Trauma Case Files

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In the pediatric trauma system, rare cases can cause real harm.
These are their stories…
DUN DUN

No Disclosures

Planners, faculty and others in control of content (either individually or as a group) for this activity have no relevant financial relationships with ineligible companies.

CASE #1
THE STAIR STUMBLER

- 13-year-old jumped down 2 feet off concrete step, hyperextending leg on landing, resulting in a fall
- EMS Called, patient reporting:
  - 4/10 pain
  - Unable to bear weight on R leg
  - Transient numbness in foot and shin
  - Denies LOC/Other Trauma
  - Notable obesity

Case 1

On Arrival:

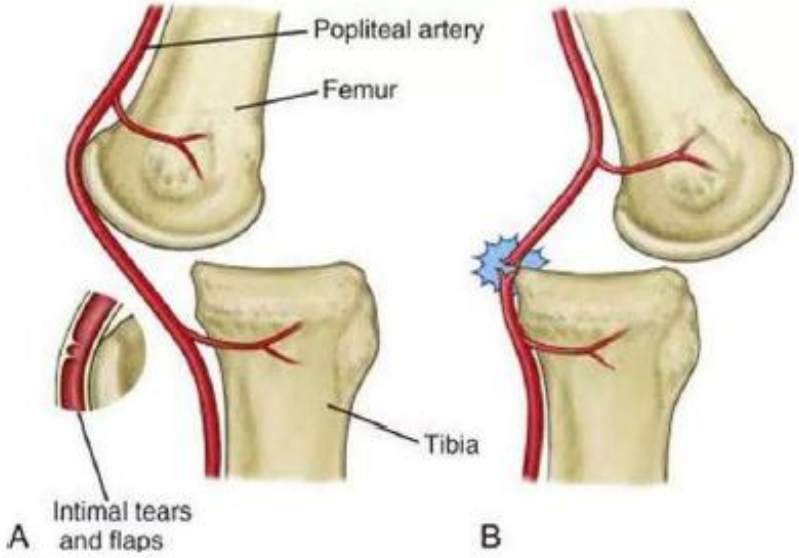
- Primary survey intact
- Initial secondary exam + palpable RLE pulse.
  - Obvious deformity of R knee
  - Sensation intact of distal RLE
  - Tenderness + edema present
- XR obtained, tibia displaced *posteriorly* relative to distal femur
- Repeat exam with no palpable pulse, intermittently dopplerable pulse
- Ketamine sedation and reduction at bedside → reported ***very difficult reduction***, thready DP pulse now weaker post-reduction

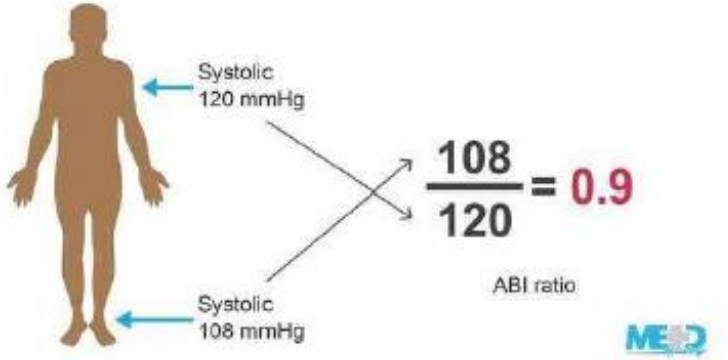
Lateral View R Knee

Property of Children's Hospital Colorado

PRESENTATION OF A POSTERIOR KNEE DISLOCATION

- Significant pain
- ✔ Soft tissue swelling
- Ecchymosis
- ✔ Ligamentous instability
- ✔ Obvious Deformity





EVALUATION OF A POSTERIOR KNEE DISLOCATION

2V Knee XR

Reduction + immobilizer placement at bedside

- If reduction fails, emergent OR

Reassessment & palpation of distal pulses

Urgent CTA Bilateral Lower Extremity with Runoff after reduction.

Vascular injury

- **PRESENT: emergent OR**
- NOT PRESENT: admit for NV checks

Case 1

ED, Cont:

- Repeat XR + CTA show recurrent dislocation with a **popliteal artery thrombosis**
- Heparin bolus and gtt started in ED
- ED to OR with Vascular + Ortho for reduction + external fixator + popliteal artery bypass

PICU + Surgical Floor:

- Admitted to PICU for q1h vascular checks, Heparin Drip + Aspirin, antibiotics x24h
- Tertiary exam with no additional injuries
- Pain controlled, PT Cleared, patient discharged home HD3

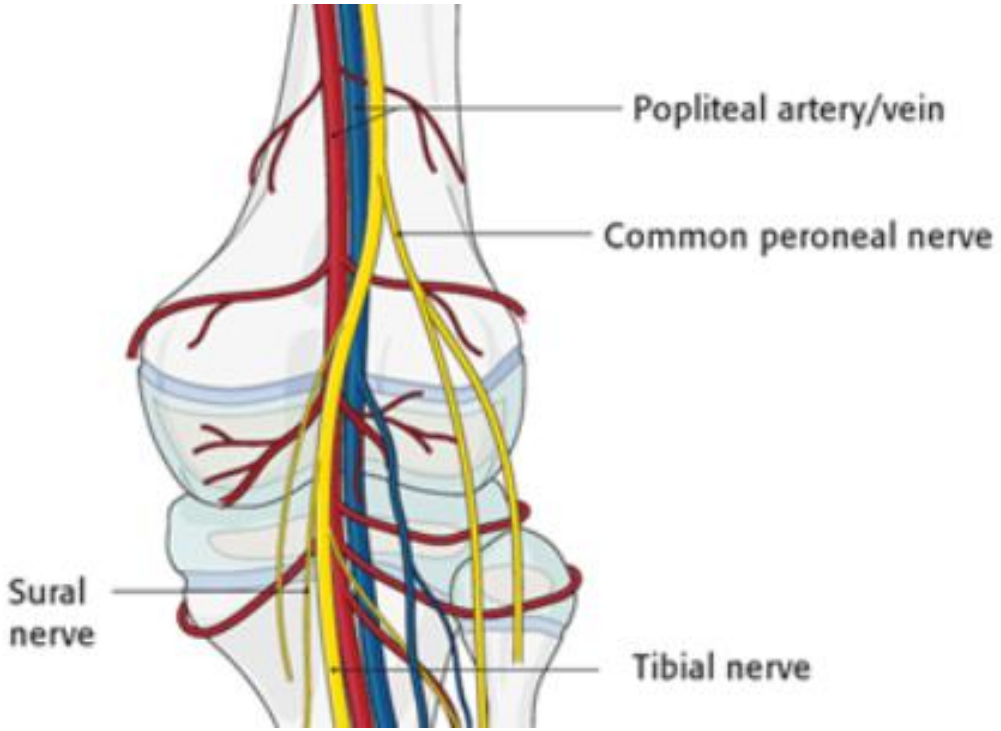
CTA

POSTERIOR KNEE DISLOCAITON ≠ PATELLAR DISCLOATION

- Patellar dislocations are NOT THE SAME
  - Popliteal bundle is posterior and *unaffected* by this injury
- Disarticulation of the patella bone from the patellofemoral joint
- 3% of knee injuries, 15-44% recurrence rate
- Spontaneous vs. closed reduction in the ED + Knee immobilizer
- F/U with Orthopedics as an outpatient
- No risk of vascular injury

POSTERIOR KNEE DISLOCATION INCIDENCE

- 0.02% of orthopedic injuries
- True incidence in pediatrics is unknown
  - Common mechanisms seen are high energy sports, trampolines, MVCs, and low-energy mechanisms in obese patients
- Popliteal artery injury: **1.6% - 30%**
  - Amputation rate 7-10%
    - Warm ischemia time of 6 vs. 8 hours makes huge difference in amputation rate
  - Risk of compartment syndrome 8.6%
- Peroneal Nerve Injury association **14% - 40%**



Key Takeaways:

📌 Posterior Knee Dislocation = High Risk for vascular injury

📌 Loss of distal pulse, even transient, is a red flag – act urgently

📌 Difficult reduction suggests ligamentous instability, with risk of re-dislocation

📌 Time = Tissue. Timely reduction, heparin, and surgical revascularization can preserve limb function

CASE #2
THE ATV ACCIDENT

- 14yo involved in ATV crash, reporting hit a "cable with sharp pieces on it." Patient walked home to parents holding neck with active bleeding.
- EMS called
  - Patient Awake, Alert, Active but unable to speak
  - Exposed trachea with minimal bleeding

Investigate a unique and serious injury pattern—"clothesline" neck/face lacerations—among children using ATVs

Seven confirmed cases involving children/adolescents (2–14 years; mean age 8).

Clothesline Injury Mechanism Associated With All-terra... Vehicle Use by Children

*James C... RN,† and Mary E. Aitken, MD, MPH**

In 5 of 7 cases, injury occurred when the child was driving an ATV across an open field and struck a low-hanging wire (e.g., fence or clothesline)

All patients suffered significant facial or neck lacerations, 5 required surgical wound exploration and closure in the OR, 1 with permanent functional impairment

Case 2

EMS Transport to Hospital:

- Interventions: BL 16g IVs, gauze over exposed trachea, Fentanyl, 15L Face Mask

Arrival to ED:

- GCS 12
- Tachycardic 110-120s, mild hypoxia ~85%, otherwise HDS
- Large lac across the anterior neck, dried blood
- Gurgling respirations, air coming from tracheal lac
- Emergent to OR for definitive airway

WHEN EVALUATING A NECK INJURY IN THE FIELD, WHAT SIGNS MIGHT PROMPT YOU TO SUSPECT CAROTID ARTERY INVOLVEMENT—EVEN IN THE ABSENCE OF EXTERNAL BLEEDING?

Case 2

Neck Exploration findings:

- Total tracheal transection at the first tracheal ring
- Esophageal wall disruption
- Right recurrent laryngeal nerve transected
- L laryngeal nerve with partial tearing and no clear continuity
- R carotid artery clotted off, no cephalad blood flow

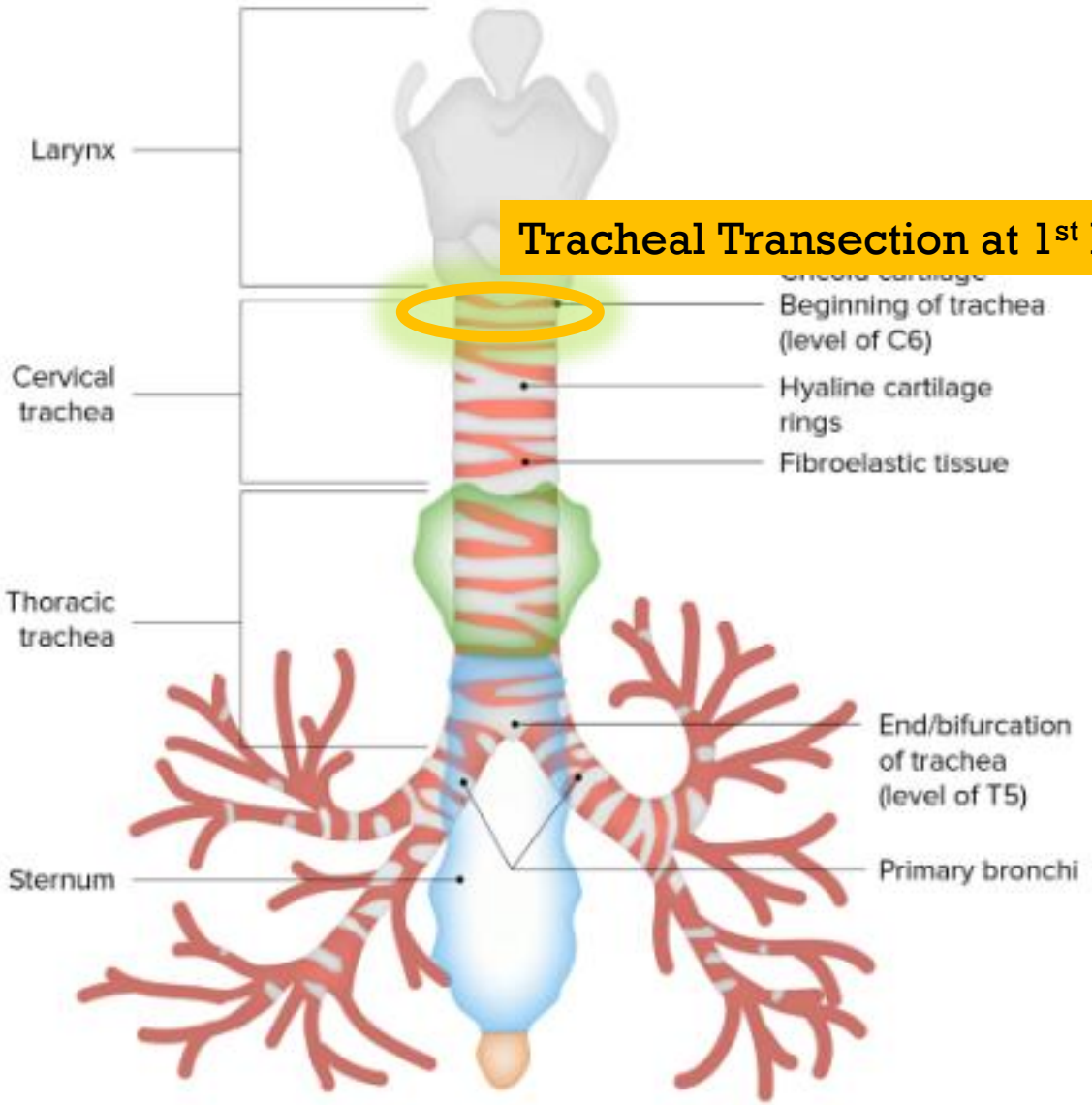
1st operative repair:

- Tracheostomy
- Laryngotracheal reconstruction
- Sternocleidomastoid rotational flap
- R Recurrent laryngeal nerve repair
- Closure of 15cm complex neck laceration and surrounding lacerations
- **R Carotid artery repair with saphenous vein patch**

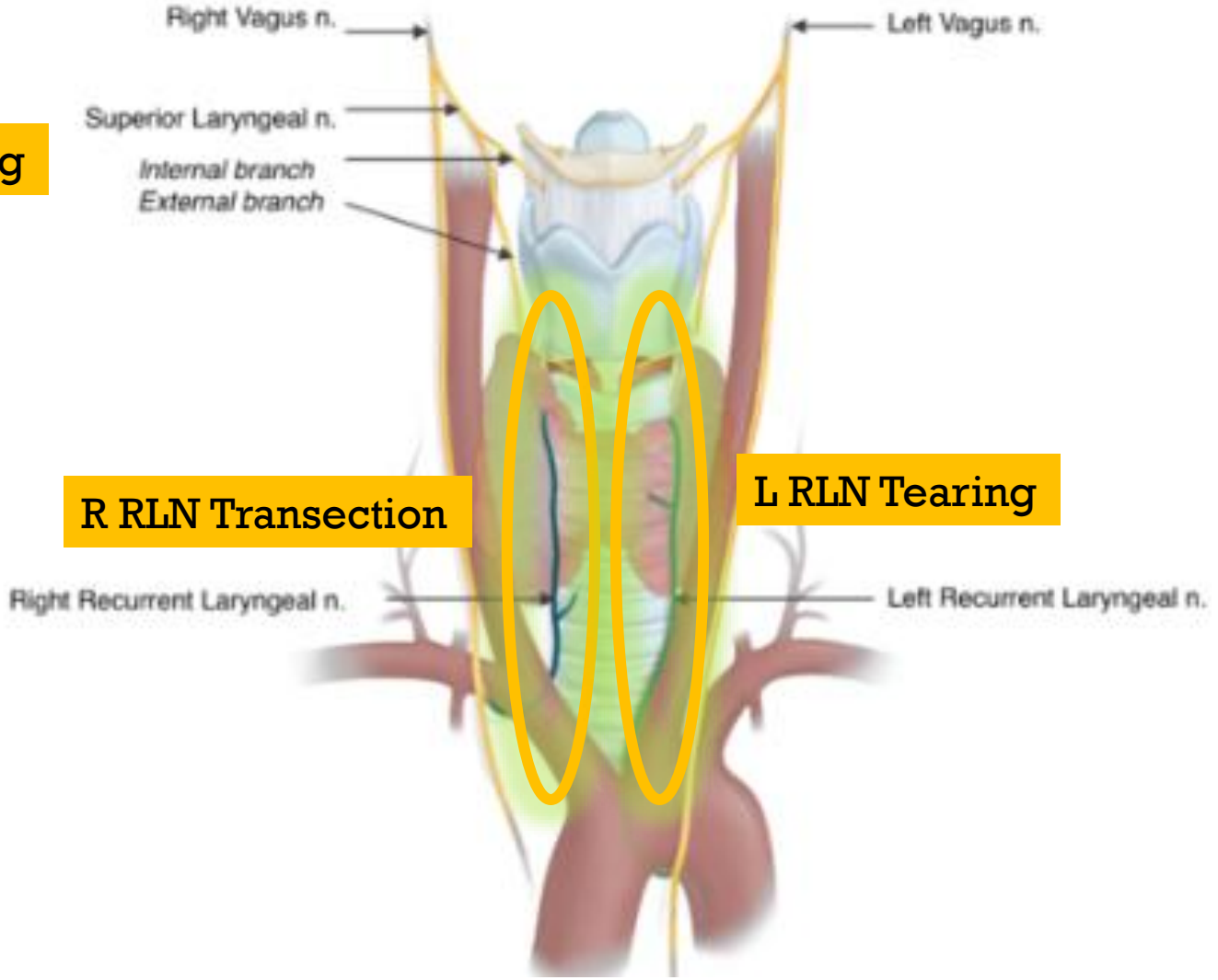
Total OR time: 8h 8m

CERVICAL TRACHEAL TRAUMA

- Complex injuries to aerodigestive tract are uncommon
- Rare in pediatrics due to added protection of large mandible, short neck, increased airway mobility, increased elasticity of the airway
- Heavily concentrated region with major nerves, blood vessels, esophagus, and trachea all within a relatively small space – potential to impact all



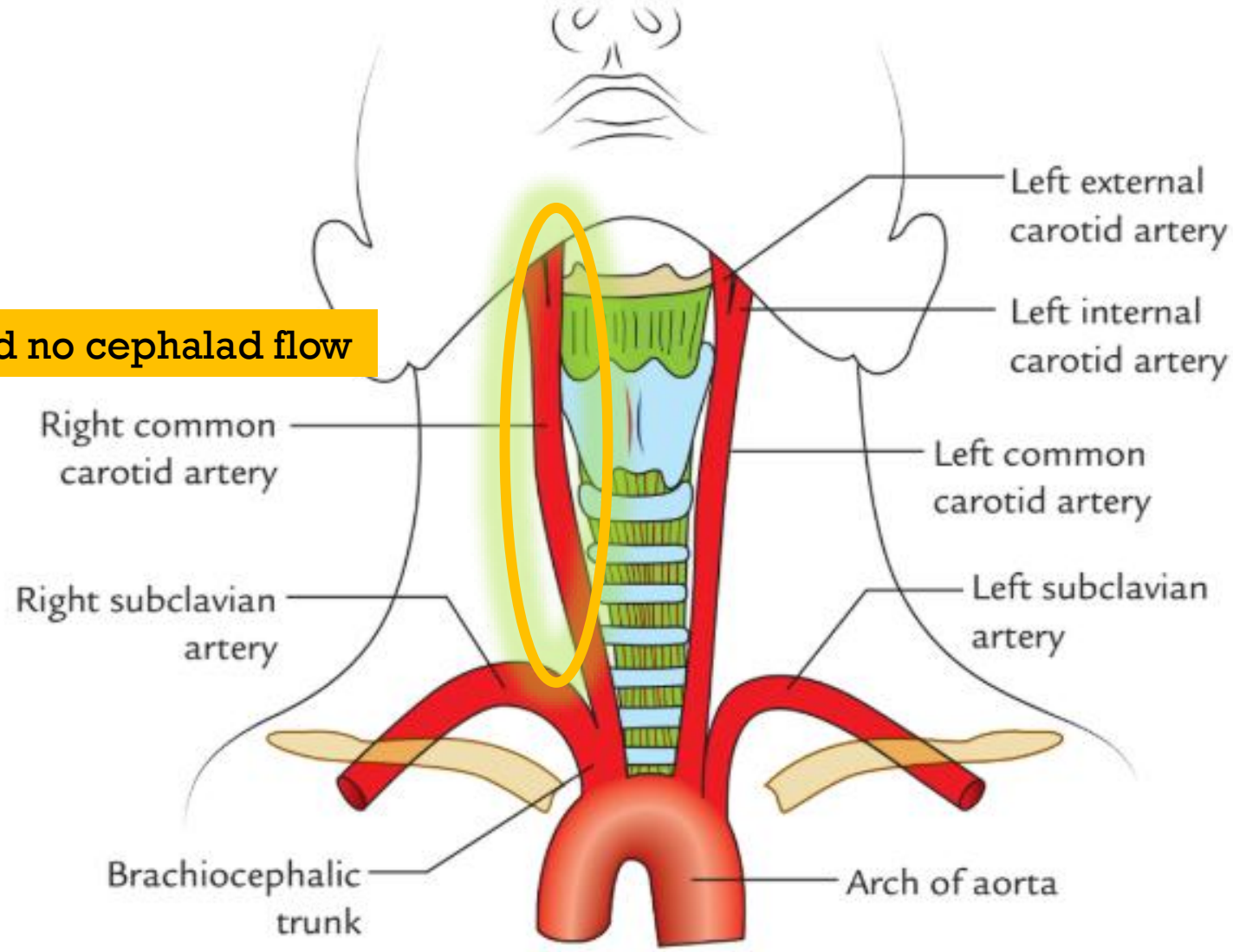
Tracheal Transection at 1st Ring



R RLN Transection

L RLN Tearing

R Carotid no cephalad flow



WHAT NEURO ASSESSMENTS WOULD YOU PRIORITIZE EVERY HOUR DURING THE FIRST 6–12 HOURS AFTER SUSPECTED CAROTID INJURY?

Case 2

First 72 hours:

1. Maintained C-collar and neuroblockade for 48 hours due to high-risk repair
2. Placed on EEG for stroke monitoring, started ASA and SQH
3. Significant purulent secretions from tracheostomy started HD 2
4. Temporal slowing on EEG developed HD 3 → Repeat CT/CTA → ……

R Parietal Stroke

BLUNT CEREBROVASCULAR INJURY

- Rare injury related to blunt trauma to the head, face, or neck
  - Intimal tear → thrombus, hematoma, occlusion, pseudoaneurysm
- Associated with stroke and high mortality rate
- Need prompt diagnosis and anticoagulation
- Risk in adults – 1-3%; 5-20% stroke risk
- Risk in pediatrics – up to 1.3%
  - Stroke rate may be as high as 29%
  - Mortality 3-19%

The smallest suffer stroke: Understanding stroke and treatment patterns in children with blunt cerebrovascular injury within the Trauma Quality Improvement Program database

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Case 2

PICU

- HD 13: MLB with airway repair intact, cords in paramedian position, NG tube removed GT placed, trach changed
- HD 16: Esophagram without leak, but aspiration noted. JP and NG tubes removed.

Transfer to Surgical Floor

- HD 20: repeat MRI with evolving R parietal lobe ischemia with no acute/new areas
- HD 24: MLB with intact airway
- HD 26: VFSS +aspiration with thin liquids
- HD 34: repeat MRI, unchanged; started capping trials
- HD 39: taking all food by mouth
- HD 48: MLB with concern for collapsed airway, improved following debridement of granulation tissue
- HD 49: tolerated capping trial all day
- **HD 49: Trach Bivona 5.0 successfully decannulated!!**

HD 50: Discharged home, tolerating regular diet with level 2 liquids PO

Key Takeaways:

📌 Oxygenate first, intubate only if you must

📌 Minimal airway intervention is often best until surgical help is available

📌 Time is brain: Don’t wait for neuro symptoms – preventative imaging and early initiation of anticoagulation saves brains

CASE #3
THE PANCREAS PEDALER

- 8yo fell off bike going 10mph, handlebars hit abdomen
- Initial presentation to OSH with abdominal pain. Admitted for serial abdominal exams
  - Initial Lipase 8542
  - CT Abdomen/Pelvis with missed pancreas transection
- Re-presented with abdominal pain, vomiting, poor appetite
  - MRI showing new large fluid collection in abdomen

How soon after injury can lipase rise, and stay elevated?

L.I.P.A.S.E

Lurking Injury Presents As Subtle Evaluation/Elevation

What does an elevated lipase indicate?

Case 3

On Arrival:

- Presented
  visible/pa
  appetite,
- CT + new l
- Lipase 9,6
- MRI + trans
  head and r
  duct injury
  fluid colle

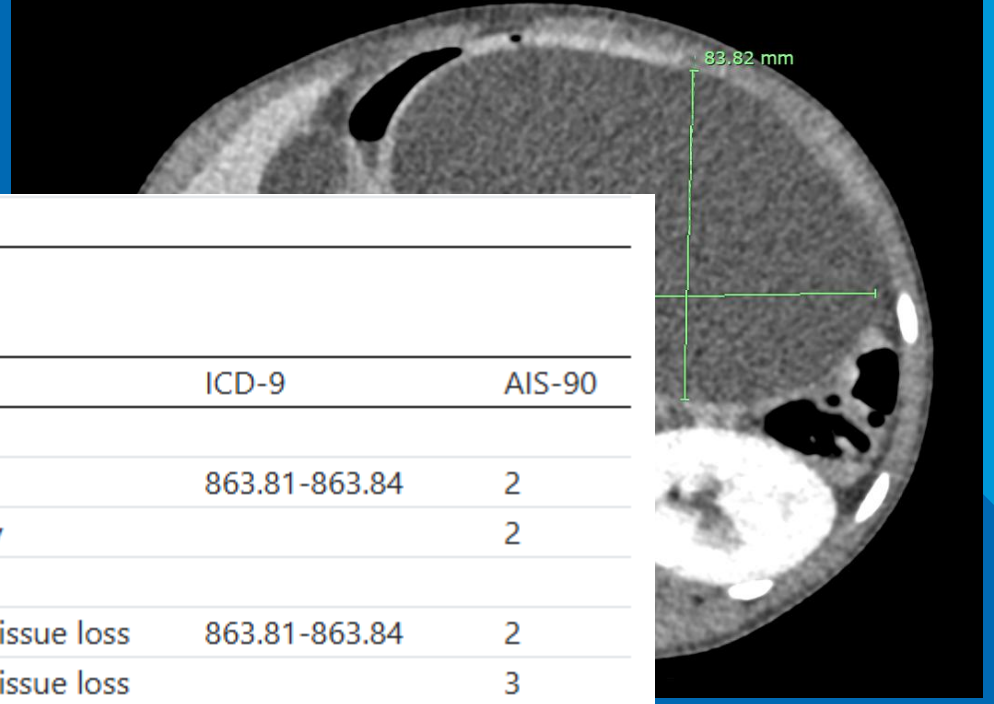
Table 10

Pancreas Injury Scale

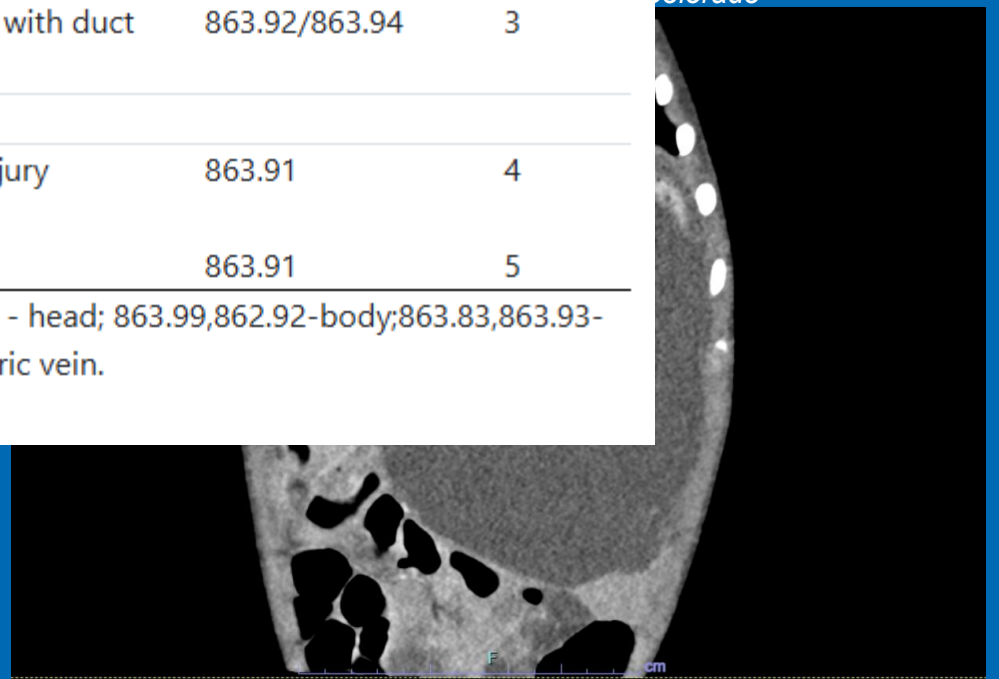
Grade*	Type of Injury	Description of Injury	ICD-9	AIS-90
I	Hematoma	Minor contusion without duct injury	863.81-863.84	2
	Laceration	Superficial laceration without duct injury		2
II	Hematoma	Major contusion without duct injury or tissue loss	863.81-863.84	2
	Laceration	Major laceration without duct injury or tissue loss		3
III	Laceration	Distal transection or parenchymal injury with duct injury	863.92/863.94	3
IV	Laceration	Proximal[?] transection or parenchymal injury involving ampulla	863.91	4
V	Laceration	Massive disruption of pancreatic head	863.91	5

*Advance one grade for multiple injuries up to grade III. *863.51,863.91 - head; 863.99,862.92-body;863.83,863.93-tail. [a]Proximal pancreas is to the patients' right of the superior mesenteric vein.

From Moore et al. [6]: with permission.



Colorado



Case 3

- **Endoscopic Intervention**: **ERCP** w/sphincterotomy and pancreatic duct stent
- **Pancreatitis management**: Antibiotics, 1.5x mIVF, pain control, anti-emetics, TPN nutrition
- **Surgical Intervention:** Cyst gastrostomy w/stent placement
- **Complication**: Ileus (new onset bilious emesis, increased abdominal pain), resolved
- LOS: 9d

MRCP	ERCP
"See Only"	"See and Do"
Diagnostic & **I**maging	**D**rainage & **I**ntervention
Non-Invasive	Invasive
Low risk of complications	Pancreatitis, perforation, infection
Centers with MRI Capability	Requires GI Physician with ERCP training, anesthesia and surgical support, endoscopy suite

PANCREATIC PSEUDOCYST

- Formed when disruption of the main pancreatic duct or its branches causes extravasation of pancreatic enzymes into the parenchyma, eventually forming a distinct collection
- Symptoms of pseudocysts: **NON-SPECIFIC**
  - Vague abdominal pain
  - Nausea
  - Vomiting
- Complications: **SPECIFIC**
  - Pseudocyst rupture (> 10cm)
  - Disruption of the pancreatic duct system
  - Infection
  - Hemorrhage

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Management of blunt pancreatic trauma in children: Review of the National Trauma Data Bank☆,☆☆

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- Largest sample of available trauma data in the US on pediatric pancreatic injuries
- Occurs in 0.3% of all traumas, 0.6% of all abdominal traumas within the NTDB
- Mortality 5%
- Morbidity 26.5%
- Higher grades of pancreatic injury and overall severity associated with operative pancreatic management

WHY SO DIFFICULT? 

- Anatomical Challenge: Deep location + minimal fat → "invisible" injuries
- Symptoms & Labs: Often mild and non-specific
- Imaging Limitations: CT misses duct injuries early (~50%)
- Delayed Detection → Worse Outcomes: Increased pseudocysts, longer stays
- Expertise Required: MRCP/ERCP and specialty resources not universal
- Low Incidence = Less Experience

You may *see* it here, but need to *treat it there*

🚨 Think Trauma. Think Tummy. Think Transfer 🚨