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# *Approach to Musculoskeletal Oncology Patients*

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# Approach to Musculoskeletal Oncology

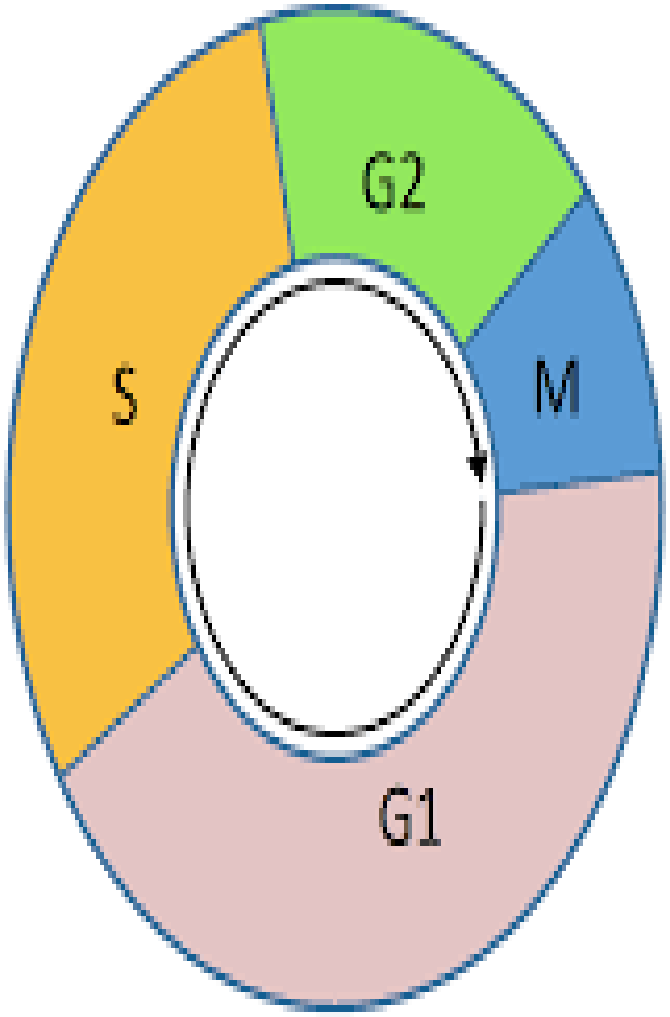
- Introduction.

.Etiology of Musculoskeletal tumors.

- Epidemiology.
- Risk factors
- Evaluation of Musculoskeletal tumors.
- Imaging Studies.
- Lab studies.
- Biopsy.
- Staging system.

- The evaluation of musculoskeletal tumors requires a close interaction between the orthopedic oncologist, radiologist, and the pathologist. Successful outcome can be achieved in a considerable number of patients by following the appropriate diagnostic strategies and staging studies. The aim of  outline the presentation, imaging, and staging of the primary and metastatic bone and soft tissue tumors. Some of the image-guided interventions for these tumors are also presented

- Musculoskeletal tumors are a rare and diverse group. Sarcomas of the bone and cartilage comprise only ~0.5% of all malignancies in humans. Their incidence is considerably higher in children than adults. The incidence of soft tissue sarcomas is 3 to 4 times higher, and the majority of these cases are seen after the fifth decade. Benign bone and soft tissue tumors are 100 times more common than malignant tumors, with an overall incidence of ~300 per 100,000 population.[1] The incidence per year of breast, prostate, and lung cancers in the United States of America is nearly 180,000 to 200,000 each, reflecting the low incidence of primary bone and soft tissue tumors. As the survival of patients with carcinomas is gradually extending, presentation with bone metastases will also rise




G1 - Growth

S - DNA synthesis

G2 - Growth and preparation for mitosis

M - Mitosis (cell division)

- The hallmark of neoplastic disease is factors affects the exit of the cell from G0 with entrance into G1.
- Inheritable genetics
- Environmental factors
    - Oncogenic viruses
    - Radiation
    - Chemical carcinogens

- Primary cancers of bones account for less than 0.2% of all cancers.
- In adults, over 40% of primary bone cancers are chondrosarcomas. This is followed by osteosarcomas (28%), chordomas (10%), Ewing tumors (8%), and malignant fibrous histiocytoma/fibrosarcomas (4%). The remainder of cases are several rare types of bone cancers.
- In children and teenagers (those younger than 20 years), osteosarcoma (56%) and Ewing tumors (34%) are much more common than chondrosarcoma (6%).
- Chondrosarcomas develop most often in adults, with an average age at diagnosis of 51. Less than 5% of cases occur in patients younger than 20.
- Chordomas are also more common in adults. Less than 5% of cases occur in patients younger than 20.
- Both osteosarcomas and Ewing tumors occur most often in children and teens.

- **Primary bone malignancy Frequency (%)**
- Osteosarcoma 35.1
- Chondrosarcoma 25.8
- Ewing's sarcoma 16.0
- Chordoma 8.4
- Malignant fibrous histiocytoma 5.7
- Angiosarcoma 1.4
- Unspecied 1.2
- Other 6.4

# Risk factors

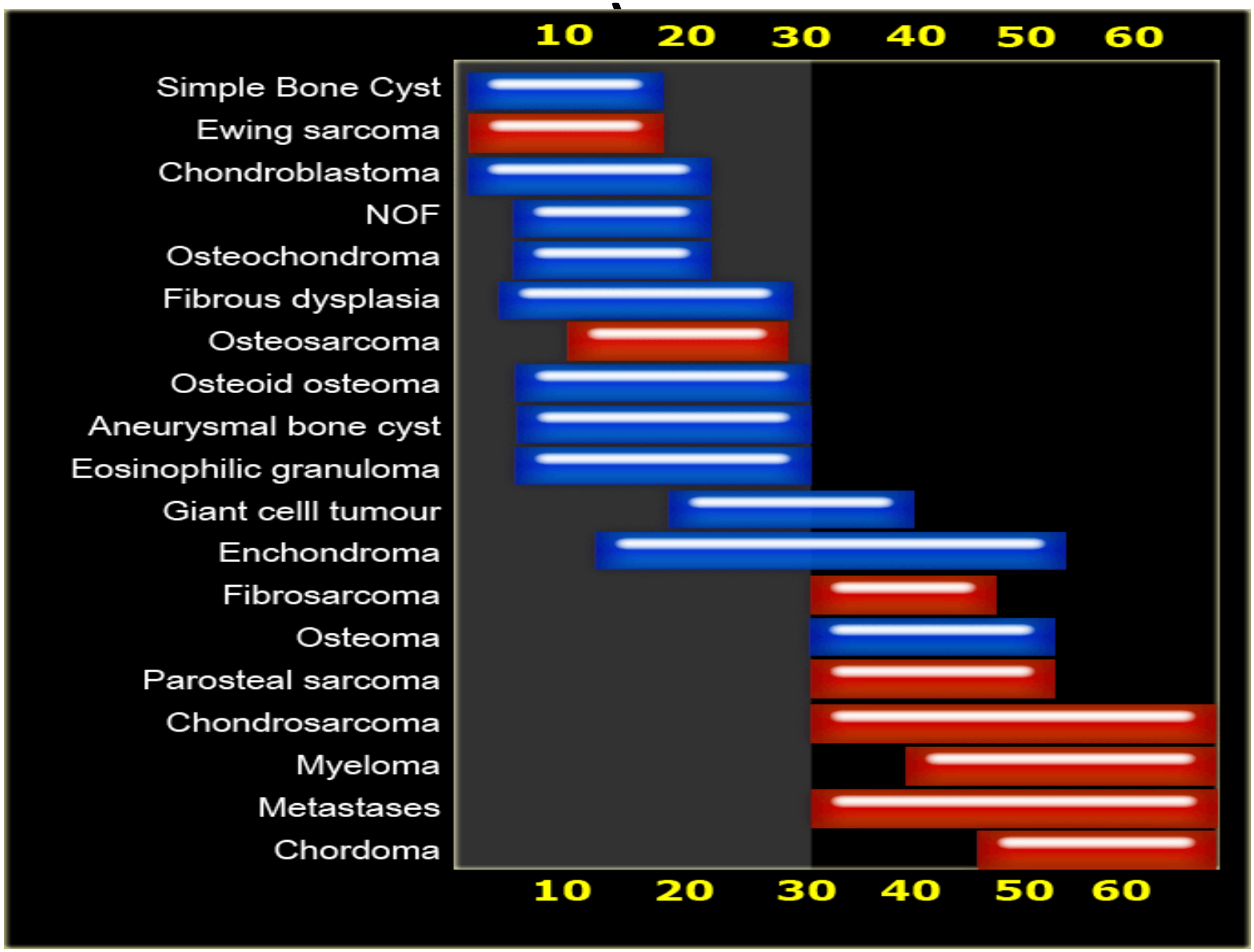
- It's not clear what causes bone cancer, but doctors have found certain factors are associated with an increased risk, including:
- Inherited genetic syndromes. Certain rare genetic syndromes passed through families increase the risk of bone cancer, including Li-Fraumeni syndrome and hereditary retinoblastoma.
- Chemical exposure
- Radiation therapy: Exposure to large doses of radiation, such as those given during radiation therapy for cancer, increases the risk of bone cancer in the future.
- Weakened immune system: People with HIV sometimes develop Kaposi sarcoma, a type of soft tissue sarcoma that develops from the cells that line blood vessels or lymph vessels

# Evaluation of Musculoskeletal tumors

- History
- Physical examination
- Imaging studies
- Lab studies
- Biopsy

# History

- The patient’s age
- Duration of complaint
- Rate of growth
- Pain
- History of trauma
- Family history
- Systemic symptoms


10
20
30
40
50
60
Simple Bone Cyst
Ewing sarcoma
Chondroblastoma
NOF
Osteochondroma
Fibrous dysplasia
Osteosarcoma
Osteoid osteoma
Aneurysmal bone cyst
Eosinophilic granuloma
Giant celll tumour
Enchondroma
Fibrosarcoma
Osteoma
Parosteal sarcoma
Chondrosarcoma
Myeloma
Metastases
Chordoma
10
20
30
40
50
60

# Duration of complaint

- Benign lesions generally have been present for an extended period ( years) while malignant tumors usually have been noticed for only weeks to months

# Pain

- Benign process usually asymptomatic or may cause secondary symptoms
- Most common presentation in malignant process is musculoskeletal pain :
  - Deep seated
  - Dull in nature
  - Intermittent
  - Related for activity
  - Increase at night
  - Progresses in intensity
  - Not relieved by NSAIDs

# Systemic symptoms

- In benign tumors there is no significant findings on the review system
- Fever, chills, night sweat, malaise, change in appetite, weight loss should alert the physician that an infectious or neoplastic process may be involved

# Physical examination

- Inspection
- Palpation
- Specific systems examination

# Mass examination

- Skin color
- Skin changes
- Location
- Size
- Tenderness
- Temperature
- Consistency
- Pulsation
- Joint range of motion
- Neurovascular exam
- Lymph nodes

# Specific systems examination

- Thyroid
- Breasts
- Chest
- Liver
- Kidney
- Rectal (prostate & rectal tumours)

# Imaging studies

- X-Ray
- U/S
- CT scan
- MRI
- Bone isotope scan
- PET scan

# Summary of Radiographic Findings

- Types of bone destructions
  - Geographic
  - Moth-eaten  bone destruction
  - Permeative bone destruction
- Tumor matrix
- periosteal reaction
- Orientation or Axis of lesion
- Zone of transition

# Lab studies

- FBC (leukaemic cells etc)
- ESR (often elevated)
- Biochemistry (Ca++, PO4, liver enzymes and Alkaline Phosphatase) -> mets
- Acid Phosphatase (prostate and increased with metastatic deposits)
- Thyroid function tests
- Parathyroid hormone level
- PSA
- Serum Protein Electrophoresis (Myeloma)
- Urinalysis