Aneurysmal bone cysts

- Rare benign expansile osteoclastic giant cell-rich bony neoplasms, composed of numerous blood-filled channels and cystic spaces.
- ABC accounts for the 'A' in the popular mnemonic for lucent bone lesions FEGNOMASHIC.
- Mostly seen in children and adolescents, with ~80% under the age of 20 years
  - Can occur at any age
  - Both genders are equally affected

Location

- Typically, eccentrically located in the metaphysis of long bones, adjacent to an unfused growth plate.
- Although they have been described in most bones, the most common locations are:
  - Long bones (~50-65%):
    - » Typically, eccentrically located in the metaphysis
    - » Especially femur, proximal tibia and fibula, and humerus
  - Spine and pelvis (~20-30%):
    - » Especially posterior elements of the spine with extension into the vertebral body in 40% of cases 5
  - Obturator foramen in pelvic location
  - Short bones of hands and feet: more often with a central location
  - Craniofacial: jaw, basisphenoid, and paranasal sinuses
  - Epiphysis, epiphyseal equivalent, or apophysis: rare but important

Xray

- Lytic, expanded lesion
- May have trabeculation but internal matrix exceedingly rare (seen more commonly histologically than by imaging)
- Usually eccentric, so expands into soft tissues
- Geographic; narrow zone of transition
- Sclerotic margin generally thin
- Margin appears complete in only 63%
- Periosteal reaction variable: usually relates to fracture (thin walls vulnerable)

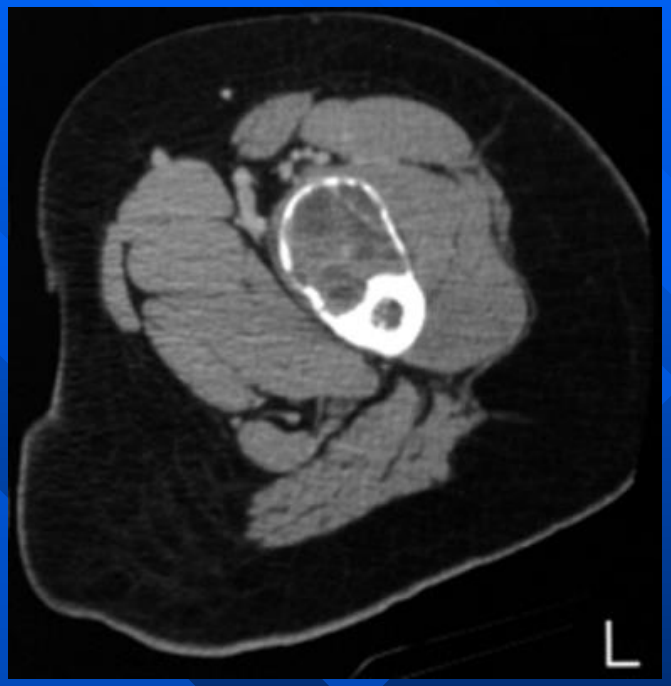
DDx:

- Telangiectatic Osteosarcoma
  - Most important differential since treatment and prognosis are radically different
  - Radiographically similar: eccentric, metaphyseal, mostly geographic
  - Similar fluid-fluid levels on MR
  - May have suggestions of greater degree of aggressiveness
  - Incomplete margination
  - Small area of cortical breakthrough/soft tissue mass
  - Prominent solid, enhancing regions
- Giant Cell Tumor
  - Eccentric, metaphyseal, lytic lesion
  - Older age group (peak: 20-45 years)
  - Often extends to subchondral bone; ABC rarely does
  - May be expanded and bubbly like ABC
  - MR: solid lesion with significant ↓ signal on T2
  - ABC-like changes may arise in giant cell tumor (GCT)
  - MR should show solid, enhancing tumor (GCT) as well as ABC-like fluid-fluid levels
- Simple Bone Cyst
  - Lytic, expanded, metaphyseal or metadiaphyseal
  - Classically central in location
  - Pseudotrabeculations on radiograph
  - MR shows less complex cystic structure
  - Fluid levels may be present but less complex loculations and layering of blood products
- Osteoblastoma
  - Primary differential diagnosis for posterior vertebra expansile lesions
  - Arises in posterior elements of spine, as does ABC
  - Expansile with thin cortex
  - If osseous matrix is present, serves as differentiating factor from ABC
  - ABC-like changes may arise in osteoblastoma (OB), showing fluid-fluid levels
  - MR should show solid tumor (OB) as well as ABC-like changes
  - OB typically has extensive perilesional edema
- Chondroblastoma
  - Lytic (rare matrix), geographic lesion
  - Originates in epiphysis, differentiating it from ABC
  - ABC-like changes may arise in chondroblastoma (CB), showing fluid-fluid levels
  - MR should show solid tumor (CB) as well as ABC-like changes
- Chondromyxoid Fibroma
  - Eccentric expanded metaphyseal lesion
  - Much less common than ABC
  - Chondroid matrix usually not present; if present, differentiates from ABC
  - MR shows solid mass, no fluid-fluid levels
  - Metastases
  - Some may be hemorrhagic, such as renal cell carcinoma
- Lesions Arising in Phalanx
  - All of these may appear identical on radiograph
  - MR with fluid levels may be only differentiating feature for ABC
  - Enchondroma protuberans
  - Often lytic and bubbly in phalanx
  - Simple bone cyst
  - GCT

Fluid-fluid levels

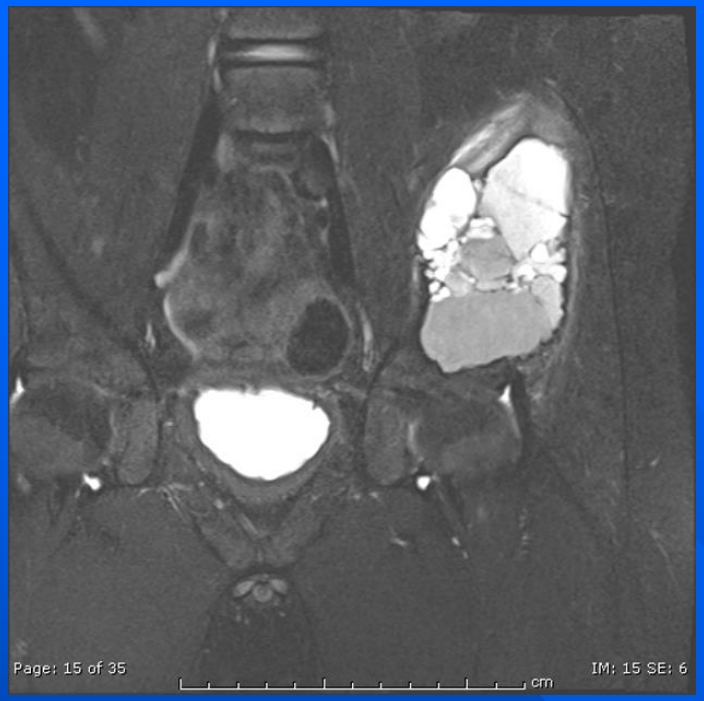
- It is important to remember that the presence of fluid-fluid levels, although characteristic of aneurysmal bone cysts, is by no means pathognomonic.
- Seen in other lesions as well, both benign and malignant
  - Giant cell tumors (GCT)
  - Chondroblastoma
  - Simple bone cysts
  - Telangiectatic osteosarcomas

Aneurysmal bone cyst



blister of bone" sign refers to a bubbly cystic lesion with a saccular protrusion of the cortex with multiple fine internal septae

ABC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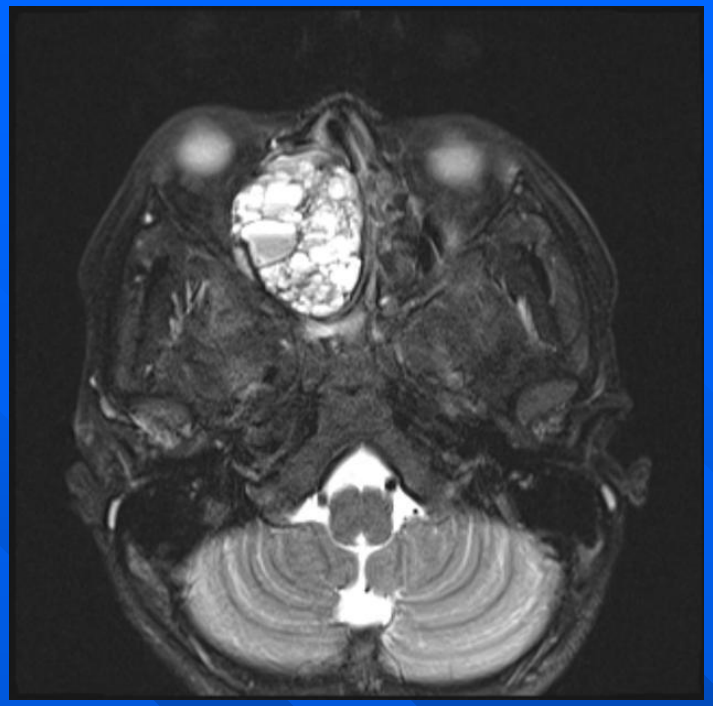


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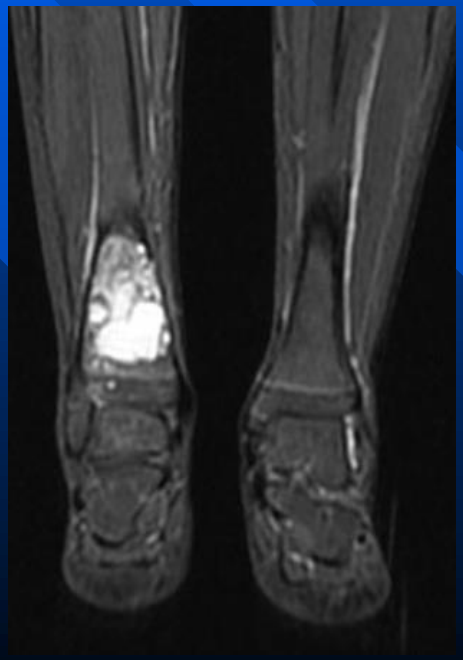
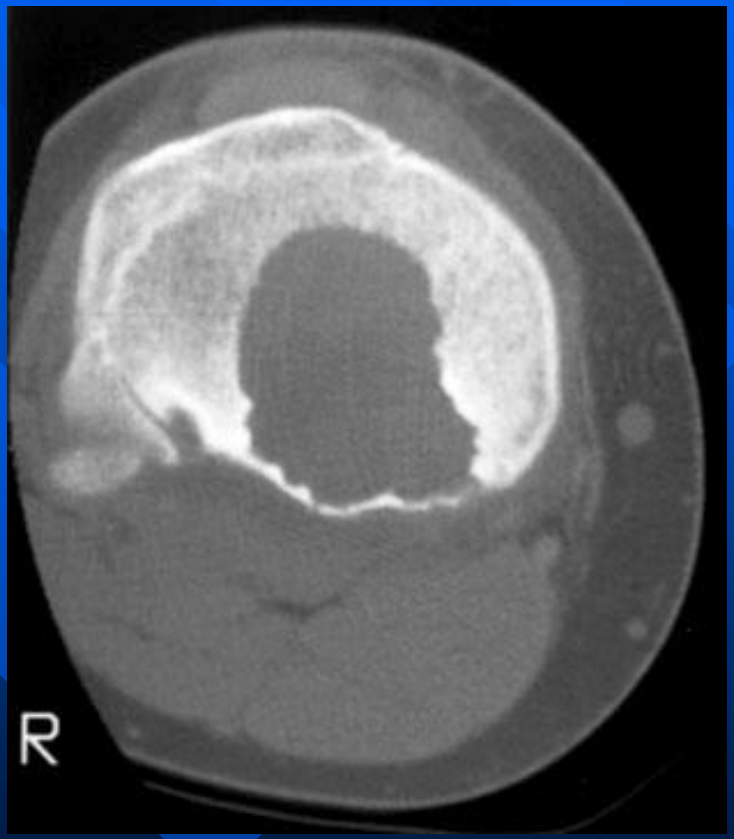
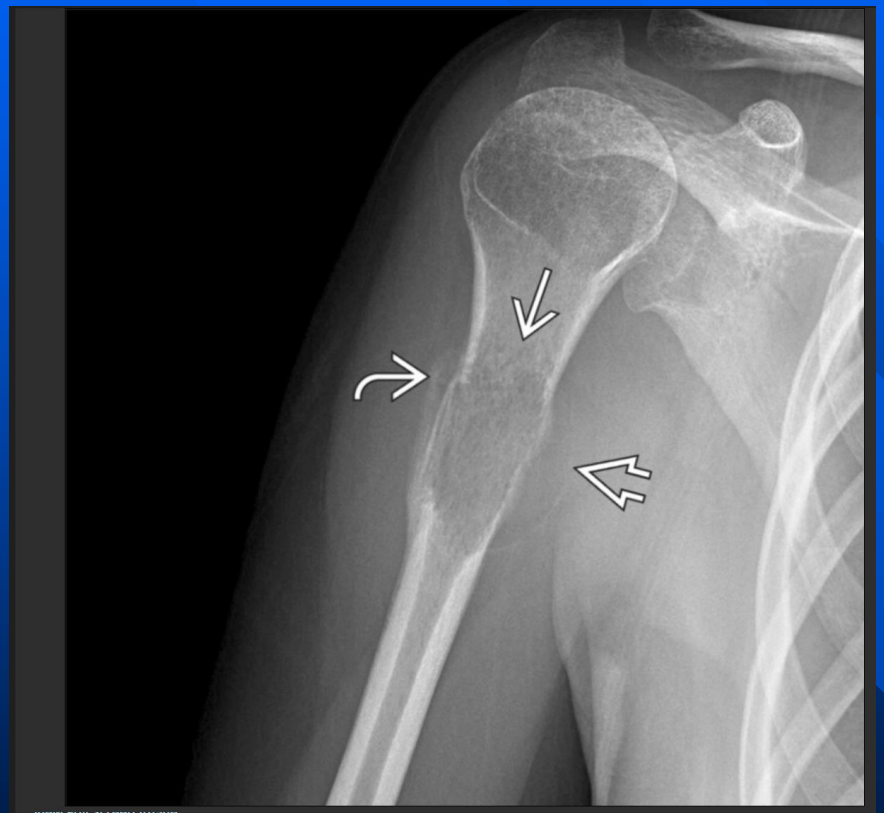


Aneurysmal bone cyst, right proximal tibia





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Frontal radiograph of the humerus in an 18-year-old woman with an aggressive appearance of ABC shows a permeative lesion → with cortex expansion ⇨ and irregular periosteal reaction ↗. The primary consideration in this age group would be primary sarcoma of bone or other malignancy. Extensive testing revealed ABC.

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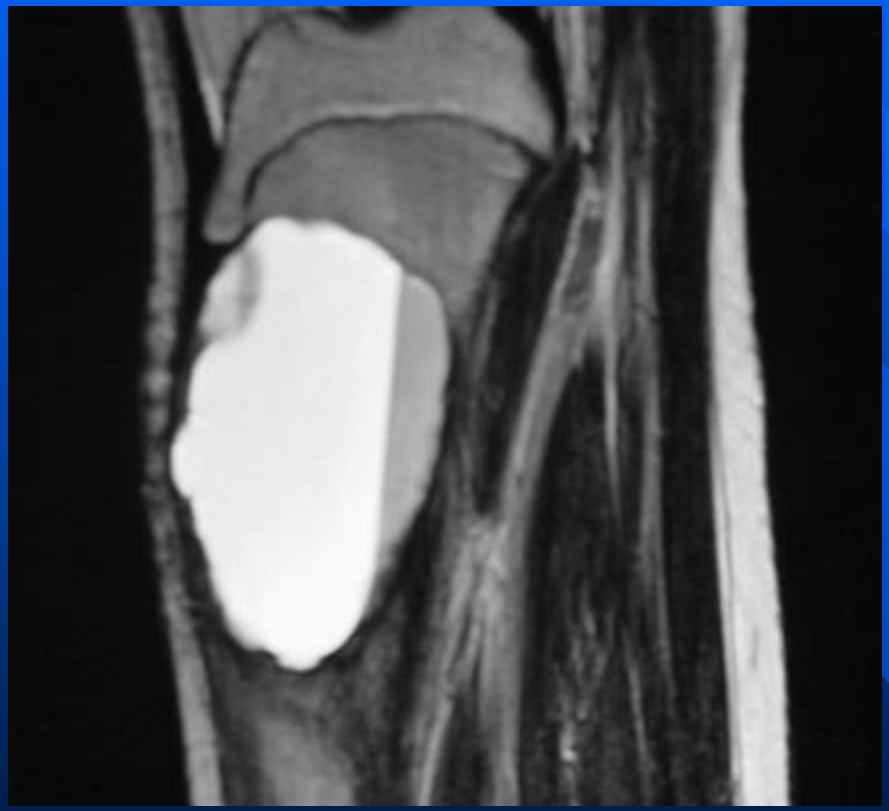
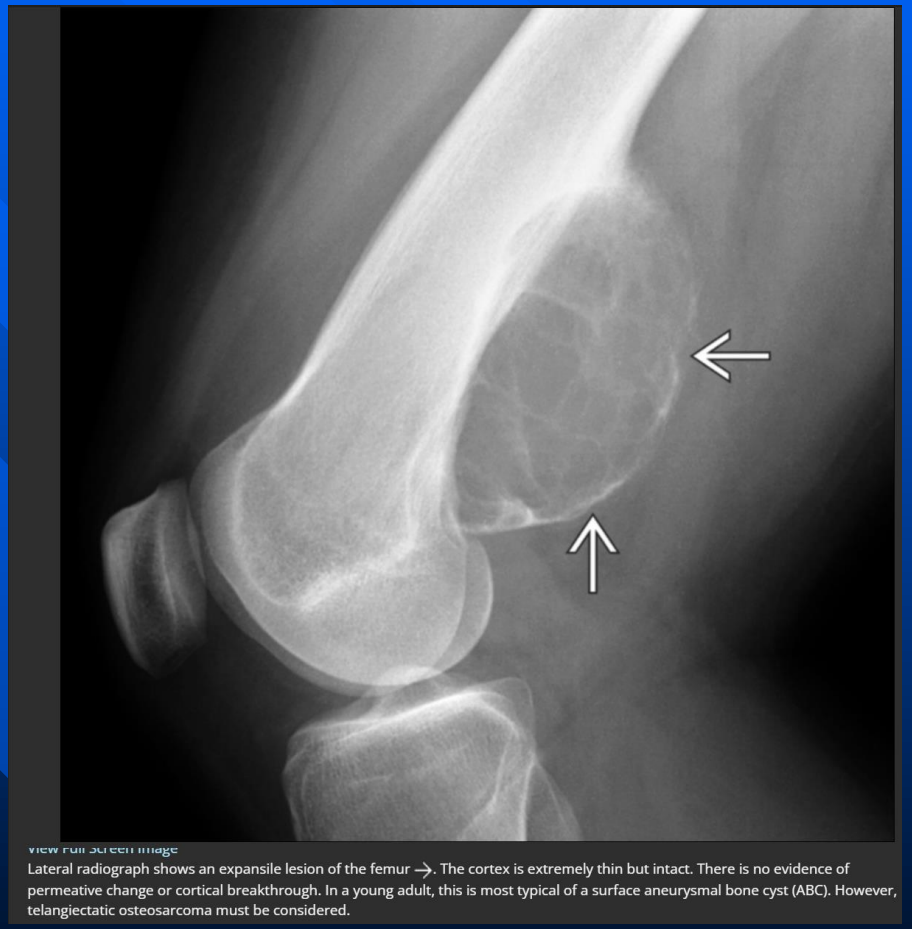
PA radiograph of the wrist in a young adult shows an eccentrically located lytic lesion, mildly expanded →, arising in the metaphysis and extending toward the subchondral bone. There is only a mildly sclerotic margin. Based on this image, a giant cell tumor might be the favored diagnosis.

ABC





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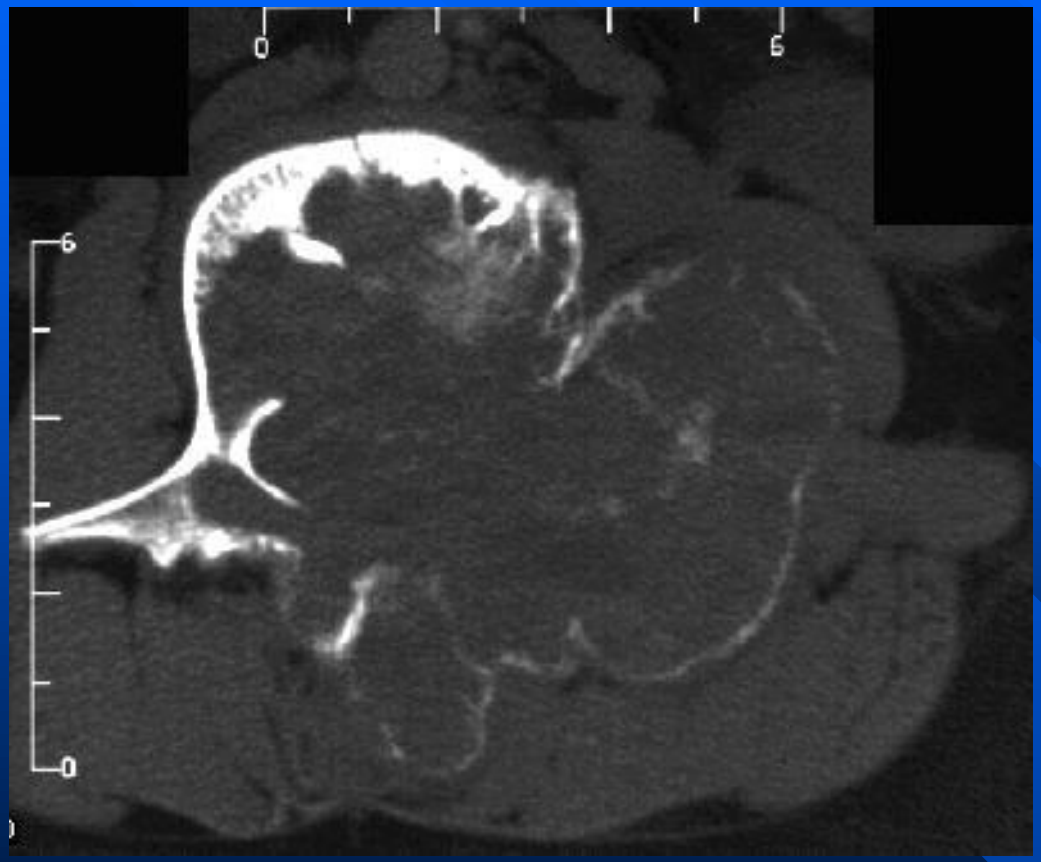
Lateral radiograph shows an expansile lesion of the femur →. The cortex is extremely thin but intact. There is no evidence of permeative change or cortical breakthrough. In a young adult, this is most typical of a surface aneurysmal bone cyst (ABC). However, telangiectatic osteosarcoma must be considered.

ABC



Types:

1. Primary nonneoplastic lesion (70%)
2. Secondary lesion
   - Giant cell tumor
   - Chondroblastoma
   - Osteoblastoma
   - Fibrous dysplasia