ICU Management of Hemorrhagic Stroke

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Hemorrhagic Strokes

ICH

SAH
Outline

• Initial evaluation
• Blood pressure
• Hydrocephalus and ICP management
• Seizures
• Respiratory failure/ARDS
Initial Management

• ABCs
• Reverse coagulopathies
• Headache control
• Monitor for neurologic deterioration
• EKG, telemetry and trend troponins
• Blood pressure management

• Goal is to prevent secondary brain injury
Hematoma Enlargement

1 hr. after onset  1 hr. after onset  CTA source image  3 hr. after onset
Blood Pressure Management
AHA Guidelines: Class IIb

- SBP > 200 or MAP > 150
  - Consider aggressive BP reduction
- SBP > 180 or MAP > 130
  - Consider BP reduction to 160/90 or MAP 110
- SBP > 180 or MAP > 130 + elevated ICP
  - Consider BP reduction to CPP ≥ 60

Hemphill et al. Stroke 2010; 41: 2108-2119
Blood Pressure Management

INTERACT-2 Trial

- SBP <140 group had improved mRS
- No improvement of mortality or severe disability
- 50% had initial SBP>180

NEJM 2013; 368: 2355-2365
Blood Pressure Management
ATACH-2 Trial

• Subjects:
  – Spontaneous supratentorial hemorrhage < 60ml
  – SBP>180, GCS ≥5
  – Need for IV Antihypertensives

• Methods: Unblinded randomized controlled trial
  – SBP: standard (140-179) vs intensive (110-139)
  – Treatment initiated within 4.5 hr. after symptom onset and continued x 24hr
  – Nicardipine as first line

Qureshi et al. NEJM 2016; 375: 1033-1043
Blood Pressure Management

ATACH-2 Trial

Qureshi et al. NEJM 2016; 375: 1033-1043
Blood Pressure Management

ATACH-2 Trial

• Discontinued due to futility before 1280 subjects enrolled
• No significant difference in neurologic outcome
• No difference in secondary outcomes
• Increased risk of renal adverse events in the first 7 days

Qureshi et al. NEJM 2016; 375: 1033-1043
Hydrocephalus

• Consider EVD placement if:
  – GCS ≤ 8
  – Transtentorial herniation
  – IVH or hydrocephalus

Hemphill et al. Stroke 2010; 41: 2108-2119
Intracranial Hypertension

- Elevate head of bed
- Neck in midline position
- Sedation
- Mannitol or hypertonic saline
- Transient hyperventilation
- Paralytics
- Hypothermia
Seizures

• ICH: Seizure prophylaxis is not recommended
• SAH: Consider seizure prophylaxis for 3-7 days after bleed
  – PHT is not recommended
• Seizures should be treated aggressively
• Consider cEEG in any patient with mental status depressed out worse than expected

Hemphill et al. Stroke 2010; 41: 2108-2119; Stroke 2012 43: 1711-37
Respiratory Failure

• Need for airway protection
• SAH: incidence of Acute Lung Injury 27%
• ICH: incidence of ARDS 27% of pts requiring mechanical ventilation
• Lung injury was associated with high tidal volumes, blood transfusions, hypervolemia, vasopressor use.

ARDS/ALI Management

- 6-8ml/kg tidal volumes
- FiO2
- PEEP
- Inverse ratio I:E or APRV
- Epoprostenol
- Inhaled nitric oxide
- Prone positioning
- ECMO
Summary

• Goal is to prevent secondary brain injury
• Aggressive BP management is likely safe but may not improve outcome
• Monitor for hydrocephalus and elevated ICP
• Consider seizure ppx in SAH, avoid in ICH
• Monitor closely for signs of lung injury and avoid high tidal volumes