Real Life Stories of the Pediatric ED

Children's Hospital Colorado

Affiliated with University of Colorado Anschutz Medical Campus School of Medicine

Kelley Roswell, MD
Associate Professor Pediatrics
University of Colorado SOM
Children's Hospital Colorado

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Financial Disclosures

- No relevant financial relationships with any commercial interests.

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Objectives

- Discuss a case of altered mental status and respiratory distress
- Discuss differential diagnosis of abdominal pain
- Discuss acute fracture management
- Discuss options for acute laceration management
- Review differential of chest pain
- Make it through “shift” w/out anything too bad happening

* Talk about some interesting cases and answer some awesome questions!

06:45

- 06:45--911 Call:
  - "Seizure"
- 0655 – At scene:
  - 14 y/o male, noted to be seizing, received IM benzo
  - VS: HR=120 RR=26 Pox= 60% during post-ictal stage, now on NRB
  - What else do you want to know?
- What else do you do prior to transport?

07:00

Start my shift

- 30 patients currently in Emergency Department
- Waiting room: 14 patients (longest wait 130 min)
- Transfer/Expected: 9 patients

- Ambulance 20 minutes out coming from scene:
  - 14 y/o male with seizures, on oxygen

07:20
Ambulance to Room 1

- 14yo M with h/o epilepsy on keppra, recent admissions x2 for breakthrough seizures found to have concurrent pneumonias on both occasions, who is BIBA after 9min GTC sz after arrival at school. He was actively seizing when EMS arrived and gave 5mg IM versed, sz broke and has been post-ictal. Unclear if head strike per EMS, but noted at scene to have +blood in nares and oropharynx. Initial sats in the field 60% w/ cyanosis, required 15L by mask to bring sats to 90% en route. BGL 120

Room 1: Seizure

HR: 138 RR: 28 BP: 120/71 Pulse Ox=92% on NRB

- Airway: sitting up, noted pink, frothy secretions from mouth, intermittent productive coughing, no laceration or injury noted
- Breathing: intermittent grunting with increased WOB, lungs with diminished breaths sounds, crackles.
- Cardiac: S1 S2 Tachycardic, no m/r/g,
- Disability: sleepy and appears post-ictal, answers questions, sleeping and opens eyes to voice, MAES. Pupils reactive (received benzo). GCS 14
- Exposure: No rashes, bruising, abrasions.

Room 1: Seizure

- TMs clear, no hemotympanum
- Abdomen soft, no mass, no liver edge noted
- No abrasions or hematoma to head.

Room 1: Seizure

- During initial exam, patient's grunting worsens and oxygen saturations drop to the mid 70s.

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What do you want to do?

Room 1: Seizure

- During initial exam, patient's grunting worsens and oxygen saturations drop to the mid 70s.

REASSESS

Room 1: Seizure

- Airway: Sitting up. Frothy secretions, teeth clenched but easily opens with manipulation.
- Breathing with grunting respirations with increased WOB, lungs with diminished breath sounds
- No seizure activity

Room 1: Seizure

- BMV initiated with anesthesia bag and CPAP required to bring saturations up to 90s.
- Suction performed with frothy pink secretions.
- Shoulder roll placed
- Breathing pattern improved with continued diminished lung sounds
- Patient placed on Heated High Flow via Nasal Cannula (HHFNC) with improvement
- RPP obtained and patient off to x-ray for CXR

0830: Room 10: Finger injury

- 15 y/o patient brought down from the NSC with left sided finger injury after his finger became stuck in a door. Occurred just prior to arrival. Finger was wrapped and patient brought to the ED for further management. IMM UTD. He is right handed.

Room 10: Finger Injury

HR: 85 RR: 18 BP: 105/71 Pulse ox: 98% RA

- Awake Alert, NAD
- HEENT: NC/AT
- Lungs: clear breath sounds bilaterally.
- Heart: Nl S1 S2, no m/r/g,
- Abd: ND. Soft. NTTP throughout with no guarding.
- Ext: **Noted injury to left distal middle finger with laceration, nailbed involvement and deformity.**
- Skin: **Open laceration to base of nail to left middle finger, oozing blood. + subungual hematoma – 100%**
- Neuro: intact, no focal deficit, CN 3-12 intact.

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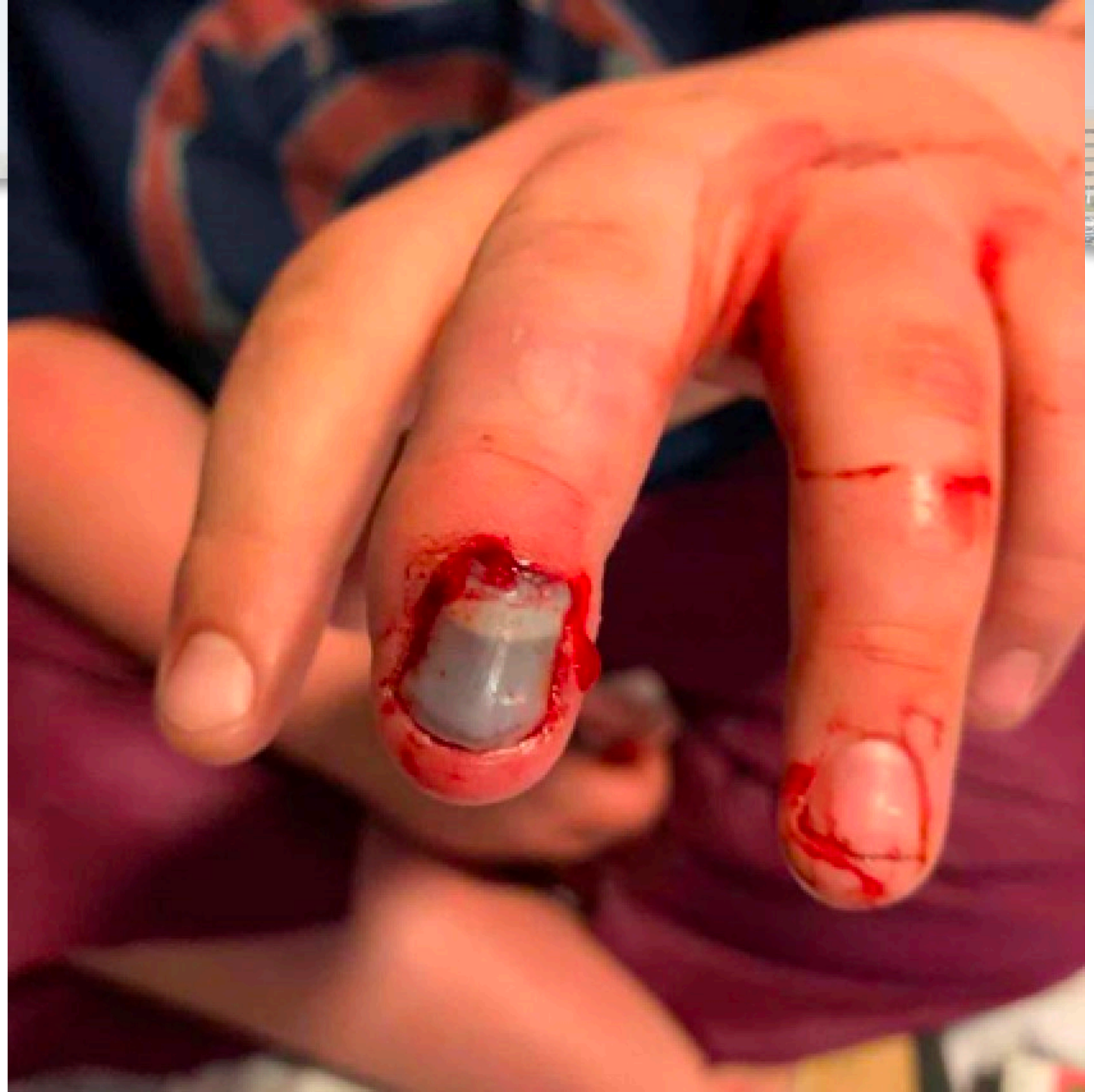

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What do you want to do?

Rm 10: Finger Injury

- Pain Control
- Imaging
  - X-ray hand ordered

Room 1: Seizure

- Back from x-ray
- TP is more awake, continues to have episodes of grunting respirations with occasional desaturations to the upper 80s.

- Patient reports he has been compliant with 13/14 keppra doses over the last week, missed x1 PM dose a few nights ago. He denies preceding infectious symptoms (fever, cough, congestion, vomiting, diarrhea), HA, urinary symptoms, poor appetite. Reports he had felt tired the last 3 days, perhaps stress related (school was closed yesterday 2/2 bomb threat).

Room 1: “seizure”

- TP continues to have episodes of grunting respirations with occasional desaturations to the upper 80s.
- On RA challenge – patient drops to the 70s within seconds
- CXR uploads

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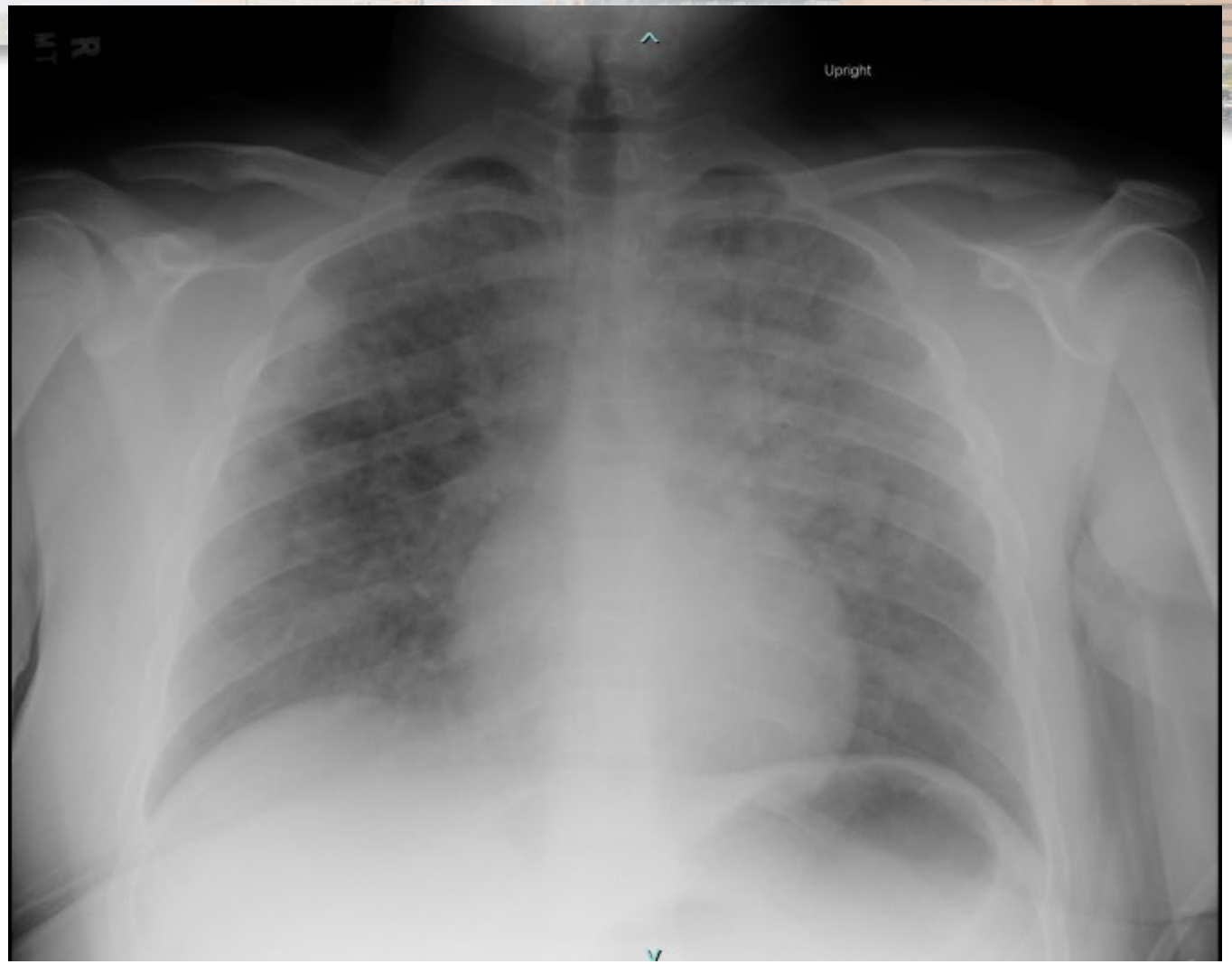

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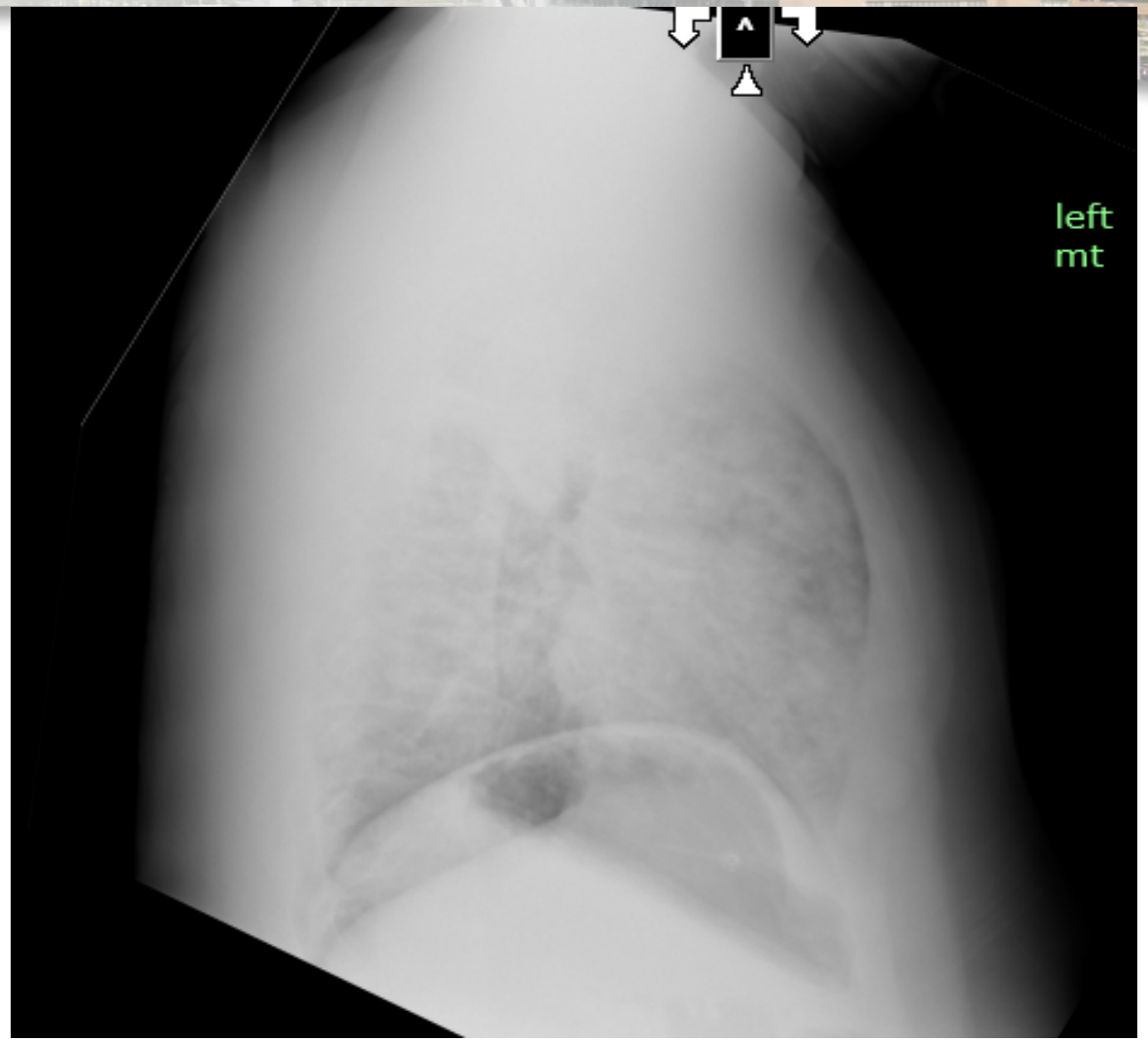

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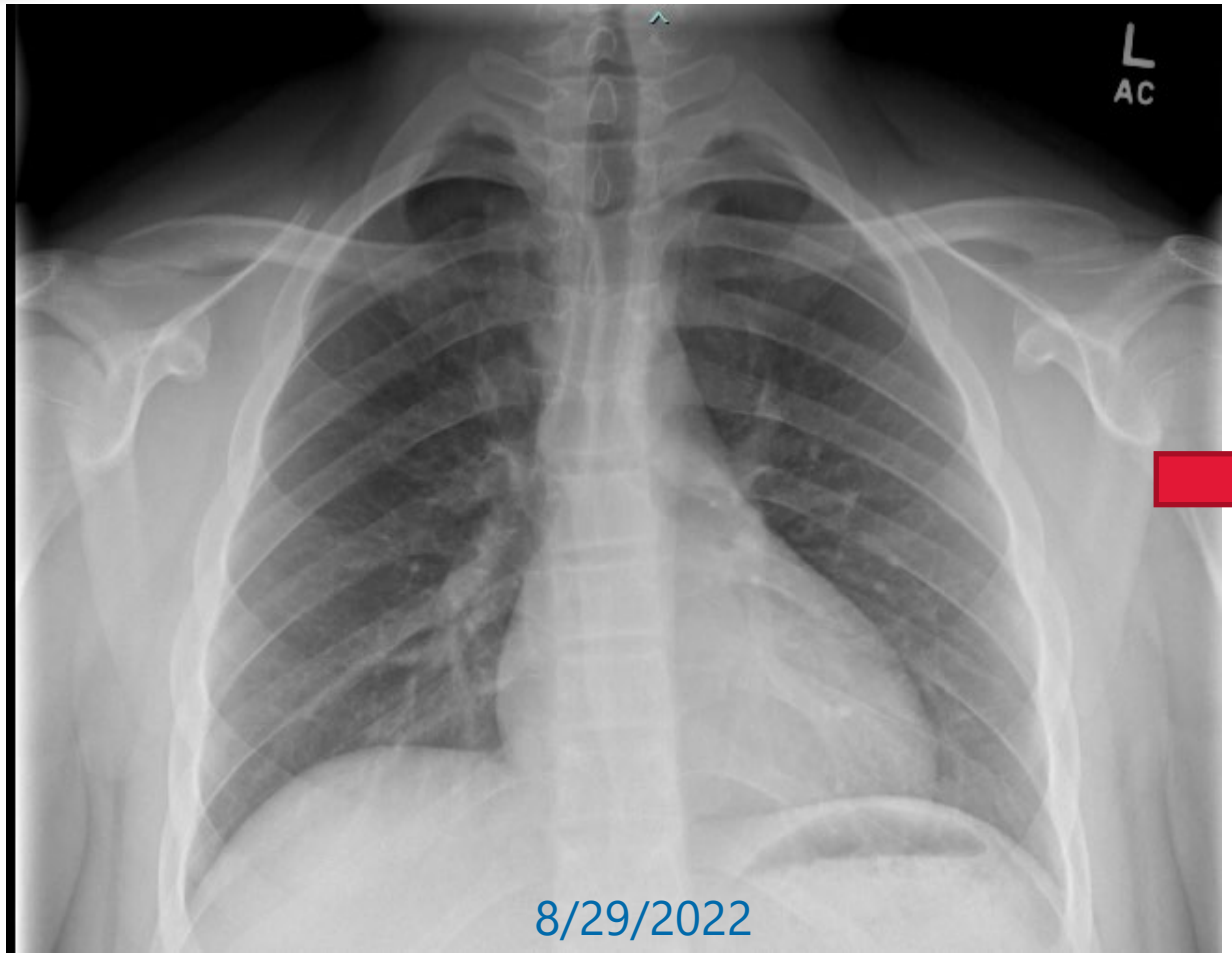

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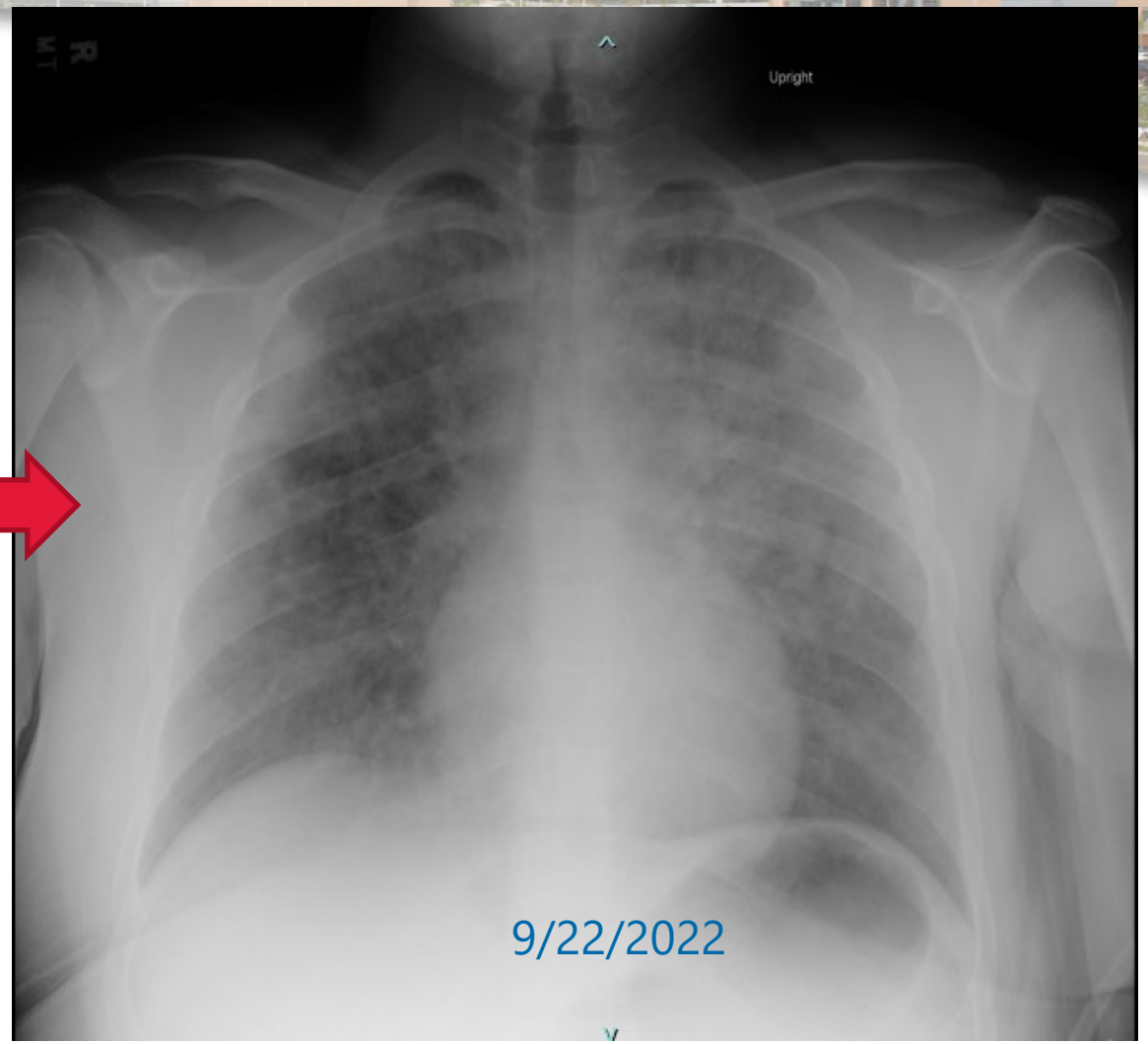

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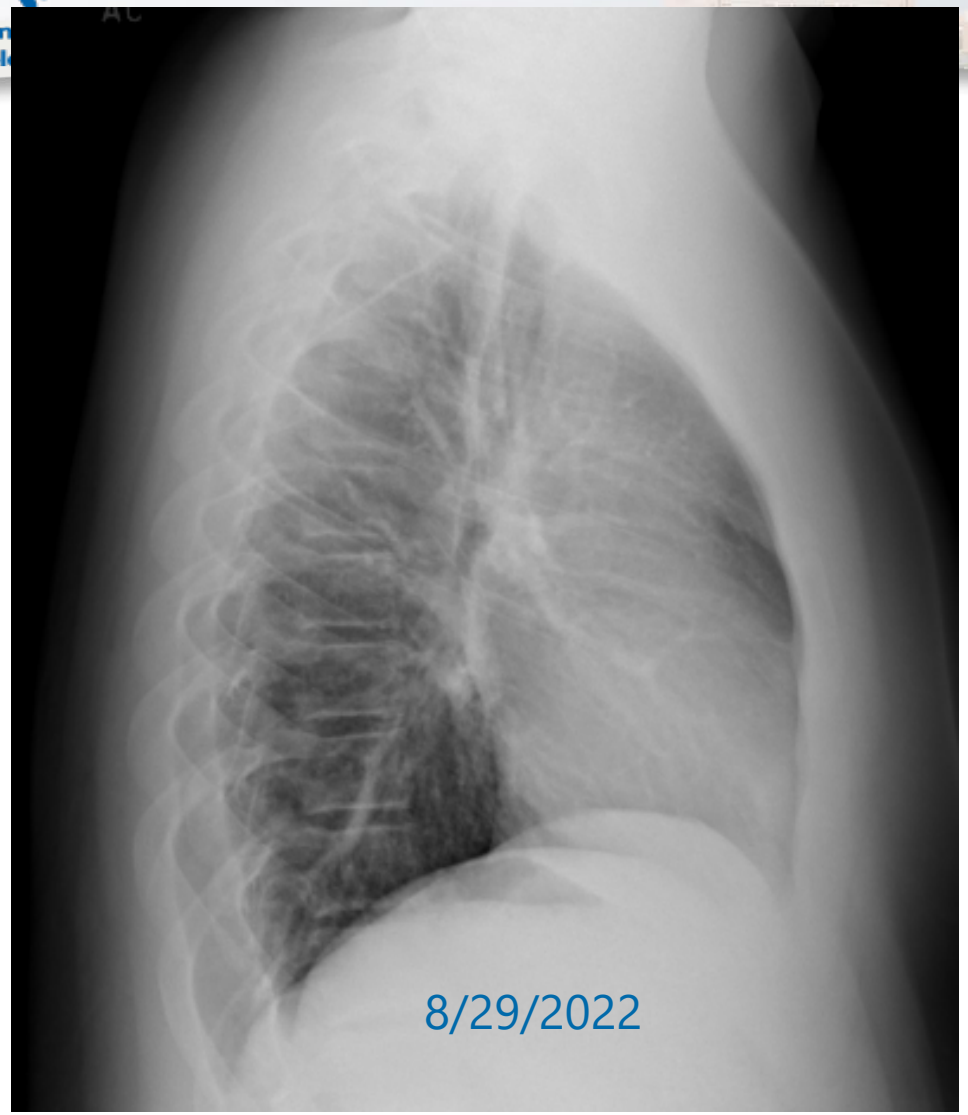
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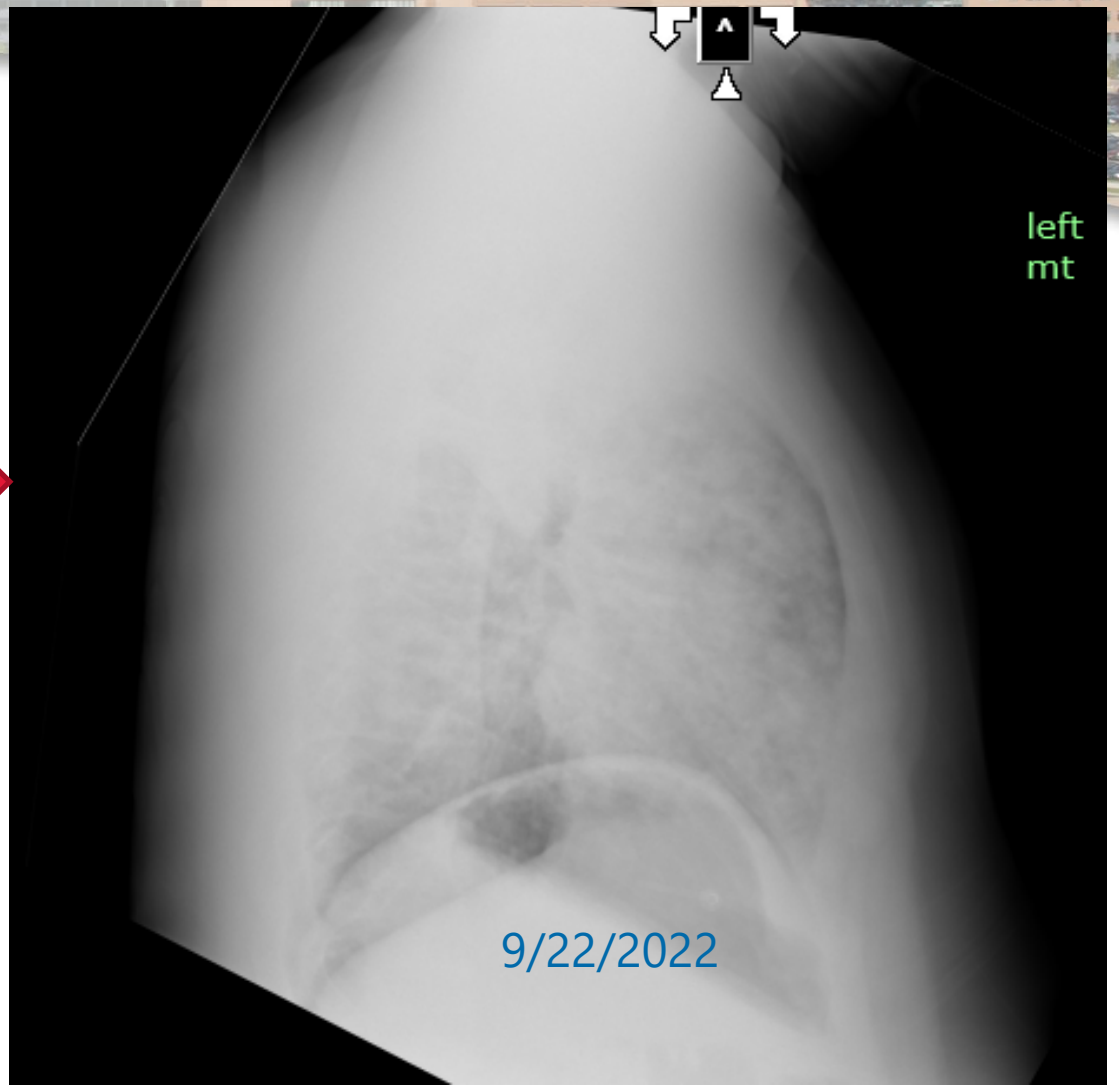
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What do you think is going on and what do you want to do?

Room 1: “seizure”

- Patient placed on BiPAP
- Neurology consulted
  - Presentation is consistent with Neurogenic Pulmonary Edema

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Neurogenic Pulmonary Edema (NPE)

- **Increase in pulmonary interstitial and alveolar fluid** that is due to an acute central nervous system injury
- Neurologic conditions that cause abrupt, rapid, and extreme elevation in intracranial pressure (ICP) appear to be at greatest risk of being associated with NPE (SAH, spinal cord injury, ?seizure)
- Elevated ICP levels correlate with increased levels of extravascular lung water
- The abrupt increase in ICP leading to neuronal compression, ischemia or damage is believed to give rise to an intense activation of the sympathetic nervous system and the release of catecholamines leads to Pulmonary Edema
- Possible direct myocardial injury leads to Pulmonary Edema
- NPE is often classified as a form of the acute respiratory distress syndrome (ARDS), but its pathophysiology and prognosis are different.

Room 1: “seizure”

- Patient placed on BiPAP
- Neurology consulted
  - Presentation is consistent with Neurogenic Pulmonary Edema
- Plan to admit to PICU on BiPAP

Rm 1: Neurogenic Pulmonary Edema
Hospital stay

- Escalated to AVAPS and weaned to NC within 24 hours
- RA and discharge home around 48 hours after presentation
- RPP negative
- TTE normal
- EEG normal
- CXR prior to discharge

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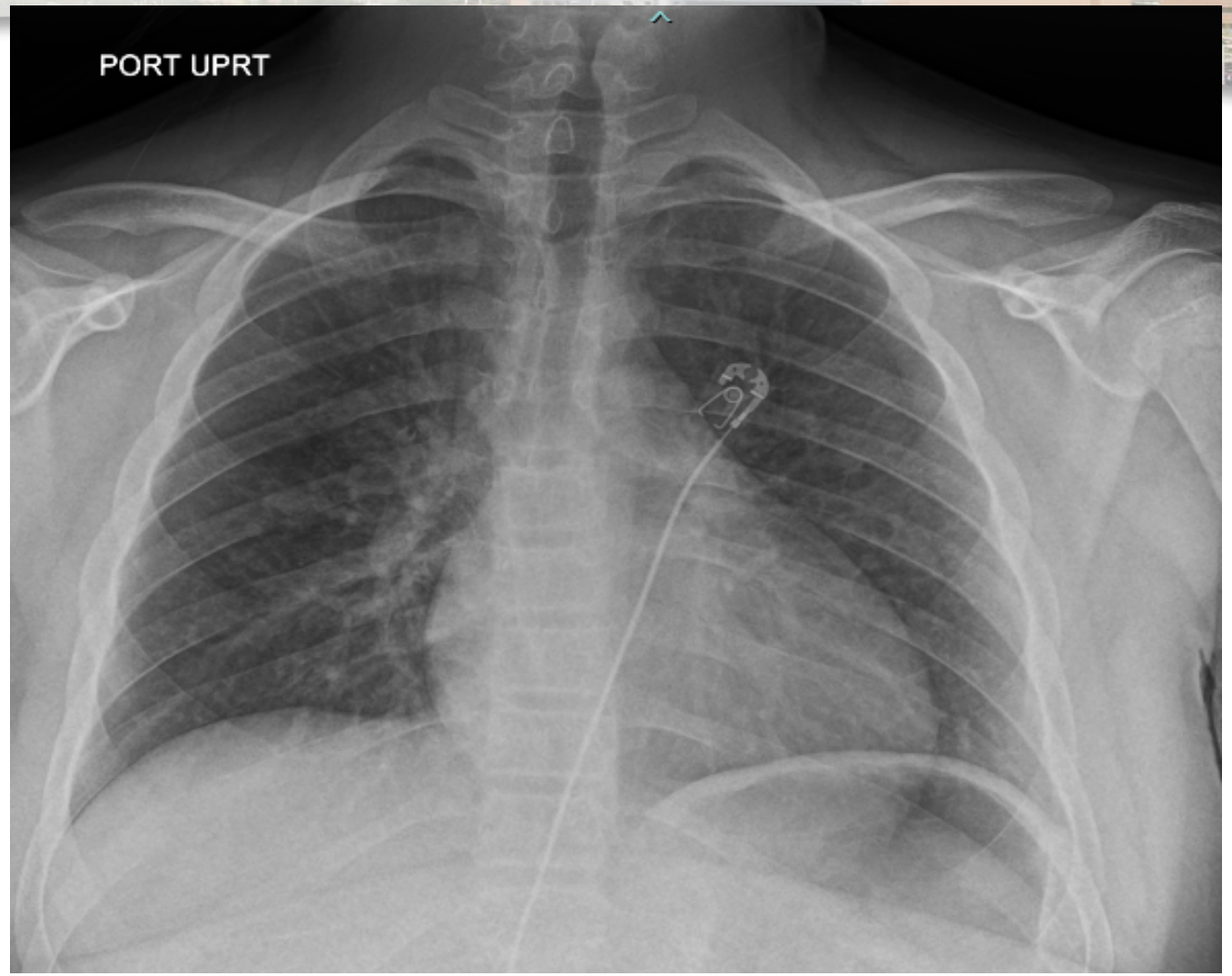

0945: RM 26: “fatigue and belly pain”

DD is an 8-year-old male with complex past medical history including but not limited to global developmental delay, G-tube placement, mitrofanoff placement, acute cystitis, seizure disorder who presents with fatigue and concerns for abdominal pain. Per mom, patient was more tired yesterday evening and was whining in his sleep, which happens when he has belly pain. At baseline, DD is running around the house playing with cats, and yesterday evening spent most of the night lying on the couch and whining. Today, patient continues to just lie around. On review of systems, patient also repeatedly grabbing toward his penis, which only happened previously with episode of acute cystitis. Patient without associated fever, nausea/vomiting/diarrhea, rash, recent falls or trauma. Sometimes requires enemas for stools, but stooling soft stools over past few days

Rm 26: “fatigue and belly pain”

- T: 37 HR: 137 RR: 20 BP: 107/65 O2 sats: 95% RA
- Gen: Awake, alert,
- HEENT: Normocephalic. Nose normal. OP clear, MMM.
- CV: Rate and Rhythm: Regular rhythm. Tachycardia present.
- Resp: Tachypneic likely due to pain. Normal breath sounds.
- Abd: ND. TTP **to deep palpation in suprapubic abdomen**. No guarding or rebound. G-tube in place without associated erythema or drainage.
- GU: Mitrofanoff in place, leaking small amount of urine. Normal penis, testes and scrotum.
- Skin: warm, CR < 2 seconds
- Neuro: no noted abnormalities

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What do you think is going on and what do you want to do?

Differential Diagnosis Abdominal Pain

- 0-60 days
  - Reflux
  - Obstruction
    - Pyloric Stenosis
    - Volvulus/Malrotation
    - Duodenal atresia
    - Hernia
  - Infection
    - UTI
    - AGE
    - URI
- 60 days – 3 y/o
  - Intussusception
  - Constipation
  - Appendicitis
  - DKA
  - Ingestion
  - Infection
    - UTI
    - AGE
    - URI

Differential Diagnosis Abdominal Pain

- 3-12 y/o
  - Constipation* →
  - Appendicitis* →
  - DKA* →
  - Hepatitis* →
  - Ingestion
  - Infection
    - UTI
    - AGE
    - URI

- 12 y/o +
  - Infection
    - UTI
    - AGE
    - URI
    - STI (PID)
  - Torsion/cysts
  - Pregnancy
  - Gastritis
  - Reflux
  - Pancreatitis
  - Gallbladder

Room 26: Fatigue and pain

- Obtain UA
- Pain control with tylenol
- Reassess and treat as indicated

10:15 Patient Updates:

- RM 1 – NPE
  - admitted to PICU
- RM10 – finger injury
  - Pain improved s/p NSAIDs
  - Hand x–ray returns

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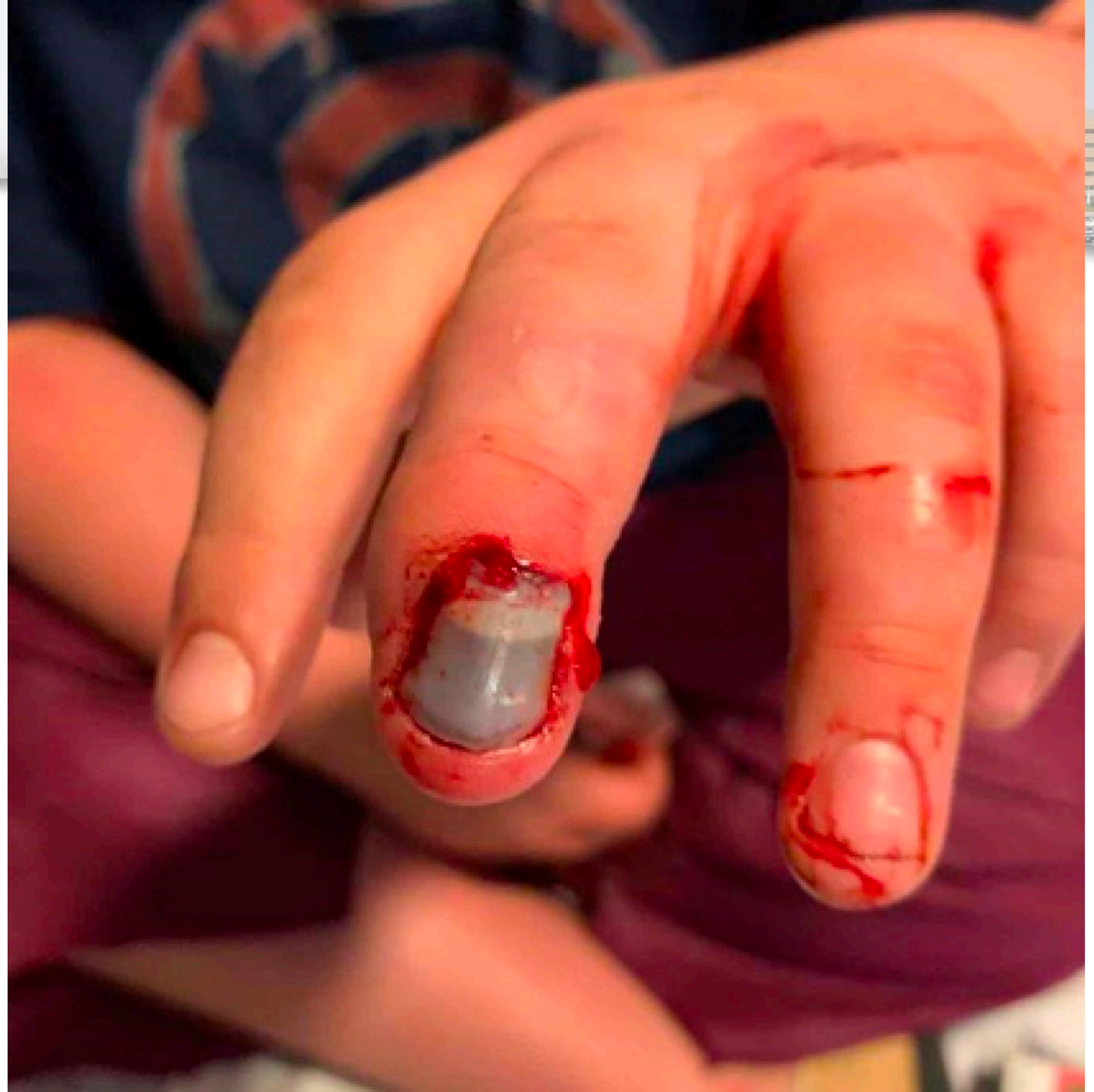

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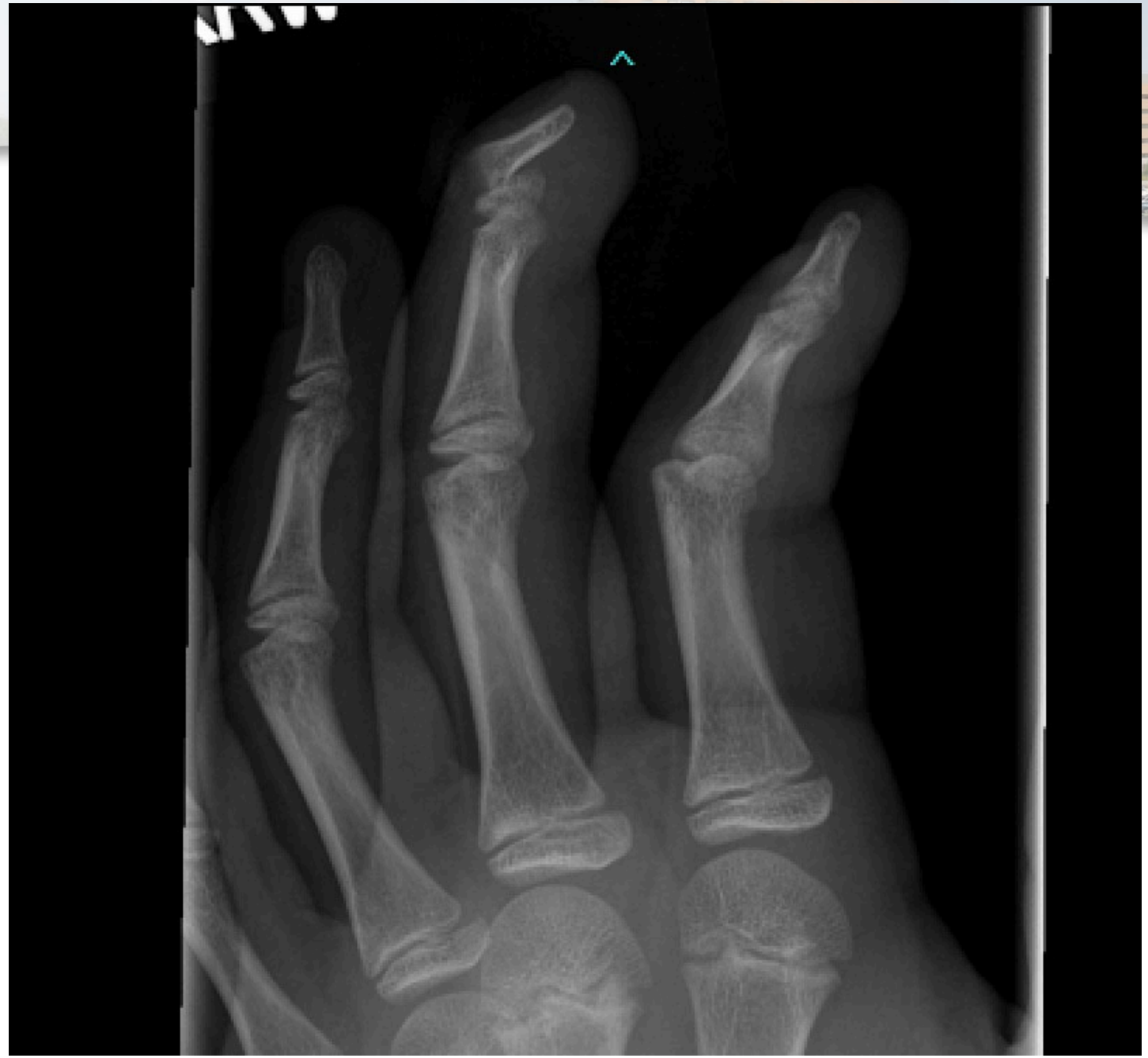
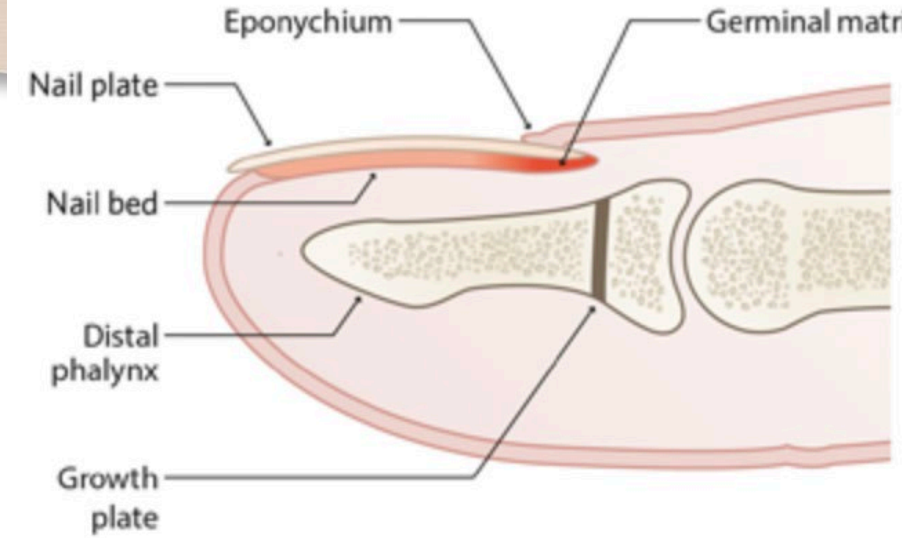
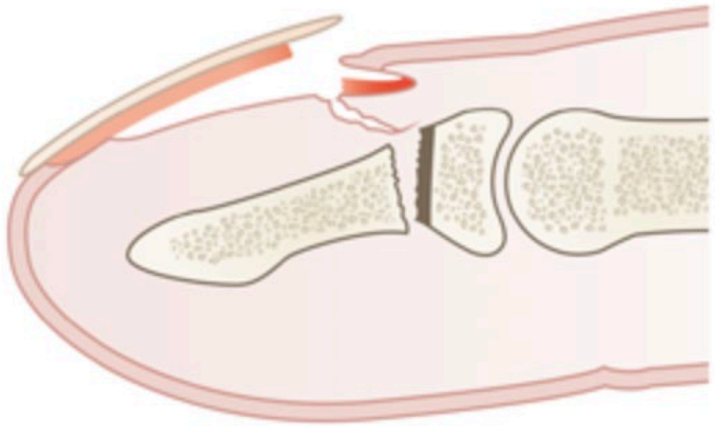


Rm 10: Seymour Fracture

- Displaced distal phalangeal physis fracture with dislocation of the base of the nail plate
- Seymour fractures may lead to complications such as osteomyelitis, physeal growth alterations, and/or nail aesthetic sequelae/dystrophy
- 83% of patients needed surgical management with pinning



Seymour fracture



Seymour Fracture ED management

- Nail must be removed
- Laceration must be repaired
- Fracture needs to be reduced
- Antibiotics
- Can replace the nail
  - Foil nail substitute

Room 10 – finger injury

- Call Orthopedics for further recommendations
- Prepare for nailbed removal and laceration repair
  - Digital block

11:00
Halfway mark of my shift

- 39 patients currently in Emergency Department
- Waiting room: 18 patients (longest wait 120 min)
- Transfer/Expected: 2 patients

- 4 admissions waiting for rooms:
  - 2 patients on continuous albuterol s/p Mg, + EV
  - 1 appendicitis awaiting transfer to OR
  - 1 infant fever r/o sepsis

11:15 Discharge time:

- Room 13: *5 y.o. w/abd pain*
  - Enema give with good results
  - Repeat exam: Pt running around room eating Taki's and drinking Mnt Dew
  - D/c home with instructions for diet change and Miralax
  - (house keeping called as bathroom now out of service)
- Room 19: *Hit head against headboard*
  - Head lac irrigated after LET on for 30 min
  - Scalp lac closed with 6 staples
  - D/c home with head injury instructions and staples out in 5 days
- Room 33: *Fever, cough, congestion*
  - 4 patients with fever (age 8 mo, 3 yr, 7yr, and 28yr)
    - 8 month old female→ shared decision making with MOC and will f/u with PCP in 2days for urine
    - Fluvid test per MOC's request
    - D/c home

1130: Rm 34: “Cut to lip”

- KC is a 11 year old male with hx of asthma coming in with lip/face laceration. He was climbing a fence and fell face first onto metal pole. No LOC or vomiting. No vision changes, dyspnea, sob, neck pain. No other bodily pain. Due for tetanus at 12 yr checkup.

Rm 34: “Cut to lip”

- BP 127/74 | Temp 98.2 | Resp 20 | HR: 113 | SpO2 96%
- General: He is alert and not in acute distress.
- HEENT: head NC/AT. No signs of hematoma or injury. Eyes and nose normal without signs of injury, EOMI and no septal hematoma.

  No midface instability. No oral trauma, jaw malocclusion or trismus. No oral trauma. No jaw malocclusion or trismus. No dental fractures. Complex lip laceration extending through left upper lip and orbicularis oris down past the angle of the mouth.
- Pulm: lungs CTAB
- CV: RRR, nl S1, S2, no m/r/g.
- Abd: ND. Soft NTTP.
- Ext: no deformities. No injuries

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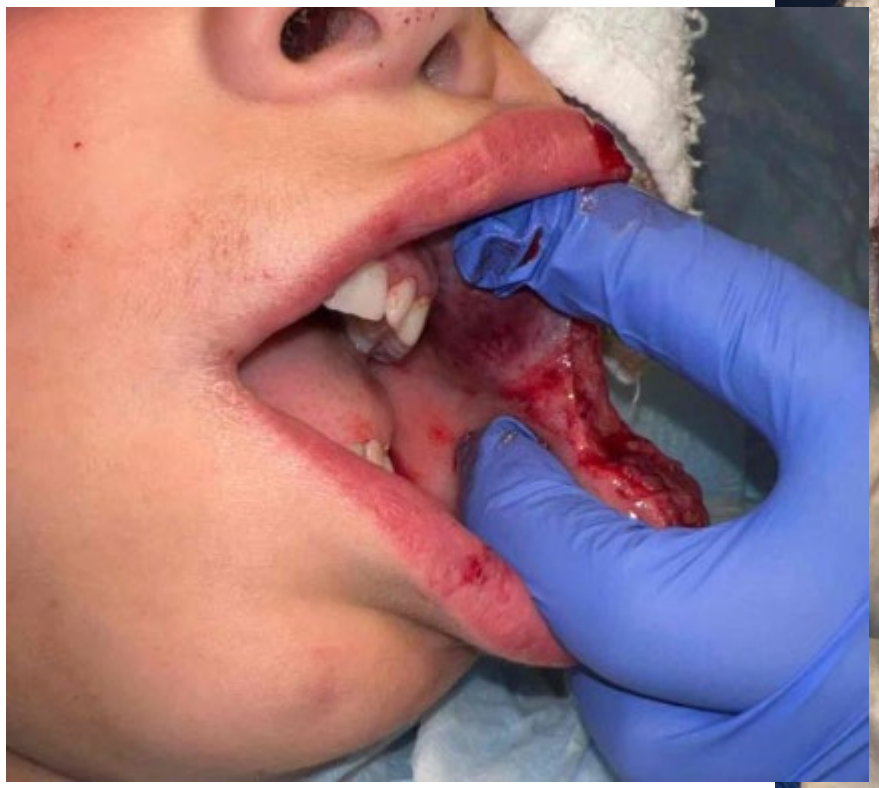

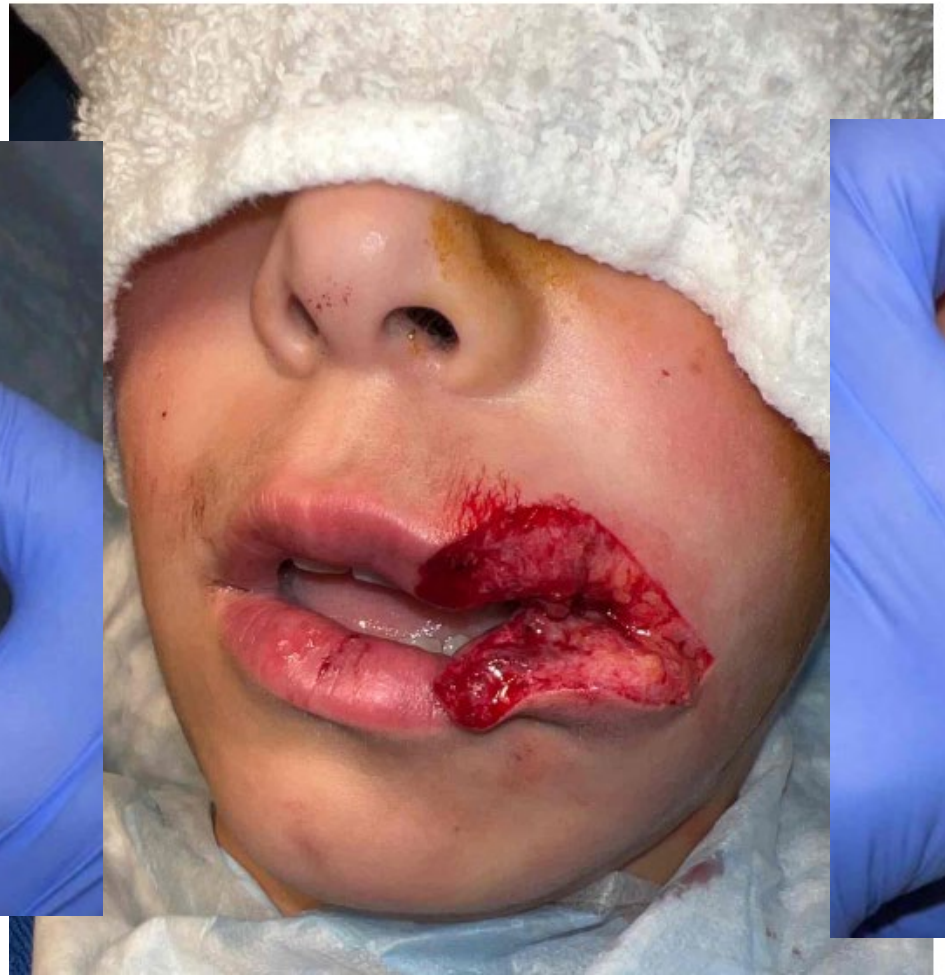

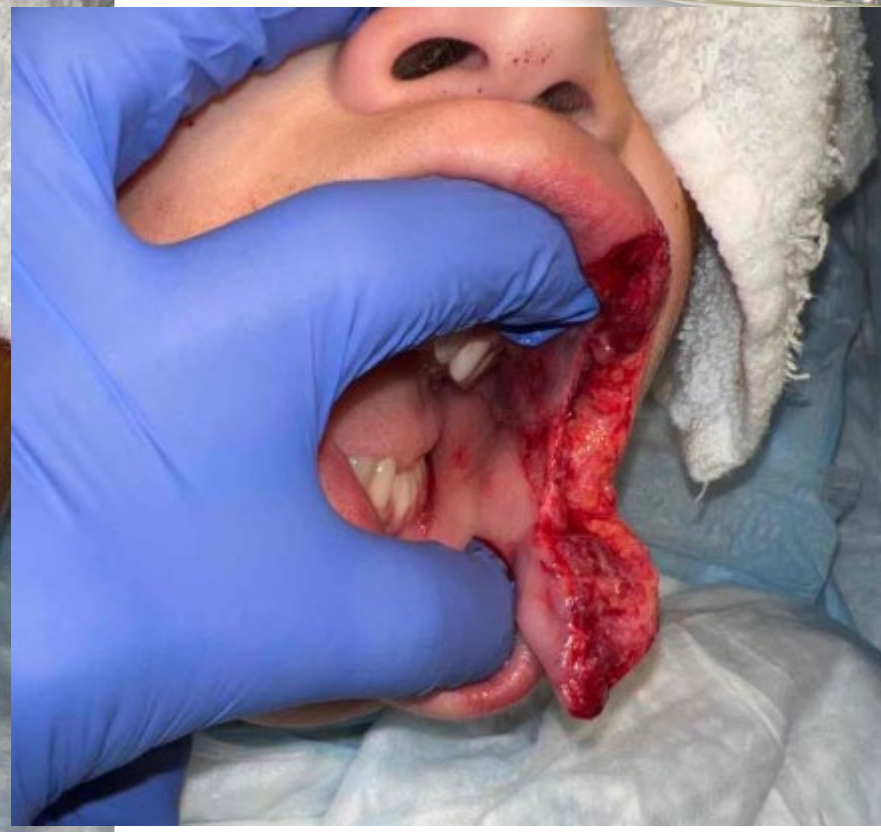

What do you want to do?

Laceration Care

- Steri-strips
- Dermabond
- Sutures
  - Different sizes of string, needle
- EC/UC provider
- Sub-Specialty provider
  - Plastics, ENT, etc

Rm 34: Laceration to Lip

- Pain control
  - Oral meds
  - IN meds
- Plastics consulted
- Tetanus given

1200: Patient Updates

- 14 y/o male finger injury
  - Orthopedics examined, plan for digital block, fracture reduction, nailbed and laceration repair

- 8 y/o male with fatigue and pain
  - Urine returned and normal without blood, nitrite, leukocyte esterase, bacteria
  - Soft stool output that had a piece of plastic in stool
  - MOC reports a history of previous FB ingestions
  - AXR ordered and pt off to x-ray

1230: Rm 12: “eye is out”

- JI is a 5 year old male with history of Norrie's disease, bilateral sensorineural hearing loss, bilateral retinal detachment, blindness, s/p prosthetic eye placement to left eye and developmental delays accompanied by his Mother with acute proptosis of his left prosthetic eye. MOC reports patient had preseptal cellulitis diagnosed earlier this month. He completed a course of Augmentin and followed up with ophthalmology on 1 week later, and was given polymyxin eyedrops for persistent symptoms. MOC reports symptoms initially improved with Augmentin, but then worsened after completion of the Augmentin. No documented fevers, but MOC feels like he has had tactile fever intermittently. Mild URI symptoms in all family members x 2 weeks. JI is nonverbal and MOC explains that he does not feel pain normally, but MOC does feel that he is in pain today as he is vocalizing sounds of distress. No redness around his eye.

Rm 12:"eye is out"

- T:37.2 °C (99 °F) HR: 95 RR: 22 BP: 128/75 02 sats: 96% RA
- General: He is active. He appears in acute distress (Pt rocking back and forth and making verbalizations of discomfort, "Hey, Hey.").
- HEENT: NC/AT. Nose, mouth normal with MMM. **Eye exam notable for right eye without vision or detection of light at baseline. Left eye cloudy, white prosthetic at baseline with significant proptosis. + erythema in left orbit without periorbital edema. Clear drainage from left eye.**
- Pulm: LCTAB
- CV: RRR, no m/r/g.
- Abdomen: soft, NTTP
- Neuro see above, MAES.

Rm 12: "eye is out"

What do you think is going on & what do you want to do?

1300: Rm 12: Proptosis DDx

- Swelling, bleeding behind the eye which causes it to “protrude” from socket”

- Infection – Abscess
- Bleeding – hemorrhage
- Hormonal dysfunction – thyroid

- Acute Proptosis is a medical emergency
- If hemorrhage – perform a lateral canthotomy

Rm 12: Proptosis

- JI is not acute
- Ophthalmology consulted, recommended CT orbits with contrast to assess for infectious cause
- IV placed
- Patient off to CT scan

1300: Patient Updates

- 15 y/o male finger injury
  - Orthopedics repaired finger
  - Discharge back to NSC and Orthopedics will follow during admission

- 8 y/o male lip laceration
  - Plastics examined and repaired s/p IN versed, local block, Child Life
  - Will d/c home with plastics follow up

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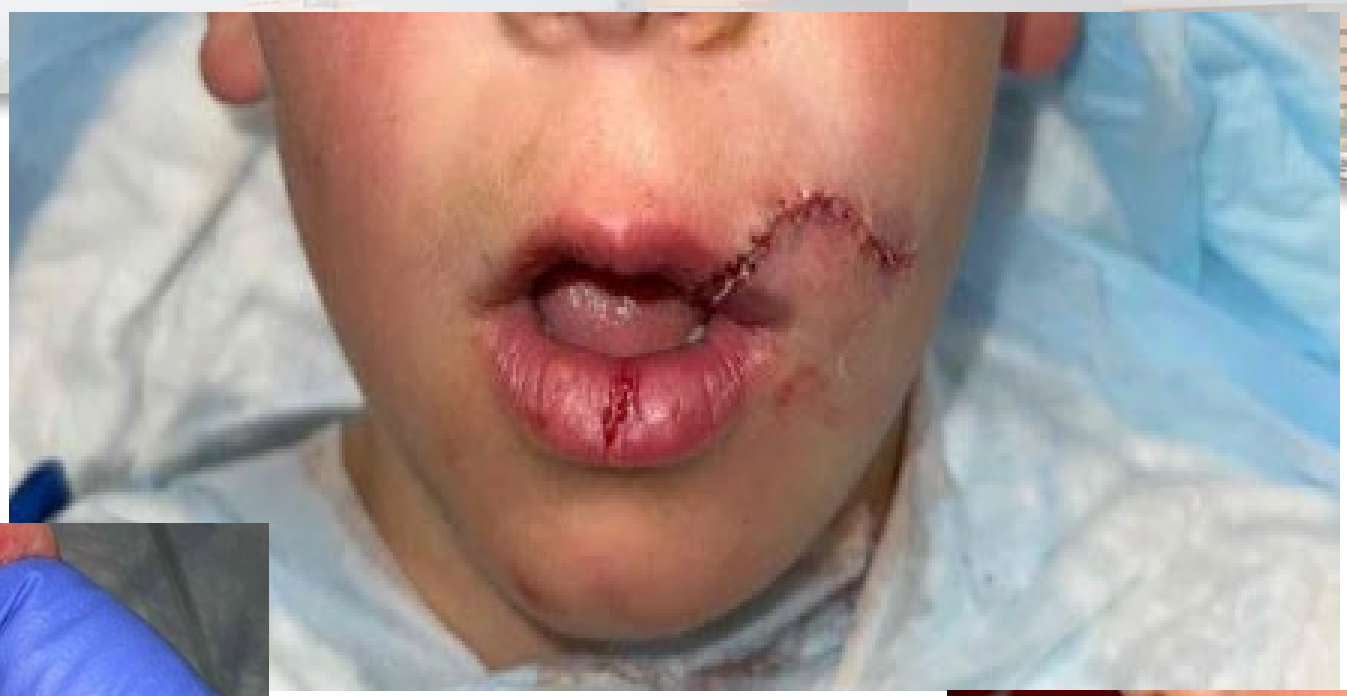

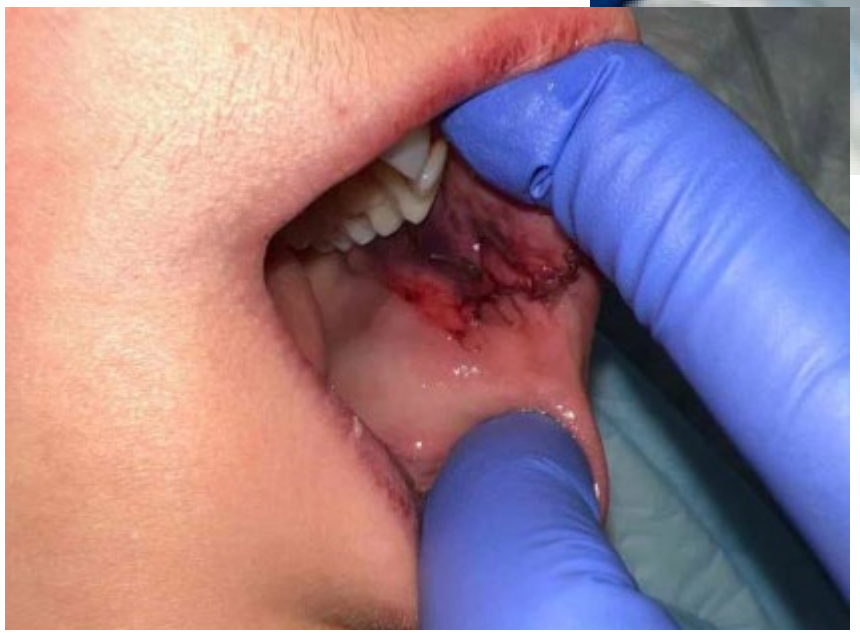

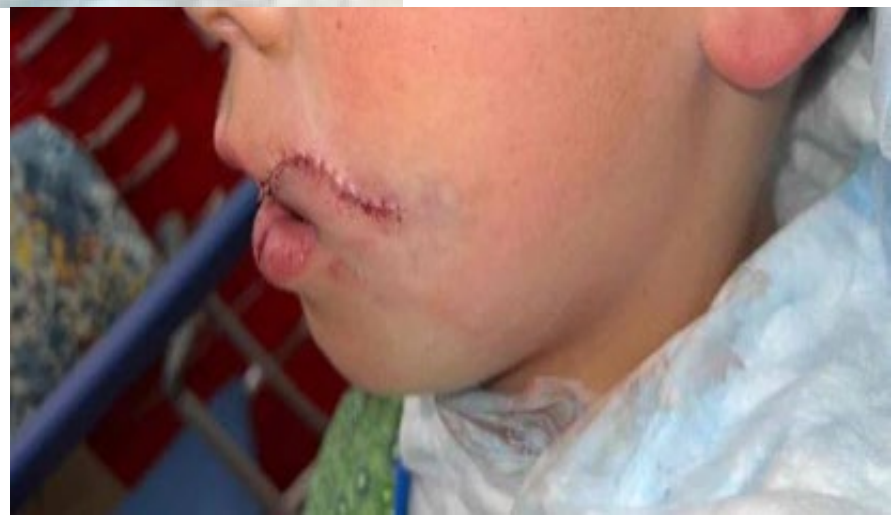

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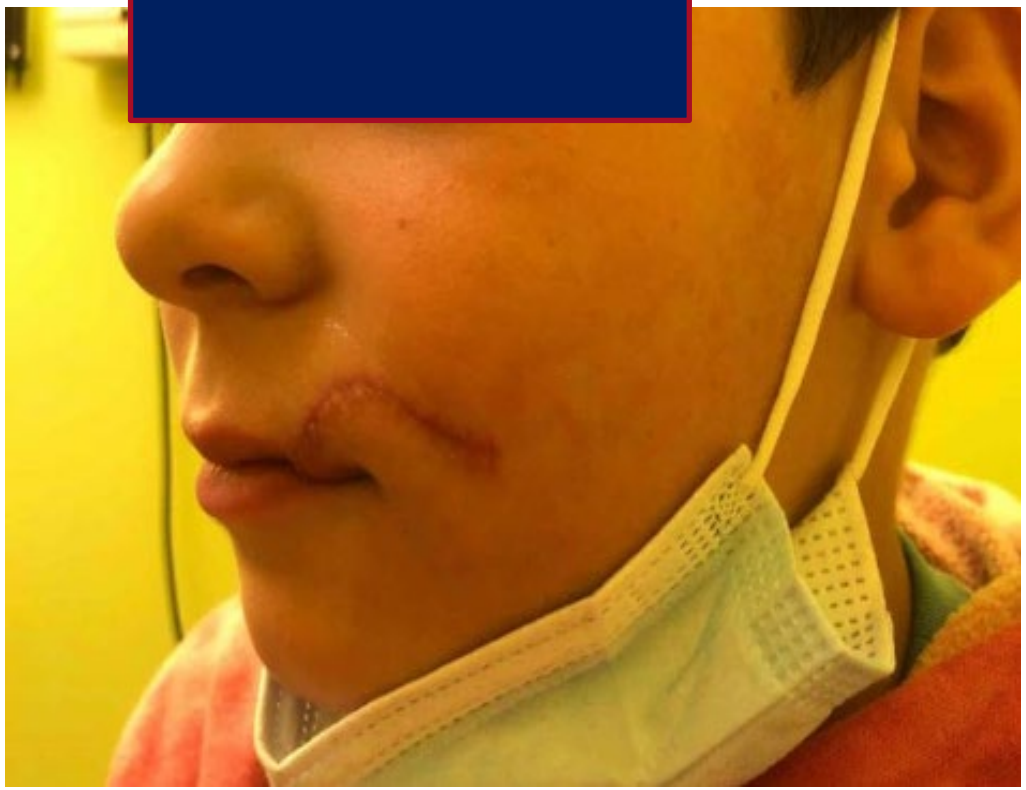

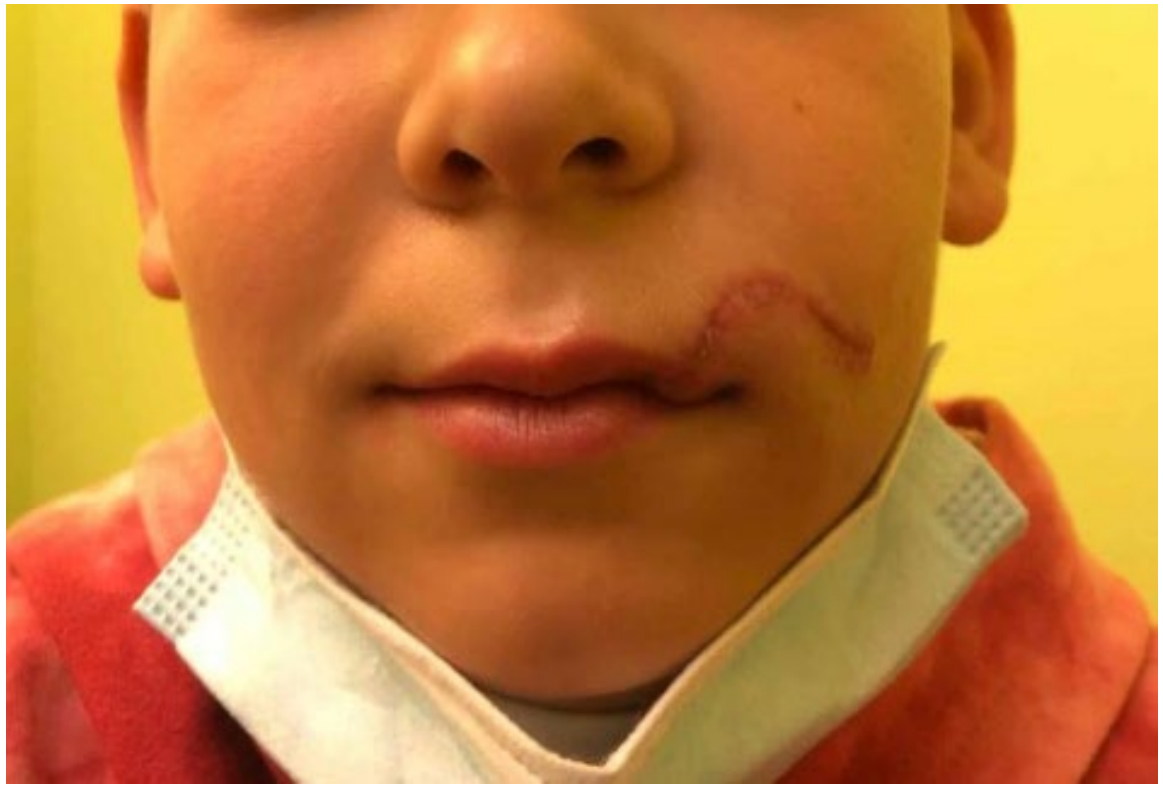

1300: Patient Updates

- 15 y/o male finger injury
  - Orthopedics repaired finger
  - Discharge back to NSC and Orthopedics will follow during admission
- 8 y/o male lip laceration
  - Plastics examined and repaired s/p IN versed, local block, Child Life
  - Will d/c home with plastics follow up
- 5 y/o fatigue and abdominal pain
  - AXR returned

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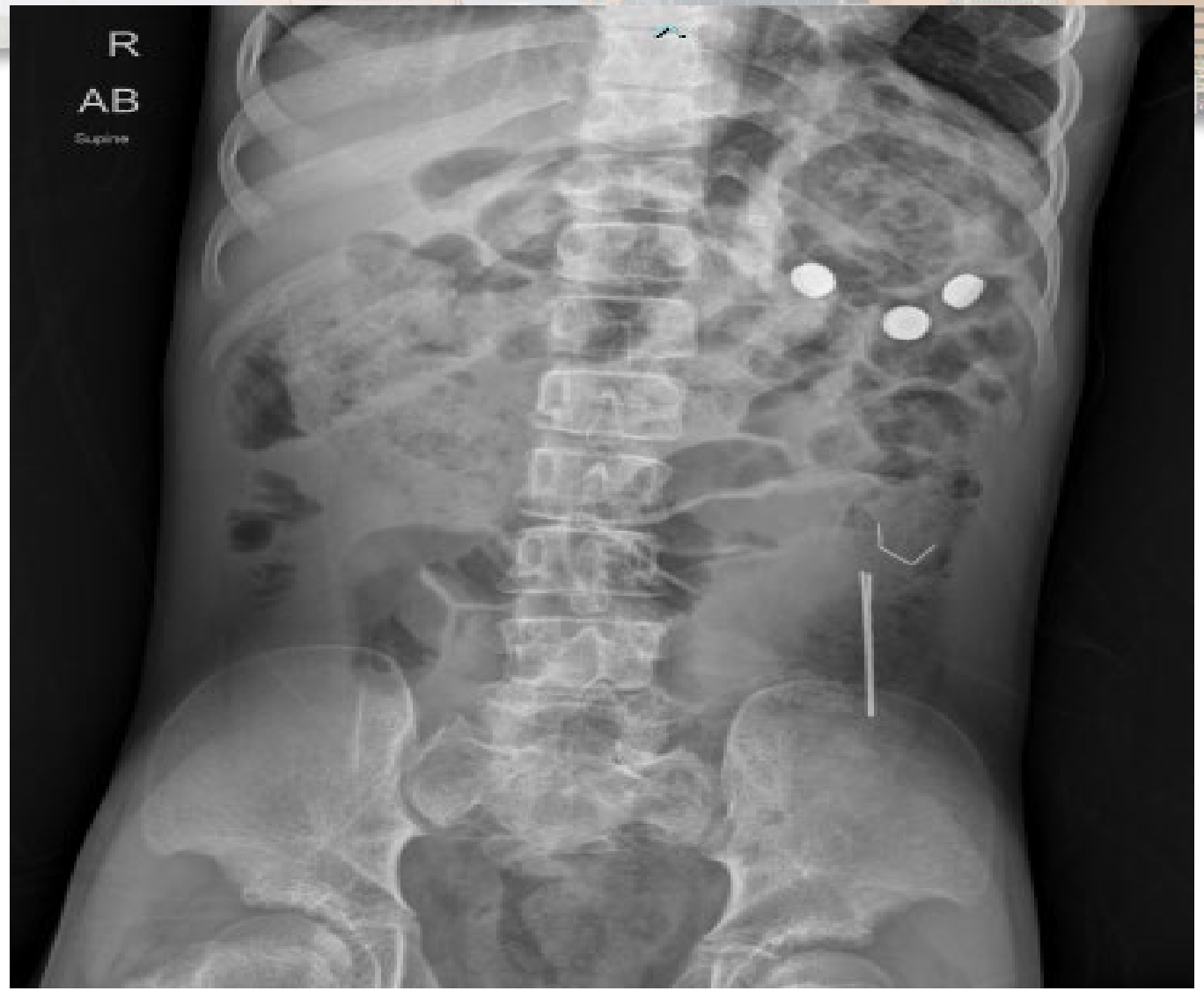

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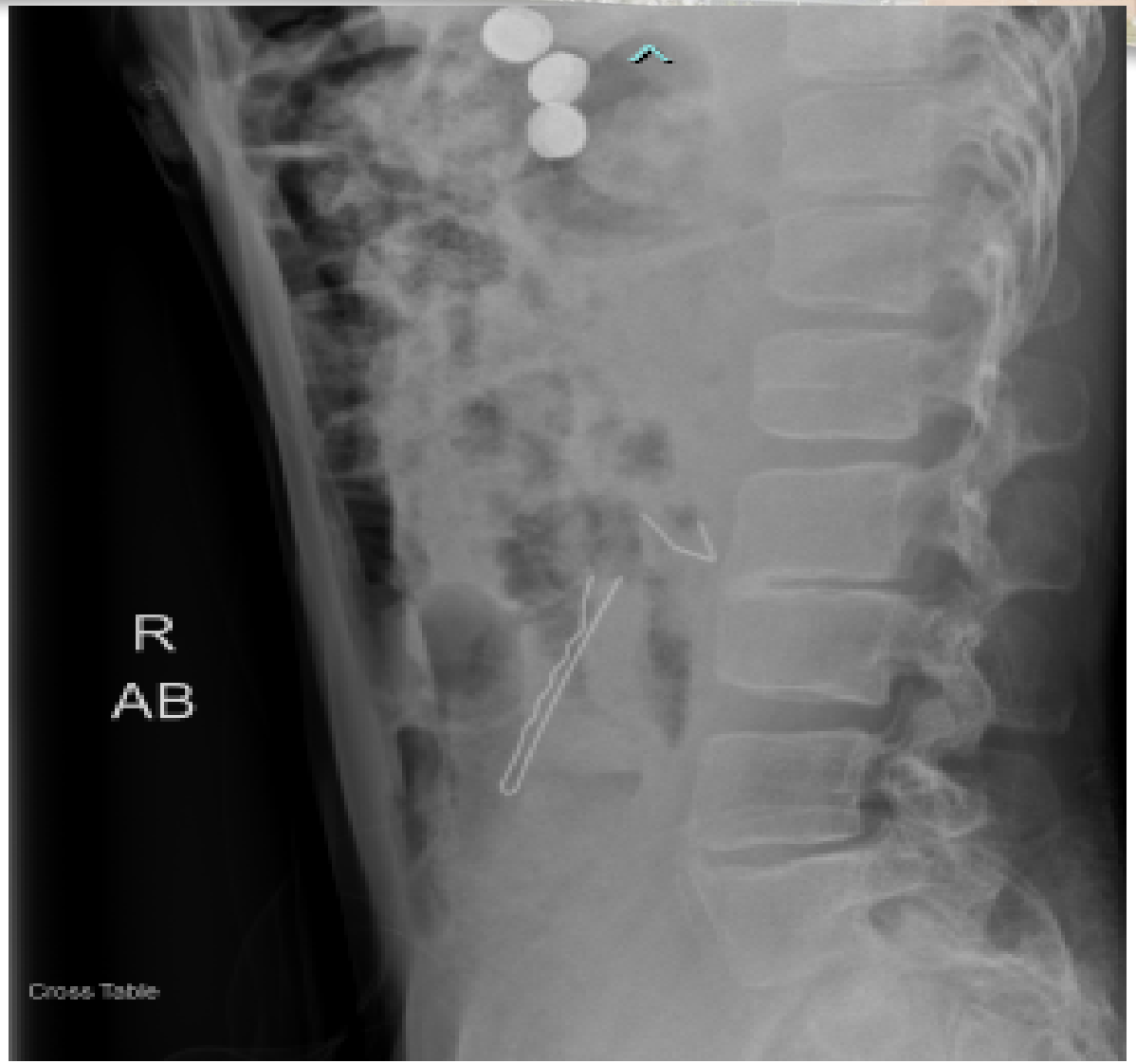

Rm 26: Button Battery Ingestion

- >2,500 ED visits a year for ingestion
- Can cause caustic tissue injury leading to ulceration, fistulas and perforation
- Tissue injury due to electrical activity which causes an alkaline injury to tissue by building up hydroxide
- Additional injury can be caused by leakage of alkaline material from battery

Rm: 26 Button Battery Ingestion

- Largest risk for injury in the esophageal mucosa
- Tissue injury can be seen less than 2 hours after ingestion
- Large lithium batteries are the most dangerous due the increased voltage
- Often confused with coins, look for "**double ring"**
- **Honey** is first line at home and if we have in ED
- Honey neutralizes the tissue pH increase and creates more localized and superficial injuries; observed in vivo was a decrease in both full-thickness injury and extension of injury in the deep muscle beyond surface ulcer margins

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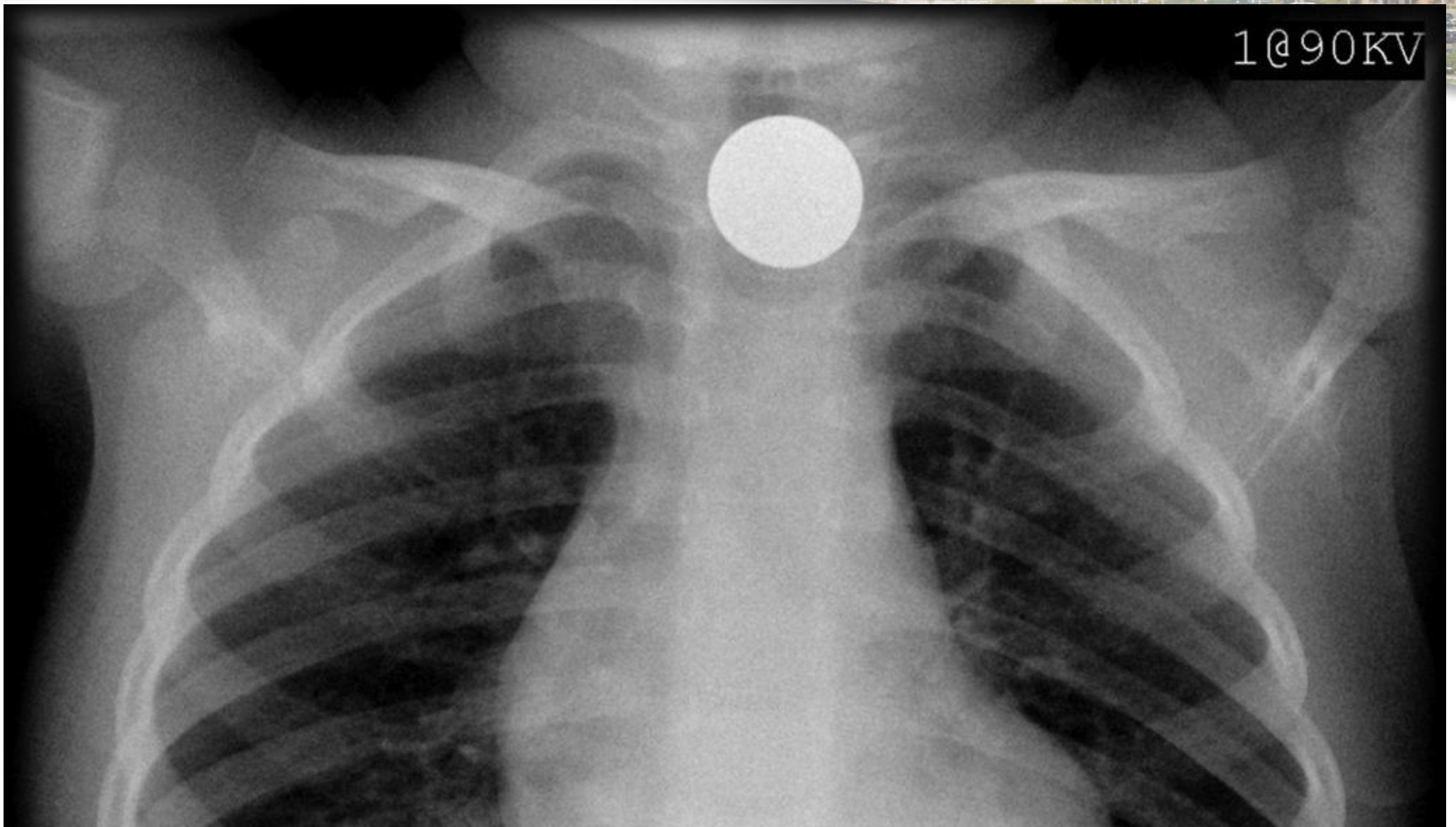

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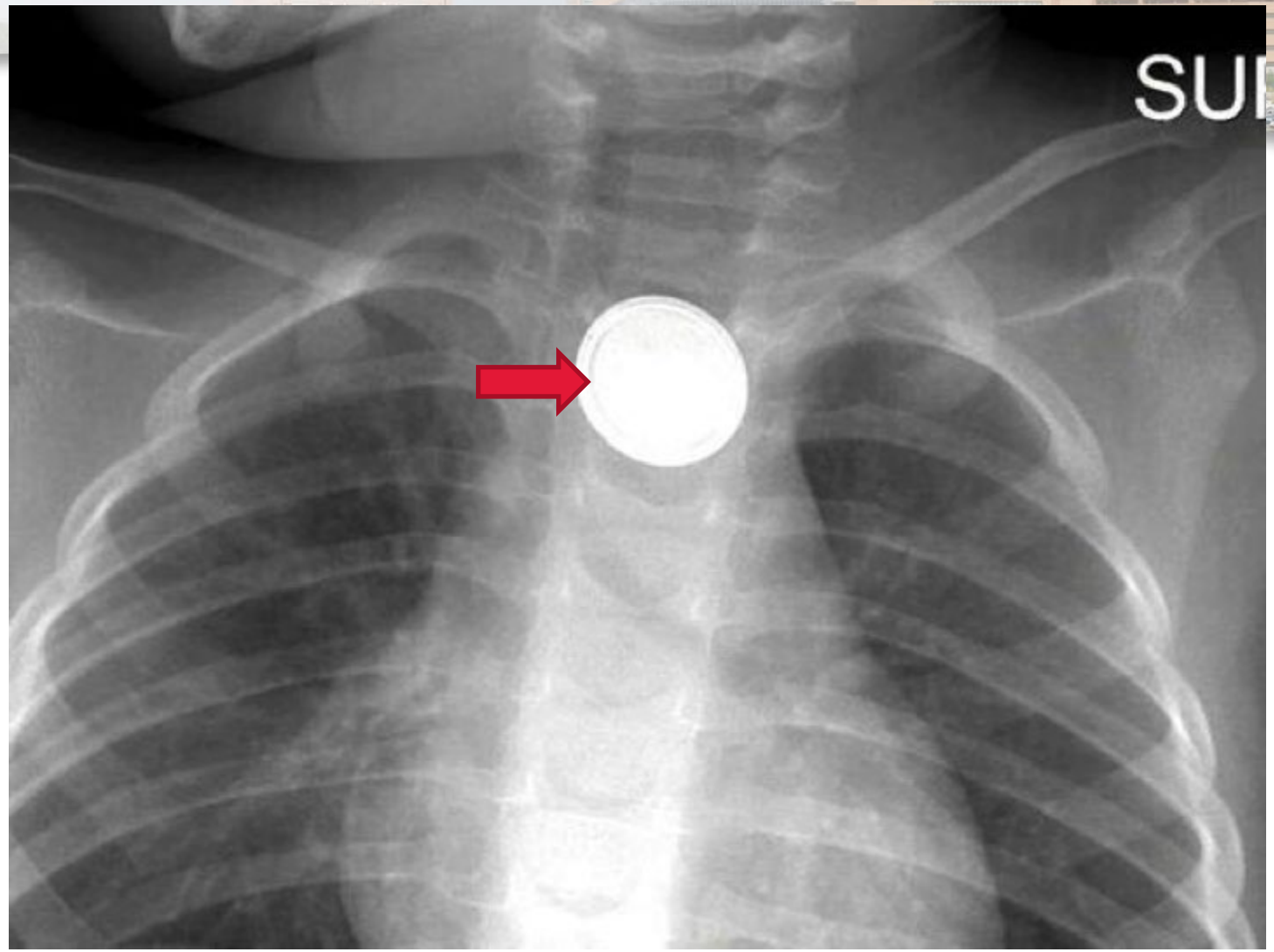


Button Batteries
Treatment

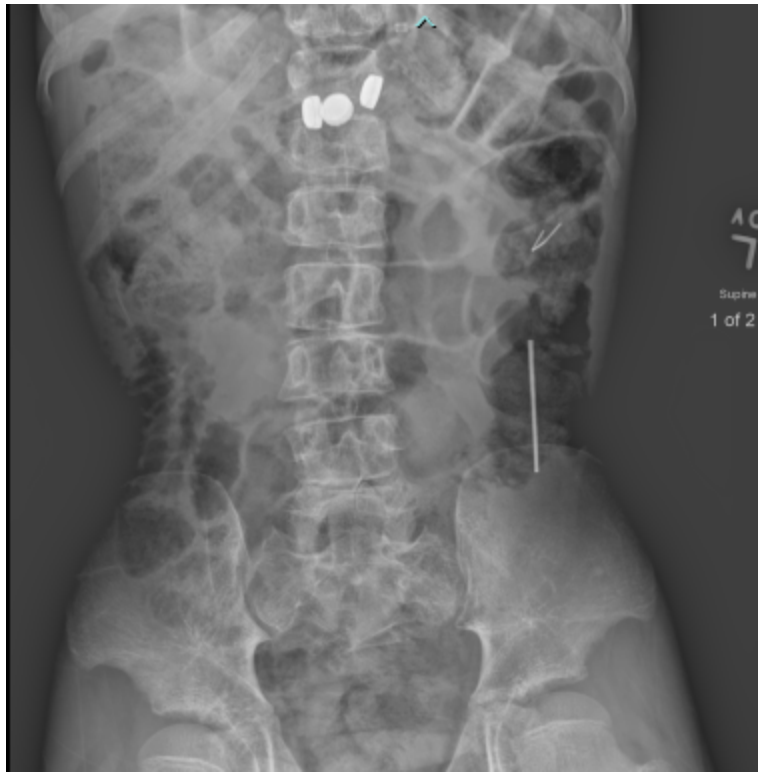
- Esophagus → Removal
- Stomach → Removal/Observe
- Intestine → Observe for Passage

RM 26: Button Battery Ingestion

- Surgery consulted
- Recommends admission to monitor for passage of FB as batteries appears to be past stomach

RM 26: Button Battery Ingestion Hospital Course

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR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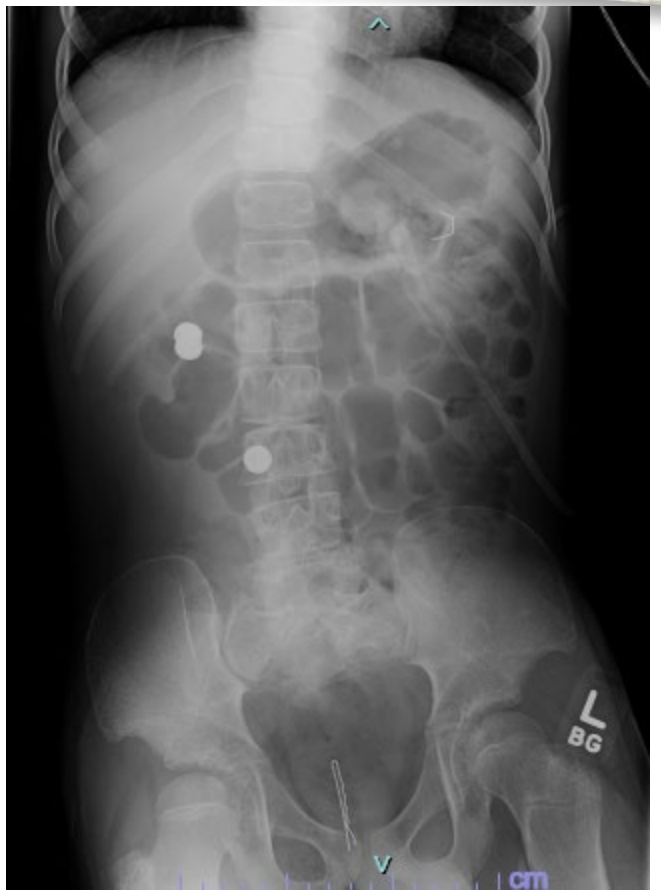
RM 26: Button Battery Ingestion

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
  - FB progressing through intestine

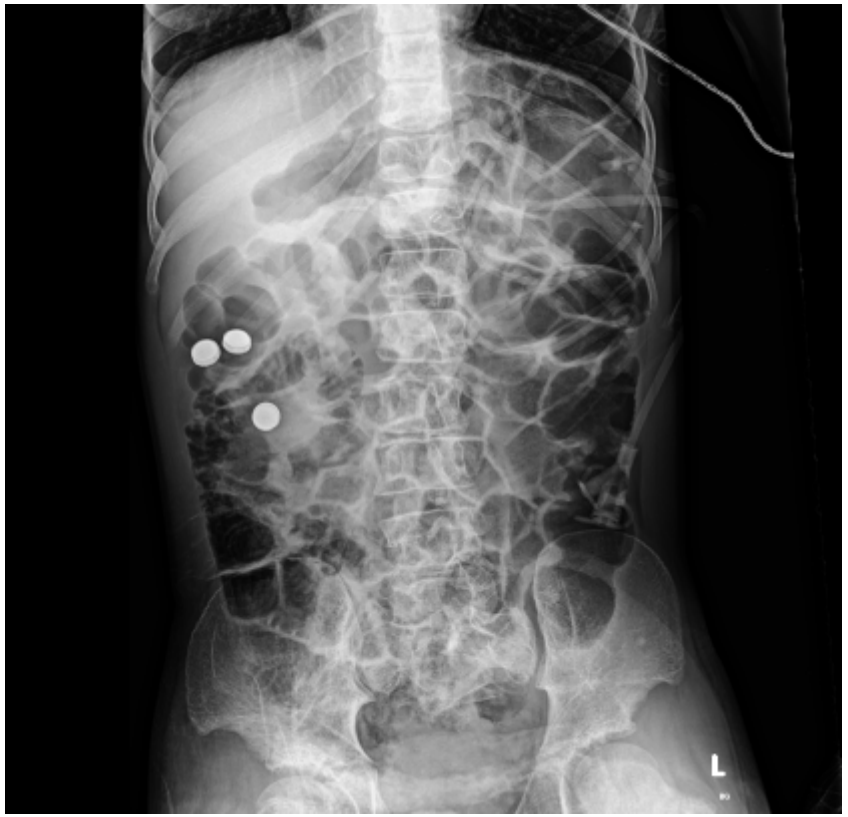
RM 26: Button Battery Ingestion

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
  - FB progressing through intestine
- HD#2 – AXR


L
BG
cm

RM 26: Button Battery Ingestion

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
  - FB progressing through intestine
- HD#2 – AXR
  - FB progressing through intestine
- HD#3 - AXR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RM 26: Button Battery Ingestion

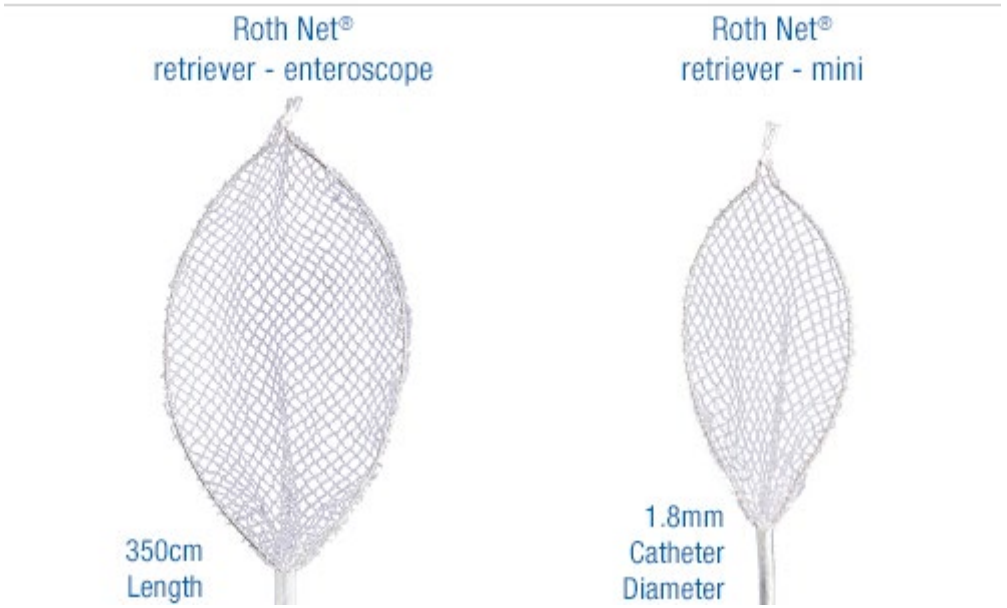
- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
  - FB progressing through intestine
- HD#2 – AXR
  - FB progressing through intestine
- HD#3 – AXR
  - 2 FB have passed, 3 BB still in large intestine

RM 26: Button Battery Ingestion

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
  - FB progressing through intestine
- HD#2 – AXR
  - FB progressing through intestine
- HD#3 – AXR
  - 2 FB have passed, 3 BB still in large intestine
- HD#4 – Endoscopy and Colonoscopy

Button Battery Ingestion

- **Postoperative Diagnosis/Findings:**
- 1. Eschar in the mid esophagus
- 2. Sigmoid ulcerations
- 3. 3 button batteries removed with a Roth net and 1 plastic balloon appearing item removed with a Raptor



RM 26: Button Battery Ingestion

- Surgery consulted and patient admitted to monitor for passage of FB
- HD#1 – AXR
- HD#2 – AXR
- HD#3 - AXR
- HD#4 – Endoscopy and Colonoscopy
- HD#5 – MRI/A of chest
- HD#6 – Discharge home

1330: Patient Updates

- 5 y/o with proptosis
  - CT returned

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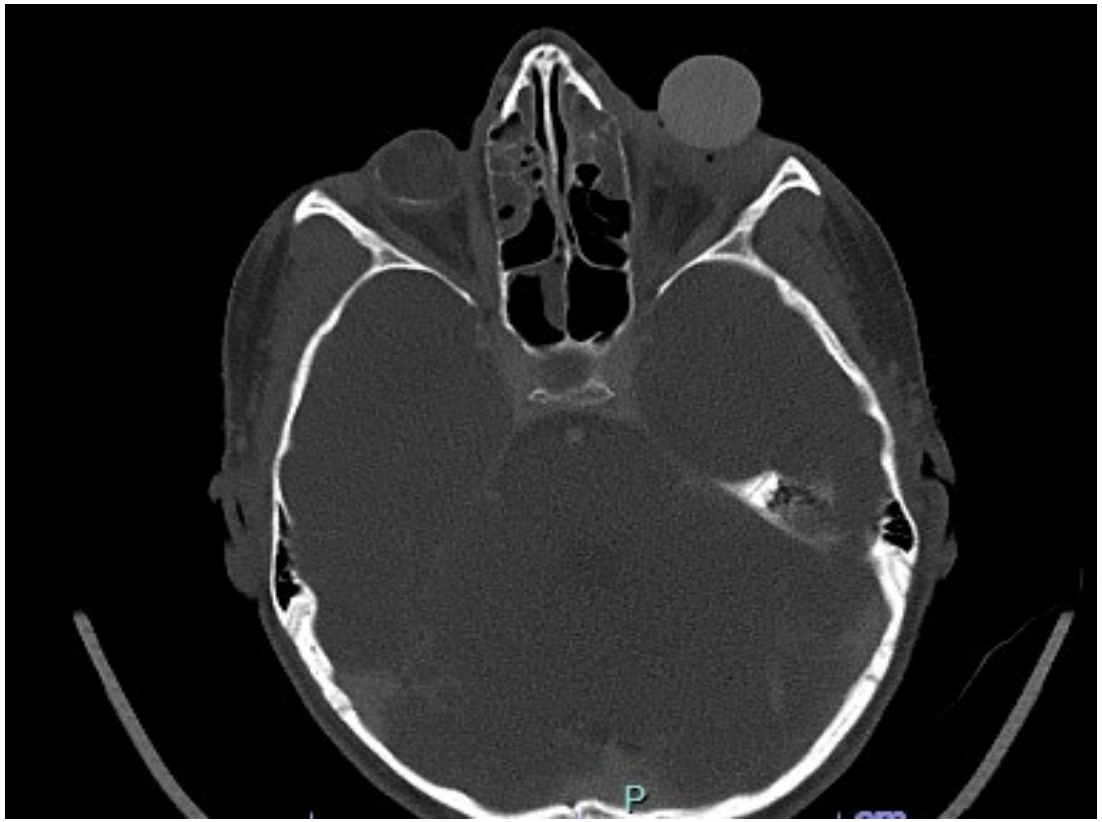

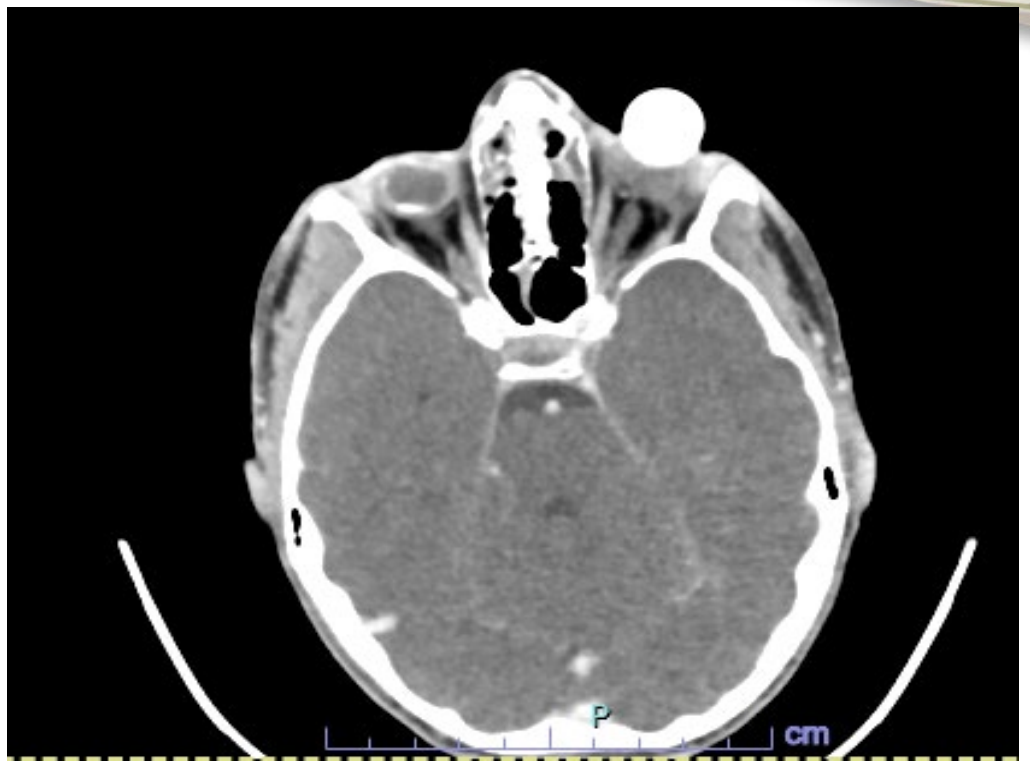

What do you want to do?

Rm 12: “eye is popping out”

- Reviewed CT scan results with Ophthalmology
- Plan to restart Augmentin
- Discharge home
- Follow up in 2 days with ocular surgery for repair

1340: 20 minutes left of my shift

I sit down to eat my lunch….

7 y/o F with Chest Trauma arriving via chopper

- ES is a 7y/o female transf e Chopper, with penetrating chest injury. She was hit npound bow, while in her backyard. Per report, Pt area and FOC did not realize she was there. Seen at OSH a . Has been stable on 2L from sending hospital and in t phine 2mg at sending hospital and 1mg in transport (ar ained airway, GCS 15. Also received Ancef and Tdap

Rm 2: “Chest Trauma”

- BP 113/68 | Pulse 98 | Resp 19 | Wt 21.8 kg | SpO2 99[1 liter NC[%
- General: She is active. She is not in acute distress. Normal respirations
- HENT: NC. Airway patent. EOMI Ears and TMs normal. Nose normal. OP clear
- Cardiovascular: RRR no m/r/g. Pulses 2+ throughout
- Pulmonary: effort normal. No distress. Normal BS.

  Noted fiberglass arrow entering chest near sternum, with stabilized exit near L scapula
- Abdomen. ND. Soft. NTTP
- Skin: No additional abnormalities noted. Cap refill 2 seconds
- Neuro: No weakness.

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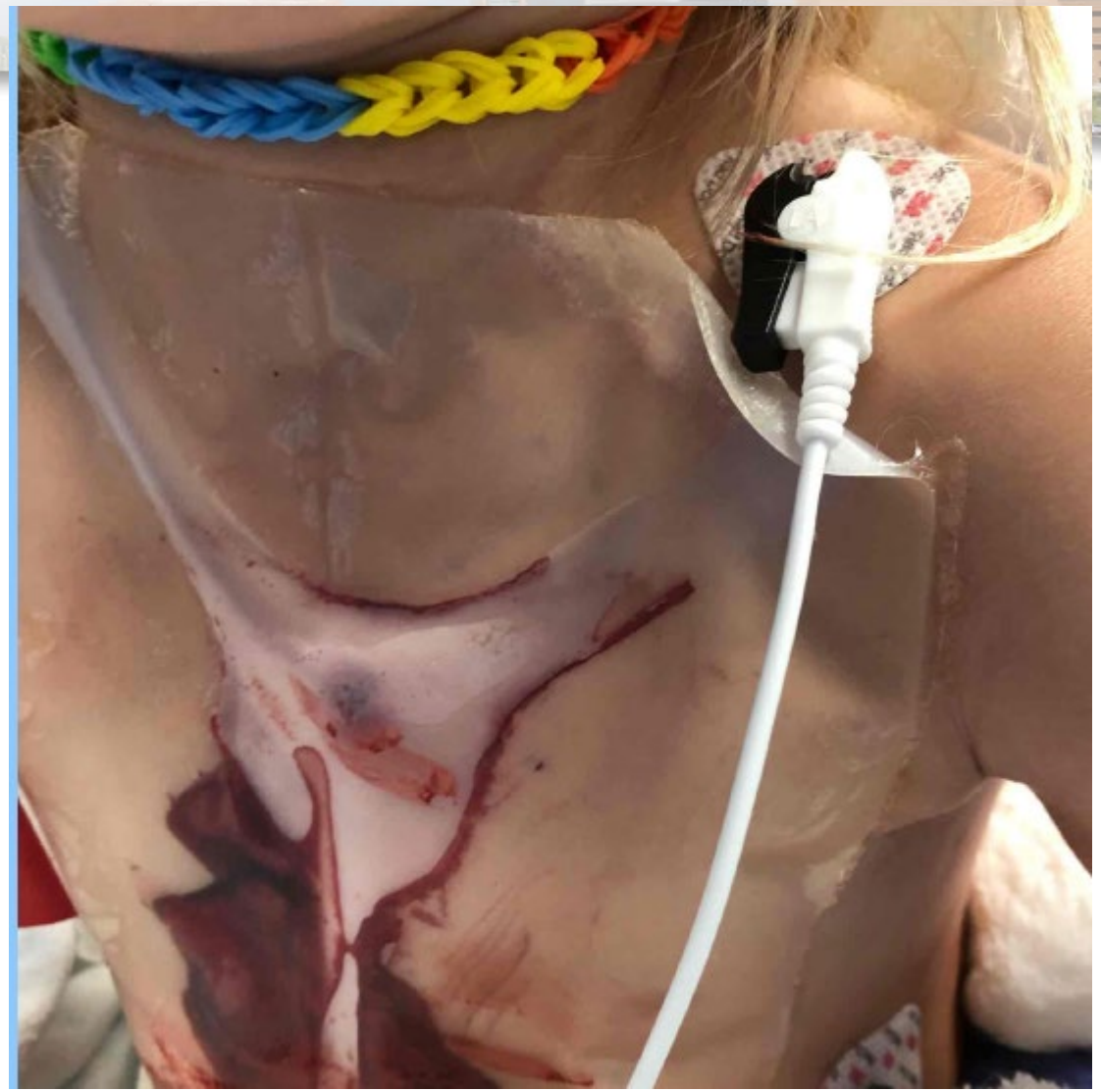

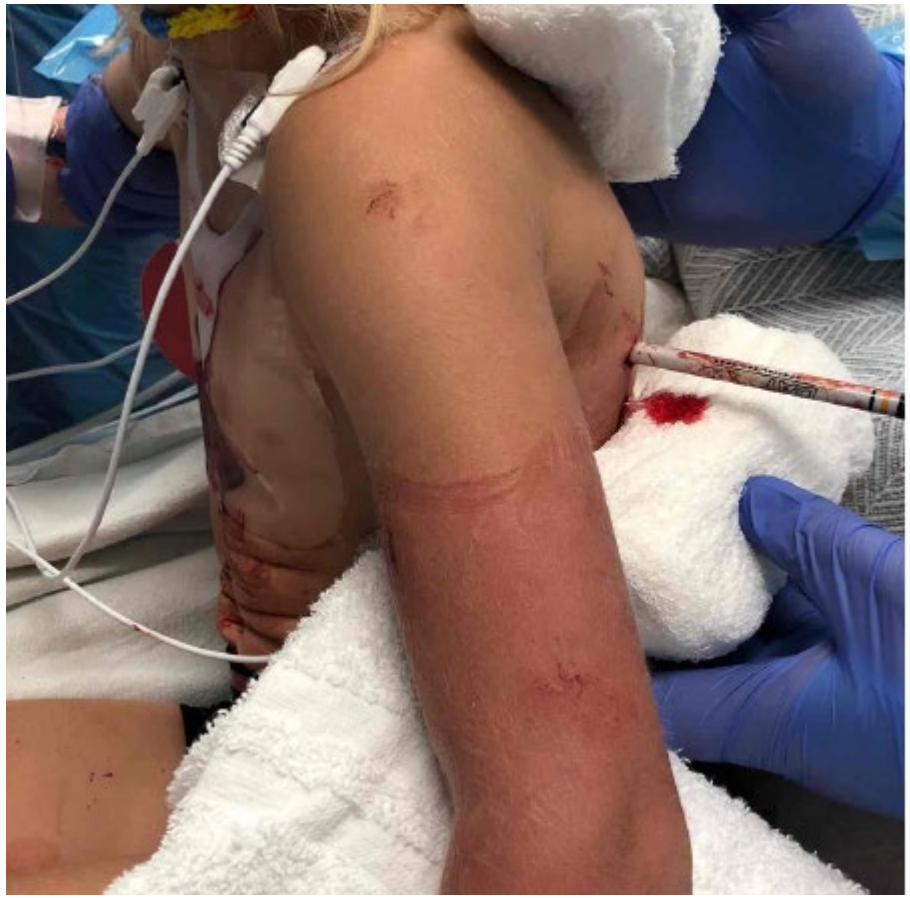

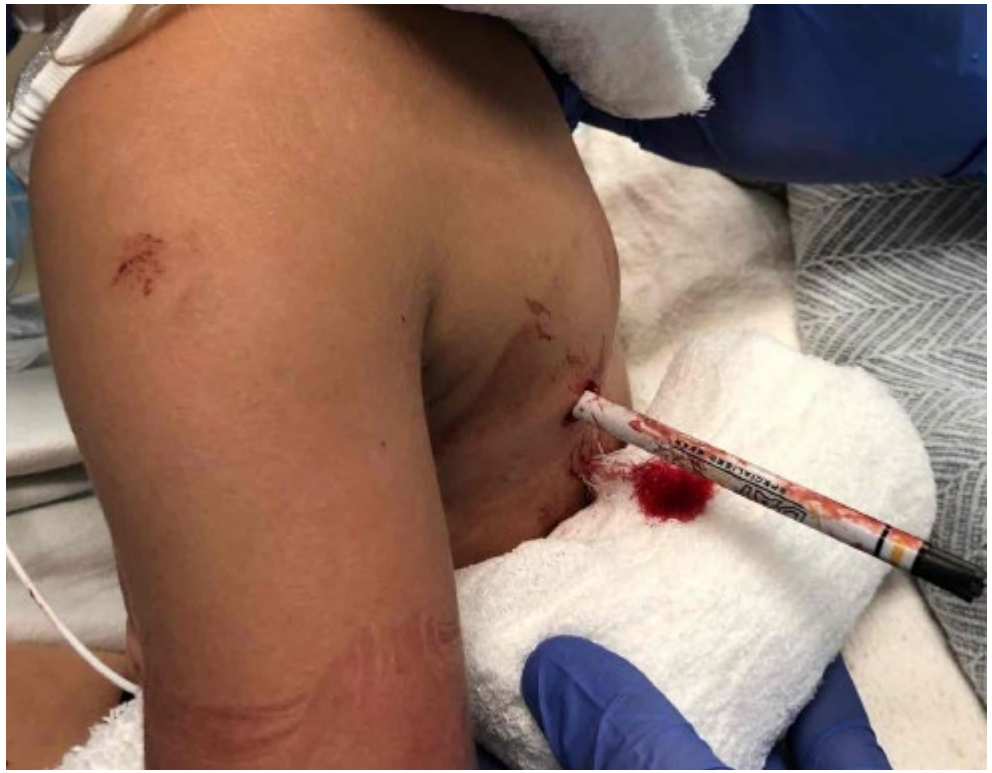

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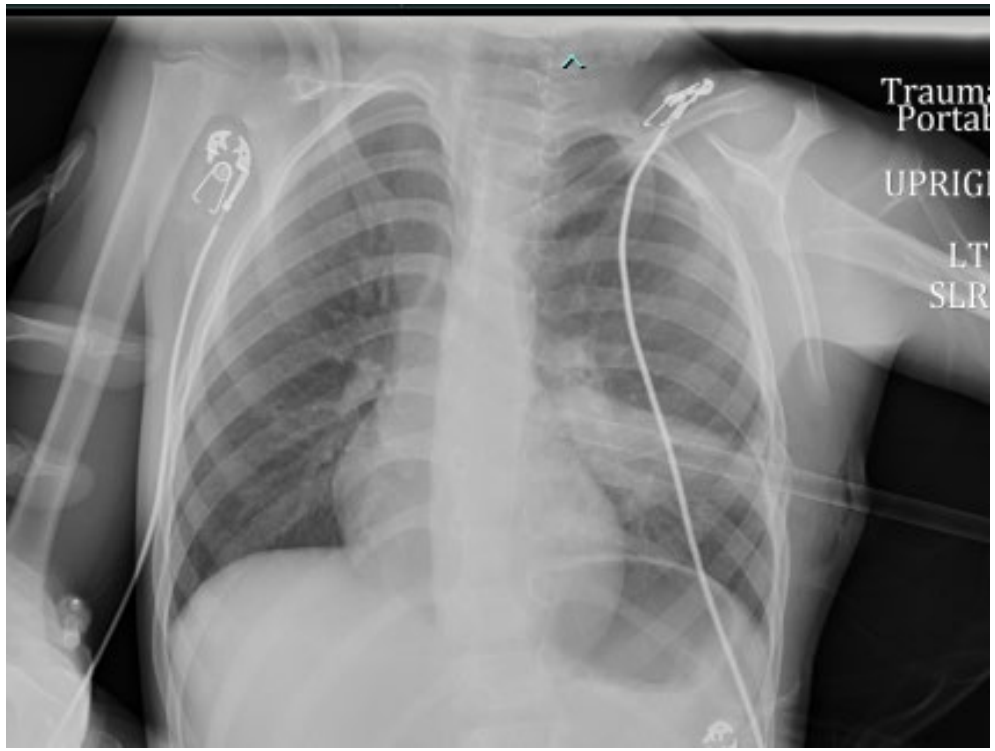
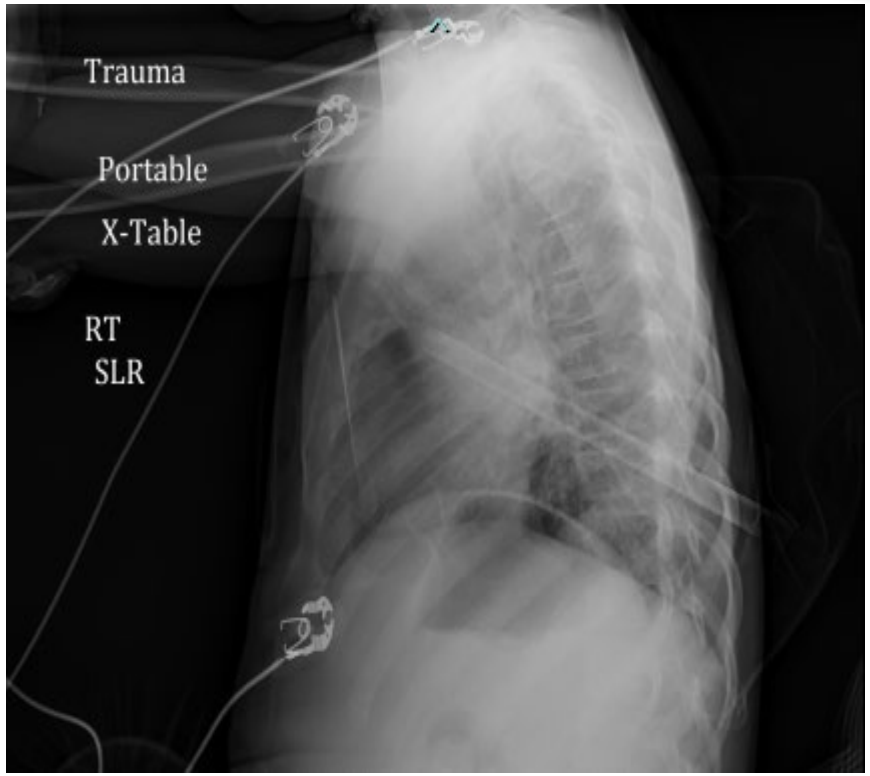
6 y/o chest wound

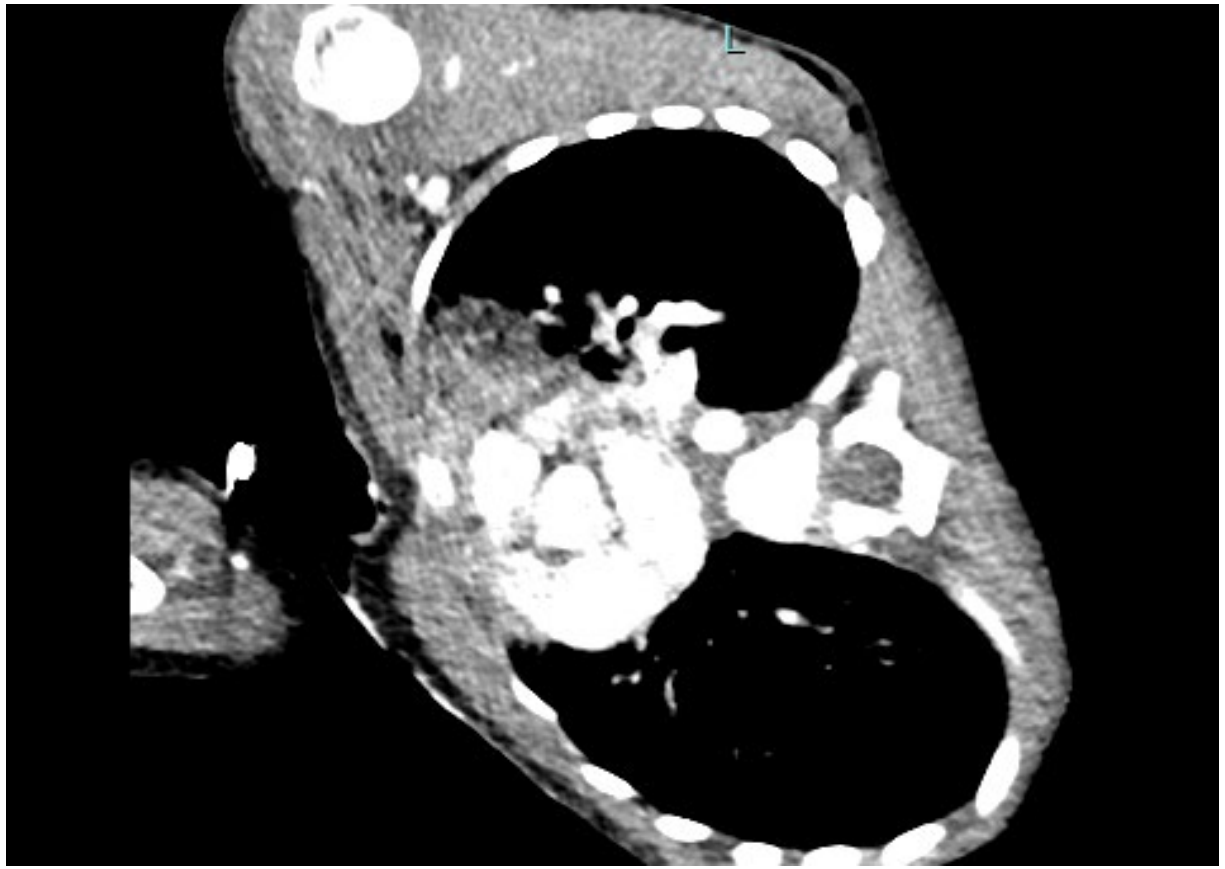
- Trauma Red
  - CXR


Trauma
Portable
UPRIGHT
LT
SLR


Trauma
Portable
X-Table
RT
SLR

6 y/o chest wound

- Trauma Red
  - CXR
  - Labs obtained
  - FAST performed
    - normal
  - CT scan chest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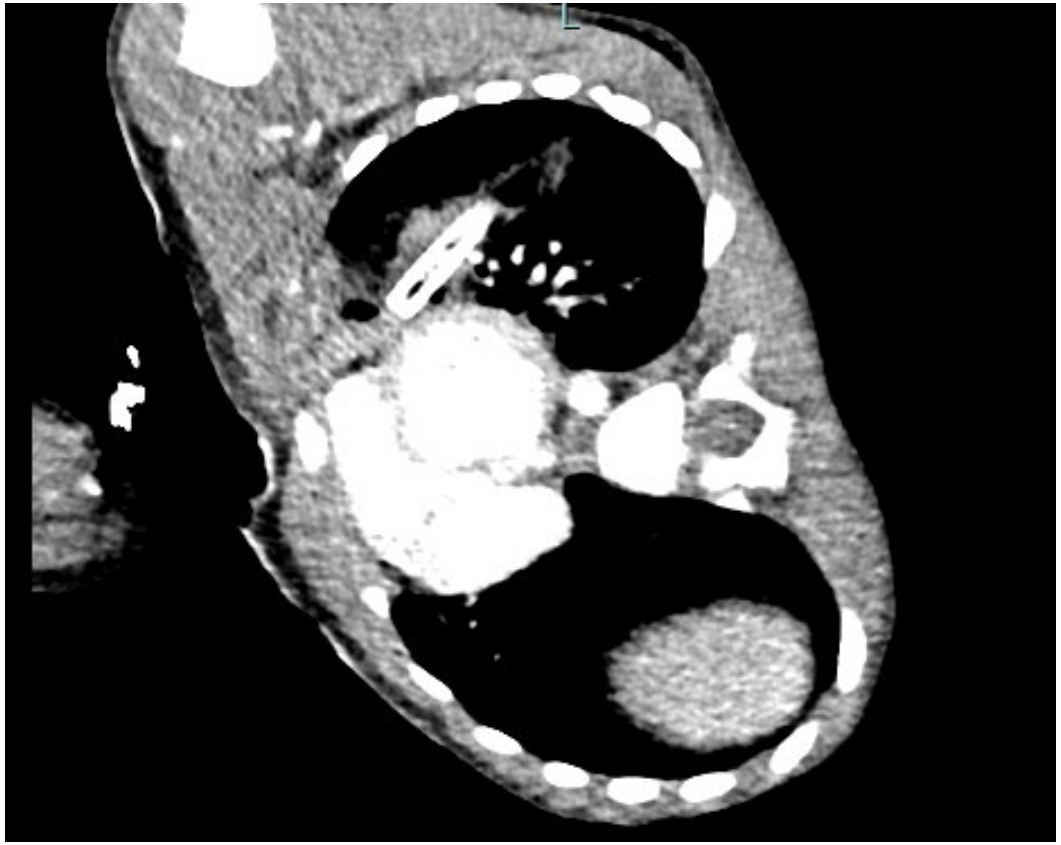

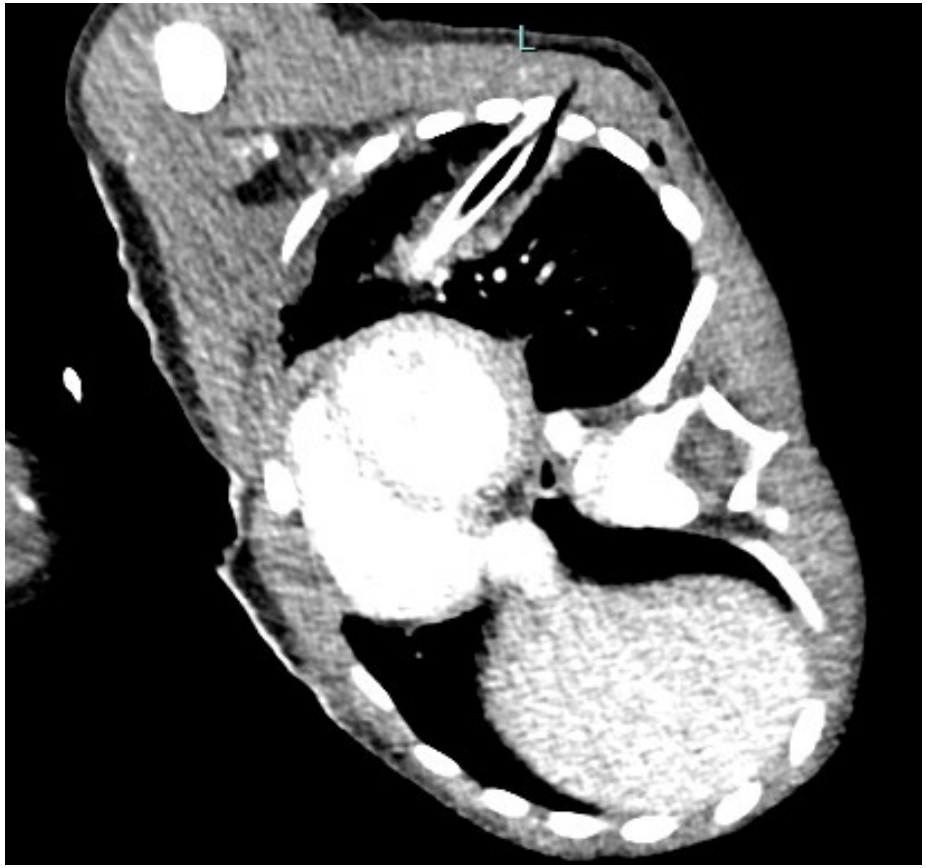
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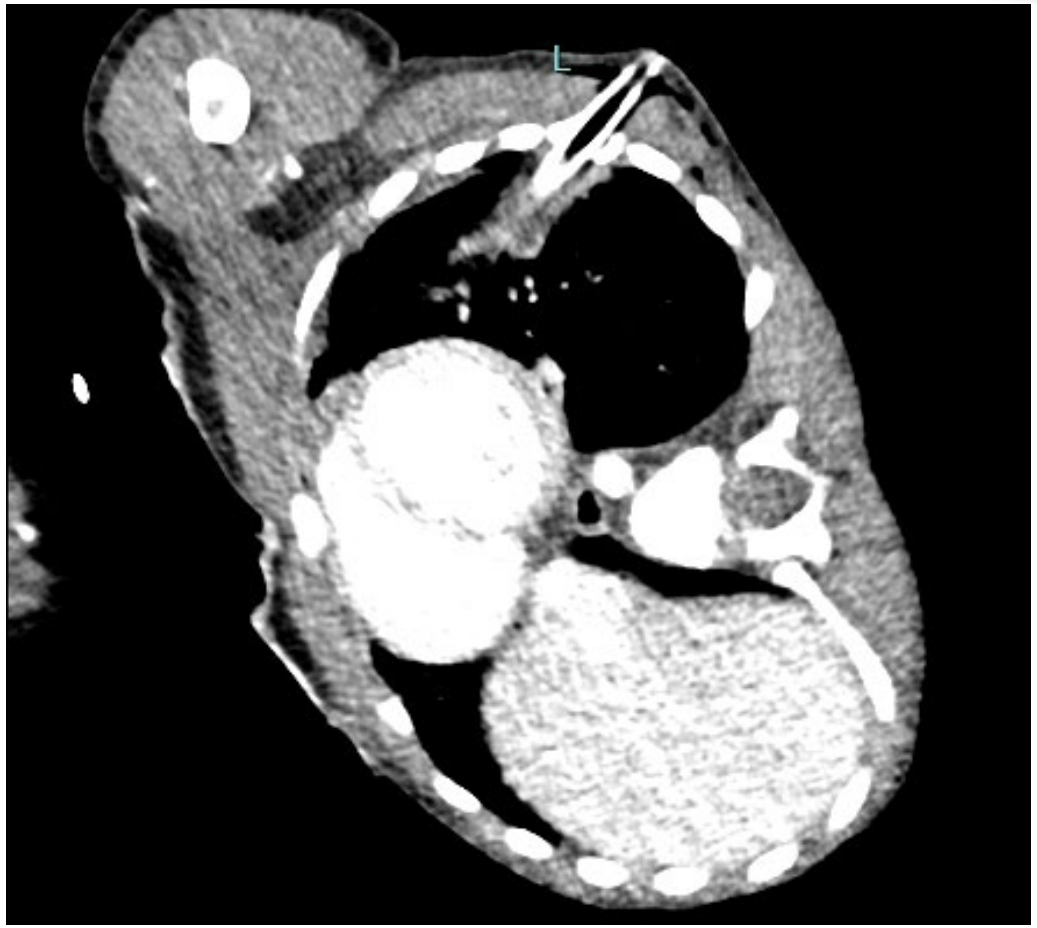
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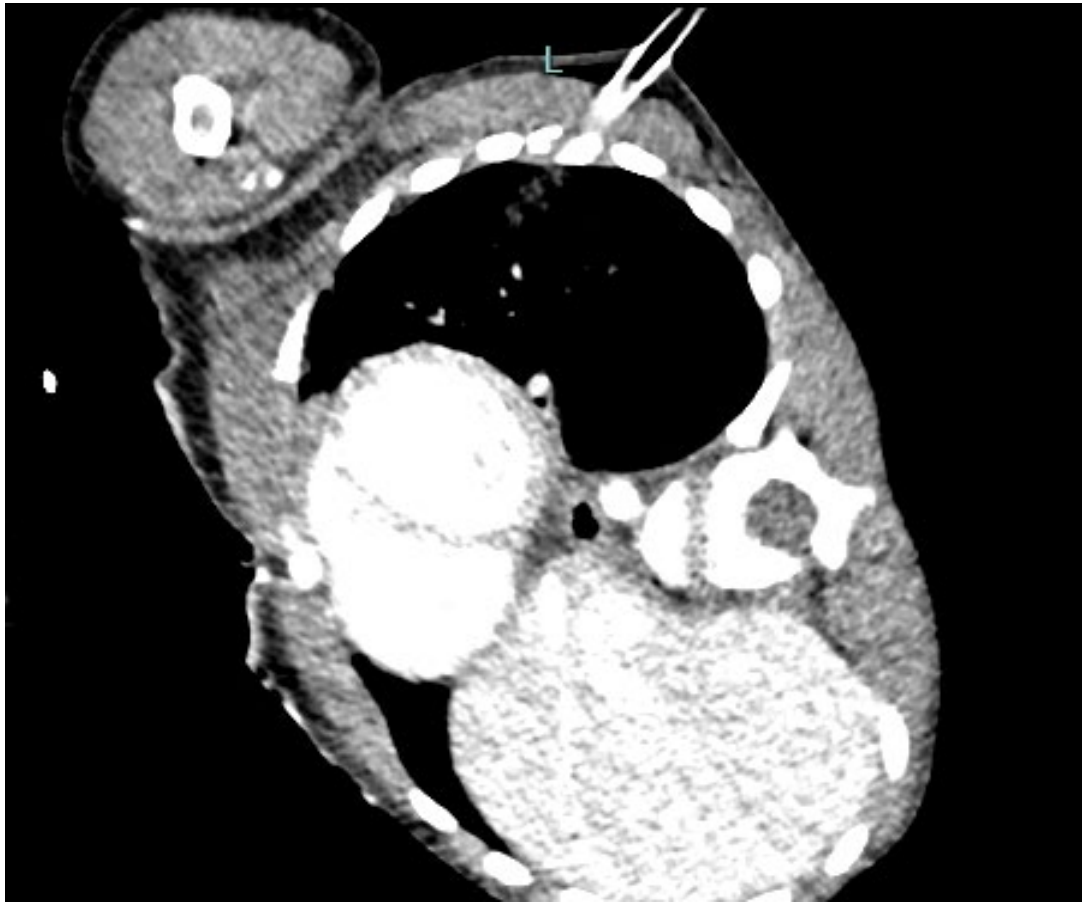
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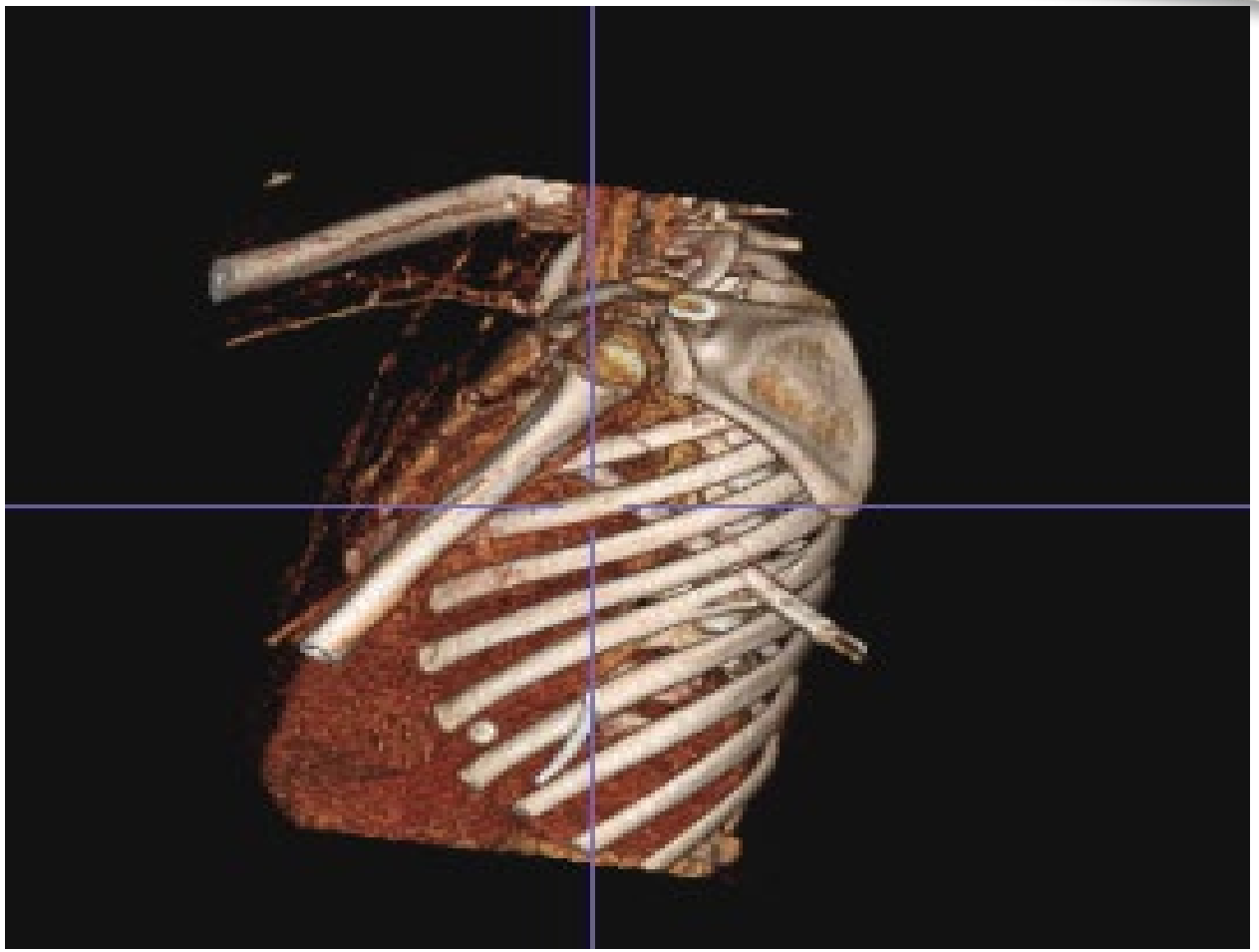

6 y/o penetrating chest injury

- To OR for removal

- OP note:
- The arrow could be seen entering from the anterior mediastinum and traversing the lung and exiting posteriorly. Passing through the middle of the upper lobe.
- Under visualization, we pulled the arrow. There was some bleeding from the tract, but not significant amounts.
- There was also not much disruption of the lung parenchyma. Just a few air bubbles.
- We observed the mediastinum where it was close to large vessels, there was minimal bleeding. We suctioned this blood
- Chest tube placed

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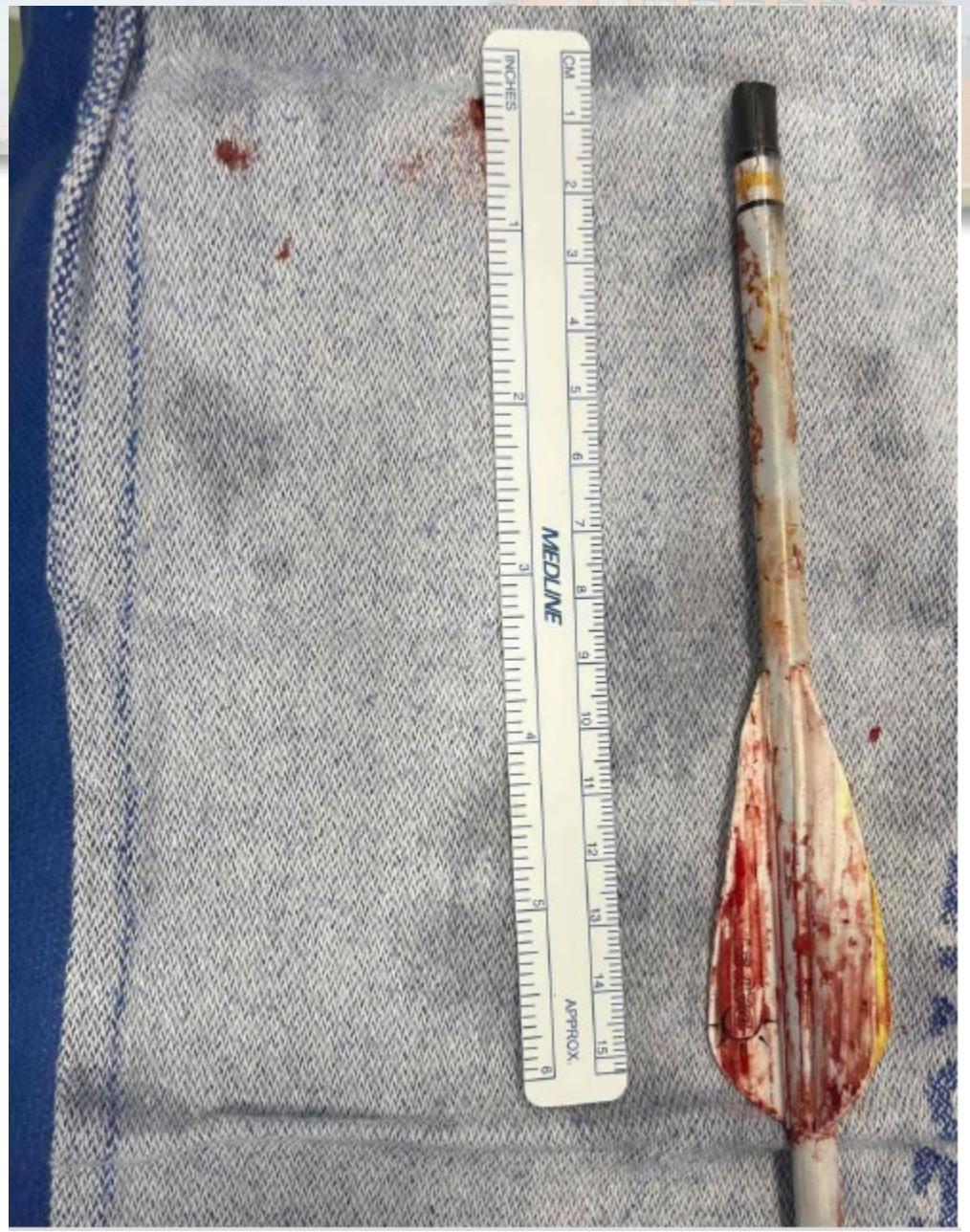

Traumatic Chest Injury

- ED management
  - ATLS
  - Common injuries include PTX, hemothorax
    - Needle decompression
    - Chest tube
  - MTP if hemorrhage
    - GSW penetrating into vascular bleed – consider thoracotomy

6 y/o penetrating chest injury

- Admitted to TACs for chest tube management
- Antibiotics
- Chest tube removed on POD#3 after minimal drainage
- Discharged home POD #4

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Thank You All for Your Time!
Questions?