

Hemorrhagic Stroke: Critical Care and Treatment

Critical Care Consortium

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T.I.A. (Tragedy About To Happen!)

Pre-hospital: Teach 9-1-1 medical emergency.

In hospital:

If patient has completed stroke and critical stenosis



Antiplatelet therapy, then CEA or carotid stent if patient deemed too high risk for surgery (CEA).

TIA: The old definition

- **Traditional definition: sudden, focal deficit <24 hours. The 24h came from mid 1960's and assumed since no sx's, no permanent injury**
- **RIND=24h to 7 days-disappeared in 70's**
- **Sx enduring >7days were thought to reliably indicate infarct=stroke**

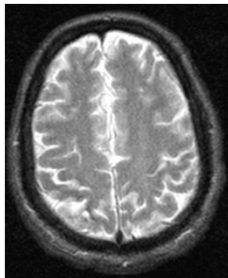
Easton et al *Stroke* 2009 ;40:2276-2293 <http://stroke.ahajournals.org>

TIA: The precise tissue-based definition 2009

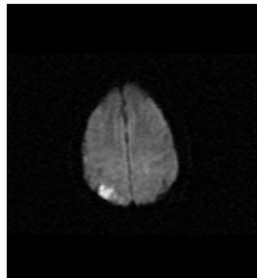
- **Endorsed by the AHA writing committee: "TIA-a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction"**
- Recommend neuroimaging eval within 24h preferably MRI
- Noninvasive imaging of cervical vessels should be performed.
- Noninvasive imaging of intracranial vessels is reasonable

Easton et al *Stroke* 2009 ;40:2276-2293
<http://stroke.ahajournals.org>

MRI with Clinical "TIA"



Same patient with diffusion weighting



TIA and stroke risk

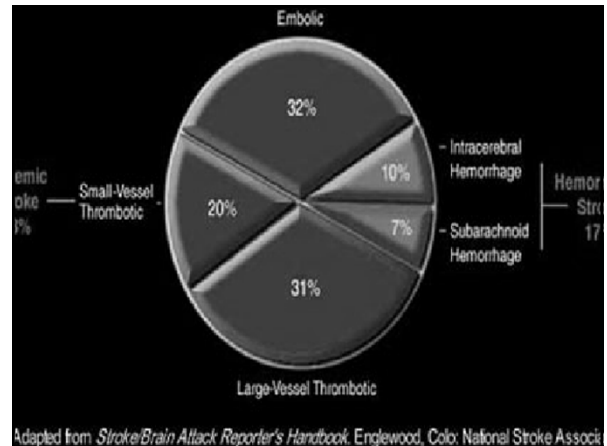
- Higher risk of early stroke after TIA than generally suspected.
- 10-15% of TIA patients have a stroke within 3 months, with half of those occurring within 48 hours!
- TIA treatments have evolved-early CEA/stent
- ABCD2 score

http://www.stroke.org/site/DocServer/NSA_ABCD2_tool.pdf?docID=5981

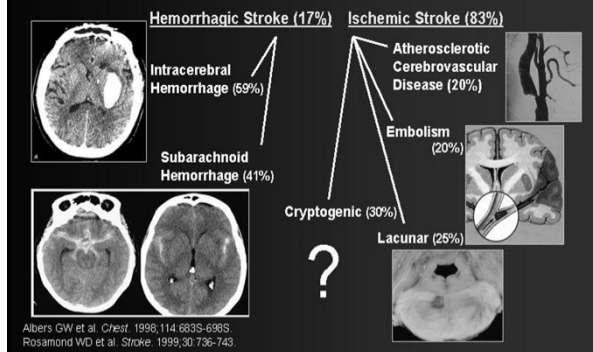
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What Are the Causes of Hemorrhagic Stroke?

- Occurs when a weakened blood vessel ruptures. HTN is a big culprit.
 - Aneurysms:** Ballooning of a weakened region of a blood vessel
- Arteriovenous Malformations (AVMs):** Cluster of abnormal blood vessels



Cerebrovascular Disease: Pathogenesis



HEMORRHAGIC STROKES

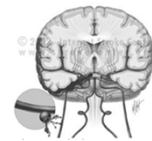
INTRACEREBRAL HEMORRHAGE

Caused by rupture of an artery in the brain, leaking blood into the brain and compressing brain structures

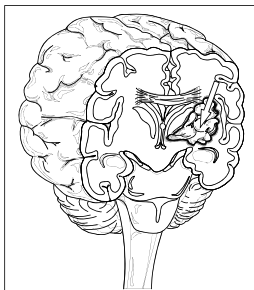


SUBARACHNOID HEMORRHAGE

Caused by rupture of an artery just outside the brain, leaking blood into the surrounding space (the subarachnoid space)



Intracerebral Hemorrhage (ICH)



Bleeding into brain

Most common cause:

Chronic Hypertension

Other causes:

Vessel malformation
Tumor, bleeding abnormalities,
Cerebral amyloid angiopathy

Intracerebral Hemorrhage (ICH)

- Results from the rupture of an intracerebral vessel leading to the development of a hematoma in the substance of the brain.
- Due to small vessel disease: HTN
- Warfarin-related: doesn't affect occurrence, but rather hemorrhage severity. H that might remain subclinical in non-Warfarin pt, enlarges to devastating ICH in Warfarin patient
- Secondary ICH ~ tumors, AVM, aneurysms

ICH

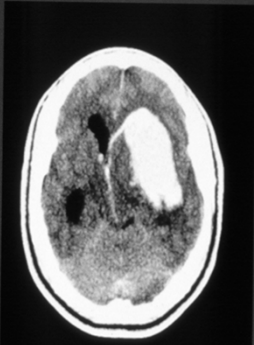
- Represents 10%-15% of all strokes
- Most fatal form of stroke
- Mortality at 30d can exceed 50%
- Of survivors: 20% live independently at 6 months



Patient Presentation of ICH

- Like other types of stroke; focal neuro deficits
- Seizure and decreased LOC tend to occur more commonly in ICH
- Headache and vomiting due to increased ICP
- ¼ of all pts initially alert deteriorate in LOC within the first 24 hours, due to ongoing bleeding!
- 30-40% of pts experience ongoing bleeding in the ER

CT SCAN OF INTRACEREBRAL HEMORRHAGE



Management of ICH

- Hematoma formation sets off a cascade of reactions in involved tissue & contribute to problem, BUT
- Mass effect of the ICH major culprit of neurologic injury
- Interventions most likely to affect outcome must be made within first few hours of ER

Management of ICH-cont

- Early intubation and airway protection
- CT for herniation/hydrocephalus=NES eval
- Osmotic agents for ICP and mass effect for patients with herniation.
- BP elevation common but unsure of cause: consequence of hemorrhage or causes prolonged bleeding in not understood
- Incomplete research as to best target BP values (2010)



Management of ICH



- Hypertension is very common after ICH.
- MAP > 140 in 34%
- MAP > 120 in 78%
- Typically, blood pressure returns to baseline over the course of one week, with the greatest decline occurring during the first 24 hours.

Mean Arterial Pressure (MAP)

Goal < 130

Diastolic x 2 + Systolic

3

220 =MAP of 160

130

Management/Challenges ICH

- ¼ of all ICH patient in the ICU develop seizure within 72 hours
- AED prophylaxis (old), new guide→If SZ, then tx with AED's
- If pt has change in mental status →EEG, SZ then AED's.
- Care of ICH pts in a dedicated neuroscience ICU is associated with lower mortality rates!

Morgenstern et al 2010; 41:1-22

Key Points: Nursing Care of ICH

- Surveillance and monitoring of ICP and hemodynamic function
- Titration and implementation of protocols for BP management, mechanical ventilation, fever
- Glucose management=normoglycemia, avoid hypoglycemia in these pts as it may worsen outcomes! At present, optimal management & target glucose remains to be clarified, but avoid HYPOGLYCEMIA

Morgenstern et al 2010; 41:1-22

Key Points: Nursing Care of ICH

- Prevention of complications of immobility through positioning, airway maintenance, and mobilization within physiological tolerance
- AHA/ASA/BAC recommends nurses be trained in standardized scale such as NIHSS.
- Prophylactic anticoagulation for DVT prevention may be started in 24-48 hrs after ICH when no evidence of ongoing hematoma expansion.

Morgenstern et al 2010; 41:1-22

Management/Challenges ICH

- Ventricular blood and obstructive hydrocephalus
- Surgical evacuation of cerebellar hemorrhages are life saving and deficit-sparing
- All of these pts should receive emergent NES evaluation
- Benefits of surgical evacuation to other areas of the brain are less clear...

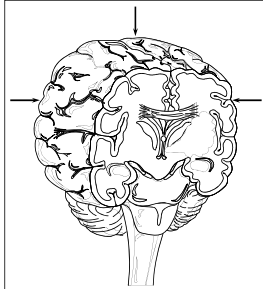


Best Management is Prevention of ICH

- Aggressive control of hypertension
- Judicious selection of patients for long-term anticoagulation (i.e., warfarin)



Subarachnoid Hemorrhage



Bleeding around brain

**Most common cause:
Aneurysm Rupture**

Other causes:
Vessel malformation
Tumor, bleeding abnormalities

SUBARACHNOID HEMORRHAGE

- **ABRUPT ONSET OF “WORST HEADACHE OF MY LIFE”.**
- **CT SHOWS IT 92% OF CASES.**

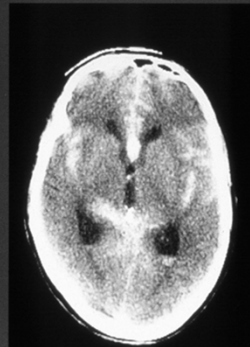


Hunt and Hess Scale

For non-traumatic SAH patient

- Grade 1 Asymtomatic, mild headache, slight nuchal rigidity
- Grade 2 Mod to severe HA, nuchal rigidity, no neuro deficits other than cranial nerve palsy
- Grade 3 Drowsiness/confusion, mild focal neuro deficits
- Grade 4 Stupor, moderate-severe hemiparesis
- Grade 5 Coma, decerebrate posturing

CT SCAN OF SUBARACHNOID HEMORRHAGE



INTEGRIS
JAMES R. DANIEL
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STROKE CORE MEASURES

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STROKE CORE MEASURES

STK 1	Venous Thromboembolism (VTE) prophylaxis
STK 2	DC on Antithrombotic therapy
STK 3	Anticoagulation Therapy for Atrial Fibrillation/flutter
STK 4	Thrombolytic Therapy
STK 5	Antithrombotic Therapy by End of Hosp Day 2
STK 6	DC on Statin Med
STK 8	Stroke Education
STK 10	Assessed for Rehabilitation
STK 7 (retired Jan 2010)	Dysphagia screen prior any PO intake
STK 9 (retired Jan 2010)	Smoking Cessation

Stroke core measures during admit and hospital stay:

- STK 1 VTE prophylaxis

Rationale: Stroke patients are increased risk of developing DVT and PE.

- PE accounts for 10% of deaths after stroke
- Studies report 30% of mod-severe strokes develop VTE
- DVT prophylaxis has been shown to lower the risk of DVT and PE by 70-80%
- Recommended by numerous clinical practice guidelines
- Non-pharmacologic approaches include
 - Early mobilization
 - SCD's

STK 1: VTE prophylaxis-cont.

- Pharmacologic approaches: LMWH=Lovenox 40 mg SQ daily. Note: hold if lumbar puncture is done in last 24 hours or planned in next 24 hours
- LMWH on our order sets and VTE form
- Aspirin alone is not enough protection for DVT prophylaxis
- TEDS alone are not enough protection for DVT prophylaxis

Challenge: Are you charting that the SCD's are actually ON the patient?????

DID YOU KNOW?

- Antithrombotic therapy should be initiated within 48 hours of symptom onset in acute ischemic stroke patients to reduce stroke mortality and morbidity as long as no contraindications exist.
- The goals of antithrombotic therapy are to block the formation of new clots, prevent the growth of existing clots, and reduce a person's risk of complications from blood clots.

- Antithrombotic therapy refers to the use of medications which interfere with blood clot formation.



- Anticoagulants are strong blood thinners which prevent blood cells from sticking to each other to form a blood clot.
- Antiplatelet agents are weaker medications which prevent platelets (the tiny discs that circulate in the blood stream and are also important to clot formation), from sticking to blood vessel walls and to one another.
- Antiplatelets include: ASA, Plavix, (Ticlid, Aggrenox)
- Anticoagulants include: Coumadin, IV heparin, enoxaparin, Arixtra
- Check out the cool video
http://www.youtube.com/watch?v=uS1RGbW8UbQ&feature=watch_response

Why these core measures for stroke?

STK 2 DC antithrombotic tx:

Rationale: Reduces stroke mortality and morbidity-proven in several large studies. (ASA, Plavix, or contraindications.)

- Be sure to include ASA on your home med instruction list given to the patient.
- Sometimes it is forgotten as a "real med" when there is not a script for it
- Cues on the ISMC General Discharge Order Sets for Stroke CM at Discharge
- If contraindicated, the physician must document reason why

STK 3 Anticoagulation for Afib/flutter:

Rationale: Important in preventing first stroke and recurrent stroke. Pts with Afib and on Warfarin=68% reduction in stroke risk!

- **Stroke range goal of 2.0-3.0 and Target INR 2.5**
- Dabigatran, new drug for Afib, no monitoring for it

Why these core measures for stroke?

STK 4 Thrombolytic tx: If patient has stroke symptoms onset < 3 hours and meets the FDA approved criteria for the drug.

- If pt arrives within 2 hours of symptom onset, and tpa not given, the physician must document contraindication to tpa for those pts
- For some patients, this window has been extended to 4.5 hours, however this 4.5 hour window is NOT FDA approved

Why these core measures for stroke?

#5 Antithrombotic by end of Hosp Day 2:

Rationale: Significantly decreases the mortality and morbidity in AIS

- Same is true for the AMI core measure, same rationale
- ASA on stroke orders, usually given in ED, AFTER swallow is assessed!

- #6 DC on Statin: Rec for pts (LDL>100) with atherosclerotic ischemic stroke/TIA and without known heart disease to ↓ risk of stroke & CV events. *Dramatically* ↓ rate of recurrent stroke and major coronary events

<http://www.youtube.com/watch?v=azZnkvAajAE&feature=related>

Why these core measures for stroke??

- #8 Stroke Education: Written material must be provided to stroke pt/family to include all 5 elements. "All or nothing measure"
 - Signs and Symptoms of Stroke
 - Call 9-1-1
 - Importance of need for f/u appts.
 - Risk Factors for stroke: include all appropriate to pt risk- HTN, diabetes, lipids, obesity, smoking, afib, etc.
 - Medications: Must be given to them in writing.

Joint Commission wants to see that the patient knows what their medications are for and why they are taking them for stroke. Please "connect the dotted lines" for our patients.

Why these core measures for stroke?

- Stroke # 9 Smoking cessation advice/counseling
 - JC retired this one, but we still track it....and so does CMS
- Stroke #10: Assessed for rehabilitation services

DID YOU KNOW?

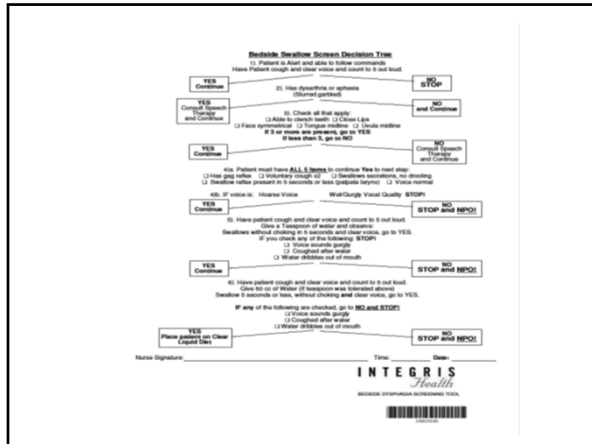
- Cigarette smoking is the single most alterable risk factor contributing to premature morbidity and mortality, accounting for approximately 430,000 deaths in the United States.
- Smoking nearly doubles the risk of ischemic stroke. Research indicates that patients who receive even brief smoking cessation advice from their physicians are more likely to quit than those receiving no counseling at all.

Dysphagia (#7 retired but we still monitor....)

- Screening for dysphagia prior to any oral intake including medications
- Dysphagia (difficulty in swallowing) is a potentially serious complication of stroke.
- It has been estimated that 27-50% of stroke patients develop dysphagia.
- Furthermore, 43-54 % of stroke patients with dysphagia will experience aspiration and of those patients 37% will develop pneumonia.
- Dysphagia may contribute to malnutrition and increased length of hospital stay.

Dysphagia Screen Prior to any PO intake-(cont)

- One study estimates that 10% of deaths within 30 days of admission among hospitalized stroke pts are attributable to pneumonia, and that one death could be averted for every 11 patients in whom stroke-related pneumonia is prevented (36).
 - <http://www.radiographicceu.com/vid/swallow2.wmv>
- Click on link to watch aspiration...
 - Look for pooling into vallecula
 - Spillage into the anterior airway



Thank You!

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