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What Is Bone Cancer?

Know Everything about Bone Cancer

What Is Bone Cancer?

Bone Cancer is a rare cancer that forms in the cells of the Bones. Soft tissue cancers are those tumors arising from the tissue around the bone namely muscles, neurovascular structure, fat, skin, synovium etc.

What is the most common form of the Bone Cancer?

The majority of cancer involving the bones is metastatic disease from other remote cancer. Primary Bone Cancer is much rarer.

How Bone Cancer is Generally Caused?

In majority of the bone cancer affected, the cancer has actually spread from elsewhere in the body to the bones. Very rarely is someone affected by true bone cancer i.e. a cancer that begins from cell that Make-up the bone. And also in almost all cases it becomes important to determine if the cancer in the bone is because of the transportation from others place or within the bone.

What are the types of the Bone Cancer?
Bone Cancer is of two types

1. Primary Bone Cancer

Here the cancer begins in the tissue of the bone itself.



The common types of primary bone and soft tissue cancer are:

- a. Multiple Myeloma
- b. Osteosarcoma
- c. Chondrosarcoma
- d. Ewing's Sarcoma

2. Secondary Bone Cancer:

This is also known as Bone Metastasis or skeletal Metastasis. This is a form of cancer of the bone where the cancer has spread to the bone from some other organ. The most common cancer which spread to the bone are from the ...

- a. Breasts b. Prostate c. Lungs d. Kidneys e. Thyroid



Secondary Bone Cancer is far more common than Primary Bone Cancer

What are the general symptoms of Bone Cancer?

The most common symptom of Bone Tumors is pain which usually mild initially and becomes more intense gradually. But the most common symptom with MFH or Fibrosarcoma is the presence of a mass or lump either on the bone or in the tissue surrounding the bone. This can be with other bone tumors too. Weakening of bone, numbness, tingling in the extremities is other symptom. While fever, chill, night, sweats, and weight loss can occur, they are more common after spread of the tumor to the other tissue in the body.

Whom does bone cancer effect the most?

Bone Cancer can affect people at any age. Primary Bone Cancer, excepting Multiple Myeloma and Chondrosarcoma is the more common in the first two decades of life whereas Secondary Bone cancer and Multiple Myeloma is more common after the age of 45 years. Soft Tissue Sarcomas can occur at any age.

Why is early diagnosis important in Bone Cancer?



There is no known cause for Bone Cancer and therefore there is no preventative precaution that can be followed. It can affect anybody. And so early detection and correct diagnosis assume higher significance

What does Radiotherapy and Chemotherapy in Bone Cancer involve?

Chemotherapy: A form of treatment where powerful drugs are injected into the body. While these drugs are toxic to living tissue, they are more toxic to cancer cells than normal cell. Hence they kill cancer cells in much larger numbers as compared to normal cells.

Radiotherapy: Another form of cancer treatment where gamma rays are used to kill cancer and shrink tumors. Radiation therapy injures or destroyed cell in the area being treated. Although radiation damages both cancer cells and normal cells, most normal cells can recover from the effects of radiation and functional property.

How is Bone Cancer Diagnosed?

At a Preliminary level,

- Complete medical history is sought
- Past health issue, early symptoms & current symptom are reviewed
- Familial History of the bone cancer is checked
- History of smoke is checked

Analyses of symptoms can help in identifying the cause of the Bone Cancer. A complete physical examination will follow to identify caused of your symptoms. This may include testing your muscle strength, sensation to touch and reflexes. Blood tests may also be required.

Some of the imaging studies conducted and their objectives are listed below

X-Ray:

- To determine the type of the cancer, Benign or Malignant
- To identify occurrence of a fracture or weakening of the bone.

CT-Scan/Computed Tomography:

- To obtain a cross-section picture of your bones
- To identify a possible tumor
- To Glean additional information on the size and location of the tumor

MRI:

- To access better details on the soft tissue, including muscles, tendons, ligaments, nerves and blood vessels than a CT Scan

Bone Scan/PET Scan:

- To identify areas of rapidly growing or remodeling bone
- To check if there are any other areas of bone involvement throughout the body.

The various imaging studies will help in determining the safest and easiest location to obtain the biopsy sample.

Biopsy Sample:

- To determine the type of tumor
- It is always preferable to do needle biopsy rather than conventional open biopsies. As it decrease the continuation of surrounding tissue with tumor cell there by felicitating limb salvage surgery

What does Bone Cancer treatment includes?

Treatment of Bone Cancer includes a combination of surgery, chemotherapy, and radiation therapy.

Treatment is based on the size and the location of the cancer and whether or not the cancer has spread from the bone to surrounding tissues. The treatments for cancer that have metastasize to the bone are often based on the initial type of the cancer.

1. What are key aspects of Primary Bone Cancer and their treatment?

Multiple myeloma:

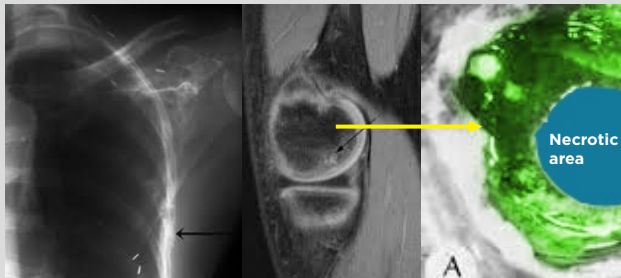
- Most common Primary Bone Cancer
- A malignant tumor of bone marrow
- Affects approximately 20 people per million each year
- Mostly seen in patients aged between 50 and 70 years
- May affect one or more bones, so pain may occur in or several locations

Treatment: Complex and may include chemotherapy, radiation therapy and surgery.

These patients are at high risk of pathological fractures. Pathological fractures or impending fractures have to be treated surgically. Likewise spine lesions should be treated surgically whenever Warranted.

Osteosarcoma:

- A primary malignant tumor in which the neoplastic cells produce osteoid matrix
- Commonly involves long bones of the appendicular skeleton like the distal femur, proximal tibia, and proximal humerus



- The relative incidence in non- long bones (i.e. jaws , pelvis , spine , and skull) tends to increase with age

Treatment: Various investigations like X-Rays, CT , MRI scans , bone scans and blood investigations are needed. Further to confirm the diagnosis needle / core Biopsy is needed. Upon confirmation , chemotherapy is commenced.

Ewing's Sarcoma:

- Relatively uncommon

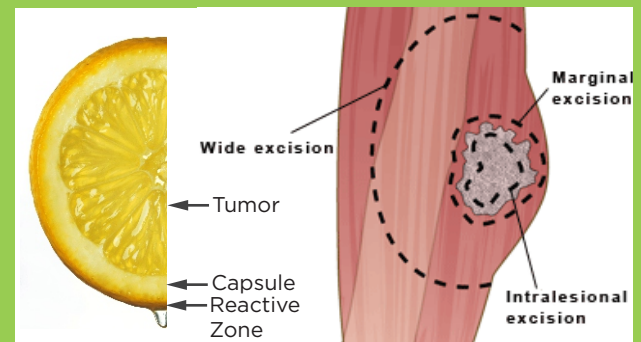
- Primary seen in the young

- Common sites are diaphyses or metadiaphyseal region of long bones like (femur , tibia , & humerus) ribs and flat bones like pelvis , skull , vertebra , scapula and short tubular bones of hands & feet are rarely involved

Treatment: Modalities include chemotherapy, radiotherapy and surgery. Chemotherapy is almost required in all cases and surgery wherever feasible. If surgery not feasible or very morbid then, definitive radiotherapy is the option. Limb salvage surgeries can be performed in 90-95% of the patients. After adequate treatment one can expect 75% long term survival of the patients

Chondrosarcoma:

- A malignant cartilage tumor arising in a previously normal bone
- 3 rd most common Primary Bone Tumor after myeloma & Osteosarcoma
- Occurs in adulthood and old age with a peak incidence at 5th to 7th decades
- Most commonly pelvis is involved other sites being proximal femur , proximal humerus, distal femur and ribs
- Pain usually is of long duration (several months or years) which is present at rest or night pain > 50% of patients. Pathologic fractures can also occur rarely.



Staging:

This is an important step in the management of any cancer , before treatment is begun. Staging is a set of investigations to determine whether the disease is localized to the site of its origin or whether it has spread to other regions of the body. In Bone Tumors , there are a few investigations which are specifically designed for staging. They are CT scan of the chest, Bone scan and sometimes PET scan. This is because , more than 90% of metastatic bone tumors spread either to the lungs or to other bones.

Treatment of Benign Tumors:

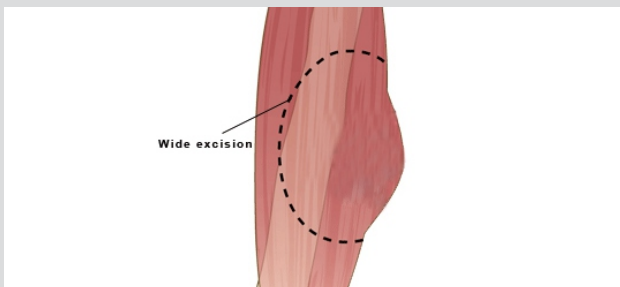
Most of these require local surgery preserving the



local joint / bone. They have a better outcome following surgery as compared to Malignant Tumors. It must be noted that, as is true with all tumors the earlier they are treated, the smaller is the disease and better is the outcome. Some tumors may come back, even repeatedly, after appropriate treatment. However, if they are detected in time, they can be managed appropriately.

Treatment of Malignant Tumors:

Treating a malignant bone tumor is a team effort. The three principal Members of this team are the Orthopedic Oncologist, Medical Oncologist, Radiation Oncologist each of whom specializes in the three



Major modalities of cancer treatment. The Orthopedic Oncologist treats cancer with surgery. The Medical Oncologist treats cancer with chemotherapy, which involves injections and Oral medications of very powerful drugs which are designed to kill cancer cells. The Radiation Oncologist treats cancer with radiation, which are powerful invisible rays that penetrate the Body and deliver lethal doses of radiation to the cancerous tissue.

Goal of treatment of Malignant Tumors:

- Treatment goals include curing the cancer and preserving the function of the body.
- Surgical options for malignant bone and soft tissue tumors
- There are two main categories of surgeries:

Limb salvage Surgery and Amputation Surgeries



Limb Salvage Surgery:

Any extremity cancer surgery where the surgical goal is preservation of the limb is called Limb Salvage Surgery (LSS).

There are three main steps in LSS.

- a) Removal of the disease with adequate margin
- b) Reconstruction of bone
- c) Reconstruction of soft tissue

Removal of the disease with adequate margin means the diseased area of bone and/ or soft tissue is taken out with a margin of normal tissue around it to ensure safe removal of the tumor.

Removal of bone often leaves a defect in the continuity of the skeletal support of that part of the limb, which needs some sort of surgery to ensure mechanical continuity. This part of the surgery is known as reconstruction. There are various options for reconstruction, depending on the indications.

The excised bone is replaced with a metallic implant (prosthesis) or bone transplant.

Surgeons now have available implants that can be matched to the patient's size. Stronger metals, bone and soft tissue allografts (transplants), microvascular and muscle transfer procedures, and bone graft substitutes.

There are even devices that can be expanded or "gown" for children to account for normal skeletal growth lost with limb preservation.

Arthrodesis, or fusion, is a procedure that makes the joint permanently stiff. Once the joint is fused solidly, it is a stable durable reconstruction. It can withstand physical stress. Follow-up surgery is less likely with arthrodesis.

Arthroplasty provides for a mobile joint. The procedure replaces the resected bone and Joint with a metallic implant. It may be total arthroplasty, as in cases of diseases around the knee or a hemi-arthroplasty, for diseases of the upper end of the thigh and arm bones (Femur and humerus respectively).

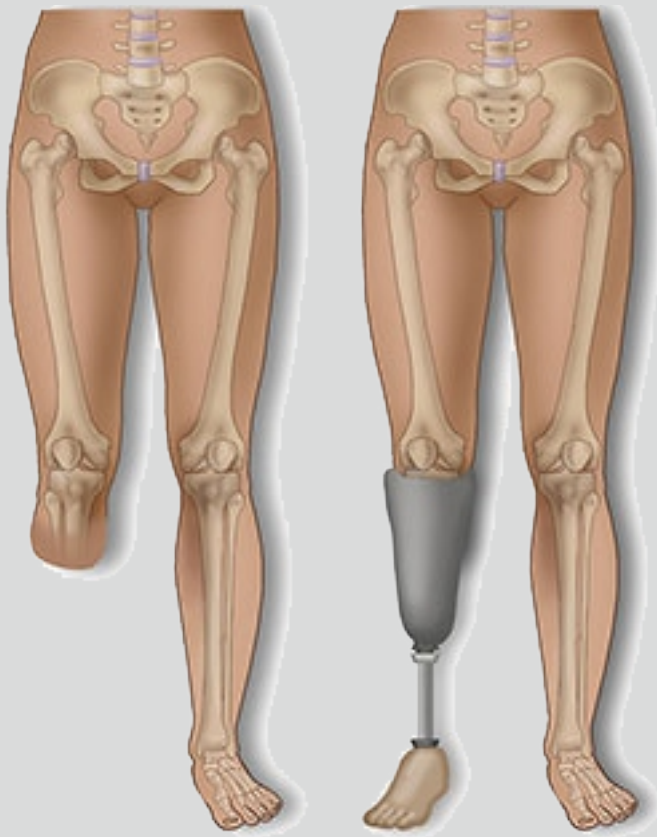
Arthroplasty is done with custom made implants which are matched to the patients's Size and the amount of bone resected.

These techniques allow the limb to be restored with good function.Despite all of these improvements and the enthusiasm for limb salvage, it is not for everyone. There are contraindications and complications that need to be considered. The decision needs to be made by the patient after a detailed and lengthy discussion With Orthopedic Oncosurgeon. The patient needs to have a thorough understanding of the advantages and disadvantages of limb salvage before pursuing this technique.

Any patient who must decide between Amputation and Limb salvage must understand everything involved with both options.

Amputation:

Amputation removes all or part of an arm or leg when the tumor is large and / or nerves and blood vessels are involved.



Dr Kishore Bhavanam Reddy,

MS Ortho., D Ortho

Fellowship in Bone and Soft Tissue Tumors, (TATA hospital,Mumbai)

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(Singapore)

HOD & Consultant Orthopaedic Onco Surgeon



With the unparalleled track record Dr. Kishore is one of the few to be ranked in the league of eminent Orthopaedic Onco surgeons in India.

He specialized in Bone and Soft Tissue Tumor Limb Salvage Surgeries in Upper Limb, Lower limb and Spine, both in a primary as well as Secondary Bone Tumor, expert in using all kinds of Mega Prosthesis for Limb Salvage Surgeries, allograft reconstruction, nail cement spacer reconstruction, rotation pasty and various spine tumor excision and reconstruction including sacrectomies. He has special interest in Pelvic Tumor Reconstruction.

Dr Kishore has several scientific presentations in national, international and regional conferences. He is credited with having 5 scientific paper publications in indexed international journals (JBJS, CORR, JPO & SKELETAL RADIOLOGY).

Dr Kishore was invited to give various talks/CME in Bone & Soft Tissue Cancers in A.P. and Telengana and nearby states. He was a Gold Medallist in Post gradation in KMC Manipal.

Dr Kishore has performed First rotation plasty in the State of AP & Telengana. Has performed first Wide Excision with ECRT Reconstruction of Femur in the state of A.P. & Telengana. And he has Performed First Total Femur replacement for Bone Cancer in the state of A.P. & Telangana

He has successfully done more than 1000 Limb Salvage Surgeries for Bone Tumor in the State of A.P. & Telangana