OSTEOSARCOMA IN OTHER BENIGN CONDITIONS pdf

1: Types of Bone Sarcoma in Adults | NYU Langone Health

The topic Osteosarcoma of Chronic Osteomyelitis you are seeking is a synonym, or alternative name, or is closely related to the medical condition Osteosarcoma in other Benign Conditions. Osteosarcoma forms a class of highly-cancerous, high-mortality, bone tumor. After multiple myeloma, it is the.

Only veterinarians who have successfully completed the certification requirements of the ACVS are Diplomates of the American College of Veterinary Surgeons and have earned the right to be called specialists in veterinary surgery. Your ACVS board-certified veterinary surgeon completed a three-year residency program, met specific training and caseload requirements, performed research and had research published. This process was supervised by ACVS Diplomates, ensuring consistency in training and adherence to high standards. After completing the residency program, the individual passed a rigorous examination. Bone tumors can involve either the appendicular limbs or axial spine, ribs, pelvis, scapula, and skull skeleton. These tumors are classified as either primary i. The four primary bone tumors are osteosarcoma, chondrosarcoma, fibrosarcoma, and hemangiosarcoma. In dogs, appendicular osteosarcoma is a highly aggressive disease and curative-intent treatment involves surgical resection of the tumor followed by chemotherapy to minimize the risk of tumor cells spreading metastasizing to other areas, particularly the lungs and other bones. The majority of primary bone tumors, particularly osteosarcoma, arise spontaneously with no known or apparent cause. Scottish Deerhounds are genetically predisposed to developing osteosarcoma and this tumor also occurs frequently in other large breed dogs, particularly the Rottweiler. Large or giant, and particularly tall, dogs are at a greater risk for the development of osteosarcoma compared to the general dog population, although small dogs less than 15 kg can also be affected. Older dogs are most commonly affected; however, bone tumors can occur in young dogs as well. Primary bone tumors are uncommon in cats. Unlike dogs, where the majority of primary bone tumors are malignant, up to a third of feline bone tumors are benign. Osteosarcoma is also the most common bone tumor in cats, but the behavior of this tumor type is less aggressive than in dogs. Tumors can occur at sites of previous bone damage. The types of bone damage, which have been linked with the development of primary bone tumors include fractures, orthopedic implants used for fracture repair and total hip replacement , radiation therapy, and bone diseases i. It must be stressed, however, that the risk of developing a bone tumor after fracture, fracture repair, or total hip replacement is rare and the vast majority of primary bone tumors develop spontaneously with no apparent predisposing cause. Lameness and swelling of the affected bone are the most common presenting complaints in cats and dogs with tumors of the appendicular skeleton. The onset and degree of lameness is variable: Dogs with metastasis spread the tumor to the lungs may present with a diffuse swelling of all four limbs hypertrophic osteopathy , generalized weakness, or respiratory breathing difficulties. Systemic illness is rare in cats and dogs with primary bone tumors that have not spread. The clinical signs associated with primary bone tumors of the axial skeleton depend on the bone involved. In most cases, a swelling or mass is the first sign of a tumor, particularly in the skull, jaw, and ribs. Other signs may include: However, differentiating primary bone tumors from secondary bone tumors can be difficult unless the primary tumor causes clinical signs e. Your primary-care veterinarian, sometimes with the help of specialists in oncology or surgery, may perform the following diagnostic tests to define what tumor type is present in the bone, where a tumor may have spread in the body, and to assess the overall health of your pet: Orthopedic examination is important to identify the affected bone, rule-out other causes of lameness particularly cranial cruciate ligament rupture, hip dysplasia, and neurologic disease , and evaluate the potential for adapting to life on three legs if limb amputation is being considered. Blood tests are recommended to assess general health status, as many cats and dogs with primary bone tumors are older and may have other problems, which need to be considered when developing a treatment plan. Urinalysis may be added to assess kidney function. If a limb-sparing procedure is being considered, then radiographs, bone scans, and advanced imaging i. A biopsy sampling of the suspected tumor itself is important to determine the best treatment plan for your pet, because different tumor types respond differently to different treatments. The biopsy may indicate other causes of bony destruction. Biopsy is recommended if the presentation is not typical

e. For patients where destruction of the bone is extensive, a presurgical biopsy may not change the course to treatment and pathologic evaluation after amputation or limb sparing procedures may be elected. Fine needle aspiration may be used in some patients as a screening test for cancer, but often, a bone biopsy [where a core sample of the suspected tumor is obtained for review by a pathologist] is needed. Appendicular osteosarcoma is a highly malignant and metastatic disease in dogs. Chest radiographs or CT scans are necessary for the evaluation of metastasis to the lungs. The incidence of bone metastasis, which often does not cause clinical signs, is approximately the same as lung metastasis but has a much greater impact on management options as there is a high risk of fracture through the metastatic lesion as a result of increased weight bearing after limb amputation. A whole-body bone scan is the most effective technique to evaluate for the presence of metastatic disease in another bone, although nuclear medicine facilities are not widely available Figure 4. Whole-body radiographs are an alternative to bone scan but are more time consuming and costly, and metastases may be missed with radiographic evaluation because they are not as sensitive for picking up bone changes as a bone scan. Advanced imaging, particularly CT scans, are recommended for many tumors of the axial skeleton as the cross-sectional and three-dimensional images provide better information for the ACVS board-certified veterinary surgeon to assess whether surgery is possible and, if so, the extent of surgery required for achieving a favorable outcome. Following limb amputation or limb-sparing surgery, the tumor should be submitted to a veterinary pathology laboratory for assessment of tumor type and, if applicable, tumor grade i. Palliative treatment is intended to provide pain control and improve quality of life but not necessarily prolong life. In contrast, the aim of curative-intent treatment is to provide a good quality of life while controlling the local tumor and minimizing the risk of metastasis in an effort to cure the tumor. Palliative treatment options include pain-killing drugs, radiation therapy, and surgery. Many drugs have pain-killing analgesic properties, but the degree of analgesia provided by these drugs can vary. Non-steroidal anti-inflammatory drugs are usually effective initially, although stronger analgesic drugs or drug combinations may be required as the tumor progresses. Radiation therapy can be used to reduce pain and inflammation and can be used in combination with pain-killing drugs and chemotherapy drugs. The bone tumor is irradiated using various protocols; the most common are either once weekly radiation for 3 to 4 weeks or once monthly radiation. Lastly, the affected limb can be amputated if the bone tumor is very painful or fractured. However, it should be noted that limb amputation without chemotherapy is palliative and does not prolong survival time. For dogs with appendicular osteosarcoma, curative-intent treatment is aimed at treating the local bone tumor and minimizing the risk of metastatic disease. Limb amputation is recommended for treatment of the local bone tumor Figures 5 and 6. If a tumor involves the hip or pelvis, a portion of the pelvis may be removed as well. The vast majority of dogs will adapt very well after limb amputation, even if arthritic in other joints, overweight, or a large dog breed. The adaptation period is approximately 4 weeks and is improved if pet owners have a positive attitude towards their dog and the treatment. Limb-sparing surgery preserves the anatomy and function of the affected limb and is a viable alternative to limb amputation Figure 7. A number of different limb-salvage techniques are now available, but most are only amenable to the distal radius bone adjacent to the carpus or wrist. Non-surgical limb-sparing techniques, such as stereotactic radiation, may be suitable for tumors in other locations. However, apart from preservation of limb function, there are no advantages of limb-sparing surgery compared to limb amputation. The decision to pursue limb-sparing surgery is usually a pet owner preference as there are few medical conditions, which would make limb amputation unfeasible. Furthermore, limb-sparing surgery is not widely available and the complication rate is relatively high. Surgery, whether limb amputation or limb-sparing, is the only necessary treatment for cats with any type of primary bone tumor and dogs with primary bone tumors other than osteosarcoma or hemangiosarcoma. The majority of primary bone tumors in cats have a low potential to metastasize and hence do not require postoperative chemotherapy. Chemotherapy is recommended for dogs with appendicular osteosarcoma as survival time is significantly improved compared to surgery alone. Chemotherapy is usually started at suture removal about 10 to 14 days after surgery. A number of different chemotherapy protocols have been used to treat dogs with osteosarcoma. The side effects and costs of these drugs vary and a consult with a medical oncologist is recommended to discuss these options. The treatment for primary bone tumors of the axial skeleton is dependent on the size and location of

the tumor. Surgery is the main treatment for axial bone tumors i. Subtotal or total scapulectomy removing part or all of the shoulder blade may be performed for scapular tumors. Hemipelvectomy removing a portion of the pelvis along with amputation is indicated for many pelvic tumors. Analgesic drugs and radiation therapy can be used for palliation if surgery is not wanted or possible. Chemotherapy may be indicated following surgery however the metastatic potential for axial bone tumors, even osteosarcoma, is lower than the same tumor in the appendicular skeleton. Chemotherapy is recommended for dogs with osteosarcoma of the ribs, scapula, and pelvis because of a high metastatic rate and a biologic behavior similar to appendicular osteosarcoma. Chemotherapy should also be considered for mandibular osteosarcoma. Limb amputation is considered the gold standard for the surgical treatment of primary bone tumors and the complication rate is very low. In contrast, the complication rate with limb-sparing surgery can be high. The most common complications are infection, implant failure, and local tumor recurrence. Antibiotics can control but rarely cure these infections. Other options for the treatment of limb-sparing-related infections include implantation of antibiotic-impregnated bone cement beads, isolated arterial perfusion of antibiotics, reconstructive surgery with skin and muscle flaps, and limb amputation. There are a number of different limb-sparing techniques, some of which may decrease the risk of infection. The aim of chemotherapy is to kill the tumor while maintaining quality of life. The risk and severity of chemotherapy complications or side-effects are often dependent on the drug used and should be discussed with a medical oncologist. For axial bone tumors, the complications are dependent on location of the tumor and the type and extent of surgery performed to remove the tumor. The type and risk of these complications should be discussed with your veterinary surgeon. The majority of dogs are able to walk unassisted within 12 to 24 hours of limb amputation. Dogs should be encouraged to walk and exercise to improve the speed of recovery. The surgical wound should be checked twice daily for signs of infection or breakdown called dehiscence. These signs include redness, swelling, watery to purulent discharge, and pain. After limb-sparing surgery, the limb should be lightly bandaged and the bandages should be changed frequently for 2 to 3 weeks. Exercise is started immediately after surgery but should be restricted to leashed walks for the first 4 weeks. Exercise is important in preventing toe contracture and minimizing swelling of the foot and toes, both of which can occur as a consequence of excising certain muscles and blood vessels during surgery. However, median survival times of approximately days have been reported following treatment with palliative radiation therapy and chemotherapy. Alkaline phosphatase is an enzyme analyzed in the preoperative blood tests, which has been shown to be associated with the duration of survival following surgery and chemotherapy. The median survival time for dogs with a normal alkaline phosphatase level is approximately Other factors that may influence prognosis in dogs with appendicular osteosarcoma include tumor size and location and histologic grade. For dogs with appendicular chondrosarcoma, the survival time following limb amputation alone i.

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2: Bone tumor - Wikipedia

Bone tumors grow when cells in the bone divide without control, forming a mass of tissue. Most bone tumors are benign, which means they are not cancer and do not spread to other areas of the body.

Cronin, MD, and Tudor H. Bone tumors are a relatively infrequent finding in musculoskeletal radiology. The list of potential osseous lesions is extensive; this review of bone tumors does not include metabolic or degenerative lesions. To provide a meaningful differential diagnosis to the referring clinician, several characteristics of every osseous lesion should be routinely assessed. Classically, 10 radiographic features of a bone lesion should be examined. Five of these include: Because these characteristics are so important to properly classifying bone tumors, more should be said about each. The zone of transition is that outer margin of the lesion that represents the change from pathologic to normal bone. A wide ZOT is said to be present when the lesion cannot be clearly circumscribed; this is usually associated with an aggressive lesion. A wide ZOT does not equate to malignancy, but it is very rare for a narrow ZOT a geographic lesion to be associated with anything other than a benign lesion. For example, a select group of lesions is eccentrically located and involves the cortex osteoid osteoma, parosteal osteosarcoma, and nonossifying fibroma Figure 2. Other lesions almost always involve the epiphysis giant cell tumor after physeal closure Figure 3, DICOM images available: Several lesions that can be polyostotic include multiple hereditary exostoses, enchondromas, fibrous dysplasia and, occasionally, eosinophilic granulomas. Periostitis is often subtle and can mislead the radiologist attempting to classify a lesion as benign or aggressive. Benign patterns are those that, in theory, have had sufficient time to organize and, thus, show solid thick or wavy unilamellar periosteal changes. Use caution when assessing periosteal reactions, as many benign lesions such as infection, EG Figure 1 , and aneurysmal bone cysts can result in an aggressive-appearing periostitis. Regardless, recognizing periosteal reaction of any type remains important, as this effectively excludes several lesions from the differential. If periostitis is present, fibrous dysplasia, solitary bone cyst, nonossifying fibromas, and enchondromas can be removed from consideration unless complicated by fracture. Moreover, while infection, metastatic lesions, and aneurysmal bone cysts typically present with pain, discomfort is rare in the absence of trauma with fibrous dysplasia, enchondromas, and solitary bone cysts. Several other characteristics, such as the presence of sclerotic margins, soft tissue involvement, a pattern of bony destruction, endosteal scalloping, and the pattern of matrix calcification, can also aid in diagnosis. Although plain radiographs, computed tomography CT , magnetic resonance imaging MRI , and radionuclide studies may each provide additional information, suspected soft-tissue extension of an osseous lesion should be evaluated further with contrast-enhanced MRI to determine not only tumoral extent but also the risk of complications like neurovascular compromise. Also, MRI may help narrow the list of differential considerations by demonstrating cystic or necrotic components, encapsulation, contrast enhancement and the presence of fluid levels Figures 2, 8, 9 or peritumoral edema on MRI. Dedicated CT may show occult, pathologic fracture in an otherwise benign-appearing but painful lesion. Scintigraphy with Tc99m â€”MDP bone scan can determine whether a lesion is mono-ostotic versus polyostotic in nature. The following is a brief description of each of the 15 most common benign and malignant osseous lesions the radiologist is most likely to encounter. There is no periostitis unless an associated fracture is present. In contrast to a unicameral or solitary bone cyst, an ABC is typically painful, can have periostitis often aggressive and is eccentrically located. The ZOT is usually narrow and an expansile bubbly appearance is common Figures 2, 8. An ABC should be considered in the differential along with osteoblastoma, tuberculosis, and osteoid osteoma for lesions in the posterior elements of the spine. ABC often complicates other lesions, most notably chondroblastoma, osteoblastoma and giant cell tumor of bone. The MR and CT appearances may show fluid-fluid levels, which is a nonspecific finding and can be seen in other lesions, including chondroblastoma, giant cell tumor of bone, or telangiectatic osteosarcoma. When located in the pelvis, fibrous dysplasia can often appear lytic and bubbly while rib lesions may have a ground-glass appearance and be expansile. Involved tubular bones are expanded and demonstrate cortical thinning. There is no periostitis and the age range of affected patients is broad. Nonossifying fibroma This common lesion is

cortically based and eccentrically located. There is no associated periostitis. The MR appearance is nonspecific, with low signal on T1-weighted images and variable T2 signal. It is eccentrically located, has a sharp nonsclerotic ZOT, abuts subchondral bone, and almost always occurs in individuals with recently closed physes Figure 3. The most common locations are distal femur, proximal tibia and distal radius. However, atypical locations such as the pelvis and calcaneus are also seen. These lesions are usually mono-ostotic; however, polyostotic tumors or satellite lesions are rarely seen and can be difficult to differentiate from metastatic GCT. Periostitis is not present. There is low signal on T1 and variable T2 MRI signal, which may include hyperintense regions or fluid levels secondary to aneurysmal bone cysts. Eosinophilic granuloma Eosinophilic granuloma EG could also be called the great mimicker of osseous lesions. The ZOT can be narrow or wide. Associated periostitis may cause this lesion to appear aggressive. Infrequently, a bony sequestrum may be present; however, this can also be seen in osteomyelitis, fibrosarcoma and primary lymphoma of bone. Enchondroma Enchondromas are centrally located, geographic, and predominantly lytic-appearing lesions, which almost invariably contain a chondroid matrix when found in the long bones Figure 5. These monoostotic, painless lesions may show endosteal scalloping; however, there is no associated periostitis. Enchondromas may be difficult to discriminate from low-grade chondrosarcomas, but the latter is more likely in a history of pain, cortical destruction or soft tissue extension. Osteochondroma This lesion arises from the metaphyseal region of the long bones as a bony excrescence contiguous with the medullary compartment that characteristically points away from the adjacent joint. Osteochondromas are typically solitary, appendicular lesions, which cease growing after the skeleton matures Figure Growth after this point, cortical erosion, or thickening of the associated cartilaginous cap is rare, but suggestive of malignant transformation into chondrosarcoma. Osteosarcoma can be subdivided into medullary, parosteal, periosteal and telangiectatic, all of which carry different prognoses and treatment options. Medullary osteosarcoma Figure 7 is the most common, occurring in adolescents and young adults typically between the ages of 15 and 25 yrs. These are rapidly growing, heterogeneous, metaphyseal lesions that show cortical destruction, aggressive periostitis, and a wide ZOT. Osseous matrix formation is the norm and a soft tissue component is often present. Evaluation with MRI shows variable T1 and T2 signal characteristics secondary to varying degrees of ossification. High T2 signal is often seen around the periphery of the lesion, presumably related to adjacent edema. Metastatic skip lesions are commonly seen and should be worked up with radionuclide evaluation. Parosteal osteosarcoma Figure 12 originates from the parosteal soft tissues and is less aggressive than the medullary form. This lesion typically occurs in older patients. Growth is circumferential around the involved bone and typically does not initially result in cortical destruction. As such the prognosis for this lesion is more favorable. However, if intramedullary extension does occur, the prognosis is more guarded. Telangiectatic osteosarcoma Figure 9 has the potential to be misdiagnosed as a giant cell tumor or chondroblastoma, as it is characteristically lytic and deceivingly nonaggressive in appearance. Subtle cortical erosion or periostitis may be present. Periosteal osteosarcomas are rarer than those mentioned previously. Adjacent cortical erosion is usually seen. An associated soft tissue mass is invariably present. This lesion typically affects the appendicular skeleton in children but is found more axially in adolescents. MRI characteristics show low signal on T1, high signal on T2, and typically an adjacent soft-tissue mass that may be heterogeneous in appearance secondary to focal necrosis. The radiographic appearance can be misleading, as often few aggressive features are present. Cortical erosion, soft-tissue extension, and pain may or may not be present. Low-grade chondrosarcoma can be difficult, if not impossible, to differentiate from an enchondroma, which is the primary alternative consideration in the differential diagnosis. On MRI, low grade, differentiated chondrosarcomas will appear bright on T2 imaging, with more homogeneous signal than that of higher-grade lesions. This lesion has a permeative appearance with an indistinct ZOT and may or may not have an associated soft tissue component Figure The MRI appearance is again nonspecific, with low T1 signal and heterogeneously bright signal on T2-weighted images. Several metastatic lesions, such as renal cell, thyroid, melanoma, and choriocarcinoma, are classically lytic in appearance. However, other than renal cell cancer, this need not always be the case. Metastatic prostate cancer Figure 16 will typically show sclerotic lesions, but breast, lung Figure 17 and gastrointestinal malignancies can also mimic this appearance. As is the

case with other lesions, MRI is useful for evaluation of soft tissue extent and staging; however, biopsy is needed for diagnosis. While this lesion is typically lytic, a rare form of sclerotic myeloma is seen in association with POEMS syndrome Polyneuropathy, Organomegally, Endocrinopathy, Monoclonal gammopathy and Skin changes. In the early stages, myeloma may be preceded by a predominantly lytic plasmacytoma that is usually found in the axial skeleton. Multiple myeloma ultimately ensues, typically with a diffuse axial and appendicular distribution. Patients inevitably suffer from renal failure secondary to Bence-Jones protein deposition or associated amyloidosis. Of note, radionuclide studies with Tc99m-MDP are ineffective in demonstrating myelomatous lesions. To construct a meaningful differential diagnosis, an attempt should be made to characterize the lesion as having either an aggressive or a benign appearance by assessing such qualities as the zone of transition, periostitis, pattern of lysis, and location. A careful and methodical analysis will help the radiologist determine if the lesion is likely benign or if additional workup or biopsy should be considered. Tumors and Tumor-Like Lesions of Bone: Bone and Joint Imaging 2nd Ed. Bone tumors and tumor-like conditions: Analysis with conventional radiography. Malignant Bone and Soft Tissue Tumors. Fundamentals of Diagnostic Radiology. Benign Cystic Bone Lesions. Resnick D, Greenway GD. Imaging and Pathology of Specific Lesions. Cortical lesions of the tibia:

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3: Bone Tumors in Cats - Symptoms, Causes, Diagnosis, Treatment, Recovery, Management, Cost

Bone cancer is a malignant tumor of the bone that destroys normal bone tissue ().Not all bone tumors are malignant. In fact, benign (noncancerous) bone tumors are more common than malignant ones.

Locations and Directions Benign and Malignant Bone Tumors A tumor is a lump or mass of tissue that forms when cells divide uncontrollably. For most bone tumors, the cause is unknown. A growing tumor may replace healthy tissue with abnormal tissue. It may weaken the bone, causing it to break fracture. Aggressive tumors can lead to disability or death, particularly if signs and symptoms are ignored. Most bone tumors are non-cancerous benign. Some are cancerous malignant. Occasionally infection, stress fractures and other non-tumor conditions can closely resemble tumors. Benign tumors are usually not life threatening. Malignant tumors can spread cancer cells throughout the body metastasize. This happens via the blood or lymphatic system. Cancer that begins in bone primary bone cancer is different from cancer that begins somewhere else in the body and spreads to bone secondary bone cancer. The four most common types of primary bone cancer are: Multiple Myeloma, the most common primary bone cancer, is a malignant tumor of bone marrow. It affects approximately 20 people per million people each year. Most cases are seen in patients aged 50 to 70 years old. Any bone can be involved. Osteosarcoma is the second most common bone cancer. It occurs in two or three new people per million people each year. Most cases occur in teenagers. Most tumors occur around the knee. Other common locations include the hip and shoulder. The most common locations are the upper and lower leg, pelvis, upper arm and ribs. Chondrosarcoma occurs most commonly in patients 40 to 70 years of age. Most cases occur around the hip and pelvis or shoulder. There are many types of benign bone tumors. The more common types include non-ossifying fibroma, unicameral simple bone cyst, osteochondroma, giant cell tumor, enchondroma and fibrous dysplasia. Diagnosis If you think you might have a bone tumor, see your doctor as soon as possible for diagnosis and treatment. Symptoms Most patients with a bone tumor will experience pain in the area of the tumor. The pain is generally described as dull and achy. It may or may not get worse with activity. The pain often awakens the patient at night. Although tumors are not caused by trauma, occasionally injury can cause a tumor to start hurting. Injury can cause a bone weakened by tumor to break, which often leads to severe pain. Some tumors can also cause fevers and night sweats. Many patients will not experience any symptoms, but will instead note a painless mass. Medical history and physical exam: Tell the doctor your complete medical history. This includes any medications you take, details about any previous tumors or cancers that you or your family members may have had, and symptoms you are experiencing. Your doctor will physically examine you. In some cases, the doctor may want to examine other parts of your body to rule out cancers that can spread to bone. Your doctor will probably obtain X-rays. Different types of tumors exhibit different characteristics on X-ray. Some dissolve bone or make a hole in the bone. Some cause extra formation of bone. Some can result in a mixture of these findings. Shows a tumor causing a saucer-like erosion in the end of the thighbone. Shows a bone tumor in the middle of the femur exhibiting a combination of characteristics. Shows a fracture through a tumor in the middle of the upper arm bone. Some tumors have characteristic findings on X-rays. In other cases, it may be hard to tell what kind of tumor is involved. You may need more imaging studies to further evaluate some tumors. Shows the cross-sectional MRI appearance of the tumor seen in Figure 1a. You may also require blood and or urine tests. If these tests are not adequate to diagnose your tumor, you may require a biopsy. A biopsy involves removing a sample of tissue from the tumor. The tissue sample is examined under a microscope. There are two basic methods of doing a biopsy. The doctor inserts a needle into the tumor to remove some tissue. The doctor uses surgery to remove tissue. This is generally done through a small incision while you are under general anesthesia in an operating room. In many cases, benign tumors just need to be watched. Some can be treated effectively with medication. Some benign tumors will disappear over time; this is particularly true for some benign tumors that occur in children. Certain benign tumors can spread or become cancerous metastasize. Sometimes your doctor may recommend removing the tumor excision or using other treatment techniques to reduce the risk of fracture and disability. Some tumors may come backâ€”even repeatedlyâ€”after appropriate

treatment. If you are diagnosed with a malignant bone tumor, you might want to get a second opinion to confirm it. If you have bone cancer, your treatment team may include several specialists. These may include an orthopaedic oncologist, a medical oncologist, a radiation oncologist, a radiologist and a pathologist. Treatment goals include curing the cancer and preserving the function of your body. To treat malignant bone tumors, doctors often combine several methods. Treatment depends upon various factors including whether the cancer has spread. Localized stage cancer cells are contained to the tumor and surrounding area. Metastatic stage cancers have spread elsewhere in the body. Tumors at this stage are more serious and harder to cure. Generally the tumor is removed using surgery. Often radiation therapy is used in combination with surgery. Limb salvage surgery removes the cancerous section of bone but keeps nearby muscles, tendons, nerves and blood vessels. If possible, the surgeon will take out the tumor and a margin of healthy tissue around it. The excised bone is replaced with a metallic implant prosthesis or bone transplant. Radiation therapy uses high-dose X-rays. This kills cancer cells and shrinks tumors. Systemic treatment chemotherapy is often used to kill tumor cells when they have spread into the blood stream but cannot yet be detected on tests and scans. Chemotherapy is generally used when cancerous tumors have a very high chance of spreading. After Treatment When treatment for a bone tumor is finished, you may need more X-rays and other imaging studies. These can confirm that the tumor is actually gone. You may need to have regular doctor visits and tests every few months. When the tumor disappears, it is important to monitor your body for its possible return relapse. Genetic research is leading to a better understanding of the types of bone tumors and their behaviors. Researchers are studying the design of metallic implants. This is allowing better function and durability after limb salvage surgery. Advancements in the development of prosthetic limbs include computer technology. This is leading to better function and quality of life after amputation. Research into new medications and new combinations of older medications will lead to continual improvements in survival from bone cancers. Your doctor may discuss clinical research trials with you. Clinical trials may involve the use of new therapies and may offer a better outcome. Reproduced with permission Fischer S. Copyright American Academy of Orthopaedic Surgeons.

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4: Bone Tumors and Soft Tissue Tumors

There are also several types of cancer that produce malignant bone tumors. Primary bone cancer means that the cancer originated in the bones. infections, and other conditions might resemble.

In the hospital, doctors will remove a small piece of the tumor and examine it under a microscope for signs of cancer. This test is important to identify the specific type of tumor and help us plan treatment. In children with bone tumors, surgeons must use extra care when choosing where to place the needle for the biopsy. There is risk of spreading the tumor cells. The goal is for your child to have the best chance for limb-sparing surgery. Benign Bone Tumor Treatment Some benign bone tumors only need to be checked by a doctor once or twice a year. Some may go away on their own. Some children with benign bone tumors need to wear a brace, splint or boot for 4 to 6 weeks to allow their bones to heal. Sometimes, a benign bone tumor can cause problems while it grows. Tumors also can press on nerves and cause pain. If this happens, your child should see an orthopedic surgeon. If your child needs surgery, we often can use techniques that are not as hard on the child as more traditional surgeries. These newer, less invasive techniques require little cutting into the skin and do not require your child to stay in the hospital. They include radiofrequency ablation and cyst injections. Curettage and bone grafting scraping The main surgery for benign bone tumors is surgery to scrape the tumor out of the bone curettage and fill the hole left behind with a bone graft. The graft most often comes from the bone bank allograft. Your child does not need to have another surgery to get the graft from their own body. The bone grafts we use come from healthy donors and are carefully screened for diseases. It usually takes about 4 to 6 weeks for children to heal after this surgery. In many cases, children use crutches and a brace, splint or boot to protect their bones while they heal. Most children recover from this surgery in 2 to 3 months. In radiofrequency ablation, the doctor inserts a tiny needle into the tumor. The needle contains wires that transmit an electric current. The current heats the tumor to a high temperature and destroys it. Doctors most often use radiofrequency ablation to treat a tumor called osteoid osteoma. In most cases, your child can go home and go back to their usual activities right away after the treatment. Cyst injections We can sometimes heal unicameral bone cysts simple or solitary bone cysts by injecting them with a paste of bone marrow and bone matrix. In children younger than 10, a unicameral bone cyst can cause a bone fracture red arrow. Bone marrow paste injections are the preferred treatment to control these cysts yellow arrow , letting the bone heal orange arrow. First, the doctor inserts needles into the cyst and removes liquid. Next, the doctor fills the cyst with a contrast fluid that helps show if the cyst is benign and contains no tumor tissue. If the cyst is benign, the doctor injects the bone paste to help the cyst heal. We will give your child medicine anesthesia to make them sleep during the surgery to collect the bone marrow. Bone matrix comes from healthy human donors. Usually, it takes more than 1 injection to heal the cyst. Your child may have injections every few months for 6 months to a year. Malignant Bone Tumor Treatment Malignant bone tumors bone cancers must be treated. Many children have more than one type of treatment. For Ewing sarcoma, doctors use chemotherapy. Many children also have surgery to remove tumors. For osteosarcoma, children almost always have chemotherapy and then surgery to remove as much of the cancer as possible. Or they may use chemotherapy both before and after surgery. The exact mix of medicines and how long they are given depend on the type of cancer your child has. Researchers are studying new mixes of medicines to find the most effective combination for each type of disease. This imaging test allows us to judge how fast a tumor is growing and whether the chemotherapy is working to slow its growth or shrink it. Our patients receive chemotherapy at our main campus in Seattle â€" most often in the hospital but sometimes in the clinic as outpatients. The kind of surgery done for bone cancer depends on: The size of the tumor Where it is located Whether the cancer cells have spread In the past, some children had their leg or arm removed amputated to get rid of malignant bone tumors in their limb. Now, this happens less often. Most of the time, surgeons can remove only the part of the bone that is affected by the tumor. In limb-sparing surgery, also called limb salvage, the surgeon removes the tumor and any bone and cartilage affected by it, but leaves the nerves, muscles and tendons around the area so that your child can keep their leg or arm. All three are trained in pediatric orthopedic surgery as well as musculoskeletal oncologic surgery. Depending on the

location of the tumor, the surgeon may use a bone transplant or a metal implant, such as a knee joint replacement, to replace the bone that was removed. If your child has had limb-sparing surgery on a leg, they most likely will use crutches for 3 to 6 months while the bone graft or implant heals. Children younger than age 12, who have more growing ahead of them than older children, need another surgery to lengthen their limb so that it keeps pace with their growth as they get older. Limb-sparing surgery is complex, and it requires doctors to make careful decisions about which children are likely to respond well to the surgery. Amputation About 2 or 3 out of every bone cancer patients must have surgery to amputate a limb to remove their tumor. Surgeons most often do it because the tumor is large or is likely to come back. This shows why early treatment is so important. It is best to treat the tumor before it gets big. Children who have amputations can do almost anything they want to do. Using an artificial limb prosthesis , they can play sports and be active. Children who have leg amputations can walk on their new prosthesis within 3 months. Others do not respond as well.

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5: Bone Tumors in Cats and Dogs | ACVS

Osteosarcoma (also called osteogenic sarcoma) is the most common type of cancer that starts in the bones. The cancer cells in these tumors look like early forms of bone cells that normally help make new bone tissue, but the bone tissue in an osteosarcoma is not as strong as that of normal bones.

Some lesions, especially those in children, may disappear over time. Other bone lesions can be treated successfully with medications. In some cases, it may be necessary to surgically remove the lesion to reduce the risk of a bone fracture. Benign lesions may come back after treatment. Malignant bone tumors Causes of malignant bone tumors or cancerous bone lesions depend on whether the cancer is primary or secondary. The most common causes of primary bone cancer lesions are: Multiple myeloma Multiple myeloma usually affects those over the age of 50, and is the most common form of primary bone cancer. Multiple myeloma is a malignant tumor of the bone marrow, which is the soft tissue in the middle of bones responsible for producing blood cells. It can affect any bone in the body and is the most common primary bone cancer, affecting about six people per , every year. Most people who get multiple myeloma are between 50 and 70 years old. Multiple myeloma is usually treated with chemotherapy and radiation therapy. Occasionally, surgery may be required. The 5-year survival rate for multiple myeloma is 49 percent. That means that just under half of people diagnosed with the condition will be alive 5 years after diagnosis. Osteosarcoma Osteosarcoma is the second most common primary bone cancer. It is still rare, occurring in between two and five people in every million each year. Most cases of osteosarcoma are seen either side of the knee in the thighbone or shinbone of teenagers and children. It can also sometimes occur in the hip or shoulder. Treatment usually involves chemotherapy and surgery. The 5-year survival rate is 70 percent for children and young people with osteosarcoma in one location when they are diagnosed. The usual treatment options for osteosarcoma are chemotherapy, surgery, and radiation. Ewing sarcoma Children and young people between the ages of 5 and 20 are most likely to experience Ewing sarcoma. The upper and lower leg, pelvis, upper arm, or ribs tend to be the bones affected by this type of tumor. It can also develop in the soft tissue surrounding a bone. While Ewing sarcoma can develop at any age, more than half of those diagnosed with it are between 10 and 20 years old. The overall 5-year survival rate for children and young people with Ewing sarcoma that has not spread is about 70 percent. If the tumor has already spread at the time of diagnosis, the prognosis is not as good. Chondrosarcoma Chondrosarcoma is a malignant tumor made up of cells that produce cartilage. It is seen mainly in people between 40 and 70 years of age. These tumors tend to develop in the hip, pelvis, or shoulder area. Chondrosarcoma is usually treated with surgery,but the type of operation needed will depend on the stage and severity of the cancer. During limb-sparing surgery, the affected part of the bone is removed and replaced with either a metal replacement or bone graft. Occasionally, if the cancer cells have spread from the bone into nerves and blood vessels, the affected area may need to be amputated. Chondrosarcoma is slow-growing cancer, and most cases are low grade when diagnosed. Secondary bone cancer lesions Types of cancer that begin elsewhere in the body and can spread to bone include:

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6: What Is Osteosarcoma?

Sometimes osteosarcoma spreads to other bones or the lungs. Image at left: Osteosarcoma common body sites and occurrence by decade of life. Osteosarcoma happens most often in the places in the body marked in red and less often in the places marked in orange.

Teenagers who are active in sports often complain of pain in the lower femur, or immediately below the knee. If the tumor is large, it can present as overt localised swelling. Sometimes a sudden fracture is the first symptom, because affected bone is not as strong as normal bone and may fracture abnormally with minor trauma. In cases of more deep-seated tumors that are not as close to the skin, such as those originating in the pelvis, localised swelling may not be apparent. Causes[edit] Several research groups are investigating cancer stem cells and their potential to cause tumors along with genes and proteins causative in different phenotypes. Liâ€”Fraumeni syndrome germline TP53 mutation is a predisposing factor for osteosarcoma development. Large doses of Sr emission from nuclear reactor , nicknamed bone seeker increases the risk of bone cancer and leukemia in animals, and is presumed to do so in people. The beliefs regarding association of fluoride exposure and osteosarcoma stem from a study of US National Toxicology program in , which showed uncertain evidence of association of fluoride and osteosarcoma in male rats. But there is still no solid evidence of cancer-causing tendency of fluoride in mice. It is also deemed as major health success. The result is that the median fluoride concentrations in bone samples of osteosarcoma patients and tumor controls are not significantly different. Due to this tendency, high incidence of osteosarcoma is seen in some large dog breeds St. Bernards and Great Danes. The tumor may be localized at the end of the long bone commonly in the metaphysis. Most often it affects the proximal end of tibia or humerus , or distal end of femur. The tumor is solid, hard, irregular "fir-tree," "moth-eaten", or "sun-burst" appearance on X-ray examination due to the tumor spicules of calcified bone radiating in right angles. These right angles form what is known as a Codman triangle , which is characteristic but not diagnostic of osteosarcoma. Surrounding tissues are infiltrated. The characteristic feature of osteosarcoma is presence of osteoid bone formation within the tumor. Tumor cells are very pleomorphic anaplastic , some are giant, numerous atypical mitoses. Tumor cells are included in the osteoid matrix. Depending on the features of the tumor cells present whether they resemble bone cells, cartilage cells, or fibroblast cells , the tumor can be subclassified. Osteosarcomas may exhibit multinucleated osteoclast-like giant cells. The route to osteosarcoma diagnosis usually begins with an X-ray , continues with a combination of scans CT scan , PET scan , bone scan , MRI and ends with a surgical biopsy. Films are suggestive, but bone biopsy is the only definitive method to determine whether a tumor is malignant or benign. Most times, the early signs of osteosarcoma are caught on X-rays taken during routine dental check-ups. Osteosarcoma frequently develops in the mandible lower jaw ; accordingly, Dentist are trained to look for signs that may suggest osteosarcoma. Even though radiographic findings for this cancer vary greatly, one usually sees a symmetrical widening of the periodontal ligament space. A biopsy of suspected osteosarcoma outside of the facial region should be performed by a qualified orthopedic oncologist. The American Cancer Society states: An improperly performed biopsy may make it difficult to save the affected limb from amputation.

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7: BMJ Best Practice

Osteosarcoma. This is the most common malignant bone tumor with the exception of multiple myeloma. It is also the most common primary malignant bone tumor of childhood and adolescence.

A growing tumor may replace healthy tissue with abnormal tissue. It may also weaken bone, causing it to fracture. For most bone tumors, the cause is unknown. Occasionally, infection, stress fractures, and other non-tumor conditions can closely resemble tumors. Benign bone tumors are non-cancerous and not typically life threatening. There are many types of benign bone tumors. The most common types include non-ossifying fibroma, unicameral simple bone cyst, osteochondroma, giant cell tumor, enchondroma, and fibrous dysplasia. Cancer that begins in bone is called primary bone cancer. Cancer that begins somewhere else in the body and spreads to the bone is known as secondary bone cancer. The four most common types of primary bone cancer are: Multiple Myeloma â€" A malignant tumor of bone marrow which is the most common form of primary bone cancer. It affects approximately 20 out of one million people per year. Most cases are seen in patients years old. Any bone can be involved. Osteosarcoma â€" The second-most common bone cancer. It occurs in people per million annually. Most of these tumors occur around the knee and are found in teenagers. Other common locations include the hip and shoulder. The most common locations are the upper and lower leg, pelvis, upper arm, and ribs. Chondrosarcoma â€" Occurs most commonly in patients years of age. Most cases occur around the hip and pelvis or shoulder. Symptoms Most patients with a bone tumor will experience pain in the area of the tumor. The pain is generally described as dull and achy. It may or may not get worse with activity. The pain often awakens the patient at night. Although tumors are not caused by trauma, occasionally injury can cause a tumor to begin hurting. Injury can cause a bone weakened by tumor to break, leading to severe pain. Some tumors can also cause fevers and night sweats. Many patients will not experience any symptoms, but will instead notice a painless mass. Diagnosis If you suspect that you might have a bone tumor, see your doctor as soon as possible for diagnosis and treatment. The doctor will collect detailed information about your medical history. Be sure to include any medications you take, any history of tumors or cancers that you or family members may have had, and the symptoms you are experiencing. Your doctor will also perform a physical exam. The focus is on the tumor mass, tenderness in the bone, and any impact on your joints and range of motion. The doctor may want to examine other parts of your body to rule out the spread of any cancer. Your doctor will probably obtain X-rays for further information. Each type of tumor can exhibit different characteristics on X-ray. Some dissolve bone or make a hole in the bone. Some cause an extra formation of bone. Some can result in a mixture of these findings. In other cases, it may be difficult to tell what kind of tumor is involved and additional imaging studies such as MRI magnetic resonance imaging or CT computed tomography could be called for. Insert first three X-ray images from https: Image Image An X-ray showing a tumor that has caused a saucer-like erosion in the end of the thighbone. A bone tumor in the middle of the femur exhibiting a combination of characteristics is displayed in an X-ray. A fracture through a tumor in the middle of the upper arm bone shown on X-ray. Your doctor may also request blood and urine tests. If these tests are not adequate to diagnose a tumor, your doctor may request a biopsy. A biopsy is the removal of a sample of tissue from the tumor. The tissue sample is then examined under a microscope. There are two methods for completing a biopsy: Needle Biopsy â€" A needle is inserted into the tumor to remove a sample of tissue. Open Biopsy â€" The doctor removes tissue in a surgery. This is typically done through a small incision using general anesthesia in an operating room. Treatment Treatment of Benign Tumors In many cases, benign tumors can be closely monitored with no immediate treatment. Some can actually disappear over time. This is particularly true for some benign tumors that occur in children. Other benign tumors can spread or become cancerous metastasize. They can sometimes be treated effectively with medication or your doctor may recommend removing the tumor. Additional treatment techniques to reduce the risk of fracture and disability may be considered. Some tumors may come back â€" even repeatedly â€" after appropriate treatment. Treatment of Malignant Tumors If you are diagnosed with malignant bone cancer, your treatment team may include several specialists. It might include an orthopaedic oncologist, a medical oncologist, a

radiation oncologist, a radiologist, and a pathologist. Your team of doctors will aim to cure the cancer and preserve the function of your body. Their treatment plan will often combine several methods and depends upon various factors, including whether the cancer is localized or has spread metastasized. If possible, the surgeon will take out the tumor and a margin of healthy tissue around it. The excised bone is replaced with a metallic implant prosthesis or bone transplant. Amputation â€" Removal of all or part of the arm or leg. Systemic Treatment Chemotherapy â€" Often used to kill tumor cells when they have spread into the bloodstream, but cannot yet be detected on tests and scans. Chemotherapy is typically used when cancerous tumors have a high likelihood of spreading. After Treatment When treatment for a bone tumor is complete, you may need additional X-rays and other imaging studies to confirm that the tumor is gone. Regular doctor visits and tests may be necessary every few months. When the tumor disappears, it is important to monitor your body for possible relapse. Research on the Horizon Genetic research is leading to a better understanding of the types of bone tumors and their behaviors. Researchers are also studying the design of metallic implants to provide better function and durability after limb salvage surgery. Computer technology is also leading to advancements in the development of prosthetic limbs. Research into new medications and new combinations of older medications will lead to continual improvements in survival from bone cancers. Your doctor may discuss clinical research trials with you. Clinical trials may involve the use of new therapies and may offer a better outcome. Reproduced with permission Fischer S. Copyright American Academy of Orthopaedic Surgeons.

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8: Benign and Malignant Bone Tumors | UConn Musculoskeletal Institute

A bone tumor can be either benign or malignant. Benign tumors are usually not life-threatening and, in most cases, will not spread to other parts of the body. Malignant bone tumors can metastasizeâ€"or cause cancer cells to spread throughout the body.

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. Lifestyle-related risk factors such as body weight, physical activity, diet, and tobacco use play a major role in many adult cancers. But these factors usually take many years to influence cancer risk, and they are not thought to play much of a role in childhood cancers, including childhood osteosarcomas. So far, lifestyle-related factors have not been linked to osteosarcomas in adults, either. Still, there are some factors that affect osteosarcoma risk. Age The risk of osteosarcoma is highest for those between the ages of 10 and 30, especially during the teenage growth spurt. This suggests there may be a link between rapid bone growth and risk of tumor formation. The risk goes down in middle age, but rises again in older adults usually over the age of Osteosarcoma in older adults is often linked to another cause, such as a long-standing bone disease. Height Children with osteosarcoma are usually tall for their age. This also suggests that osteosarcoma may be related to rapid bone growth. Gender Osteosarcoma is more common in males than in females. Females tend to develop it slightly earlier, possibly because they tend to have their growth spurts earlier. Radiation to bones People who were treated with radiation therapy for another cancer might have a higher risk of later developing osteosarcoma in the area that was treated. Being treated at a younger age and being treated with higher doses of radiation both increase this risk. The amount of radiation used for these tests is many times lower than that used for radiation therapy. If there is any increased risk it is likely to be very small, but doctors try to limit the use of these types of tests whenever possible, especially in children, just in case. Certain bone diseases People with certain non-cancerous bone diseases have an increased risk of developing osteosarcoma. Paget disease of the bone: In this condition, abnormal bone tissue forms in one or more bones. It mostly affects people older than The affected bones are heavy and thick but are weaker than normal bones and are more likely to break. Usually this condition by itself is not life-threatening. Osteochondromas are benign bone tumors formed by bone and cartilage. Each osteochondroma has a very small risk of developing into a bone sarcoma most often a chondrosarcoma , but less often it can be an osteosarcoma. Most osteochondromas can be cured by surgery. However, some people inherit a tendency to develop many osteochondromas starting when they are young, and it may not be possible to remove them all. The more osteochondromas a person has, the greater the risk of developing a bone sarcoma. Inherited cancer syndromes People with certain rare, inherited cancer syndromes have an increased risk of developing osteosarcoma. Retinoblastoma is a rare eye cancer of children. Some children have the inherited form of retinoblastoma hereditary retinoblastoma , in which all the cells of the body have a mutation change in the RB1 gene. These children also have an increased risk of developing bone or soft tissue sarcomas, including osteosarcoma. If radiation therapy is used to treat retinoblastoma, the risk of osteosarcoma in the bones around the eye is even higher. The Li-Fraumeni syndrome makes people much more likely to develop certain types of cancer, including breast cancer, brain tumors , osteosarcoma, and other types of sarcoma. This syndrome is usually caused by a mutation of the TP53 gene. Children with Rothmund-Thomson syndrome are short and tend to have skin and skeletal problems. They also are more likely to develop osteosarcoma. This syndrome is usually caused by abnormal changes in the REQL4 gene. Other rare inherited conditions, including Bloom syndrome, Werner syndrome, and Diamond-Blackfan anemia, have also been linked to an increased risk of osteosarcoma. The way in which inherited gene changes make some people more likely to develop osteosarcoma is discussed in What Causes Osteosarcoma?

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9: Benign Tumor and Osteosarcoma

Most bone lesions are benign, not life-threatening, and will not spread to other parts of the body. Some bone lesions, however, are malignant, which means they are cancerous.

This bone cancer shows up as tumors in the bone marrow. Multiple myeloma most commonly affects older adults. What are the causes of bone tumors? A few possible causes are genetics, radiation treatment , and injuries to the bones. Osteosarcoma has been linked to radiation treatment particularly high doses of radiation and other anticancer drugs , especially in children. The tumors often occur when parts of the body are growing rapidly. Recognizing potential symptoms of bone tumors A dull ache in the affected bone is the most common symptom of bone cancer. The pain starts off as occasional and then becomes severe and constant. The pain may be severe enough to wake you up in the night. Sometimes, when people have an undiscovered bone tumor, what seems like an insignificant injury breaks the already weakened bone, leading to severe pain. This is known as a pathologic fracture. Sometimes there may be swelling at the site of the tumor. Tumors can also cause night sweats , fevers , or both. People with benign tumors might not have any symptoms. The tumor might not be detected until an imaging scan reveals it while receiving other medical testing. A benign bone tumor, such as an osteochondroma , may not require treatment unless it starts to interfere with your day-to-day function and movement. Diagnosing a bone tumor Fractures , infections, and other conditions might resemble tumors. To be sure you have a bone tumor, your doctor might order a variety of tests. First, your doctor will do a physical exam with a focus on the area of your suspected tumor. Your doctor will also ask you questions about your family medical history. Blood and urine tests Your doctor may order tests, including blood or urine samples. A lab will analyze these fluids to detect different proteins that may indicate the presence of a tumor or other medical problems. An alkaline phosphatase test is one common tool doctors use to diagnose bone tumors. When your bone tissue is especially active in forming cells, large quantities of this enzyme show up in your blood. This could be because a bone is growing, such as in young people, or it could mean a tumor is producing abnormal bone tissue. Imaging tests Your doctor will probably order X-rays to determine the size and exact location of the tumor. Depending on the X-ray results, these other imaging tests may be necessary: A CT scan is a series of detailed X-rays of the inside of your body that are taken from several angles. An MRI scan uses magnets and radio waves to provide detailed pictures of the area in question. In a positron emission tomography PET scan , your doctor will inject a small amount of radioactive sugar into your vein. Since cancer cells use more glucose than regular cells, this activity helps your doctor locate the site of the tumor. An arteriogram is an X-ray of your arteries and veins. Biopsies Your doctor may want to perform a biopsy. In this test, a sample of the tissue that makes up your tumor will be removed. The sample is examined in a laboratory under a microscope. The main types of biopsies are a needle biopsy and an incisional biopsy. Your doctor will insert a needle into your bone, using it to remove a small bit of tumor tissue. Your doctor will make an incision and remove your tissue through the incision. Completing a bone biopsy is important to make a definite diagnosis of the condition. How are benign bone tumors treated? If your tumor is benign, it may or may not require action. Sometimes doctors just keep an eye on benign bone tumors to see if they change over time. This requires coming back periodically for follow-up X-rays. Bone tumors can grow, stay the same, or eventually disappear. Children have a higher likelihood of having their bone tumors disappear as they mature. However, your doctor may want to surgically remove the benign tumor. Benign tumors can sometimes spread or transform into malignant tumors. Bone tumors can also lead to fractures. How are malignant bone tumors treated? Although malignant tumors are a cause of concern, the outlook for people with this condition is improving as treatments are developed and refined. If your cancer cells are confined to the tumor and its immediate area, this is called the localized stage. In the metastatic stage, cancerous cells have already spread to other parts of the body. This makes curing the cancer more difficult. Surgery, radiation, and chemotherapy are the main strategies for treating cancer. Surgery Bone cancer is usually treated with surgery. In surgery, your entire tumor is removed. Your surgeon carefully examines the margins of your tumor to make sure no cancer cells are left after surgery. This means that while the cancerous cells are removed, your tendons,

muscles, blood vessels, and nerves are spared. Your surgeon will replace the cancerous bone with a metal implant. Advances in chemotherapy have greatly improved recovery and survival. New drugs are being introduced on an ongoing basis. Surgical techniques have improved greatly, too. Doctors are much more likely able to spare your limbs. However, you might need reconstructive surgery to retain as much limb function as possible. Radiation therapy Radiation is often used in conjunction with surgery. High-dose X-rays are used to shrink tumors before surgery and kill cancer cells. Radiation can also reduce pain and decrease the chance of bone fractures. Chemotherapy If your doctor thinks your cancer cells are likely to spread or if they already have, they may recommend chemotherapy. This therapy uses anticancer drugs to kill the rapidly growing cancer cells. The side effects of chemotherapy include:

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