Head And Neck Trauma

Alison Ruiz, PA-C

Case Presentation

- 60 y/o WF presents with the CC of severe headache
- Started this morning and has become significantly worse in the past hour.

History

- She is difficult to talk to and very irritable. When you ask her a question, she is uncooperative and is not answering your questions. Head pain didn’t start until today. Tripped and hit head getting out of car yesterday but denies head pain other than bump on head yesterday. She is awake and oriented times 3. She is moving in the bed and won’t sit still.

Physical Exam

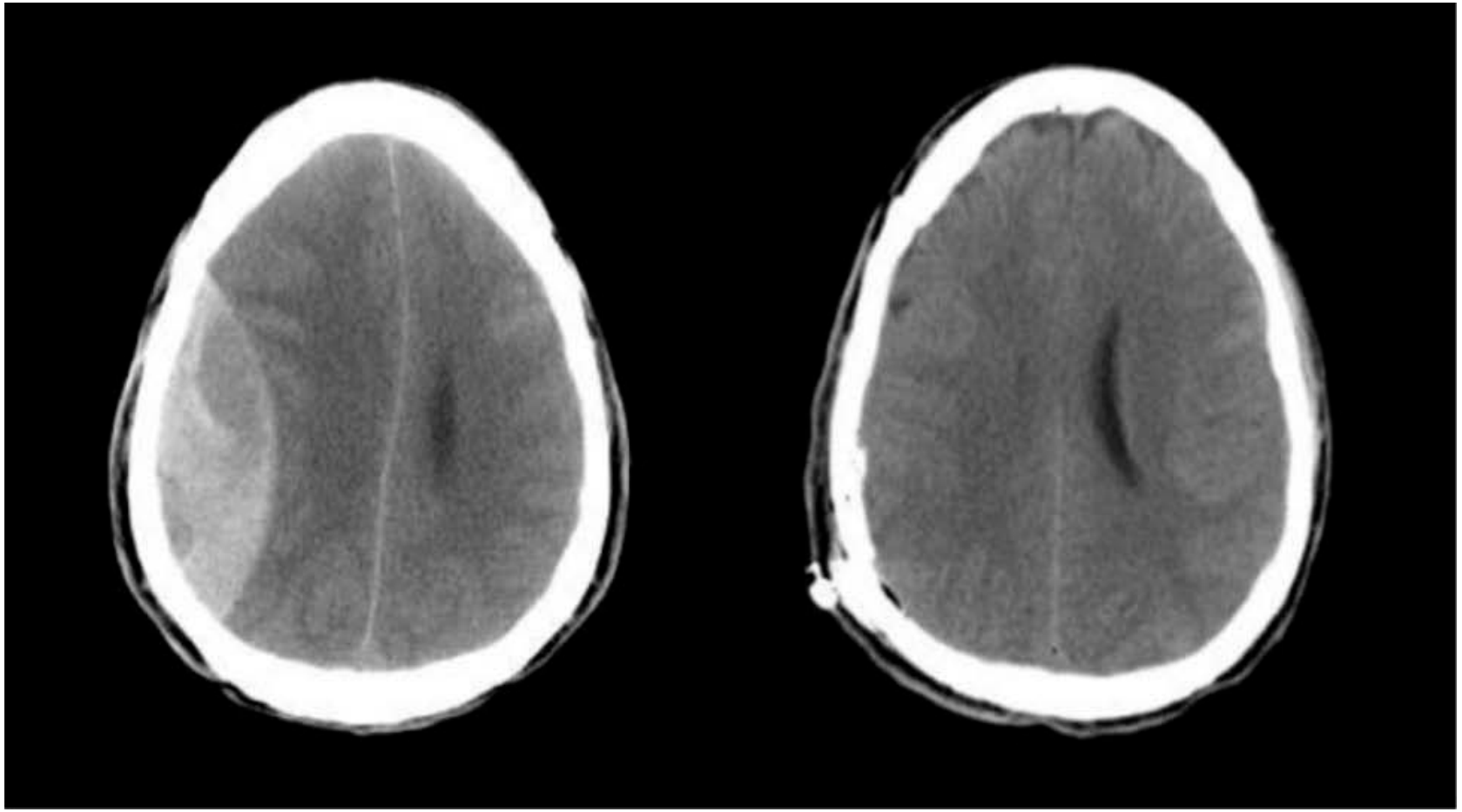
- Vital Signs: T: 98.9 orally, BP: 200/90, HR 90, RR 20
  - HEENT: hematoma to the rt parietal area of scalp. PERRL, EOMi, TMs clear bilat
  - Neck supple full rom.
  - Lungs: CTA bilat. No W/R/R
  - CV RRR s1s2
  - Abd: soft NT ND NABS
  - Ext: No C/C/E
  - Neuro: CN II-XII grossly intact, Muscle strength 5/5 UE and LE bilat.
    - Pronator drift negative, finger to nose WNL, reflexes 2+ bilat patellar tendon, brachioradialis, triceps, achilles bilat.
    - Rhomberg unable to assess
    - Gait: unable to assess
    - Stroke scale unable to assess, speech WNL, GCS all WNL

Differential Diagnosis

- **Brain hemorrhage (likely from trauma)**
- Migraine
- Tumor
- Infection
- Stroke

Imaging

- CT head



What is Diagnosis

- Epidural hematoma

Work up/Labs

- CBC
- BMG
- Cardiac Markers
- EKG
- PT/PTT
- CXR

Management

- Immediate Neurosurgery consult
- ABC assessment
- Trauma Assessment
- Possibly transfer patient
  - Hospital dependent
  - Admit to ICU

- Medications
  - IV fluids to maintin cerebral perfusion pressure
  - Osmotic diuretic
    - Lower ICP and cerebral edema

Pathophysiology Head Trauma

Primary phase

- Cell death as a direct result of trauma

Secondary Phase

- Cell death from compressive forces that happen weeks after the injury

Evaluation and Management

Goal is to correct and prevent

- Hypoxemia
- Hypotension
- Anemia
- Hyperglycemia
- Hyperthermia
- Evacuation of the intracranial masses is critically important

Evaluation and Management

Maintain Cerebral perfusion pressure (CPP)

- Must maintain a BP of 90 mm HG in order to maintain CPP.

ABCs

- Hypoxia increases mortality
  - Aggressive airway management
- Improved BP resuscitation decreases mortality.
  - Aggressive fluid resuscitation
  - Hypertension is a critical indicator of increased ICP in pt with head injury.
    - Cushing Reflex: is a physiological nervous system response to increased intracranial pressure (ICP) that results in Cushing's triad of increased blood pressure, irregular breathing, and a reduction of the heart rate

Evaluation and Management

Disability and Neuro exam

- AVPU: Alert, verbal commands, painful stimuli, or unresponsive
- GCS- less than 9 is considered severe TBI, moderate 9-13 and mild 14-15.

Assess LOC, vomiting, seizure activity, hx of anticoagulate use, mental status assessement

- If Altered mental status
  - Consider hypothermia, inhalation injuries and toxic exposures.

Spectrum of brain injuries

- Mild, moderate, severe
- Use this to determine imaging choice and d/c versus admission.

Clinical Findings of ICP

- Unilateral or bilat dilated pupils, hemiparesis, motor posturing and progressive neruo deterioration determined by repetitive AVPU and GCS

Treatment

- Mannitol
- Manage BP
- Neurosurgery consult

Skull Fractures

Basilar Skull Fracture

- Signs include otorrhea or rhinorrhea (leakage of CSF)
  - Mastoid ecchymosis (Battle signs)
  - Periorbital ecchymosis (Racoon Eyes)
  - Hemotympanum
  - Vertigo
  - Decreased hearing
  - Seventh Nerve Palsy
  - Anisocoria

Brain Herniation

- Uncal herniation is the most common
- 3rd cranial nerve (oculomotor) compression may occur causing ipsilateral fixed and dilated pupil

Hemmorhage and Hematomas

Subarachnoid hemmorhage (bleeding from subarachnoid vessels from trauma)

- Headache, photophobia, mild meningeal signs
- Seen along the ventricles, falx and tentorium and circle of willis on CT scan
- Use of Nimodipine reduces death by 55%.

Epidural (LENS SHAPED)

- Arterial blood collecting between the skull and dura
- Lucent period follwing immediate LOC after significant blunt trauma with patient awakening prior to again falling unconscious
- Treatment: neurosurgery consult to evacuate clot

Subdural (CRESENT SHAPED)

- Acceleration/deceleration of brain parenchyma, tearing bridging veins
- Treatment: neurosurgery consult: surgery depending on severity

Penetrating Injury

- GCS less than 5 approach 100% mortality
- Trauma/Neurosurgery consult

Concussion

Pathophysiology

Cortical contusions due to coup and contrecoup injuries.

While axonal rupture from shear and tensile forces can occur at the time of severe head injury, milder degrees of axonal damage are postulated to play a role in mild traumatic brain injury (TBI).

Signs and Symptoms

Confusion and Amnesia

- Sometimes with, but often without a preceding loss of consciousness
- The amnesia almost always involves loss of memory for the traumatic event
  - But may include loss of recall for events immediately before (retrograde amnesia) and after (anterograde amnesia) the head trauma

Headache

Signs and Symptoms

Dizziness

- Vertigo or imbalance
- Lack of awareness of surroundings
- Nausea and vomiting.
  - May progress over hours or days to
    - Mood
    - Cognitive disturbances
    - Sensitivity to light and noise
    - Sleep disturbances

Physical Findings

Vacant stare

Delayed verbal expression

- Slower to answer questions or follow instructions

Inability to Focus

Disorientation

- Walking in the wrong direction
- Unaware of time, date, place

Slurred or incoherent speech

Physical Findings

Gross observable incoordination

- Stumbling, inability to walk tandem/straight line

Emotionality out of proportion to circumstances

- Appearing distraught/crying for no apparent reason

Memory deficits

- Repeatedly asking the same question that has already been answered
- Inability to memorize and return three of three words and three of three objects for five minutes

Physical Findings

Loss of consciousness

- Coma, unresponsiveness to stimuli

Associated Transient Cortical Neurologic Deficits

- such as global amnesia or cortical blindness, can occur.
  - Thought to be secondary to vascular hyperreactivity and may be trauma-induced, migraine-equivalent phenomena.

Imaging

CT Brain

- MRI is more sensitive in showing small areas of contusion or petechial hemorrhage, axonal injury, and small extra-axial hematomas

Who Should Get a CT Brain?

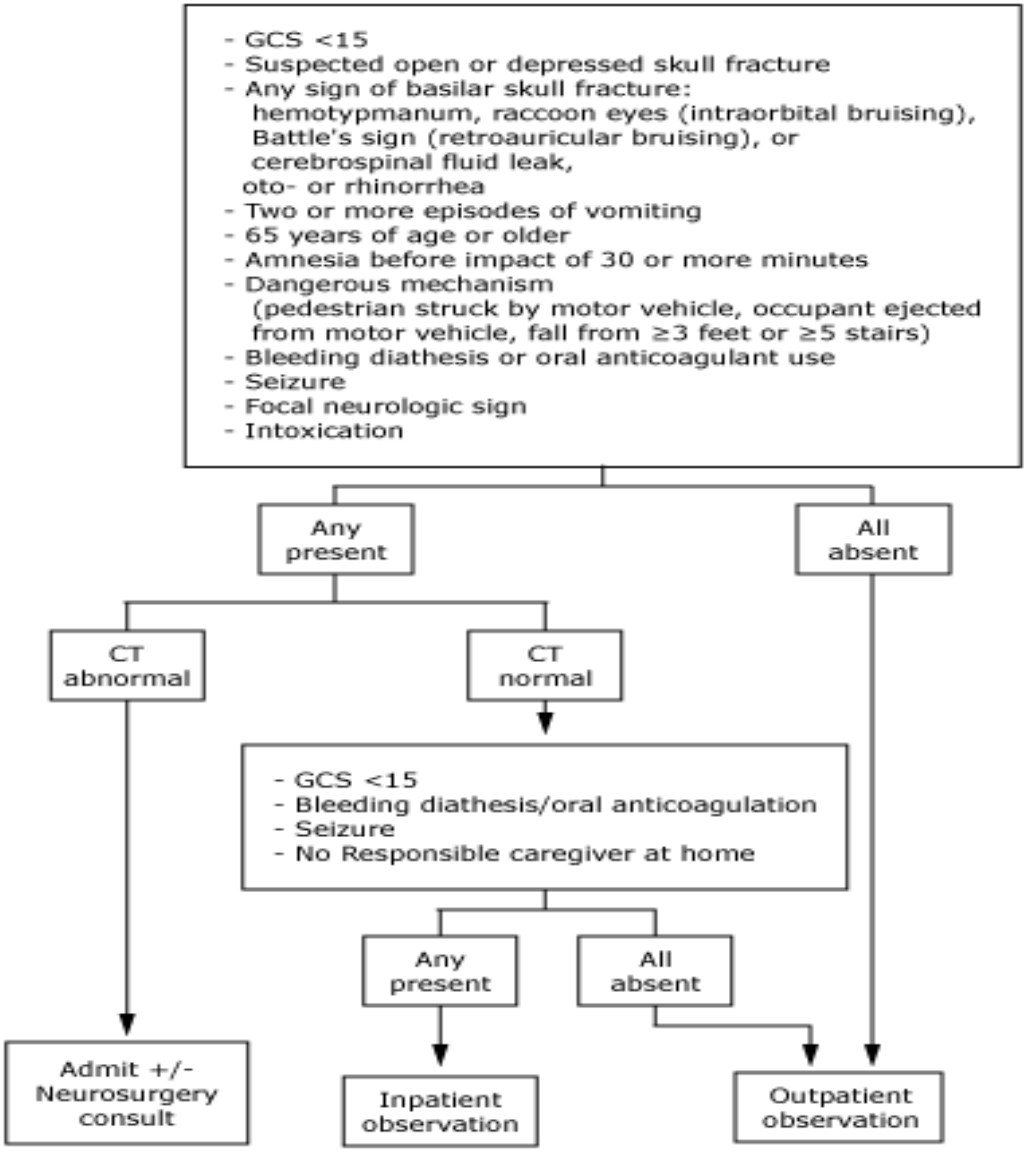
Canadian CT head rule and the New Orleans criteria

- Used to determine who gets a head CT

Algorithm

- next slide

Acute evaluation and disposition of patients with mild TBI



Data from: Vos, PE. Eur J Neurol 2002; 9:207 and Borg, J. J Rehabil Med 2004; S43:61.

Complications

Seizures

- Children, alcoholics and those with intracranial hematomas have a 30% risk of post traumatic seizures.
- Management is the same in the ER as nontraumatic seizure patients seen in the ER

Complications continued

Concussion and Postconcussive Syndrome

- Alteration of cerebral function from a force to the head resulting in one or more of the following
  - Light-headedness, Vertigo, Headache, N/V, Photophobia, Cognitive or memory dysfunction, Tinnitus, Blurred vision, Diffiiculty concentrating, Amnesia, Fatigue, Personality Changes, Balance Disturbance.
- When athletes present with symptoms of concussion, they should be referred for testing prior to being cleared to return to sports.

How to Read A CT Brain

Density and Appearance of Tissue on CT Brain

- Black----------→White
  - Air, fat, CSF, white matter, gray matter, acute hemorrhage, bone (get whiter as go to the right)
- Ventricles (dilation or compression)
- Bone (Fractures)
- Blood and its location

How to Read A CT Brain Continued

Infarct

- Non-hemmorhagic do not show on CT for 12-24 hours

Tumor

- Appears hypodense
- 70-80% will show on CT
- Usually edema present

Abscess

- Ill-defined hypodensity on a non-contrast CT.
- Ring enhancement present with IV contrast

Case presentation

- 48 y/o M car CC Neck Laceration/Neck Pain

History

- Pt was riding his bike at night and person opened car door and hit him in neck. Pt was knocked off of his bike. Pt c/o laceration to the neck. Denies LOC. Was wearing helmet which is intact now. Denies cervical pain. C collar in place. Laceration bleeding. Denies numbness, tingling or weakness.

Primary Survey

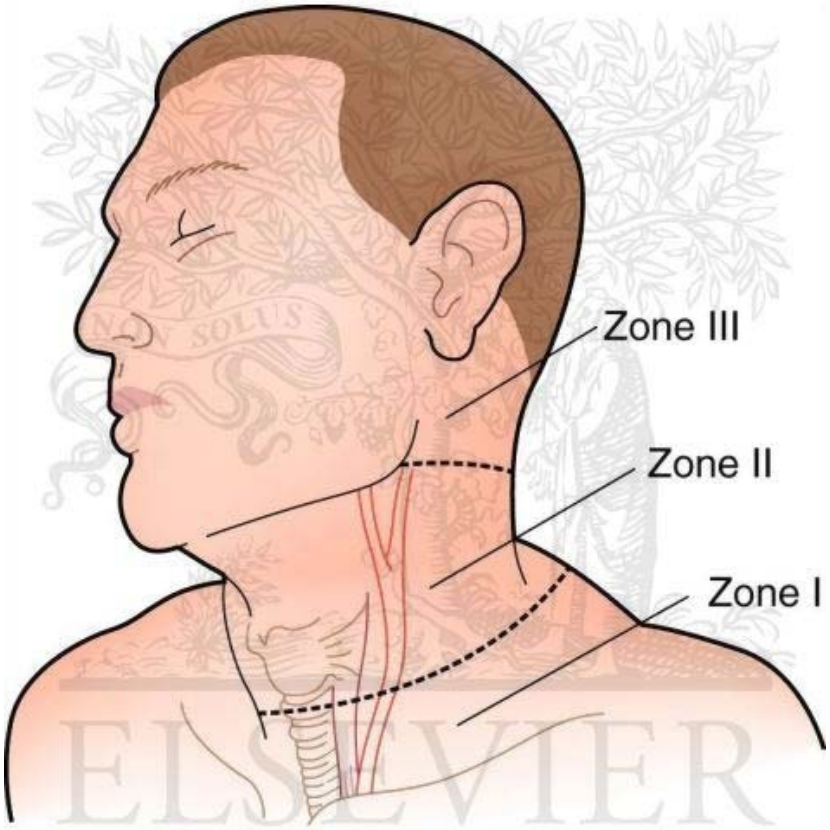
- ABCDE
- Airway
  - Currently patent.
  - No stridor, no crepitus
- Breathing
  - Speaking in full sentences
- Circulation
  - Skin pink and warm
- Disability
  - No neuro deficits
- Exposure
  - Neck laceration present

Physical Exam

- Physical Exam: Vitals: T: 98.4 po, BP 110/48, HR 100, RR 22
- HEENT: NCAT, PERRL EOMi TMs clear bilat.
- Neck: c collar in place 5 cm laceration to the left side of neck. Bleeding is minimal now
- Lungs; CTA bilat. NO W/R/R
- CV RRR s1s2
- Abd: soft NT ND NABS No HSM, No CVAT
- Ext: MAEW times 4. Nontender full rom.
- Neuro: CN II-XII grossly intact, Muscle strength 5/5 UE and LE bilat. Reflexes 2+ bilat Patellar tendon, achilles, brachioradialis, triceps biceps, GCS 15
- Skin: clear

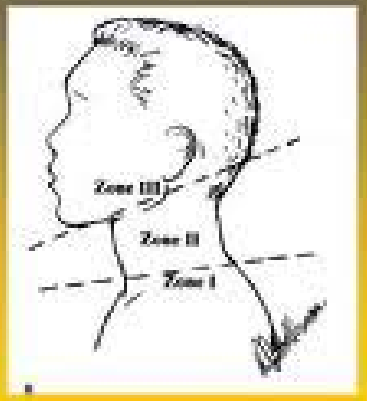
Neck laceration- What Zone is this?

Pathophysiology



Zones of the neck

- Zone I
  - Inferior aspect of cricoid cartilage to the thoracic outlet
- Zone II
  - Cricoid to angle of mandible
- Zone III
  - Angle of mandible to the base of the skull



What to do next?

- Imaging
  - CXR
    - To visualize the upper chest and lower neck
  - CT C spine to clear c collar
  - CT neck angiography to assess vessels
- Surgical/Trauma consult

Differential Diagnosis

- Vascular injury
- Bony injury
- Digestive injury
- Neurologic injury

Landmarks

If the platysma is disrupted then evaluate further

Major vascular and aerodigestive structures are located in the anterior triangle

- Deep to the platysma

Penetrating injuries to the posterior triangle should raise concern about trauma to the c spine or spinal cord

Presenting Symptoms and Physical Findings

If the platysma has been violated, it must be assumed that significant injury has occurred

- Do not probe the neck in these cases
  - May disrupt hemostasis

Airway injury

- Dyspnea, hemoptysis, subcutaneous air, stridor, hoarseness and dysphonia

Hard signs of vascular injury

- Bruit, thrill, expandng or pulsatile hematoma, pulsatile or severe hemorrhage, pulse deficit

Presenting Symptoms and Physical Findings

Soft signs of Vascular injury

- Hypotension and shock, stable, non-pulsatile hematoma, and CNS ischemia, proximity to major vascular structure

Esophageal injury

- Subcutaneous air, crepitus, dysphagia, odynophagia, drooling, hematemesis.

Labs/Imaging

Conventional Angiography

- For vascular injury

CT angiography

- Patients without an obvious immediate need for operative intervention

Esophagoscopy

- Combined with contrast studies has 100% sensitivity for esophageal injuries

Treatment

Internal Jugular Vein Injury or Possible Air Embolus

- Place patient in trendelenburg

Esophageal Injuries typically require surgery

Cervical Spine Injuries

- Early fracture stabilization and fixation

Pearls

- Nexus Study
  - Unstable cervical fractures and spinal cord injuries are extremely unlikely if
    - Pt is alert and awake
    - Is not intoxicated
    - No signs or symptoms of neuro injury
    - No spinous process tenderness (midline tenderness)
- Thorough vascular and esophageal evaluation is required if any abnormalities are evident.
  - Radiographs do NOT rule out esophageal injuries.
- Airway management is crucial
- Must do a thorough neuro exam
- Gold Standard for diagnosis of vascular injury is conventional angiography
- Admission criteria: organ damage and penetration of the platysma muscles.