

## PEDIATRIC RADIOLOGY:

### Cases from the ER

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### Jumpers knee

- Sinding-Larsen-Johansson syndrome.
- Osteochondrosis
- Traction tendonitis
- Chronic repetitive stress

### ACL RUPTURE

#### Unhappy Triad

- ACL rupture
- Medial collateral ligament injury
- Medial meniscus tear

#### Flattening of femoral intercondylar notch

### Soft tissue Neck Xray

- Indication: acute stridor, foreign body
- Most common inflammatory disorders include croup, epiglottitis, exudative tracheitis, and retropharyngeal cellulitis and abscess.
- Anatomy: adenoids, tonsils, epiglottis, & aryepiglottic folds, subglottic trachea, and retropharyngeal soft tissues.
- Interpretation retropharyngeal ST:
  - Soft tissues are wider than the adjacent vertebral bodies.
  - Anterior convexity of soft tissues.
  - Reversal of cervical lordosis
  - Careful pseudo-retropharyngeal thickening

## 2<sup>nd</sup> Branchial cleft cyst

- most common branchial anomaly
- second branchial cleft cysts occur near the angle of the mandible
- Most often a cyst but can be sinus or fistula
- path of 2nd branchial cleft anomalies: can occur anywhere along a line from the supraclavicular region to the oropharyngeal mucosa
- **From the Archives of the AFIP**. Congenital Cystic Masses of the Neck: Radiologic-Pathologic Correlation Radiographics [Vol. 19, No. 1](#)

## Retropharyngeal Abscess & Complications

- Mediastinal extension
- Septic thrombophlebitis (Lemierre Syndrome)
- IV contrast for infection

## Epidural Hematoma

- Lentiform shape on CT
- Arterial bleed usually middle meningeal a.
- Can be venous bleed
- Associated with skull fracture
- Acute blood is bright on CT (but < Ca<sup>++</sup>)
- Calcium is bright on CT
- CSF is black on CT

## Subdural hematoma

- crescent shaped
- associated with child abuse

## Ct for head trauma:

- NO IV contrast!!
- Can obscure small petechial bleed or contusion

## Acute medial epicondyle fracture

- High occurrence in elbow dislocation, 60%
  - Usually fragment trapped in humeral ulnar joint
- If XR's do not depict medial epicondyle apophysis in kid older than 6-7 yrs then maybe displaced
- Surgery for entrapped fragment of avulsion greater than 5mm
- Imaging the Injured Pediatric Athlete: Upper Extremity. Radiographics 2016 Vol. 36, No. 6

## Pediatric Scaphoid Fractures

- Scaphoid view:
  - Obtain if pain in anatomic snuff box.
  - Removes superimposition by pronating, dorsiflexing wrist with ulnar deviation
  - Indirect sign: Obscured scaphoid fat pad
- Scaphoid most frequently fx carpal bone in kids.
- Scaphoid fx in kids usually distal pole
  - Adult waist fx pattern becoming more common in kids due to inc BMI & high impact sports
- Indirect signs of soft-tissue edema/effusion may be occult fx.
- Xray low sensitivity for detection of scaphoid fractures:
  - varies as low as 21% in peds.
  - MR for occult fx, also find tendon injuries
  - Clinical snuff box pain Parramount
- Complications:
  - nonunion and avascular necrosis
  - Missed occult fx higher incidence non union
- Pediatric Distal Forearm and Wrist Injury: An Imaging Review. Radiographics 2014 vol 34 no 2

## Long bone images:

for shaft fractures or bone lesions

if pain at joint must get dedicated joint views otherwise could miss a fracture as xray beam fans out at edges.

## Parapneumonic effusions & empyemas:

- Pleural collections w/underlying pneumonia
- Ultrasound evaluation: Confirms fluid, Replaces decubitus CXR, Rapid answer to an opaque hemithorax on CXR, Detects septations & exudate not detected by CT
- CT not routine, only if complicated, immunocompromised, surgical intervention or TPA
- 1st stage:
  - Exudative phase; inflammation & simple effusion.
  - low cellular content
- 2nd stage: Fibrinopurulent phase; fibrin covers pleura, thin septations & loculations
- 3<sup>rd</sup> stage: Organizing phase (weeks to form)
  - Formation thick fibrous capsule prevents lung re-expansion
- Goals of drainage:
  - Immediate goal: to control pleural sepsis.
  - To allow re-expansion of underlying collapsed lung.
  - Re-expansion facilitates transbronchial clearance of intrapulmonary secretions.
  - Promotes restoration of pleural elasticity.
  - 60-80% w/Conservative Tx (abx & CT drainage)
- Pediatric Pulmonology 40:148–156 (2005) Thorax 2005 60:1-21 (BTS guidelines)
- Pediatric Pulmonology 40:148–156 (2005)

### Child abuse (Non Accidental Trauma)

- Skeletal survey most important modality in detecting child abuse-highest sensitivity
- Skeletal fractures more common in child 3 yrs & under
- 80% of rib fractures are occult
- Bone scintigraphy is complimentary and helps detect occult fxs, but is limited for detection CML
- Thick peripheral osseous component of the classic metaphyseal lesion (CML) is due to subperiosteal bone collar
- Published in: Gael J. Lonergan; Andrew M. Baker; Mitchel K. Morey; Steven C. Boos; *RadioGraphics* **2003**, 23, 811-845. DOI: 10.1148/rg.23403503

### Henoch-Schonlein Purpura

- non-thrombotic, diffuse vasculitis
- Affects blood vessels of gut, skin, joints, kidneys & multiple organs
- Clinical triad:
  - palpable purpuric rash on the lower extremities, abdominal pain, and arthritis
- Abdominal pain, vomiting and bloody diarrhea most common presentation.
- Intussusception occurs in 2-3 %. Renal involvement in 50%.
- children aged 2-11. peak prevalence at 5.
- DDX: includes idiopathic thrombocytopenic purpura, hemolytic uremic syndrome, Colitis
- Evaluation: US & CT
- Nonspecific lymphadenopathy
- Bowel wall edema and hemorrhage
  - most common in jejunum
- Bowel infarction with or without perforation
- Synovitis
- Scrotal edema
  
- Intestinal obstruction in CHILD:
  - TAKE AAIIMM:
    - Appendicitis
    - Adhesions
    - Intussusception
      - Lead points
    - Incarcerated inguinal Hernia
    - Malrotation with volvulus
    - Meckel's

### Meckles diverticulum

- Omphalomesenteric (vitelline) duct: communication between yolk sac and primitive midgut
- Incomplete involution takes various forms, including:
- may bleed if contains gastric mucosa (50%)
- Rule of 2's
  - 2% population
  - Within 2 feet ileocecal valve
  - 2 inches long

### Vitamin C deficiency

- Rare in developed world
- Impaired collagen formation, bone matrix, cartilage, tendon & ligament synthesis
- diffuse demineralization & subperiosteal hemorrhage
- Imaging is not needed for diagnosis which can be made clinically
- Classic signs:
  - Wimberger ring-sclerotic epiphyseal rim related
  - Frankel line - metaphysis
  - metaphyseal spurs & corner fractures

### Ovarian Torsion:

- Clinical diagnosis
- Cysts/Ovarian masses >4-5cm pt at risk for torsion or can be a cause of torsion
- Ovaries have dual blood supply, so presence of color flow is not diagnostic for torsion
- Most specific imaging finding is increased ovarian size

### Langerhans cell histiocytosis

- Over production histiocytes
- Most common dendritic cell disorder
- Classic imaging signs:
  - Vertebral plana, punched out lytic skull lesions with beveled edges, bizarre lung cysts (mid-upper), floating teeth, absent pituitary bright spot, hepatomegaly, cervical lymphadenopathy
- Unifocal disease limited to bone lesions 70%
- Multifocal unisystem: 20% bones + reticuloendothelial sys.
- Multifocal multisystem (fatal): 10% anemia. Thrombocytopenia, <2yrs age
- imaging: Bone survey, PET CT
- skin biopsy
- Radiographics 2014, vol 34, no 7

Common Pediatric Soft Tissue Masses:

<b>Congenital</b>	<b>Thyroglossal duct cyst Branchial cleft cyst Lingual thyroid Dermoid/epidermoid cyst Vascular Malformation Hemangioma</b>
<b>Inflammatory</b>	<b>Suppurative lymphadenitis Abscess Parotiditis/sialoadenitis Ranula</b>
<b>Neoplastic</b>	<b>Rhabdomyosarcoma Lymphoma Mets</b>

Summary: ER Pediatric imaging

- US for appendicitis, intussusception, soft tissue evaluation, foreign body, lymphadenopathy, collections, pleural effusions, abscess
- Repeat imaging if symptoms persist
- Clinical exam is paramount for occult fx
- Dedicated joint views are a must for joint pain.
- History is KEY!

Use IV contrast for evaluation of

- infection
- inflammation
- Tumor
- Appendicitis (oral contrast if generalized abdominal pain)
- Vascular injury or blunt abdominal trauma

NO IV contrast

- Sinusitis
- Head trauma (unless vascular injury then CT angiogram which should include non-contrast scan in protocol)

Thank you!