ALPHABET SOUP AND CYSTIC LESIONS OF THE BONE

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ALPHA BET SOUP AND CYSTIC LESIONS OF THE BONE

• Giant cell tumor (GCT)
• Unicameral bone cyst (UBC)
• Aneurysmal bone cyst (ABC)
• Epidermoid inclusion cyst
• Subchondral cyst
• Intraosseous ganglion
• Post-traumatic cyst
GIANT CELL TUMOR (GCT)

CLINICAL FEATURES

• Approximately 5%-10% of all biopsied primary bone tumors; 18%-23% of benign bone neoplasms
• Symptoms—pain and swelling often relieved by decreased activity
• Pathologic fracture 10%-35%
GIANT CELL TUMOR

CLINICAL FEATURES

- Adults: 80% between 20 - 50 years
- More common in Chinese (20% of primary bone tumors)
- Rare in children 1% - 3% (<14 years)
- Approximately equal sex distribution
  - F : M ratio 3:2 benign GCT
  - M : F ratio 3:1 aggressive GCT
GIANT CELL TUMOR LOCATION

- Originate metaphyseal side of long bone growth plate and grow to subchondral bone (84% - 99%)
- Long tubular bones 75% - 90%
- About knee 50% - 65%; distal femur 23%-30%; proximal tibia 20%-25%
- Radius (10%-12%); humerus (4%-8%)
GIANT CELL TUMOR

LOCATION

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Giant Cell Tumor Location

- Spine – (7%-15%) - vertebral body – sacrum-thoracic-cervical-lumbar
- Pelvis – 4%; Hands/feet - 5%
- Multifocal (0.5%-1%) - skull and face (Paget disease), Goltz syndrome
GIANT CELL TUMOR PATHOLOGY

- Osteoclast like giant cells (90%)
- Mononuclear spindle cell stromal component
- Hemorrhage, necrosis and hemosiderin
- ABC like areas 10%-15%
- Cytogenetic aberration H3F3A (92%)
OSSEOUS LESIONS CONTAINING GIANT CELLS

- GCT/ABC/UBC
- NOF/CMF/OGS
- Brown tumor HPT/chondroblastoma
- Fibrous dysplasia and variants
- Osteoblastoma
- Giant cell reparative granuloma
• Solitary eccentric geographic lytic lesion extending into subchondral bone

• Center of lesion-metaepiphysis

• Margin IB (80%-85%), IC (10%-20%), IA (1%-2% but up to 20% by CT)

• No mineralized matrix
GIANT CELL TUMOR RADIOLOGY

- Expansile remodeling (47%-60%) with apparent cortical permeation (33%-50%)
  - Septations-subperiosteal new bone
  - Periosteal reaction unusual 10%-30%

- Radiologic characteristic do not reflect clinical behavior of GCT
GIANT CELL TUMOR
RADIOLOGY

• Bone scan-doughnut sign (57%)
• Usually a vascular lesion (75%-90%)
• MRI > CT for evaluation of extent
• Fluid levels in cystic (ABC) components
• Low to intermediate intensity usually predominates on T2W images (90%-95%) in solid components
SACRAL LESIONS
DIFFERENTIAL DIAGNOSIS

• GCT/ABC
• Metastasis
• Myeloma/plasmacytoma
• Chordoma
• Neurogenic tumor
GIANT CELL TUMOR TREATMENT AND PROGNOSIS

- Curettage and cryosurgery or en bloc resection and bone graft
- Local recurrence rate 40% - 60% historically
- Current recurrence rate 2% - 25%
- Denosumab medical therapy (86% response)
- Recurrence does not correspond to radiologic or microscopic appearance
UNICAMERAL BONE CYST

SIMPLE BONE CYST

A fluid-containing lesion lined by mesothelial (epithelial-like) cells usually arising in metaphysis of long bone adjacent to physis.
SIMPLE BONE CYST

CLINICAL FEATURES

• 3% of all biopsied primary osseous neoplasms
• Young patients 85% <20 years
• M > F; 2:1
• Pathologic fracture 50%
SIMPLE BONE CYST
PATHOLOGY

• Clear, straw-colored fluid filled cyst
• Cyst lining-thin flat epithelial-like cells-mesothelial origin
• Complicated cysts-hemorrhage, fibro-osseous repair tissue
SIMPLE BONE CYST
LOCATION/ETIOLOGY

• Under age 20 - humerus (55% - 65%), femur (25%-30%), tibia, fibula, radius and ulna rare

• Over age 20 - iliac bone/calcaneus

• Cause - lymphatic or venous obstruction vs. synovial origin
SIMPLE BONE CYST

- Geographic IA lesion - originate in central metaphysis (active)
- Can migrate into the diaphysis (latent)
- Mild expansile remodeling
- Not infrequently multilocular
SIMPLE BONE CYST

RADIOLOGY

• Pathologic fracture
  - “Fallen fragment” sign (5%)
• CT/MRI-noncomplicated see simple fluid
• CT/MRI-complicated case
  - Soft tissue
  - Fluid-fluid/gas-fluid level
SIMPLE BONE CYSTS
TREATMENT AND COURSE

- Spontaneous regression or heal after fracture
- Curettage and bone grafting
- Intralesional steroids (70% - 95% effective)
- Intralesional bone marrow or bone matrix
- Recurrence 20% - 40%
  - Increases with younger age and larger size
- Extremely rare malignant transformation
ANEURYSMAL BONE CYST (ABC) DEFINITION

“The so called aneurysmal bone cyst is neither a cyst nor a neoplasm; rather it is probably a periosteal to intraosseous arteriovenous malformation not uncommonly seen in association with other well known benign and even malignant lesions”

ANEURYSMAL BONE CYST

CLINICAL FEATURES

• 1%-6% of all biopsied primary osseous neoplasms
• 80%-85% between ages 5 and 20 years
• Patients present with pain, swelling, and pathologic fracture (10%-20%)
• May be associated with trauma
• More common in women (1.5-2:1)
ANEURYSMAL BONE CYST SECONDARY LESION

• 1% - 32% of cases
• Benign lesions - chondroblastoma, CMF, NOF, GCT, fibrous dysplasia, UBC, brown tumor, hemangioma, giant cell reparative granuloma
• Malignant lesions - hemangiendothelioma, telangiectatic osteosarcoma, chondrosarcoma
OSSEOUS LESIONS WITH PROMINENT FLUID LEVELS
DIFFERENTIAL DIAGNOSIS

- Aneurysmal bone cyst (only fluid levels)
- Giant cell tumor (to bone end, metaphyseal center)
- Chondroblastoma (epiphyseal center)
- Osteoblastoma (posterior elements spine)
- Telangiectatic Osteosarcoma (thick walls, osteoid CT)
- Fibrous dysplasia (diaphysis, “ground glass”)
ANEURYSMAL BONE CYST

PATHOLOGY

• Gross – “Blood filled sponge”
• Cavernous blood filled spaces lined by fibrous walls
• May see chondroosteous tissue indicating repair
ANEURYSMAL BONE CYST LOCATION

• Long tubular bone 70% - 80%
• Spine posterior elements-15% (thoracic, lumbar, cervical, sacral)
• Pelvis 5% - 10%
• Hands 10% - 15%
ANEURYSMAL BONE CYST

- Only osseous neoplasm named for its radiologic appearance
- Metaphysis (80% - 90%), eccentric medullary geographic lytic lesion
- Can appear central with expansion
- Diaphysis (10% - 20%), often surface lesions
ANEURYSMAL BONE CYST

- Expansile remodeling uneven in distribution creating one aggressive margin
- Spine-expansion can lead to neurologic deficits
- Periosteal membrane intact on CT/MRI
- Bone scan peripheral activity (65%)
ANEURYSMAL BONE CYST RADIOLoGY

- Fluid levels (CT/MRI)-nonspecific representing sedimentation of blood
- Angiography-hypovascular lesion with localized areas of increased vascularity
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