EMERGENCY IMAGING OF THE HEAD AND NECK

Timothy N. Booth
Children’s Medical Center of Dallas
University of Texas Southwestern
No Disclosures
Select the most correct statement

- A. The piriform aperture normally measures 5 to 10mm
- B. The retropharyngeal space is well differentiated from the danger space on CT
- C. Orbital infarction in sickle cell is more common in adults
- D. Retroantral fat involvement in the immunocompromised patient has less than a 70% PPV for invasive fungal sinusitis
- E. Enlarged lymph nodes in Castleman disease demonstrate central hypervascularity on ultrasound
Objectives for Emergency H&N Imaging

- Clinical presentation centered discussion
- Know appropriate imaging work up and findings for a given presentation
- Know common etiologies and differential diagnosis
- Complications
ACUTE PROPTOSIS (NON-TRAUMATIC)
Orbital infection

• Clinical
  • Limited exam – pain/swelling
  • Young, trauma – preseptal
  • Old, fever – orbital
  • Diplopia, ophthalmoplegia, proptosis

• Etiology
  • Breech in skin barrier – preseptal
  • Sinusitis – orbital/postseptal
  • Dental

Classification

- Preseptal
- Orbital cellulitis
- Orbital abscess
  - Subperiosteal
  - Intraorbital
    - extraconal, intraconal
- With or without IC complications

15 year old

2 year old
Complications

- Ocular
  - Endophthalmitis, retinitis, detachment, optic neuropathy
- Vascular
  - SOV and cavernous sinus
- Intracranial empyema
Mimics

- Dacrocystitis
  - Infection of the duct and sac
  - Medial canthus
  - Antibiotic and/or dacrocystorhinostomy
- Neuroblastoma metastasis
  - Orbital predilection

18 month old
Mimics

- Bone infarct
  - Sickle cell patient
  - Acute, rapidly progressive
  - More marrow

- Imaging
  - Regional STS
  - Subperiosteal and epidural hematoma
  - MR – marrow edema

3 year old, Neuroblastoma

2 year old, AML

2 year old, LCH
3 month old,
Infantile hemangioma

6 month old,
Rhabdoid tumor

3 year old,
Lymphatic malformation
4 year old, Thyroid associated orbitopathy

6 month old, Neurofibromatosis
PHARYNGITIS, EVALUATE FOR RETROPHARYNGEAL ABSCESS
Oropharyngeal

- Clinical
  - Sore throat, fever
  - Lymphadenopathy
- Radiographs
  - Pre-vertebral STS
- CT (complications)
  - Pharyngitis – pharyngobasilar fascia
Tonsillar

- CT
  - Location
    - Tonsillar
    - Peritonsillar
      - Tonsillar capsule and superior constrictor m.
    - Nor equal to RTP or PPS
  - Rim enhancing fluid collection
Retropharyngeal

- Local spread
- CT (MOC)
  - RTP edema
  - Suppurative node
    - Will not cross midline
    - Abscess
- Medial to carotid sheath
  - Usually responsive to abx therapy
Beware

- Danger space
  - Divided from the true RTP space by alar fascia (not seen)
  - Allows extension into posterior mediastinum

Hoang JK et al. Multiplanar CT and MRI of collections in the RTP space: Is it an abscess. AJR 2011; 196: 426-432
Complications

- Vascular
  - Narrowed ICA
  - Pseudoaneurysm
  - Venous thrombosis
- Emboli
  - Arterial – brain
  - Venous – pulmonary
- Brain and spine
  - Extra-axial

11 year old with rapid onset right neck swelling

Which one doesn’t belong?

• A. Lemierre syndrome
• B. Fusibacterium necrophorum
• C. Lower extremity swelling
• D. Thrombophilia
• E. Anticoagulation treatment
11 year old with rapid onset right neck swelling

Which one doesn’t belong?

- A. Lemierre syndrome
- B. Fusibacterium necrophorum
- C. Lower extremity swelling
- D. Thrombophilia
- E. Anticoagulation treatment
Don’t forget!

Newborn

18 month old
SINUSITIS, IMMUNOCOMPROMISED
Invasive fungal sinusitis

• Clinical
  • Painless, necrotic septal ulcer
  • Fever, discharge, bleeding
  • High mortality

• Imaging (initially CT)
  • Hypo or hyperdense
  • Erosion, facial STS, extra-sinus extension, unilateral = 100% PPV
  • Periantral fat alone 60% PPV

• MR - vascular and IC complications

6 year old with leukemia

6 year old with leukemia

Finkelstein A et al. Paranasal sinuses computed tomography in the initial evaluation of patients with suspected invasive fungal rhinosinusitis. Eur Arch Otorhinolaryngol 2011; 268: 1157-1162
PERIAURICULAR SOFT TISSUE SWELLING
Mastoiditis

- Clinical
  - Retroauricular pain, erythema, STS
  - Uncomplicated
    - Abx and retroauricular puncture

- Imaging CT
  - Fluid not = to mastoiditis
  - STS, bony erosion
  - Look for complications
Complications

- Clinical
  - Associated with high WBC
- Imaging

Petrous apicitis

• Clinical
  • Diplopia, facial pain, otorrhea
  • Mastoid or primary etiology

• Initial CT
  • Bone destruction often subtle
  • Complications similar
    • Beware of the cavernous sinus (MR)

8 year old with HA and 6th nerve palsy

6 year old with HA
Mimics

- **Beware**
  - Young child, not responsive to abx
  - Facial nerve palsy (bad)

- **Differential diagnosis**
  - Atypical infection (TB)
  - LCH
  - Rhabdomyosarcoma
  - Neuroblastoma
  - Lymphoma/leukemia
Parotid mimics

- Parotitis
  - Bilateral = viral (mumps)
  - Unilateral
    - Calculus (10%)
    - Bacterial
    - Adjacent infection
    - Traumatic
- Air
- Masses

6 year old, recurrent parotid swelling

4 month old, infantile hemangioma
CERVICAL ADENOPATHY
Cervical adenopathy

• Clinical
  • Nodes common
    • 90% children 4-8
  • Reactive
    • Tender, mobile, and soft
  • Neoplastic
    • Opposite

• Imaging
  • US should be first
    • NL – oblong, fatty hilum
    • Doppler – central vascular pedicle
    • Guide fine needle
    • Superficial abscess

Cervical adenopathy

- Computed tomography
  - Extent of abnormality
  - Deep nodes
  - Perinodal soft tissue
  - Abscess – deep
- Size criteria not helpful
  - <1cm, <1.5cm 1B, 2A
  - RTP ≤ 8mm
Bilateral - hyperplastic

- Reactive
  - More commonly bilateral
  - No regional inflammation
- Viral
  - EBV
    - Adenoidal and tonsillar enlargement
- HIV
  - +/- adenoidal and tonsillar enlargement
  - Lymphoepithelial cysts

3 year old, EBV

6 year old, HIV
Unilateral - inflammatory

- Bacterial
  - Lymphadenitis
    - Asymmetric, single nodal group
    - Perinodal inflammation
  - Suppuration
    - Confined to the node
    - Central necrosis
    - Peripheral enhancement/vascularity
- Abscess
  - Not confined by the node
5 year old, neck swelling
Thymopharyngeal duct remnant

- Variably described as 3rd or 4th branchial sinuses
  - Recurrent abscess left neck
  - Thyroid involvement
  - CT then laryngoscopy

Thomas B et al. Revisiting imaging features and the embryologic basis of third and fourth branchial anomalies. AJNR 2010; 31: 755-760
Unilateral necrotic

- Nontuberculous mycobacterial
  - Clinical
    - Slowly enlarging, purplish mass
    - Parotid, submandibular, fistula
    - MAI, + PPD <40%
  - Imaging
    - Single nodal group
    - Understated perinodal inflammation
    - Skin involvement

Unilateral necrotic

- Mycobacterium TB
  - Clinical
    - Constitutional
    - 15-25% extrapulmonary
    - PPD and CXR
  - Imaging
    - Level 2 and 5, bilateral
    - Acute – nodal enlargement
    - Subacute – necrosis, minimal inflammation
    - Chronic - calcification
Unilateral necrotic

- Cat scratch
  - Clinical
    - Cat scratch or bite 3 weeks prior
    - Regional lymphadenopathy
    - Bartonella henselae (PCR)
  - CT/US
    - Necrotic, enhancing adenopathy
    - Minimal regional inflammation
    - Epitrochlear > axillary > neck
    - 25% Neck alone
  - Self limiting, azithromycin
Unilateral - neoplastic

- Ultrasound
  - Enlarged
  - Absent/displaced hilum
  - Hypoechoic, conglomerate
  - Doppler
    - Subcapsular vessels
    - Displaced vascular pedicle
    - Absent segments

- CT
  - Enlarged
  - Increased enhancement
  - No inflammation
    - Beware of extracapsular tumor spread
Unilateral - neoplastic

- Lymphoma
  - 2<sup>nd</sup> decade
  - Calcification rare before Rx
  - Thoracic inlet compression
- Leukemia
  - Similar

16 year old respiratory distress
Unilateral - neoplastic

7 month old, NBL

13 year old, RMS

8 year old, papillary thyroid
**Syndromes**

- **Kawasaki disease**
  - Young, unexplained fever > 5 days
  - Erythema hands and feet
  - Imaging
    - Unilateral lymphadenitis
    - Conglomerate
  - Early IV IG

- **Castleman disease**
  - Isolated mediastinal > neck
  - Imaging
    - Peripheral hypervascularity
    - Calcification, central fibrosis
  - Surgery, may recur

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3 year old with fever

15 year old, lower neck mass
BLUNT CEREBROVASCULAR INJURY
Traumatic vascular injuries

- Screening of BCVI
  - Children commonly asymptomatic
  - Adult criteria (Denver)
    - Focal neurologic deficit
    - Infarct on CT
    - Non-expanding cervical hematoma
    - Anisorcoria
    - Cervical fractures
    - Severe facial fractures
    - Seatbelt sign above clavicle
    - Bruit or thrill
    - GCS < 8
Traumatic vascular injuries

- Clinical
  - Seat belt sign
    - High association with vascular injury
      - 4/131 (3%) carotid injuries
      - None children
    - 2/3 may not be associated with screening risk
  - Treatment of minor injuries?

- Imaging CTA
  - Technique
    - 2cc/kg IV contrast, 3cc in <1yr
    - 2-3 cc sec.
    - kVp 100
    - Triggered technique, 100-125 HU

Rozycki GS et al. A prospective study for the detection of vascular injury in adult and pediatric patients with cervicothoracic seat belt signs. J Trauma 2002; 52: 618-624

CTA

• Grading of injuries
  • Associated with risk of CV ischemic event
  • Grades
    • I – wall irregularity, <25% luminal stenosis
    • II – Intraluminal thrombus or flap, >25%
    • III – pseudoaneurysm
    • IV – occlusion
    • V – transection or AV fistula
  • Conservative Rx grade I, II

14 year old MVC (facial fractures)
2 year old, crush injury (TV)
NEONATE WITH RESPIRATORY DISTRESS AND NASAL OBSTRUCTION
Piriform aperture stenosis

- Clinical
  - Obligate nasal breathers
  - Cyanosis worse with eating
- Imaging
  - <11mm
  - Single central incisor
  - Triangular palate
- Conservative Rx
- Surgery - sublabial

Bilateral choanal atresia

- Clinical
  - Respiratory distress
  - Inability to place NGT
  - Additional anomalies 75%
    - CHARGE

- Imaging – non-contrast CT
  - Membranous osseus
    - <3.4mm
  - Volmer and lateral nasal walls
  - Report thickness

- Airway and surgical repair
Midnasal stenosis

- Rare
- Imaging
  - Isolated
  - Stenotic anterior nasal cavity
    - Midface hypoplasia
    - Syndromic – CFS, FAS
- Conservative RX
13 year old with suspected meningitis
Summary

- Understand the approach and imaging appearances of common pediatric head and neck emergencies
- Be able to develop a reasonable differential diagnosis, stressing the likelihood of infection
- Be aware of complications
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