

# Severe Traumatic Brain Injury

Unconfounded GCS ≤ 8

- Spine precautions**
- HOB 30 degrees (if thoracolumbar spine cleared); or
  - Reverse Trendelenburg 30 degrees (if full spine precautions)

**Airway & C-spine**

- Protect airway
- Spine precautions

Indication for intubation?

- GCS < 8 or motor score < 6; or
- Concomitant hypoxemic respiratory failure; or
- Absent cough or gag; or
- Agitation prohibiting CT scanning?

**Intubation**

- Avoid hypotension (SBP > 100 mmHg), hypoxemia (O<sub>2</sub> sat > 92%)
- Suggested induction agent: Ketamine 0.5-1.0 mg/kg IV
- Suggested paralytic agent: Rocuronium 1-1.2 mg/kg IV

**Breathing**

- Ventilate to PaCO<sub>2</sub> 35-40 mmHg
- Oxygenate to PaO<sub>2</sub> 100-150 mmHg
- PEEP 5-12 cm H<sub>2</sub>O

**Circulation**

- Central or Intraosseous line & Arterial line
- MAP > 80 mmHg using norepinephrine infusion (0-20 mcg/min or 0-0.3 mcg/kg/min)
- SBP < 160 mmHg using Labetalol and/or Hydralazine

**Central line**

Avoid prolonged Trendelenburg positioning while placing central line for concerns of increased cranial pressure (ICP). Consider femoral central line.

**MAP goal > 80 mmHg**

1st vasopressor: Norepinephrine 0-20 mcg/min, or 0-0.3 mcg/kg/min

**SBP goal < 160 mmHg**

- Labetalol 5-15 mg IV every 15 min prn (avoid for heart rate < 60 beats per min)
- Hydralazine 5-15 mg IV every 15 min prn

**CT Scan**

- Non-contrast CT head
- Consider CT angio (arch to COW) and CT c-spine
- Consider chest/abdomen/pelvic CT for other injuries as indicated

**Coagulopathy Treatment**

Administer plasma, platelets and cryoprecipitate as necessary to achieve: INR < 1.5, PTT < 40, Platelets > 100, Fibrinogen > 1.0

Warfarin (Coumadin) prescribed?

Administer prothrombin complex concentrate (Octaplex/Beriplex)

**Disability**

Document best neurologic examination (pupil size & reactivity, GCS, best motor examination)

**Drugs**

Sedation **after** neurologic examination (Propofol 0-80 mcg/kg/min IV infusion)

Overt signs of pain? (grimace, tachycardia, hypertension)

Consider analgesia: Fentanyl 0-75 mcg/hour IV infusion

- Depressed skull fracture; or
- Penetrating trauma; or
- Witnessed seizure; or
- Temporal lobe contusion?

**Seizure Prophylaxis**

- Phenytoin 20 mg/kg IV load (round to closest 50 mg) and then 5 mg/kg/d IV (round to closest 50 mg) divided every 8 hours x 7 days
- Levetiracetam 1000 mg enteral every 12 hours

**Exposure**

- Use antipyretics (acetaminophen) & external cooling devices (cooling blanket) to achieve core temperature goal: 36.0-37.5 °C
- If hypothermic on admission (temp < 35 °C) then maintain temperature 35-36 °C

**Labs**

- Goal: Na 140-150 mEq/L
- Goal: hemoglobin ≥ 90 g/dL

If serum sodium < 140 mEq/L then consider 3-5 mL/kg 3% Hypertonic Saline IV bolus followed by hypertonic saline 3% infusion (1-2 mL/kg/h IV infusion)

Limit blood draws and transfuse RBC for Hb < 90 g/dL

**Herniation**

If herniation syndrome (unilateral or bilateral pupils become fixed and dilated):

- 3% Hypertonic saline (3-5 mL/kg IV bolus): Repeat dose in 2-4 hours.
- Mannitol (20% 1 g/kg IV bolus)
- Mild hyperventilation - PaCO<sub>2</sub> 25-30 mmHg

Preferred agent with concomitant hemodynamic instability.

**Acronyms**

GCS = Glasgow Coma Scale  
HOB = head of bed

**Legend**

- Investigation
- Action
- Diagnosis
- Consult & Transfer
- Notes