Evaluation of the Solitary Bone Lesion

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Components of Evaluation

- Morphological appearance (radiographic aggressiveness, host response, what is it making)
- Location
- Age

Patterns of Destruction

- Geographic
- “Moth-eaten”
- Permeated
Patterns of Destruction

- Geographic
  - Well defined lesion
  - Sharp zone of transition between lesion and host bone

- May or may not have rim of reactive or sclerotic host bone
- Implies slow growth
Patterns of Destruction

• “Moth-eaten”
  - Smaller foci of destruction
  - Not well defined
  - Usually associated with minimal host reaction
  - Implies intermediate to rapid growth

Patterns of Destruction

• “Moth-eaten”
  - Usually malignant
  - Metastasis
  - Multiple myeloma
  - Chondrosarcoma
Patterns of Destruction

- “Moth-eaten”
  - Osteosarcoma

Patterns of Destruction

- “Moth-eaten”
  - Infection

Patterns of Destruction

- “Moth-eaten”
  - Benign lesions

  Histiocytosis
  (Langerhans Cell Histiocytosis)
Patterns of Destruction

- Permeated
- High suspicion of malignancy
- Lesion blends imperceptibly with surrounding bone
- Round cell tumors
  - Ewing’s sarcoma
  - Leukemia/Lymphoma
Patterns of Destruction

- Permeated
  - Infection

Host/Periosteal reaction

- Reactive rim of “sclerotic” bone
- Implies slow growth
- Usually associated with latent or active benign lesions (NOF, fibrous dysplasia, ABC, CMF, chondroblastoma, osteoid osteoma,
Host/Periosteal reaction

- Periosteal reactions
- Sign of extraosseous extension
- Associated with both benign and malignant tumors
- Infection
- May be very subtle and the only radiographic abnormality

- "Interrupted"
  - Suggests malignant or highly aggressive process
  - "Sunburst"
  - "Onion-skin"
  - Codman’s triangle
Matrix

- No matrix
- Most bone lesions have no discernable radiographic matrix
  - Density of stroma is equal to surrounding soft tissues
- NOF, ABC, UBC, GCT,
Matrix

- Calcification
  - Density is greater than that of the surrounding bone
  - “Popcorn”, arcs/rings

- Cartilage
Matrix

- Ossification
- Density of matrix is equal to bone
- Differential diagnosis is limited to 7 bone producing tumors
- “Cumulous cloud”, “cottony” densities
Matrix

- “Ground-glass”
- Pathognomonic of fibrous dysplasia
- Immature osseous stroma
CT

- Test of choice in:
  - Cartilage tumors
  - Osteoid osteoma
  - Myositis ossificans
Enchondroma or Chondrosarcoma?
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Location

- Epiphyseal
- Metaphyseal
- Diaphyseal

- Chondroblastoma
- Giant cell tumor
- Clear cell chondrosarcoma
- Other: PVNS, subchondral cyst, infection
Location

- Epiphyseal
  - Age:
    - <20: chondroblastoma
    - 20-40: GCT
    - >40: clear cell chondrosarcoma

Location

- Diaphyseal
  - Metastasis
  - Myeloma/lymphoma
  - Ewing’s sarcoma
  - EG
  - Osteoid osteoma
  - Enchondroma
Location

- Metaphysis
  - Anything

Location

- Cortically-based lesions
  - NOF
  - Osteoid osteoma
  - ABC
  - Adamantinoma
  - Osteofibrous dysplasia
Age

- Skeletally immature
  - Malignant/Aggressive
    x-ray appearance:
    - Osteosarcoma
    - Ewing’s sarcoma
    - EG
    - Infection
      (Metastatic neuroblastoma < 5 y/o)

Age

- 20-50 years old
  - Malignant/Aggressive
    x-ray appearance:
    - Lymphoma
    - Juxtacortical OGS
    - Adamantinoma
    - Chondrosarcoma

Age

- >50 years old
  - Malignant/Aggressive
    x-ray appearance:
    - Metastasis
    - Myeloma
    - Chondrosarcoma
    - MFH of bone
    - OGS (Paget’s)
MRI

- Evaluate marrow replacement/extent
- Soft tissue extent
- “Roadmap” for surgical planning

MRI

- Best imaging in assessing extent of resection (i.e. “what has to go”)