Boston Children's Hospital
Orthopedic Center

Orthopedic Center
Hand and Orthopedic Upper Extremity Program
Osteochondroma

Whether your child or loved one suffers a broken arm, a sports-related injury or the most complex spine condition, the Orthopedic Center at Boston Children's Hospital is committed to providing comprehensive and compassionate care. Established in 1903, we are among the world's most experienced pediatric orthopedic programs, treating a high volume of some of the most complex orthopedic conditions. And with 13 specialty clinics, we are the largest in the country. We are also one of the busiest. Each year, our staff attends to about 100,000 patient visits and conducts about 6,000 surgeries.

The Hand and Orthopedic Upper Extremity Program provides comprehensive care for infants, children and adolescents with a wide range of complex upper limb conditions. Multidisciplinary care involving occupational and physical therapy, splinting, casting and reconstructive surgeries is provided for congenital, neuromuscular, sports-related oncologic, traumatic or post-traumatic conditions.

Osteochondroma is a benign tumor that contains both bone and cartilage and usually occurs near the end of a long bone. This tumor, one of the most common benign bone tumors, takes the form of a cartilage-capped bony spur or outgrowth on the surface of the bone. It is sometimes referred to as osteocartilaginous exostosis.

Most of the time these tumors occur in the distal femur (thigh bone), proximal tibia (shin bone) and proximal humerus (upper arm). Another common site is the ilium of the hip. Osteochondroma, which most often strikes in the second decade of life, can occur as a solitary tumor or less commonly as multiple lesions. The latter form is known as multiple hereditary exostoses

Osteochondromas do not spread beyond the affected bone, and may grow in size as the child grows, but they cease to grow at skeletal maturity (when bones normally stop growing). However, very rarely, an osteochondroma can transform into a malignant condition later in adulthood. Doctors may want to keep an eye on the condition after skeletal maturity for this reason. Although this is extremely uncommon, the risk of malignant transformation is highest if the tumors are found in the pelvis, ribs, scapula and spine. Malignant transformation almost never occurs in childhood, but should be considered in an adult who is experiencing growth and pain in an osteochondroma, especially in the setting of multiple hereditary exostoses.

The malignant condition associated with osteochondromas is most often chondrosarcoma, a cancer of cartilage, though it sometimes transforms into malignant fibrous histiocytoma or osteosarcoma. Chondrosarcoma that arises from osteochondroma tend to be low grade. They rarely metastasize (spread) and have a better prognosis than other forms of the disease. Once again, malignant change is extremely unusual and is therefore not a reason to remove all osteochondromas.

What causes osteochondroma?

The exact cause of osteochondroma is unknown. It is thought of as a piece of the growth plate that breaks off and grows away from the bone. Multiple hereditary exostoses are most often genetically inherited, though it can also occur sporadically.

What are the symptoms of osteochondroma?

The following are the most common symptoms of osteochondromas. Keep in mind that each child, adolescent or young adult can experience symptoms differently, depending on the size and location of the tumor or tumors:

- hard painless mass (although it can be painful if it involves tendons, muscles or nerves)
- inflammation (like a bursitis from muscles or tissues rubbing over the osteochondroma)
- fracture
- irritation of a nearby nerve (weakness, numbness)
- blood vessel aneurysm (extremely rare) from pressure of the blood vessel by the osteochondroma
- angular deformity
- limb length discrepancy
- neurological problems (associated with spinal tumors)

The symptoms of osteochondroma resemble the symptoms of other conditions. Always consult your child's physician for a diagnosis.

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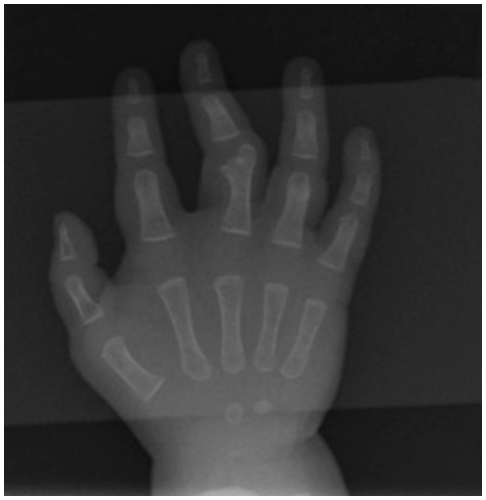

Clinical Team

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10 Centennial Drive
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How is an osteochondroma diagnosed?

In addition to a taking a complete medical history and performing a full physical examination, your child's doctor may use one or more of the following tests to diagnose an osteochondroma:

- x-rays - a diagnostic test that uses invisible electromagnetic energy beams to produce images of internal tissues, bones, and organs onto film.
- magnetic resonance imaging (MRI) - a diagnostic procedure that uses a combination of large magnets, radiofrequencies, and a computer to produce detailed images of organs and structures within the body. This test is done to rule out any associated abnormalities of the spinal cord and nerves.
- computerized tomography scan (also called a CT or CAT scan) - a diagnostic imaging procedure that uses a combination of x-rays and computer technology to produce cross-sectional images (often called slices), both horizontally and vertically, of the body. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat, and organs.
- bone scan - a nuclear imaging method to evaluate any degenerative and/or arthritic changes in the joints; to detect bone diseases and tumors; to determine the cause of bone pain or inflammation.
- complete blood count (CBC) - a measurement of size, number, and maturity of different blood cells in a specific volume of blood
- blood tests (including blood chemistries)

Treatment for osteochondroma

Every child is unique and treatment is structured around the child's needs. Specific treatment for osteochondroma will be determined by your child's physician based on:

- your child's age, overall health, and medical history
- extent of involvement with the growth plate in the affected bone
- your child's tolerance for specific medications, procedures, or therapies
- how your child's physician expects the disease may progress
- your opinion or preference

Since most osteochondromas cease to grow when a child stops growing, they are not usually removed, particularly when they occur in close proximity to the affected bone's growth plate, since interference here could affect how the bone grows. Complications that can occur with surgery to remove this kind of tumor (or tumors) also factor in to a decision to leave the tumor alone.

Surgery is considered, however, if your child is experiencing pain, fracture, nerve irritation, or if the tumor continues to grow after your child's bones have reached their full growth potential. There is no known medical treatment for osteochondromas.

The surgical treatment of choice is complete excision of the tumor. Depending on the location of the osteochondroma, this may be relatively simple. In other locations, relationship to adjacent nerves and blood vessels may make the resection difficult and risky. For this reason, the decision for removal should not be made lightly.

Although rare, an osteochondroma that becomes malignant usually takes the form of a low grade chondrosarcoma (meaning they are unlikely to spread elsewhere in the body). , Higher grades of cancer can occur, but this is even more uncommon. In that case, other additional therapies, such as chemotherapy and radiation, may be used in treatment. Multiple tumors (multiple hereditary exostoses) are more likely to result in functional impairment of the involved extremity. Therefore surgery may be needed to treat deformities of painful lesions. The operation involves excision of the tumors, and sometimes involves surgical cutting and realigning the bones that have become deformed. The latter surgical procedure is known as osteotomy. Rarely, in the adult, a growing and painful osteochondroma may be removed because of the concern for malignancy, but this is rare even in patients with multiple osteochondromas.

What is the long-term outlook for a patient with osteochondroma?

The long-term outlook for a patient with osteochondroma varies from individual to individual depending on:

- the extent of the disease.
- the size and location of the tumor.
- the tumor's response to therapy.
- the age and overall health of the child
- your child's tolerance of specific medications, procedures, or therapies.
- new developments in treatment

Prognosis and long-term survival can vary greatly from child to child. Generally, the prognosis for a child with osteochondroma is favorable. Most often, these tumors cease growing at skeletal maturity. In those that continue to grow in adulthood, surgery is usually curative. In some instances, however, if for example a higher grade of cancer than usual results, the outcome is less certain. Prompt medical attention and aggressive therapy are important for the best prognosis. Continuous follow-up care is essential for a child diagnosed with multiple osteochondromas. Patients with multiple osteochondromas should be informed that this is a hereditary condition that may be passed on to their offspring.

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