SURVIVING THE IMPACT: INSIGHTS INTO AOD AND STROKE AFTER MVA

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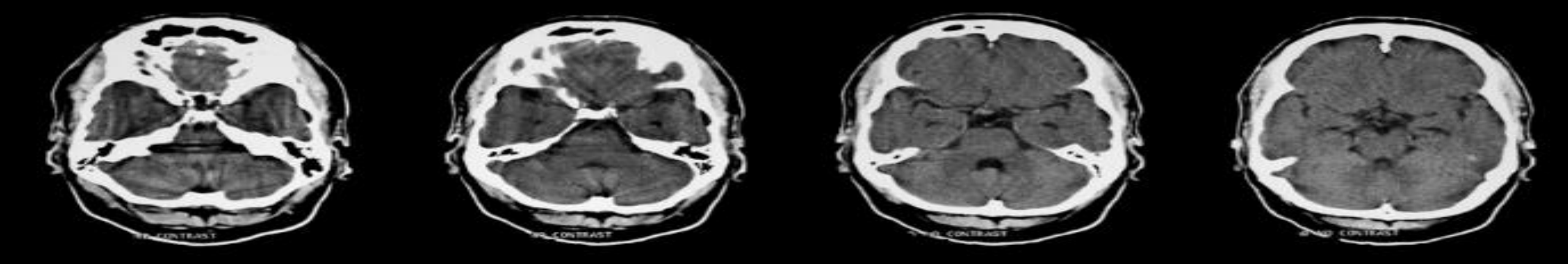


OBJECTIVES

- NO DISCLOSURES
- CASE REVIEW
- CARE CONSIDERATIONS
- COMPLICATIONS
  - Atlanto-Occipital Dislocation
  - Vasospasm & Middle Cerebral Artery Ischemic Stroke

ACCIDENT

- School Age Child
- Roll over MVA, 55mph
- Fatality from same row as pt
- Restrained- per EMS in a booster type seat
- Unknown extraction time

- **Pre-Hospital**
  - Unresponsive, pale, GCS 4
  - Pupils 4mm and 5mm, sluggish
  - BP 90/55
- **Outside Hospital**
  - Pupils 9mm, sluggish
  - BP 59/39
  - Mannitol Administered
- **Helicopter Transport**
  - Focused on serial neuro assessments instead of intubation
- **Trauma Hospital**
  - GCS 12, following commands
  - Pupils 4mm and brisk
  - BP 124/66

INJURIES

CT HEAD

- R Skull base fx
- Bilateral occipital condyle fx with 4 cm R-side displacement
- SAH surrounding basil ganglia and brainstem
- Intraventricular hemorrhage

CT NECK

- Extravasation of contrast to mediastinum
- CTA showed R IJ hematoma
- Concern for cranio-cervical instability

CT C/A/P

- Bilateral pulmonary contusions
- Grade 3-4 liver lac
- Small hemoperitoneum

CT THORACIC & LUMBAR

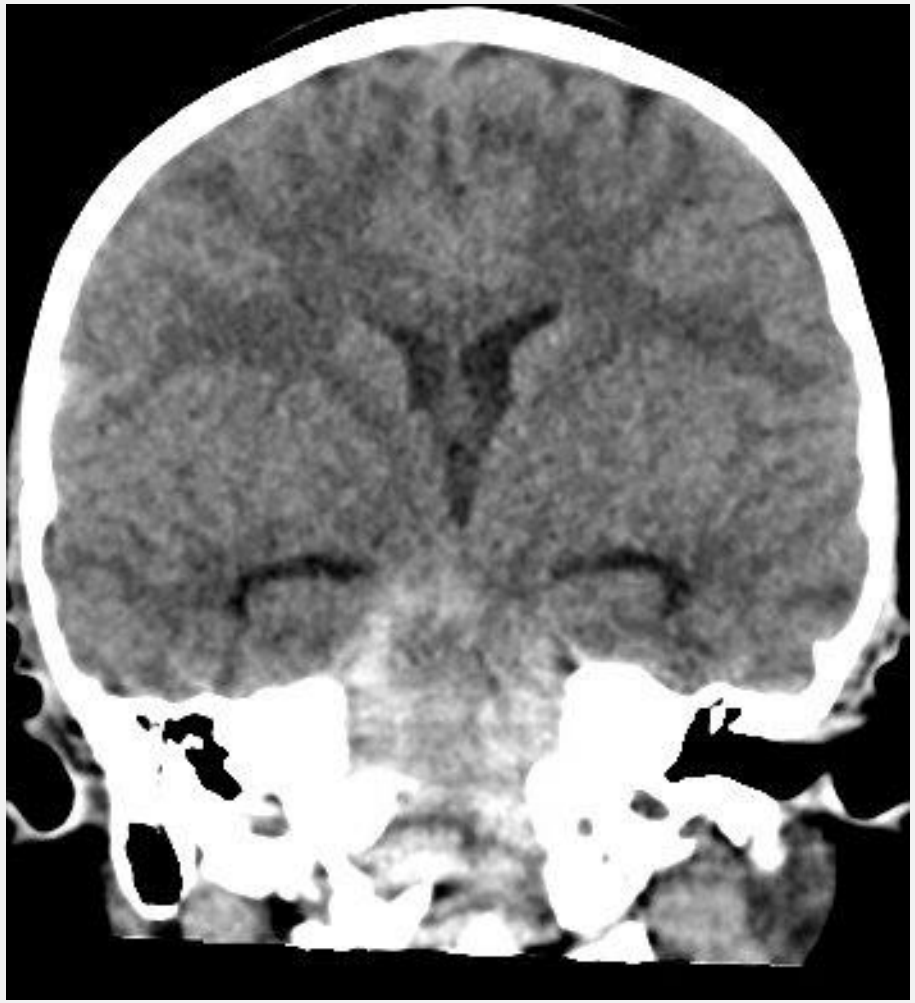
- Negative

MRI-

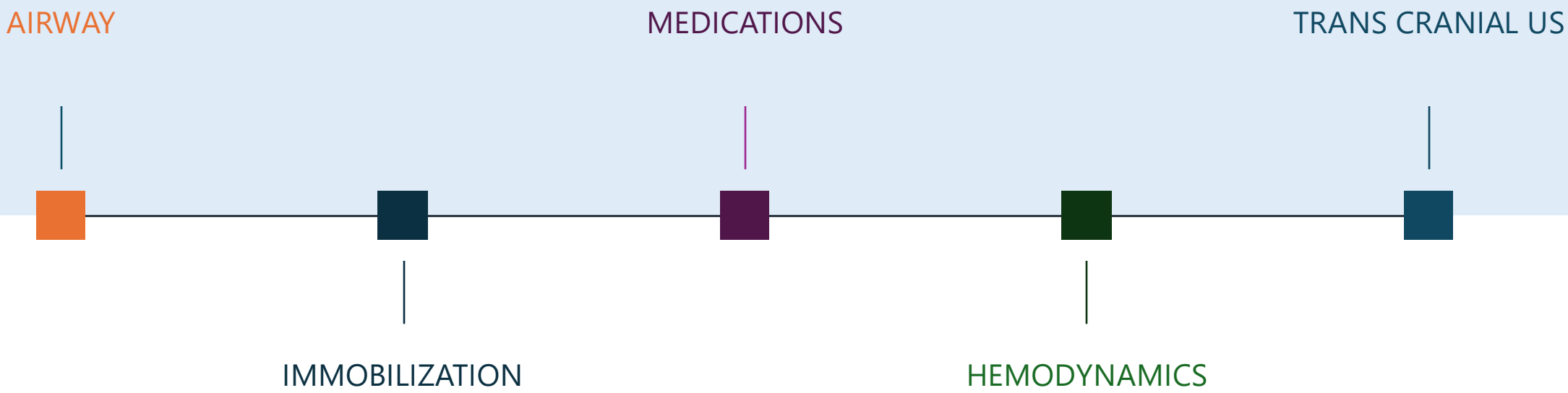
- Ligamentous Atlanto Occipital Dislocation (AOD)
- Rupture of the anterior atlantooccipital membrane
- FX T4, T5, T10, T12, L1-L3, & L5

EVENTS OVERVIEW

- DAY 1- Accident, PICU
- DAY 2- MRI, AOD Confirmed
- DAY 3- Halo placed
- DAY 6- Occipital to C2 fixation
- DAY 9- Failed extubation
- DAY 12- Changes noticed, Trach placed
- DAY 13- CT, Infarct Verified, Vasospasms Confirmed
- DAY 28- Transferred to Peds Floor
- Day 43- Transferred to Peds Rehab
- DAY 114- HOME!!!



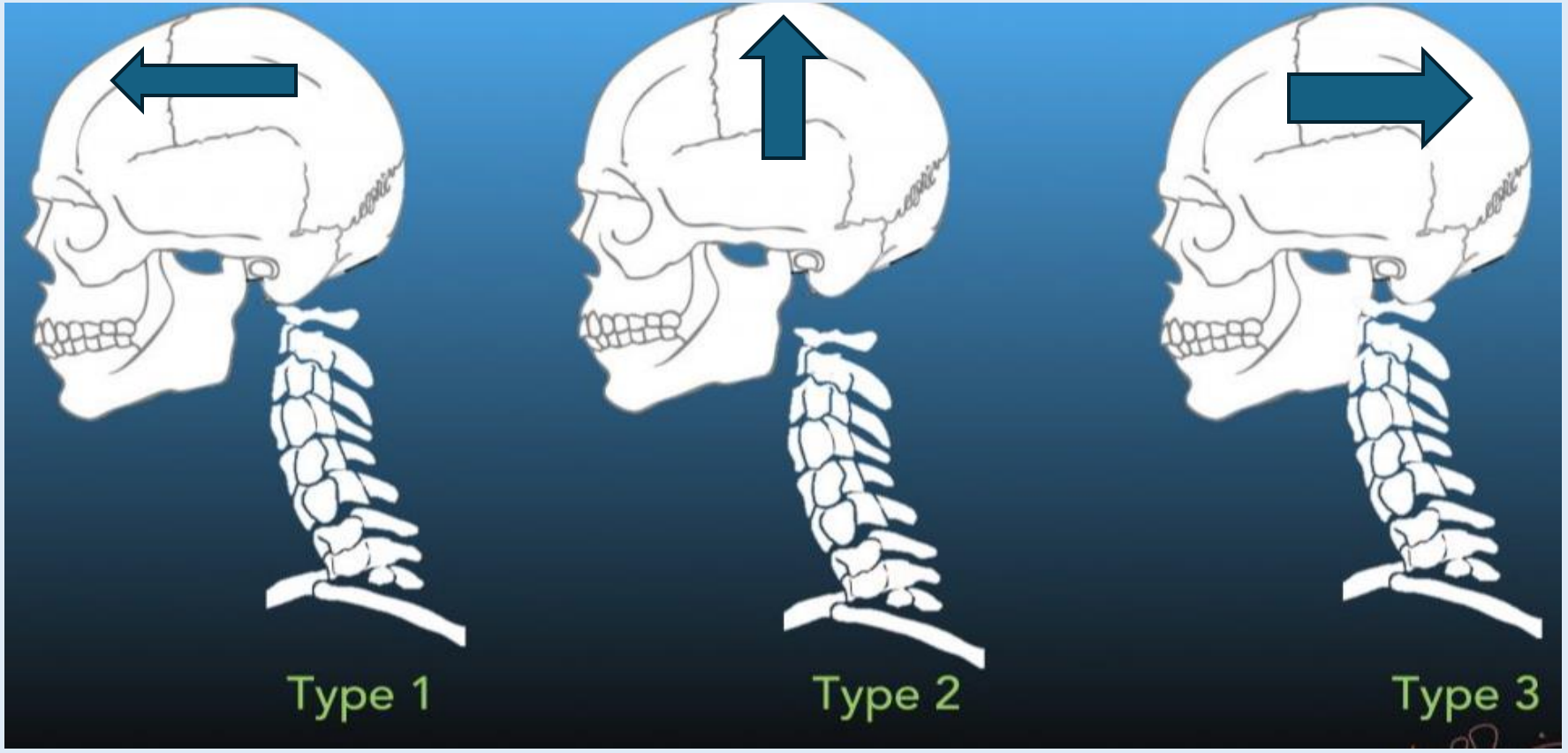
CARE CONSIDERATIONS



AOD

Atlanto-Occipital Dislocation

AOD is a highly unstable craniocervical injury, resulting from damage to ligaments and/or bony structures connecting the skull to the cervical spine. Results from the disruption of the tectorial membrane, alar ligaments, or transverse ligaments.



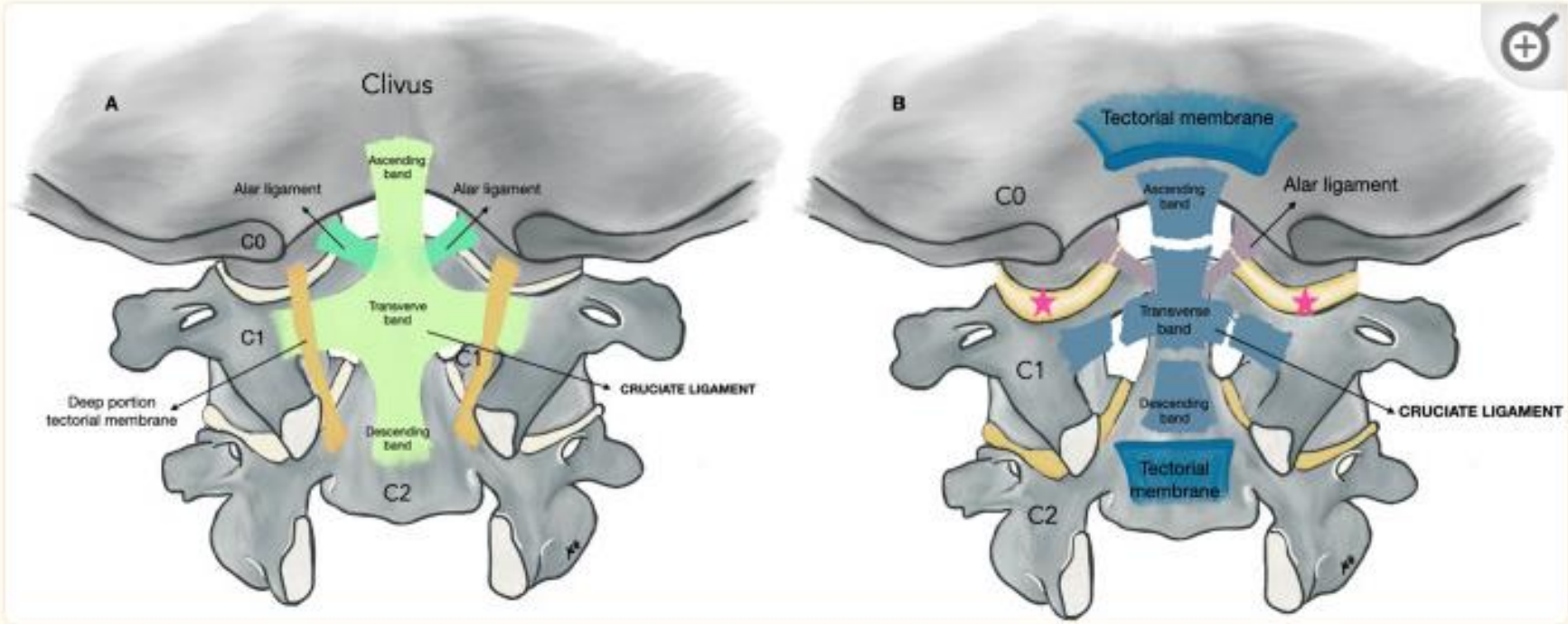


FIG. 5.

A: Normal anatomy of the CCJ. The cruciate ligament with the transverse, ascending and descending bands, the alar ligaments, are shown. **B:** AOD with disruption of the ligamentous structures; rupture of the tectorial membrane, cruciate ligament, and alar ligaments. Traumatic rupture of the C0–1 joint depicted with a *pink star*. Illustration by Marta Garvayo, published with permission.

AOD IN PEDIATRICS

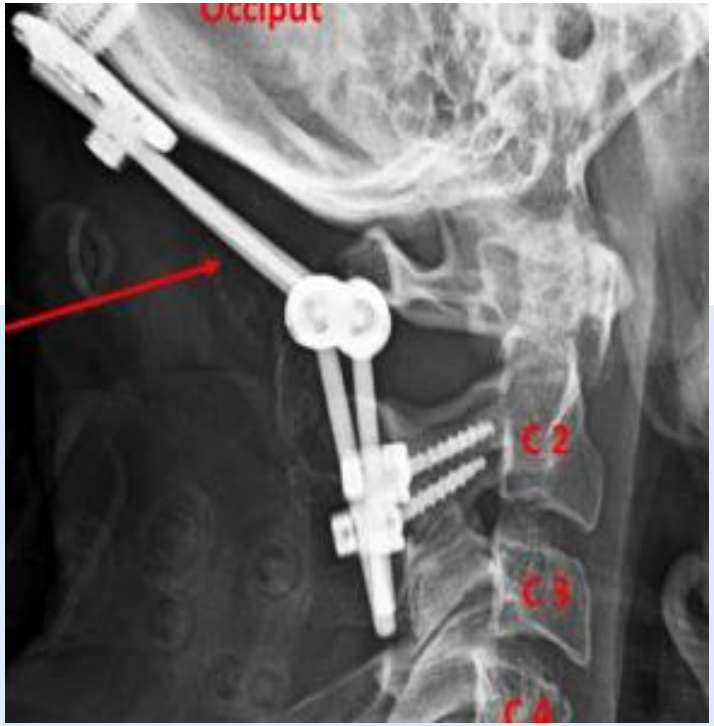
- Three times more likely in children d/t proportionally heavier heads, flatter AO joint, and softer ligaments connecting the bones.
- Suspect with high-speed mechanisms: MVC, peds vs. auto, skiing/snowboarding, motorized scooters
- On scene, low GCS or arrest. SAH around the brainstem or epidural bleed.
- The slippage can result in damage to the lower brainstem; controls breathing
- The nerves that innervate the diaphragm can also be damaged.
- Can be difficult to diagnose, c-collars and proper positioning at time of CT can make measurements falsely normal.

MANAGEMENT OF AOD

Internal fixation of Occiput-C2 is standard of care

Halo Immobilization

Traction contraindicated



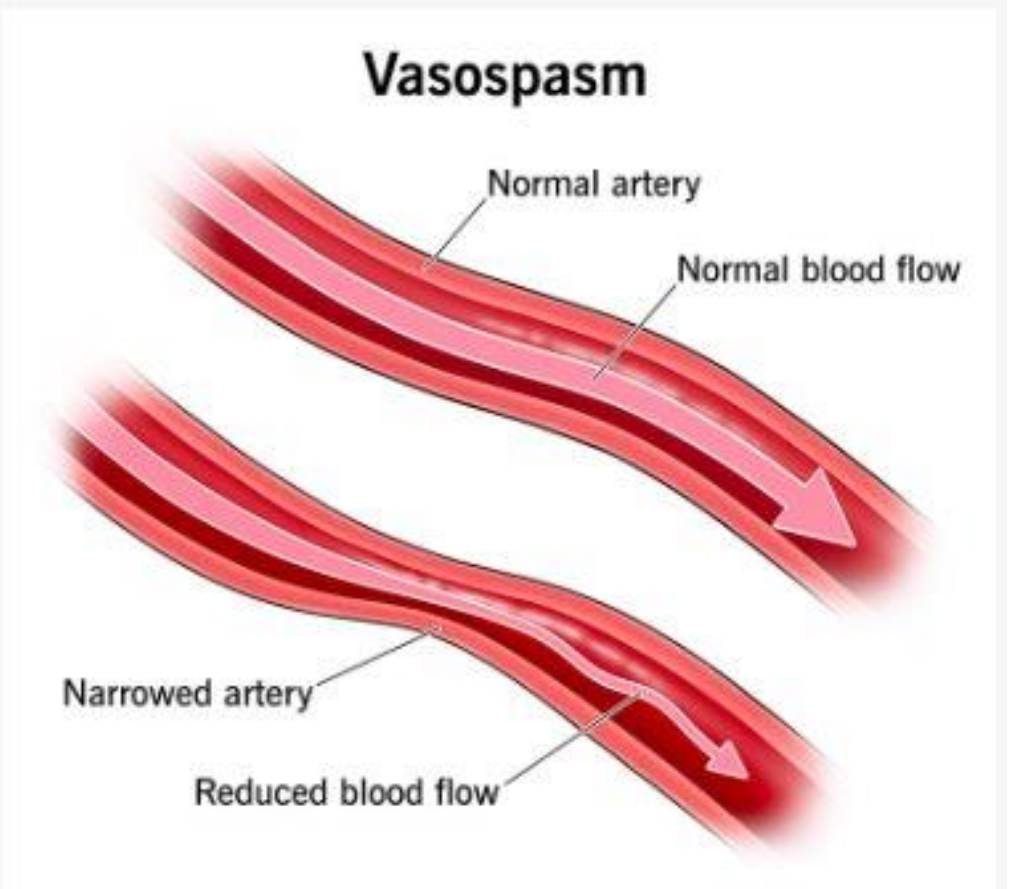
Case study of a 10-year-old with traumatic AOD was successfully managed with noninvasive halo immobilization for 3 months.

Severity, Age, Weight, and Other Injuries need to be considered

Case study out of Sweden looked at the technique of using muscle-preserving temporary internal fixation of Oc-C2 to preserve muscle function and help regain meaningful function.

POST TRAUMA VASOSPASM

- What is a Vasospasm??
- A vasospasm is a tightening of an artery that lasts longer than a normal constriction
- When your blood vessel is narrow, it reduces the amount of oxygen that reaches the organs and tissues it supplies
- Vasospasm develops in two-thirds of people post SAH
- One-third with vasospasm develop delayed cerebral ischemia 3-14 days post injury
- Multiple reasons
  - The trauma itself, inflammatory process, increased ICP



POST-TRAUMATIC CEREBRAL INFARCTION

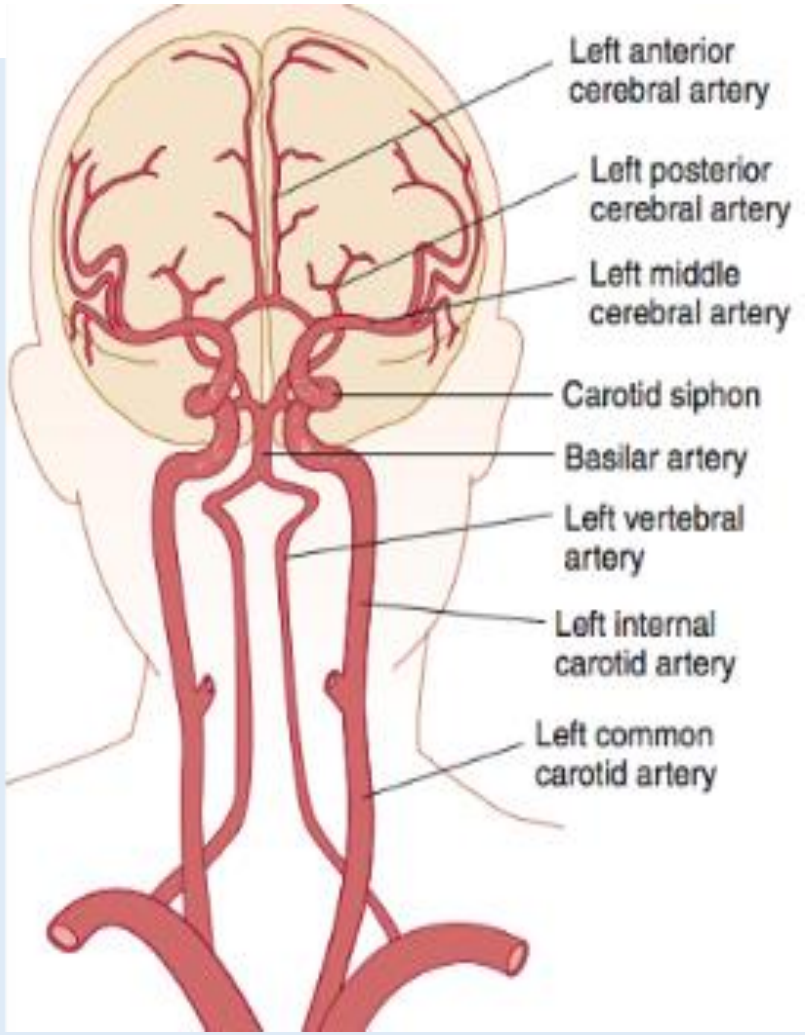
Largest identified risks

Low GCS score on presentation

Cerebral herniation

Cervical artery dissection

Post-traumatic vasospasm



MANAGEMENT

- Vasospasm
  - Serial TCU
  - Assessments/Communication
  - Systemic vasodilators contraindicated
  - Administer directly at site of vasospasm

- Permissive Hypertension
- HOB 30 degrees
- 3% Hypertonic Saline
- Following your organization's stroke protocol or flowsheet

WHAT HAPPENS WHEN THEY GO HOME?

- CONTINUED TREATMENT:
  - PT, OT, SLP
  - Trach, Respiratory Supplies if needed
  - Home Modifications
  - G-Tube, Eating/Food Support
  - Medications

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Thank You!

Questions?