Radiographic Principles in Interpretation of tumor and tumor-like conditions of Bone

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Disclosures

Nothing to disclose in this lecture

Learning objectives

• Basic radiographic principles in diagnosis
  – Detection
  – Characterization

• Principles of tumor staging/monitoring treatment

• Advantages/weaknesses of imaging modalities

Diagnosis

• Triad

  – Clinical signs
  – Imaging
  – Histology

Detection : role imaging

• Standard radiography : still the *mainstay* (although not very sensitive)

• Cross-sectional imaging : *complex anatomical regions* (skullbase/spine/pelvis)

Characterization

• Age
• Location
• Size of the lesion
• Matrix
• Margin
• Transitional zone
• Reaction of surrounding bone (periost, cortical thinning/infiltration, sclerosis, edema)
• Multiplicity
Age

- Ewing/PNET
- Osteosarcoma
- Parosteal osteosarcoma
- Metastasis
- Myeloma
- Chondrosarcoma

Children/adolescents

- Location
  - Flat bones / pelvis?
  - Spine?
  - Skull (base)/ sacrum?
  - Tubular long bones?
    - metaphyseal?
    - diaphyseal?
  - Ewing/PNET
  - Chondrosarcoma
  - Multiple myeloma
  - Metastasis
  - Lymphoma
  - Chordoma
  - Metastasis
  - GCT
  - Osteosarcoma
  - Ewing sarcoma
  - Multiple myeloma
  - Other

Characterization: role imaging

- Age
- Location
- Size of the lesion
- Margins
- Matrix
- Transitional zone
- Reaction of surrounding bone (periost, cortical bone, sclerosis, edema)

Location

XR/CT (MRI)

Margins (Lodwick)

Ref: Davies A.M. et al. Imaging of Bone Tumors and Tumor-like Lesions Springer 2009
Conventional osteosarcoma

Additional role of MRI
- Low SI on T1-WI
- High SI on T2-WI
- High SI on T1-WI
  - hemorrhage
  - fat
- Low SI on T2-WI
  - mineralization
  - hypocellularity
  - fibrous tissue
  - hemosiderin
- More specific pattern

Additional role of MRI
- Fat: intraosseous lipoma

Additional role of MRI
- Fat: Hemangioma

Additional role of MRI
- Hemosiderin: Giant Cell Tumor

Additional role of MRI
- Fluid-fluid levels
Additional role of MRI

- Cartilage: low grade chondrosarcoma
  - High SI on T2-WI
  - Lobular appearance
  - Ring and arc enhancement

Additional role of MRI

- Pattern: chordoma
  - Extension over more levels
  - Typical sparing of the intervertebral discs

Diagnosis

- Triad
  - Clinical signs
  - Imaging
  - Histology

  Detection → Characterization → Definitive diagnosis

But: first MRI before biopsy