Treatment of Traumatic Hemorrhagic Brain Injury

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Who gets a traumatic “bleed”?
- Motor vehicle occupants
- Elderly
- Infants
- Athletes
- Victims of domestic violence

Hemorrhage Compartments
- Extracranial
  - Scalp, face
  - Galea
  - Sinuses
- Intracranial
  - Epidural
  - Subdural
  - Intraparenchymal (Contusion)
  - Subarachnoid
Extracranial Blood Collections
- Subgaleal hematomas
- Scalp hematomas
- May directly overly intracranial pathology
  - Coup injury
- May lie opposite intracranial pathology
  - Contrecoup injury

Intracranial Compartments
- Epidural
- Subdural
- Mixed epidural and subdural when dura torn
- Intraparenchymal
- Intraventricular
- Subarachnoid

Extracranial Hemorrhage Treatment
- Compression (wrap head) treat other injuries
- Can be life-threatening in children
- Repair by ER Dr, General or Plastic Surgeon
- Treat pain, apply ice
- Other bodily injuries can be treated first and scalp can be closed anytime in first 24 hours in adults; Take it to the OR if there is road rash in it or if closure is delayed
Intracranial Hemorrhage Treatment

- Usually requires neurosurgical evaluation
  - Occasionally requires emergent surgery
- Neurology evaluation adequate in some situations (obviously small collections)
- Mechanism of injury often dictates managing service
  - Elderly hypertensive small hemorrhage s/p fall managed by neurology in some settings

Immediate Treatment in ER

- HOB to 30 degrees
- NPO
- Foley in
- IV started
- Neurochecks frequently (tell nurse Dx)
- Send labs including CBC, PT/PTT, Type and Screen, platelet aggregate study if on Plavix

Treatments for medical pts with bleeds with possible trauma

- Coumadin → order INR, give Vitamin K and order FFP, goal is INR < 1.5
- Plavix → order FFP, Type and Cross, platelet function assay, pray
- Hypertensives → get BP down to 140 range without nitroglycerin (increases ICP)
- Diabetics → get blood sugar down to normal range
Consulting the Specialist

- State compartments hemorrhage is present
- Dimensions are key
- Age of blood can be useful
- Presence of shift or edema
- How was the patient when first found?
- How is the patient now?

Tips

- Examining physician should make the call to the consultant whenever possible
- Films and chart should be within fingertip reach
- Exact age and name of patient necessary
- Knowledge of administered medications and awareness of times of administration useful; nurse can relay

Be Prepared, or Things Not to Say Whenever Possible

- I haven’t seen the films
- They haven’t had a CT yet
- “Possible” bleed
- I didn’t see the patient
- Just take the few minutes to think about the patient, film findings, mechanism of injury, the medical picture before you
Acute on Chronic Subdural

- Note shift is massive
- Low density area consistent with chronic component
- Measure at thickest area
- Note compression of hemisphere
What is the subdural space?

- Under dura, overlying brain cortex
- It is not supposed to have anything in it except thin layer of CSF
- "Potential space" according to some authors
- Collection of blood in this space often signifies severe injury to underlying hemisphere
Subdural with membrane

- High density linear structure between brain and chronic subdural fluid
- Area of acute subdural hematoma posterior to blood
- Mimics epidural lens shape

What is the epidural space?

- Space between bone and dura
- There should definitely never by anything in this space
- Hemorrhages in this area are often under a fracture or focal area of severe blunt trauma
- Hammers make good epidural hematomas

SDH and EDH

- Both are bad
- Width important
- Acute collections can be very dangerous
- EDH often lens shaped, under fractures
- EDH may have lucid interval (always on tests but I don't see it that much)
- SDH are SICK if acute component is 1 cm or more
How to describe it

- Bilateral subacute and chronic subdural hematomas greater than 1 cm on each side with no resulting shift; no hydrocephalus
- Patient has poor balance, headache
- GCS 15

What compartments have hemorrhage and what type?
Where is the blood?
- Right subdural and/or epidural space
- Left subarachnoid space
- SA blood follows along cortex surface
- Classic SAH is aneurysm rupture
- Trauma more common source of SAH

What compartment?
- Looked subdural → lines along hemisphere
- Actually was epidural and subdural with lacerated dura
- Very, very bad situation for elderly lady on Plavix

What about falls and Plavix
- Very bad prognosis with subdural hematoma
- Underlying damage in the hemisphere is usually unbelievable on post-op Day #1
- Check out POD #1 after complete evacuation of subdural and epidural hematoma in this 86 y/o female that fell at Big Boy
Post-op day one: SDH on Plavix

- Post-op air
- Galea swollen
- Huge contusion with edema
- Massive midline shift
- Trapped ventricular system
- Right hemisphere occupies 2/3 of calvarial cavity

SDH on Plavix catastrophe

- Blood flow to injured hemisphere compromised
- Blood flow to other side impossible
- Intracranial hematoma will continue to ooze
- Deadly
What is going on here?

Bleed?
- Read out as a bleed s/p a trip and fall
- No actual blood was outside vessels on the right; small amount SAH left
- Was a calcified right MCA fusiform aneurysm
- Patient did not look like a bleed clinically
- Patient was fine

Intraparenchymal or “intracranial” bleeds
- These are sick people
- Decreased level of consciousness common
- Focal deficits (like ischemic strokes) common
- Hypertensive, amyloid angiopathy, bad luck, trauma usually result of bleed
- Often on anticoagulant
What anticoagulants are dangerous?

- ALL of them
- Pletal
- Ticlid
- ASA, NSAIDs
- Coumadin
- Aggrenox
- Plavix

ICH

- Blood in brain parenchyma
- High frontal area, left
- Measure
- Note edema, lack of midline shift
- Progressing right sided weakness
ICH
- Cause likely amyloid angiopathy
- Not a typical place for HTN bleeds
- Note chronic white matter change (ischemic damage) in other hemisphere

Intraparenchymal Bleeds
- Often are not surgical
- Blood pressure control vital
- 28% increase in size over 1-3 days
- Brain can clean up blood over 6-12 wks
- Often gradual (hours) onset of symptoms and often look like they had a stroke
- Slower progression than embolic or ischemic stroke patient

Summary
- Acute subdural and epidural hematomas more commonly require surgery than spontaneous intraparenchymal hemorrhages
- Description of compartment and measurements help ensure that you are accurately communicating to your specialist what is going on
Summary

- Trauma may be cause of blood in the head
- Trauma may be the result of blood in the head
- Treat all trauma patients with care
- Today's intracranial hypertensive hemorrhage that causes a fall may be tomorrow's acute subdural hematoma

Comments or Questions

- Don't be shy about investigating "which came first" -- the trauma or the bleed
- Don't hesitate to ask questions when cases present themselves in ER
- Look at your own films and be a superstar

Thank you for your attention

Requests for future topics welcome