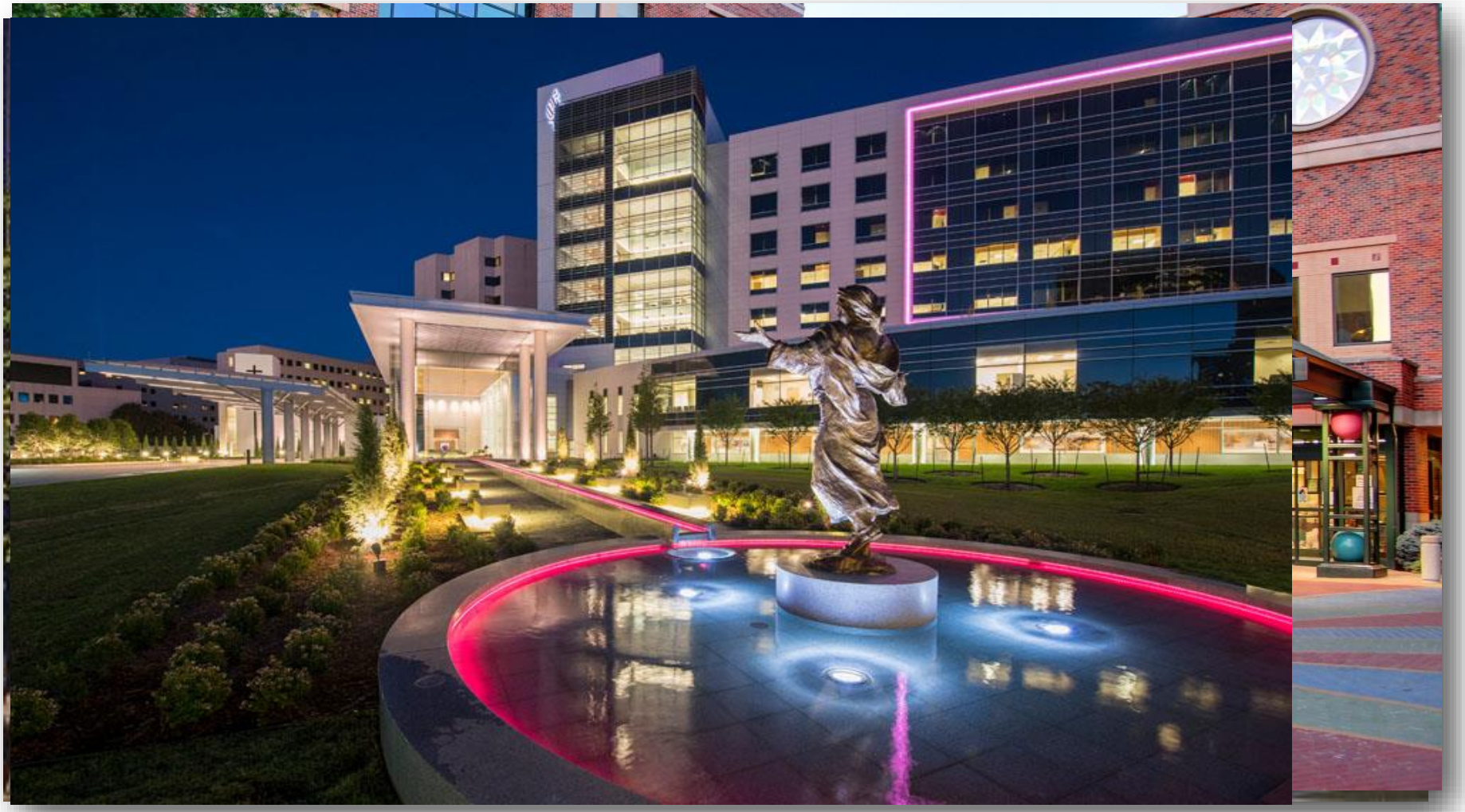
Pediatric ENT Trauma

Steven R. Dyer, D.O.
Warren Clinic Otolaryngology

Disclosures

- I have no relevant financial disclosures

Background



Pediatric ENT Trauma

- Penetrating Injury to the Oropharynx

Penetrating Pharyngeal Trauma

- 3-5 Year Old
- Toddlers Running
- Minor trauma
  - Frequently unrecognized
  - Palate Bleeding typically present to the ER

Penetrating Pharyngeal Trauma

Grade	N	%	Description
1	8	7%	Abrasion or ecchymosis without mucosal disruption
2	68	64%	Puncture wound or simple laceration ≤ 1 cm
3	31	29%	Laceration > 1 cm or any laceration with an oronasal fistula or large mucosal flap

Questions to Consider

- When does it heal without intervention
- When are prophylactic antibiotics warranted
- Are there signs/symptoms that may predict presence of ICA injury
- Which patients require admission/observation
- What are appropriate screening radiology tests

Historical Context

- Varnuil 1872
  - First reported case of minor soft palate injury with neurologic sequela
- Caldwell 1936
  - 16y/o boy fell onto hedge
  - Penetrating palate wond
  - Contralateral hemiplegia
  - Coma and died on 6th hospital day

Historical Context

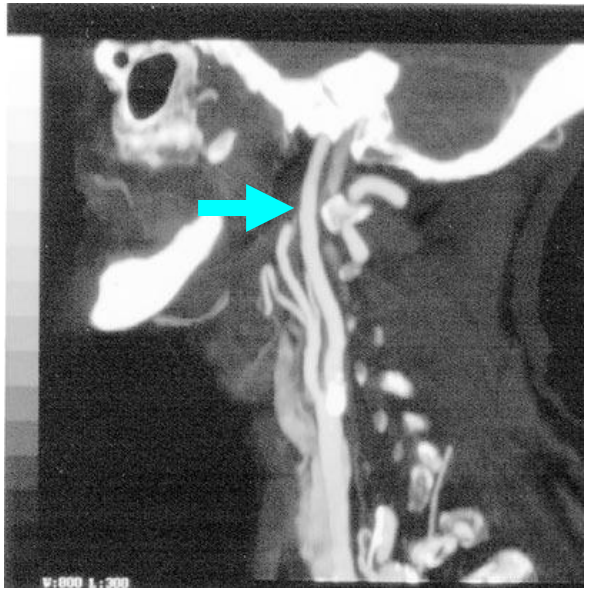
- Braudo 1956
  - 3 patients with hemiplegia and other deficits after soft palate injury
- Bickerstaff 1964- Coined term “Pencil Injury”
- 20-30 additional case reports
- Internal Carotid Artery injury is a rare complication
  - Thrombus, Dissection, Hematoma

Case Reports

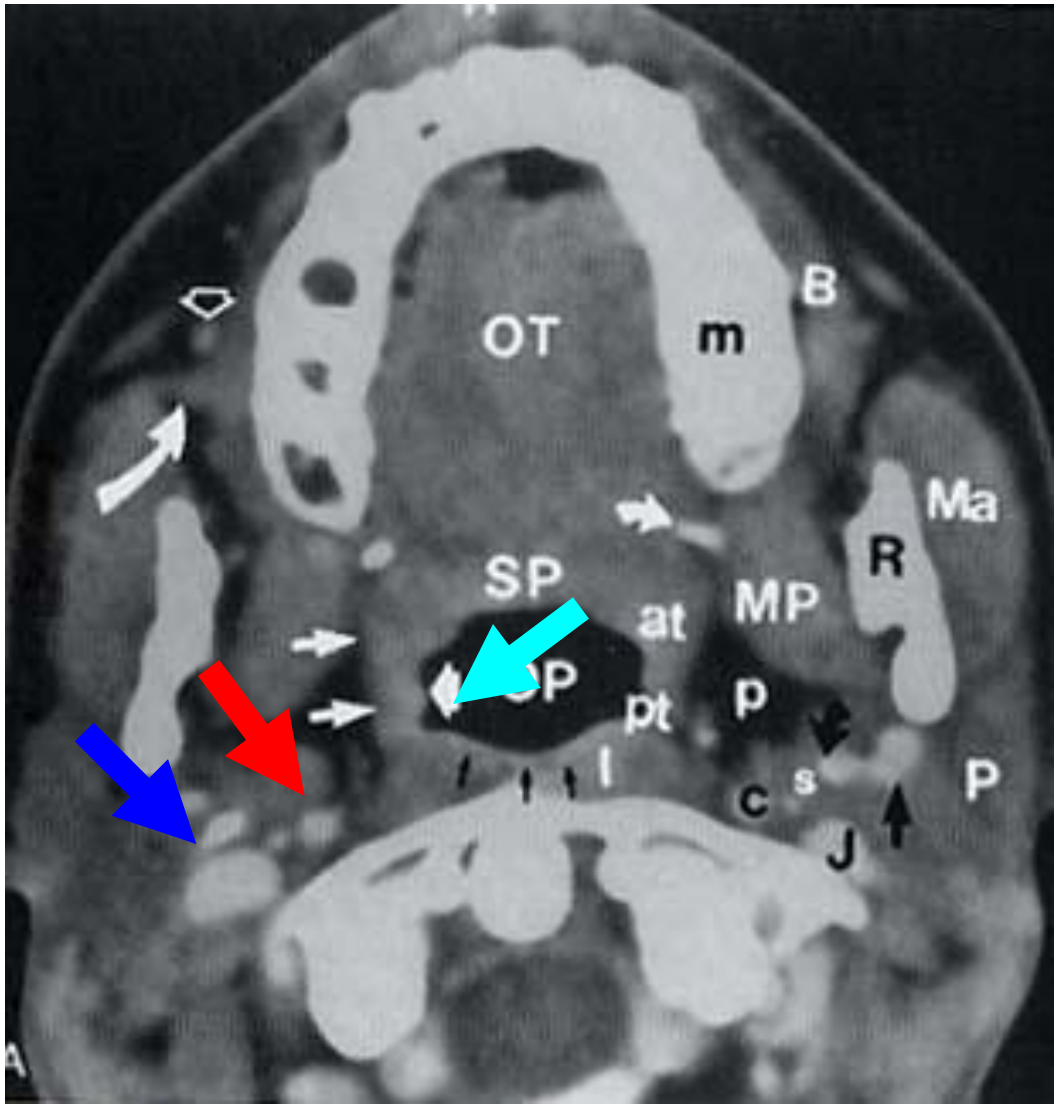
- All injuries involved the lateral palate
  - Grade 1, 2,3
- Most patients had a ”lucid period”
  - 3-60 hours with no neuro symptoms
  - Immediate neuro symptoms are very rare
  - Most do not develop symptoms for over 24 hours

Neurologic Deficits

- Carotid sheath
  - Close proximity to Tonsil/Palate
- ICA compressed
  - Compresion between object and transverse process of C2/3
- Intimal Tear of ICA
  - Mural Thrombus formation
    - Occlusion of Lumen
    - Distal Propogation



Cross Section Anatomy



Neurologic Deficits

- ICA Thrombosis
  - Typically Asymptomatic
  - If symtoms present, they usually resolve completely
- Circle of Willis
  - Adequate contralateral circulation

Neurologic Deficits

- Distal Propagation of thrombus
- ”Lucid Interval”
- Most affected artery: MCA
  - Infarction of cerebral hemisphere
  - Mortality rate of 30-40%
  - Surgical exploration and/or anticoagulation did not improve neurologic status

Neurologic Deficits

- Contralateral hemiplegia
- Homonymous hemianopsia
- Aphasia
  - If dominant side affected
- Rare
  - Expanding Neck hematoma
  - Cervical Bruit
  - Horner's Syndrome

Homonymous Hemianopsia

Horner's Syndrome

Recent Case Reports

- Borges et al. 2000
  - 2 pediatric cases of ICA thrombosis
- Pierrot et al. 2006
  - 2 Pediatric cases of carotid dissection
    - 1 case had symptomatic cerebral ischemia
    - CTA followed by MRA
    - Anticoagulation
    - Rec CTA for lateral palate injury with MRA if positive

Large Retrospective Series

- Trauma to the Oropharynx
  - Radkowski et al. 1993
    - 23 cases over 9 years
  - Hellman et al. 1993
    - 131 cases over 17 years
  - Schoem et al. 1997
    - 26 cases over 8 years
  - Ratcliff et al. 2003
    - 48 cases over 5 years
  - Brietzke et al. 2005
    - 23 cases over 7 years

Large Retrospective Series

- TOTAL = 251 Cases
- No neurologic Sequela
- No cases of ICA Thrombosis

Large Retrospective Series

- Mean age was 3.5y/o
- Age range Newborn to 16y/o
- Male to Female 1.5:1 to 5.5:1
- Location of Injury
  - Lateral Oropharynx 70%-81%
  - Most common site
    - Left Soft Palate(53%)
    - May be due R handedness

Large Retrospective Series

- Penetrating Objects
  - #1 Wooden stick
  - Pen/Pencil
  - Plastic Toy
  - Toothbrush
  - Metal Pipe
  - Straw
  - Eating Utensil
  - Flute
  - Bicycle Handlebar
  - Baton
  - Ruler
  - GSW
  - Unknown

Large Retrospective Series

- General anesthesia with debridement and surgical closure:
  - 52% Radowski et al. 1993
    - 2/12 patients had ICA exposure
  - 18% Hellman et al.1993
  - 8% Schoem et al. 1997
    - 2 cases of open neck for vessel exposure due to FB
  - 6% Ratcliff et al. 2003
    - 1 case if open neck for vessel exposure due to FB
  - 4% Brietzke, Jones 2005
    - 3 other OR cases: Impaled FB, removal of partially avulsed tonsil, MLB

Large Retrospective Series

- Length of Hospitalization
  - 12 hours to 18 days
  - 54% stayed <24 hours
  - 78% stayed <48 hours
  - Reasons for extended stay (>48 hours)
    - Poor PO intake
    - Cellulitis
    - Pneumomediastinum
      - Extended free air into parapharyngeal/retropharyngeal space

Large Retrospective Series

- Prophylactic Antibiotics
  - Antibiotics used in 88% of cases
  - 85% received IV abx followed by oral
  - PCN or 1st Gen Cephalasporin

Series Management Protocols

- Hengerer et al. 1984. U of Rochester
  - Any patient with lateral palate of peritonsillar wound should be admitted
  - Observe closely for 48 hours, even with no neurologic findings
  - Frequent Doppler studies
    - Goal to document injury prior to symtoms
    - If Doppler changes occur, immeidiate angiogram

Series Management Protocols

- Radkowski et al. 1993
- Hellmann et al. 1993
- Schoem et al. 1997
  - Hospitalization for all children is neither practical or clilnically warrented
  - Admission for 24 hours creates false sense of security
  - Give similar instructions for minor head trauma
  - Emphasize close parental observation for 3 days

Series Management Protocols

- Return to ED immediately if:
  - Drowsiness
  - Irritability
  - Confused Speech
  - N/V
  - Arm/Leg Weakness
  - Headache
  - Seizures
  - Blurred Vision
  - Neck Swelling

Series Management Protocols

- Admit for Observation if:
  - Less than 1 y/o
  - Mentally handicapped
  - Unreliable home situation
  - Palate repair performed

Radowski et al 1993, Hellman et al 1993, Schoem et al 1997

Series Management Protocols

- Antibiotic use empirically recommended
- Most soft Palate injuries heal without repair
  - Even large gapping through and through
  - Great blood supply and healing
- Reserve Surgery for:
  - Large avulsive flap
  - Need to explore for retained FB

Radowski et al 1993, Hellman et al 1993, Schoem et al 1997

Questions to Consider

- When does oropharyngeal laceration usually heal without intervention?
  - Within a few days
  - Over 90% require no surgery
- When are prophylactic Abx warranted?
  - Pretty much anytime there is a mucosal laceration

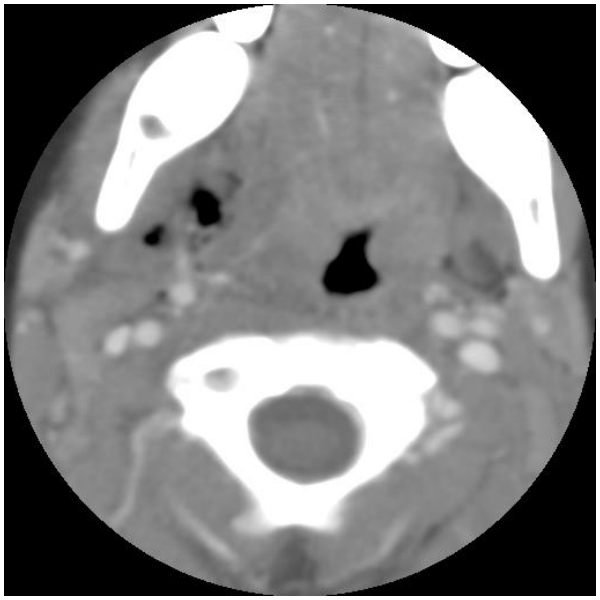
Questions to Consider

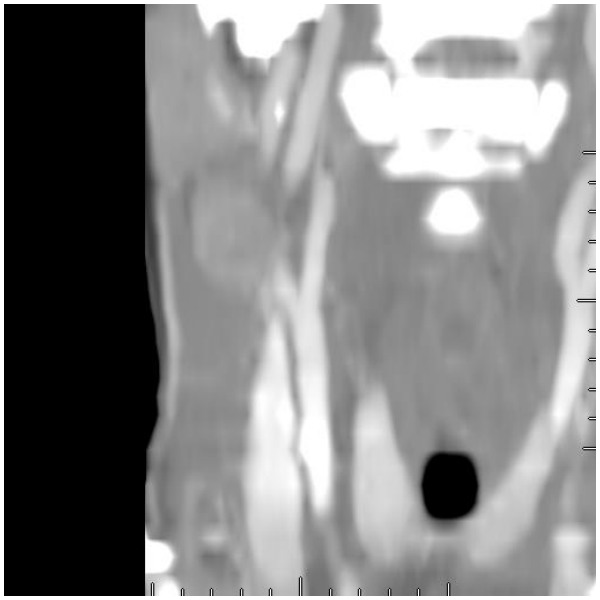
- Are there and presenting signs or symptoms that may predict presence of ICA injury?
  - NO
- Which patients require admission, and for how long?
  - Palate repair
  - < 1 y/o
  - Mentally handicapped
  - Unreliable
  - Observe for 48-72 hours

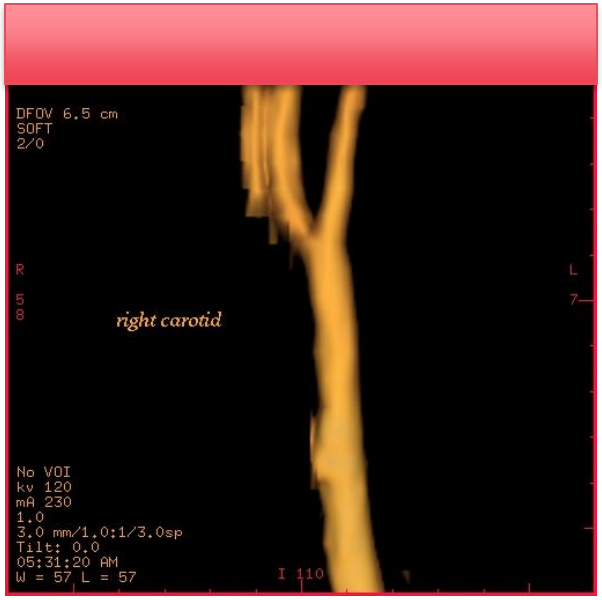
Questions to Consider

- What are the appropriate screening radiology tests?
  - None (Radkowski 1993, Hellmann 1993)
  - Lateral neck XR(Schoem 1997
  - US Hengerer 1984
  - CT with Contrast Radcliff 2003, Brietzke/Jones 2005
  - CTA
  - MRA
  - Angiography

CASES



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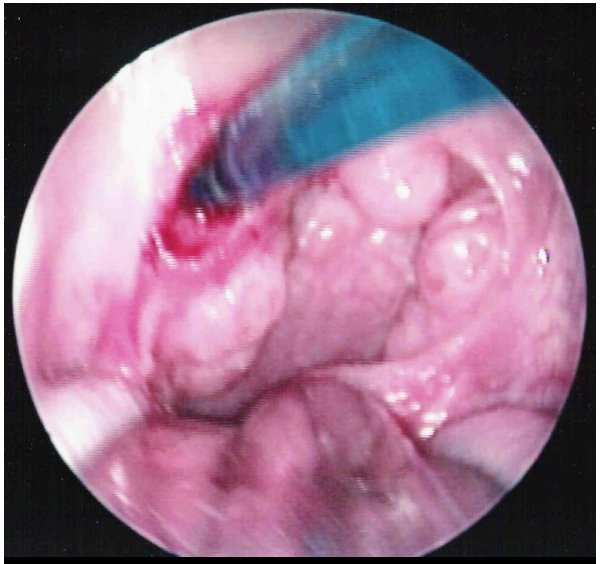
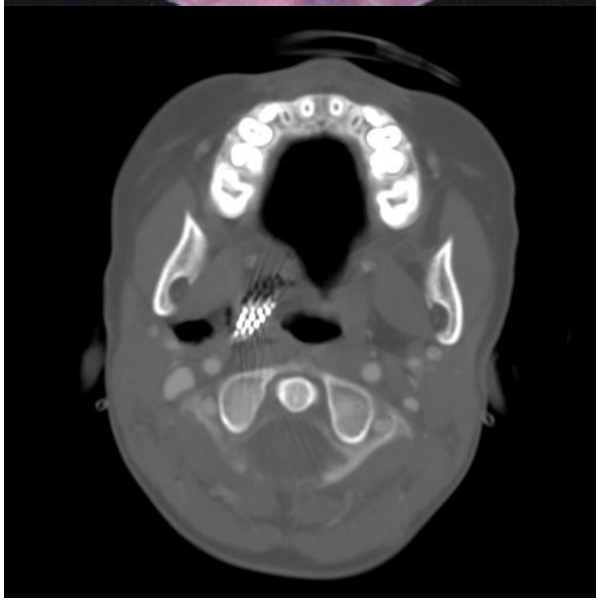
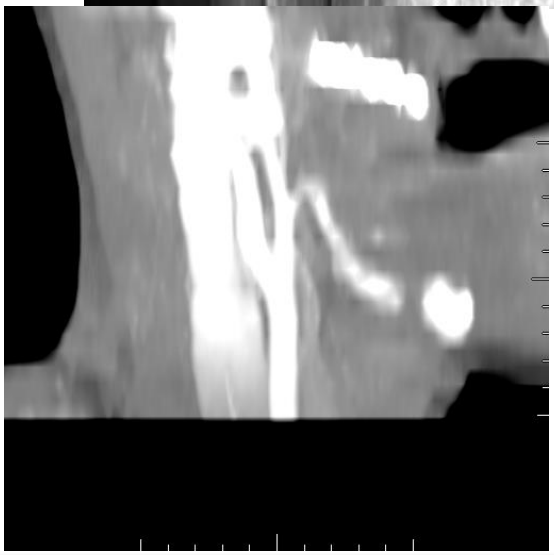
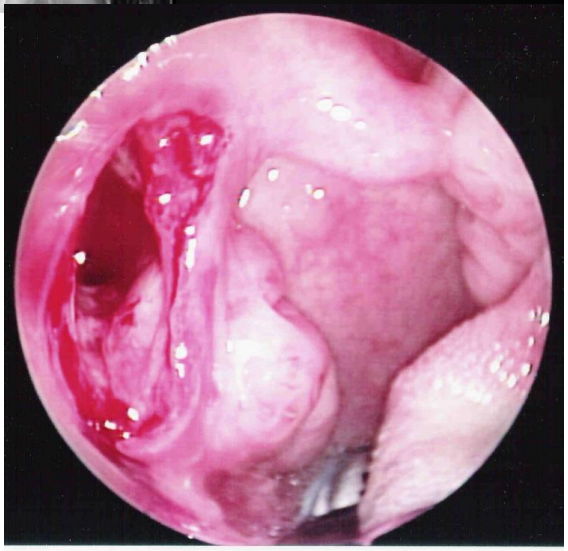
CASES









Summary

- Over 90% of Oropharyngeal laceration heal within a couple days without intervention
  - Indications for OR
    - Grade 3 wounds
    - Hemostasis
    - Airway concerns
    - FB Removal
    - Exploration when awake exam unable to be completed
- Prophylactic Antibiotics
  - Consider standardizing management
  - Give to any patient with mucosal penetration (grade 2 or 3)

Summary

- Most patients do not need admission
  - ICA injury is rare
  - Neurologic sequela are rare (0/251 cases)
  - Isolated cases are reported
  - Lucid interval may last for up to 3-5 days, so overnight observation has limited benefit
  - ADMIT IF
    - Neurologic changes
    - Unreliable Patient/Home situation
    - Need for OR

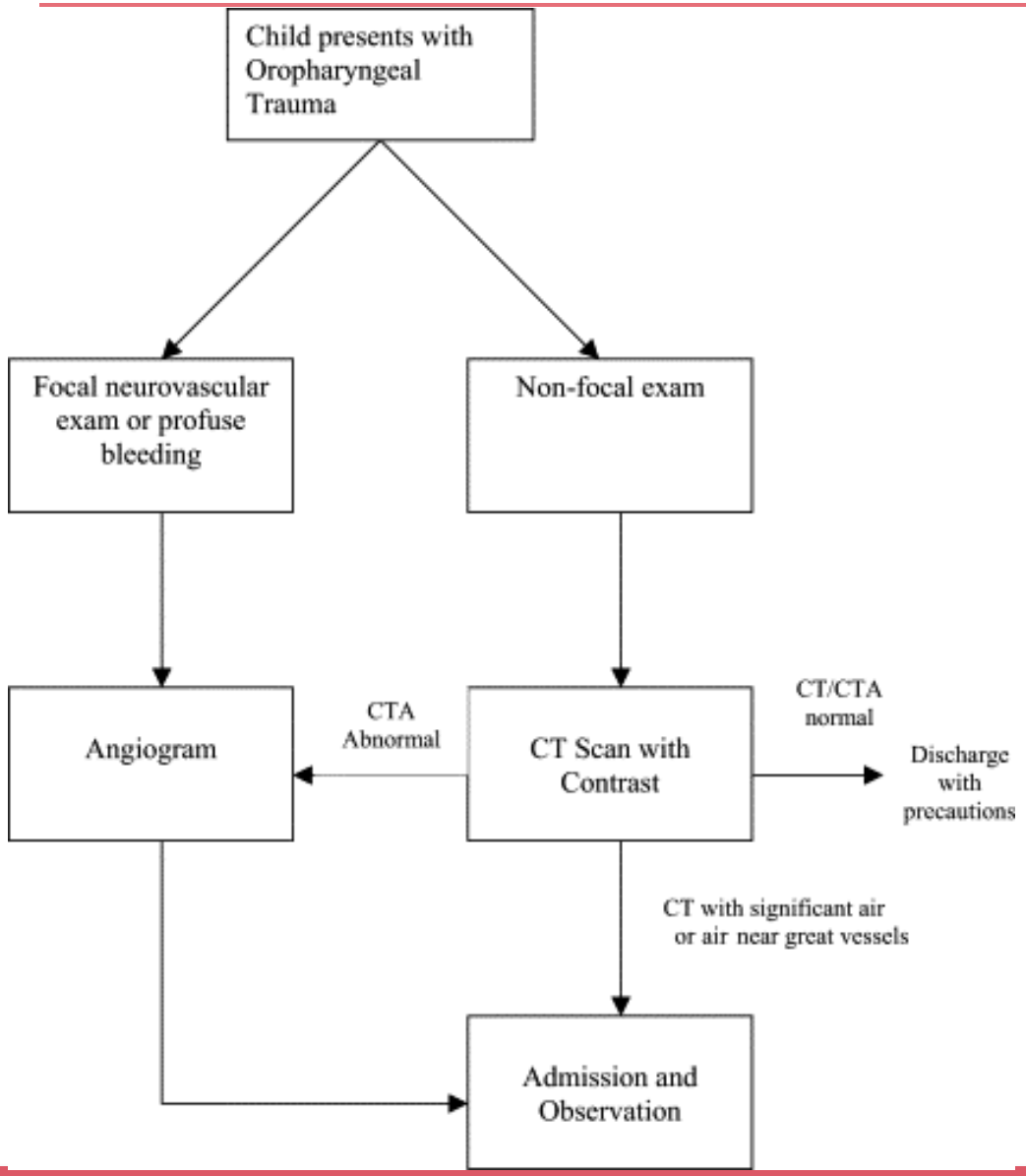
Summary

- Except for rare case of embedded FB, severity or appearance of wound should not influence decision for imaging
  - ICA thrombus can occur even with grade 1(no tear of mucosa)

Summary

- There is no consensus on which screening radiology test, if any, is routinely warranted
- Choices
  - Best option is CT with contrast
    - Recommend if injury places ICA at risk
    - All lateral palate/peritonsillar injuries
    - Not indicated for midline injury
  - Formal Angiography
    - CT imaging suspicious for ICA injury
    - Neurologic changes

Summary



Pediaitric Oropharyngeal Trauma Algorithm

Brietzke SE, Jones DT; intl J Ped Oto 2005

Steven R Dyer, D.O.

- Email: srdyer@saintfrancis.com
- Cell: 918-230-3127
- Office: 918-502-9555