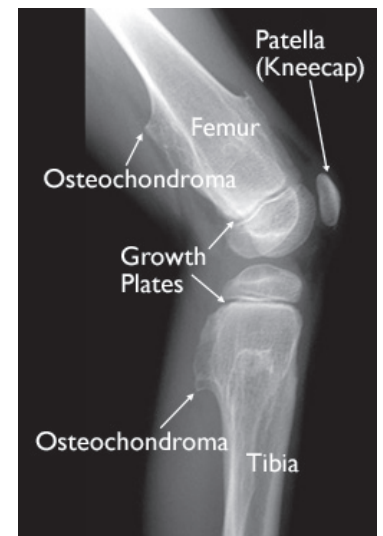
The symptoms of multiple osteochondromatosis are similar to those of solitary osteochondroma, only often more severe. It can cause painless bumps at the sites of tumors. Pain and other discomforts are possible should tumors put pressure on soft tissues, nerves, or blood vessels.

Doctor Examination

Diagnosing multiple osteochondromatosis includes a medical history and physical examination, as well as imaging tests.

Multiple osteochondromatosis can be seen on a plain x-ray. The findings are generally more severe than those of solitary osteochondroma.

Orthopaedic oncology evaluation. If you have any symptoms of a tumor becoming cancerous, you should be evaluated by a doctor who specializes in the treatment of bone tumors (an orthopaedic oncologist).



Several tumors in the femur and tibia are apparent in this x-ray of a child's knee taken from the side.

Symptoms and signs of a tumor becoming cancerous are:

- Growth of an osteochondroma after puberty
- Pain at the site of an osteochondroma
- A cartilage cap thicker than 2 cm

If cancer is suspected, you will need a thorough evaluation that includes MRI and CT scans of the tumors. Your doctor may also order a CT scan of your chest to look for any disease that may have traveled through the bloodstream to your lungs. A biopsy of the tumor tissue will confirm whether there is any cancer.

When an osteochondroma becomes cancerous, it most commonly changes into a cancer called chondrosarcoma.

Treatment

Nonsurgical Treatment

In most cases, treatment consists of careful observation over time. Your doctor may want to take regular x-rays to keep track of any changes in the tumors.

Indications for surgical removal of tumors are the same as for solitary osteochondromas: pain, pressure on nerves or blood vessels, and a large cap of cartilage.

Surgical Treatment

If surgical removal of an osteochondroma is indicated, the procedure is the same as with a solitary tumor. Deformities such as knock-knees or ankles may require surgery to straighten the bone.

Should multiple chondromatosis become cancerous, treatment will depend on the stage of the cancer's progress. In general, malignant tumors are removed using surgery. Often, radiation therapy and chemotherapy are used in combination with surgery.

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