



# Management of Traumatic Intracranial Hemorrhage

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## 1. Initial Stabilization

### A: Airway

Intubate if patient not protecting airway, GCS  $\leq$  8



### B: Breathing

Maintain physiologic levels of Oxygen and CO<sub>2</sub> to avoid 2° Brain Injury

- high oxygen potentially leads to free radical damage
- elevated CO<sub>2</sub> can cause vasodilation of carotid arteries and  $\uparrow$  cerebral blood flow  $\rightarrow$   $\uparrow$  ICP



### C: Circulation

#### Hypotensive:

- Shoot for MAP  $>$  80 to maintain cerebral perfusion pressure  
 $MAP = (SBP + 2 \times DBP) / 3$
- Fluids, vasopressors as needed
- Most ICH pts are hypertensive, find source of hypotension

#### Hypertensive:

- Increases perfusion pressure, can worsen ICH
- Nicardipine gtt and A line to keep SBP  $<$  180

## 2. Subsequent Management

### Reverse Anticoagulation

- Warfarin: Vitamin K, FFP, Prothrombin Complex Concentrate (PCC)
- Aspirin/Antiplatelets: consider desmopressin; platelets controversial
- Other potential options: PCC, idarucizumab (praxbind), dialysis (dabigatran)

### Increased ICP

#### **Signs/Symptoms:**

- Cushing's Triad (irregular respirations, HTN, bradycardia), "blown" dilated pupil, AMS
- CT showing midline shift, blood, loss of sulci, signs of herniation

#### **Treatment Options:**

**-The most important intervention is RAPID early surgical evacuation of space occupying lesions**

#### **Avoid delays, plan early!**

- Elevate head of bed 30°, control pain/sedation
- Hyperventilation to PCO<sub>2</sub> 30-35 is only an anecdotal temporizing measure, do not use routinely
- Hypertonic Saline
  - 3% - 250cc over 10 minutes, re-dose as needed
  - 23% - "bullet" 30mL push
- Mannitol: 1g/kg, potent diuretic, avoid if patient hypotensive

### Seizures

- Treat all clinical seizures emergently with Benzos
- Consider EEG monitoring
- Discuss Anticonvulsants with Neurosurgery
  - Levetiracetam (Keppra) or phenytoin