ICU Management of Hemorrhagic Stroke

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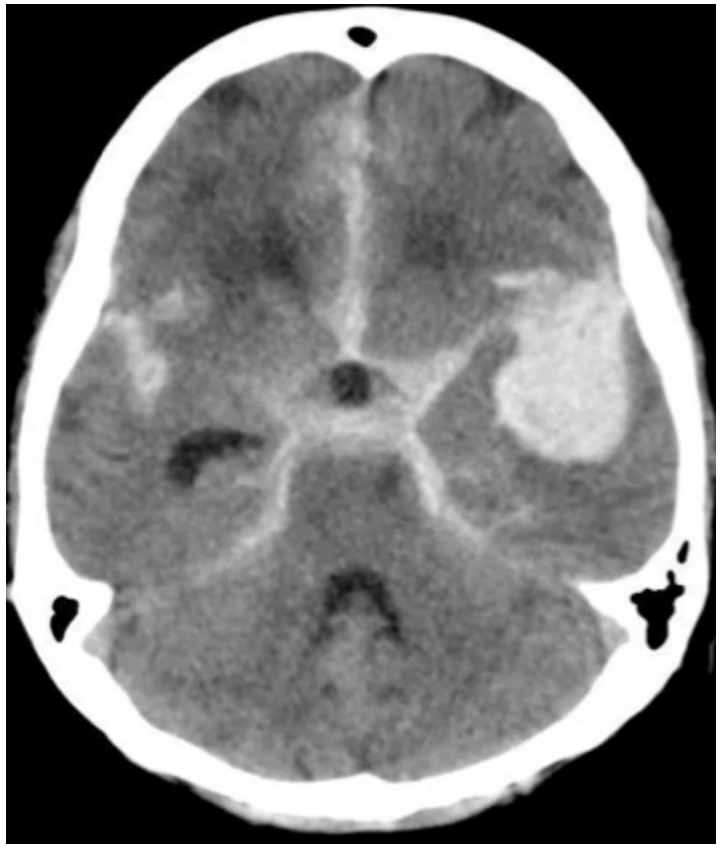
Stroke Treatment Alliance of Rochester
STAR-NY

Hemorrhagic Strokes

ICH



SAH

Outline

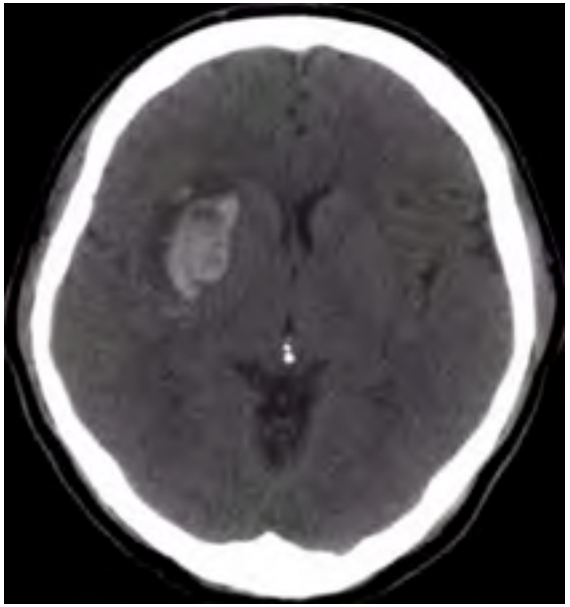
- Initial evaluation
- Blood pressure
- Hydrocephalus and ICP management
- Seizures
- Respiratory failure/ARDS

Initial Management

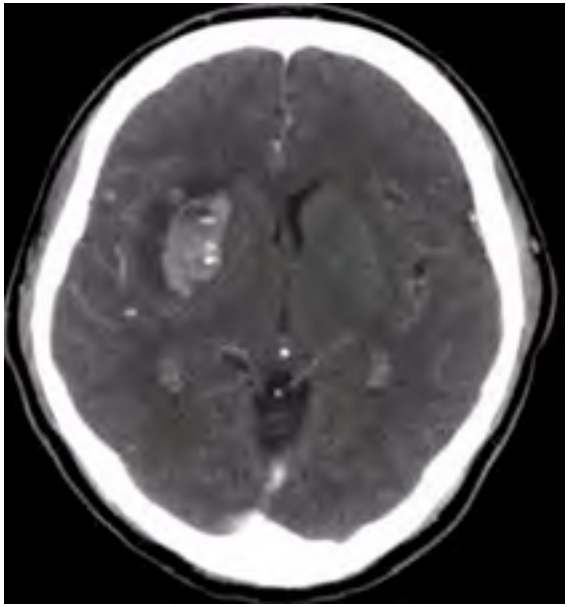
- ABCs
- Reverse coagulopathies
- Headache control
- Monitor for neurologic deterioration
- EKG, telemetry and trend troponins
- Blood pressure management

- **Goal is to prevent secondary brain injury**

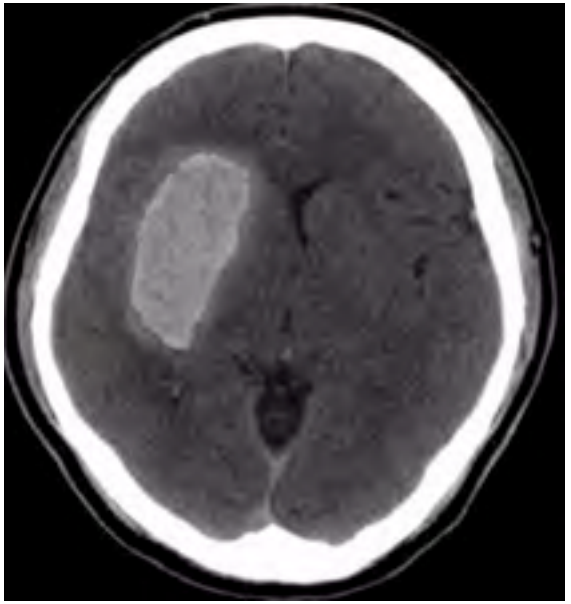
Hematoma Enlargement



1 hr. after onset



1 hr. after onset
CTA source image



3 hr. after onset

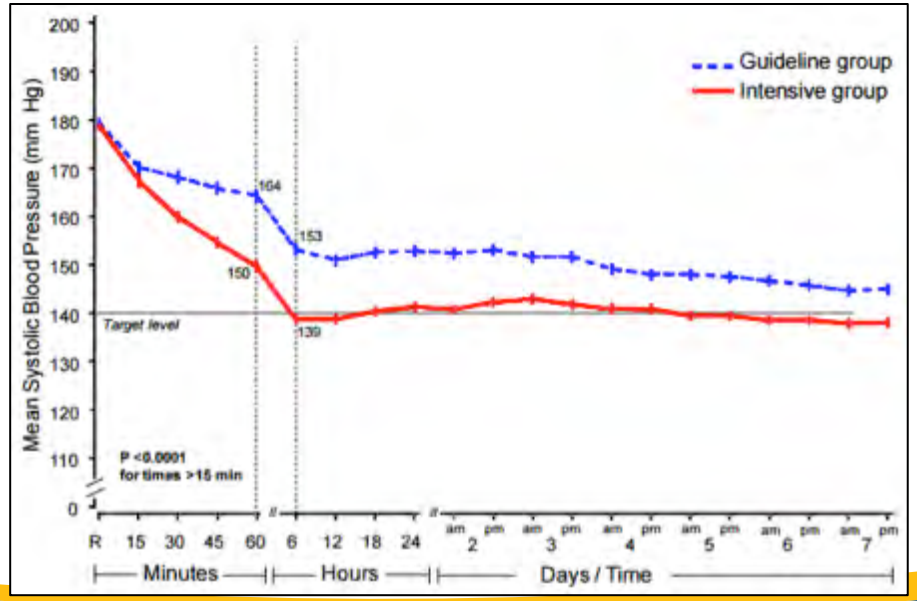
Blood Pressure Management
AHA Guidelines: Class IIb

- 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

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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

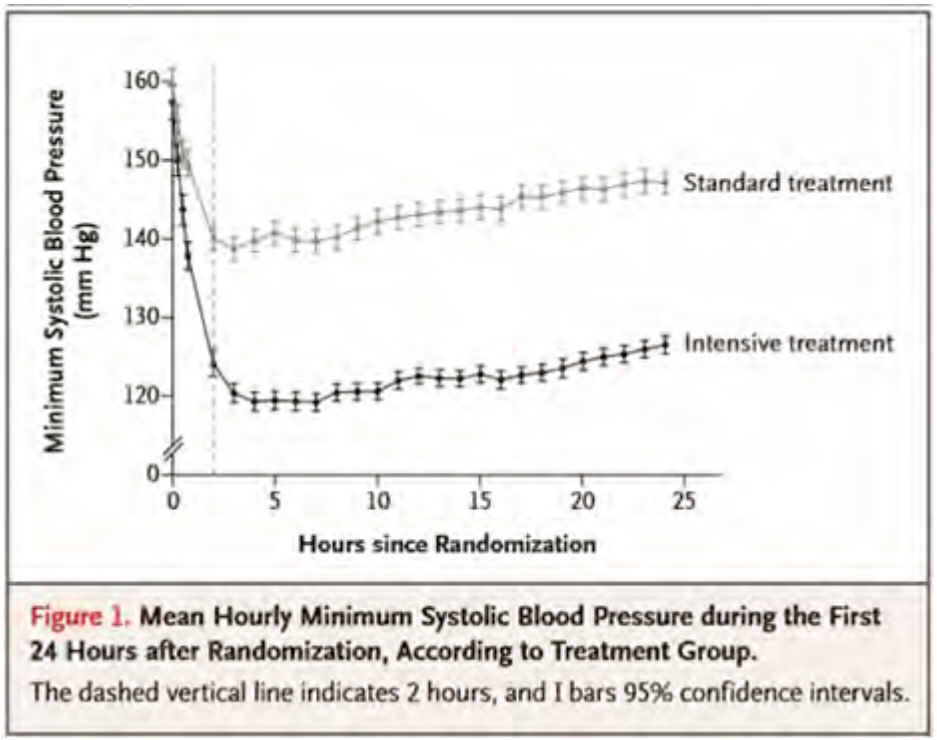
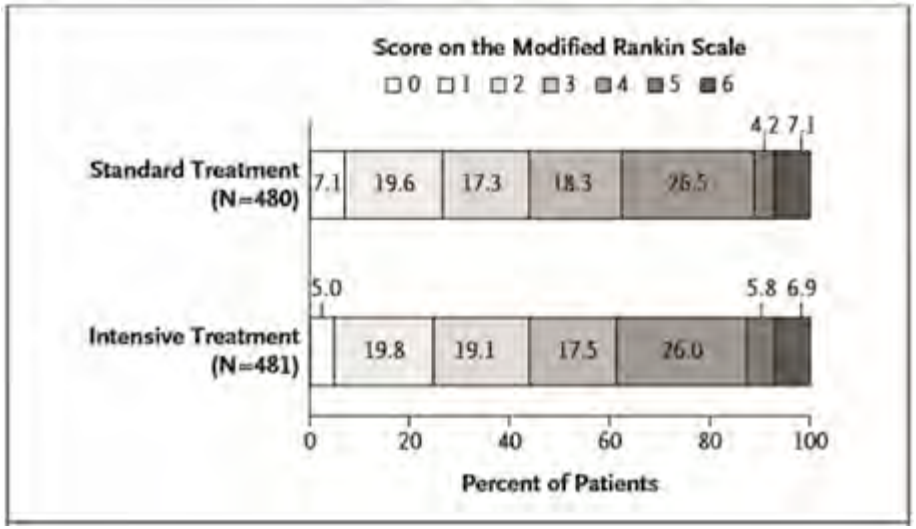


Figure 1. Mean Hourly Minimum Systolic Blood Pressure during the First 24 Hours after Randomization, According to Treatment Group.
The dashed vertical line indicates 2 hours, and I bars 95% confidence intervals.



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

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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.

Crit Care Med 2006; 34: 196-202; Crit Care Med 2013; 41: 1992-2001

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