Management and Treatment of the Stroke Patient from a Neurosurgical Perspective

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About Me: Education and Experience

- Bachelor of Science, Biomedical Science, University of Wisconsin - La Crosse (2012 - 2016)
- Master of Physician Assistant Studies, Des Moines University (2017 - 2019)
- APP Critical Care Fellowship, University of Iowa (2019 - 2020)
- Neurosurgery, MercyOne Des Moines (2020 - Present)
- Disclosures: none

Objective

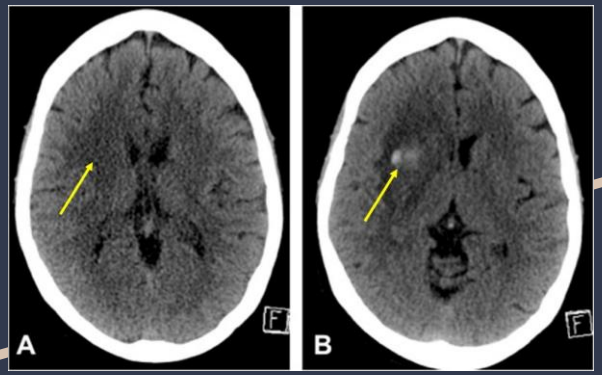
- Explain latest updates and options for ischemic and hemorrhagic stroke management and standards of care.

Types of stroke

- Ischemic
  - 87%
- Hemorrhagic
  - 13%

Per CDC

Ischemic Stroke Management



- Malignant cerebral edema, large territory
  - Less than 10% of strokes
  - Swelling causing shift or herniation of brain
  - Involving middle cerebral artery M1 territory or internal carotid artery
  - Mortality rate up to 78%
- Medical management
  - ICU
  - Frequent neurological checks
  - HOB > 30 degrees
  - Elevated sodium goal, > 145 mEq/L
  - Blood pressure management per neurology
- Hemorrhagic transformation vs Intraparenchymal hemorrhage
  - Early or late development
  - With or without primary ischemic stroke intervention
  - Consideration of starting antiplatelet therapy or using reversal agents
- Cerebellar stroke
  - Risk of hydrocephalus

Ischemic Stroke Management

- Surgical considerations
  - Patient wishes
  - Age
  - Functional outcome
  - Left vs right-sided, speech
  - Prevention vs Emergent
- Decompressive hemicraniectomy
  - Allow outward cerebral edema to prevent inward herniation and further brain damage or death

Hemorrhagic Stroke Management

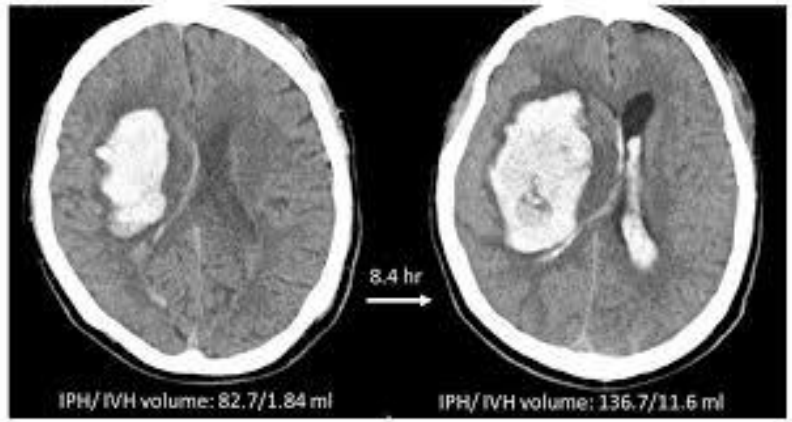
- Causes and Risks
  - Hypertension, hyperlipidemia, smoking, obesity
  - Aneurysm or arteriovenous malformation
  - Amyloid angiopathy
  - Blood thinner use
- ICH Score
  - 1 to 6
  - GCS, age, volume, IVH, location
- Medical Management
  - SBP < 140 mm Hg (<160 if starts >220)
  - HOB > 30 degrees
  - Sodium goal, normal vs elevated
  - Blood thinner reversal, if needed
  - Follow-up head CT in 6 hours, sooner if indicated, repeat again if necessary
- Surgical intervention
  - Risk and benefits, expected outcome
  - Hematoma evacuation - does not change morbidity or mortality but may decrease ICU and hospital stay, provide earlier rehabilitation
  - +/- hemicraniectomy
  - +/- external ventricular drain with intracranial pressure monitoring

Blood thinners

- Anticoagulants (i.e. warfarin, apixaban, rivaroxaban, dabigatran, heparin)
  - Prothrombin complex
  - Vitamin K
  - Andexanet alfa
  - Idarucizumab
  - Protamine
- Antiplatelets (i.e. clopidogrel, ticagrelor, aspirin)
  - DDAVP (desmopressin) 0.3-0.4 mcg/kg
  - Platelets NOT recommended unless surgical intervention is performed (1 to 5 units)
    - Increased morbidity and mortality
  - Consideration of Na level
    - FFP if below 133 mEq/mL
- Rare considerations
  - Patient with LVAD on warfarin
  - Co-management with cardiology
    - No reversal due to significant thromboembolic risk
    - Generally allow INR down to 1.5

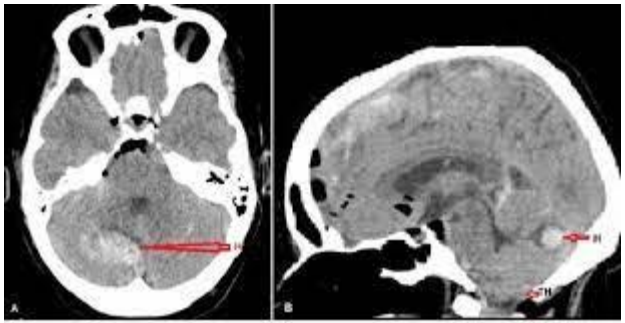
Intraparenchymal hemorrhage

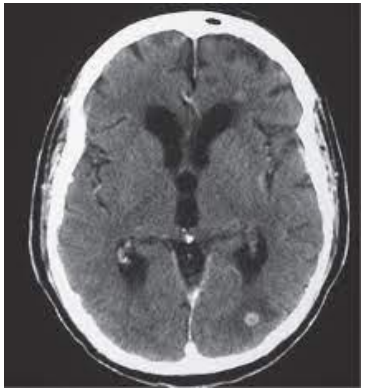
- Basal ganglia or thalamus
  - Often hypertensive
  - Concern for intraventricular extension



Cerebellar stroke

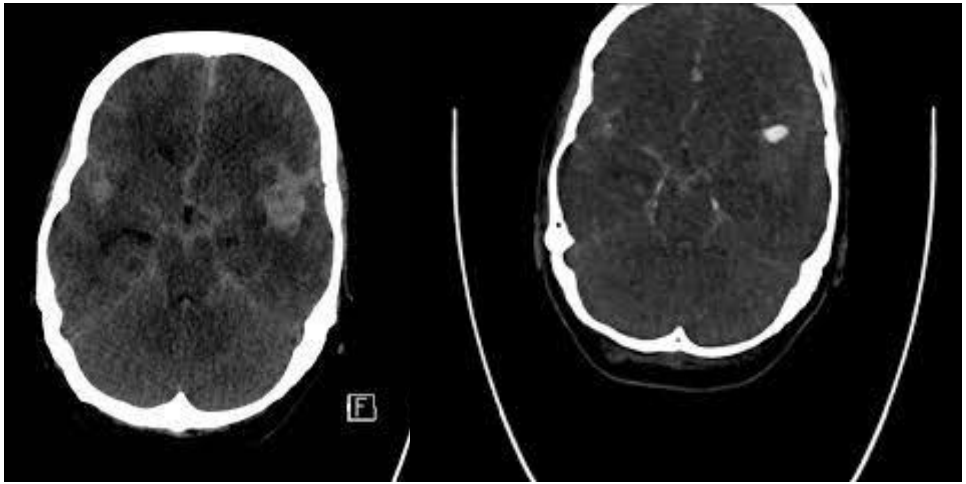
- Posterior
  - Ischemic or hemorrhagic
  - Risk of hydrocephalus and brain stem damage
- Medical Management
- Surgical intervention
  - Decompressive suboccipital hemicraniectomy and external ventricular drain placement
  - Preventative vs emergent





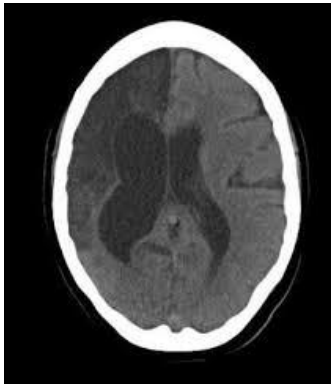
Ruptured aneurysm

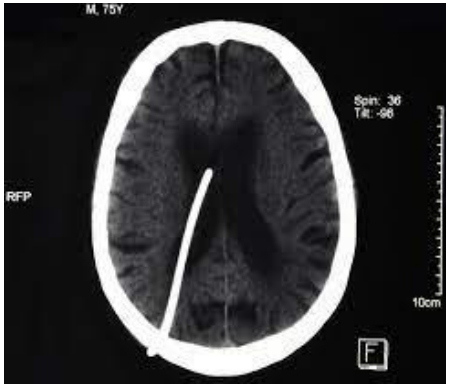
- Hunt and Hess Score
  - 1 to 5
- +/- external ventricular drain
  - Risk of hydrocephalus
- Nimodipine for vasospasm prevention
- Neurosurgical or endovascular intervention
  - Clipping or coiling
- ICU



Late post stroke treatment

- Persistent hydrocephalus
- Development of ex evacuo
- Ventriculoperitoneal shunt





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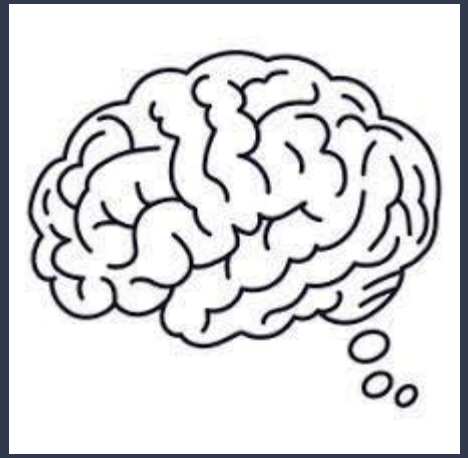
Questions?



American Heart Association®

American Heart Association: **Hemorrhagic Stroke Initiative**

Why ICH?

ICH accounts for ≈10% to 15% of all strokes and carries a disproportionately high risk of early death and long-term disability

- Evidence for optimal treatment of ICH has lagged behind that for ischemic stroke
- Translation of guidelines into actionable metrics for data collection will further enhance outcomes for ICH patients

American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. 2024 Heart disease and stroke statistics: a report of US and global data from the American Heart Association. Circulation.

Get With The Guidelines®-Stroke ICH Layer

GWTG-Stroke ICH Measures

Performance Measures

- **AHASTR155:** Admission Unit
- **AHASTR296:** Anticoagulant Reversal (DOACs)
- **AHASTR156:** Assessed for Rehabilitation
- **AHASTR157:** Avoidance of Corticosteroid Use
- **AHASTR158:** Baseline Severity Score
- **AHASTR159:** Blood Pressure Treatment at Discharge
- **AHASTR160:** Coagulopathy Reversal (Warfarin)
- **AHASTR161:** Dysphagia Screening within 24 Hours
- **AHASTR163:** Passed Dysphagia Screen Before First Oral Intake
- **AHASTR164:** Venous Thromboembolism (VTE) Prophylaxis
- **AHASTR308:** Inappropriate Platelet Transfusion*

Descriptive Measures

- **AHSTR162:** ICH Records with Missing Times
- **AHASTR299:** Anticoagulant Reversal Agents
- **AHASTR300:** Reasons No Anticoagulant Reversal was Administered
- **AHASTR301:** Time to Anticoagulant Reversal
- **AHASTR309:** Antithrombotic Prior to Platelet Transfusion*

American Heart Association.

Participation

How to Participate

- Any active Get With The Guidelines®-Stroke hospital may request the ICH Measure set be added to their registry

- No additional fees or contracting involved

- Reach out to your **AHA Program Consultant-Health Care Quality** OR email:
  - Beth.malina@heart.org