STROKE IS TRAUMA!

CUTTING EDGE ISCHEMIC & HEMORRHAGIC STROKE CARE

Eric M. Deshaies, MD, FAANS, FACS

Medical Director, Crouse Neuroscience Institute

Director, Neurovascular & Stroke Center

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GOALS OF PRESENTATION

- **Discuss** the *expanded definition of "Stroke"*
- **Understand** the *New ED to Discharge Pathways*
- **Define** *The changing role of the ED in this expanded stroke definition*

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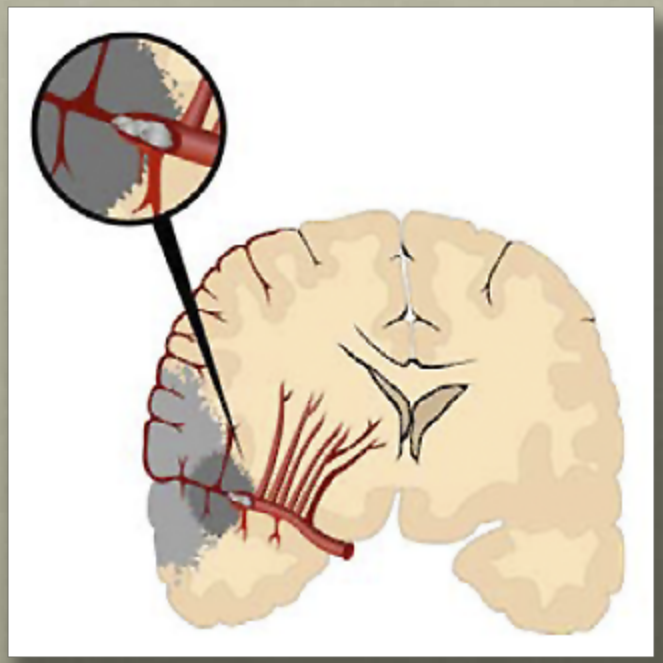
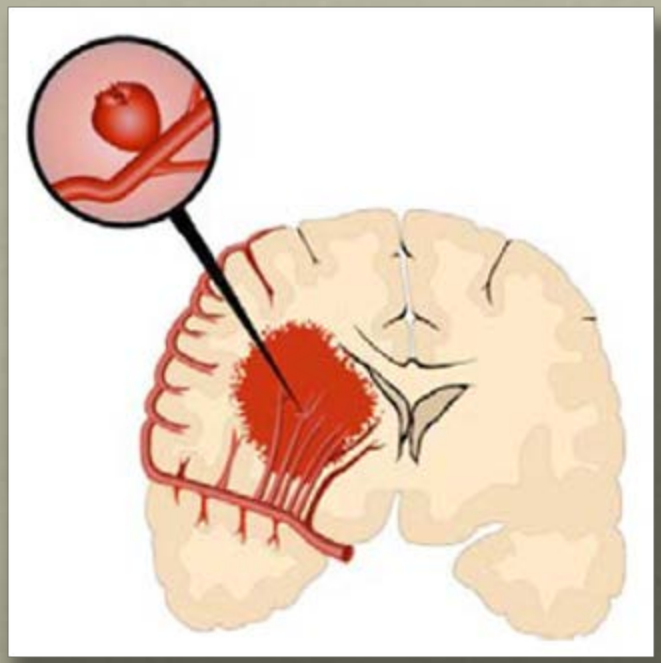
Expanded Definition of Stroke

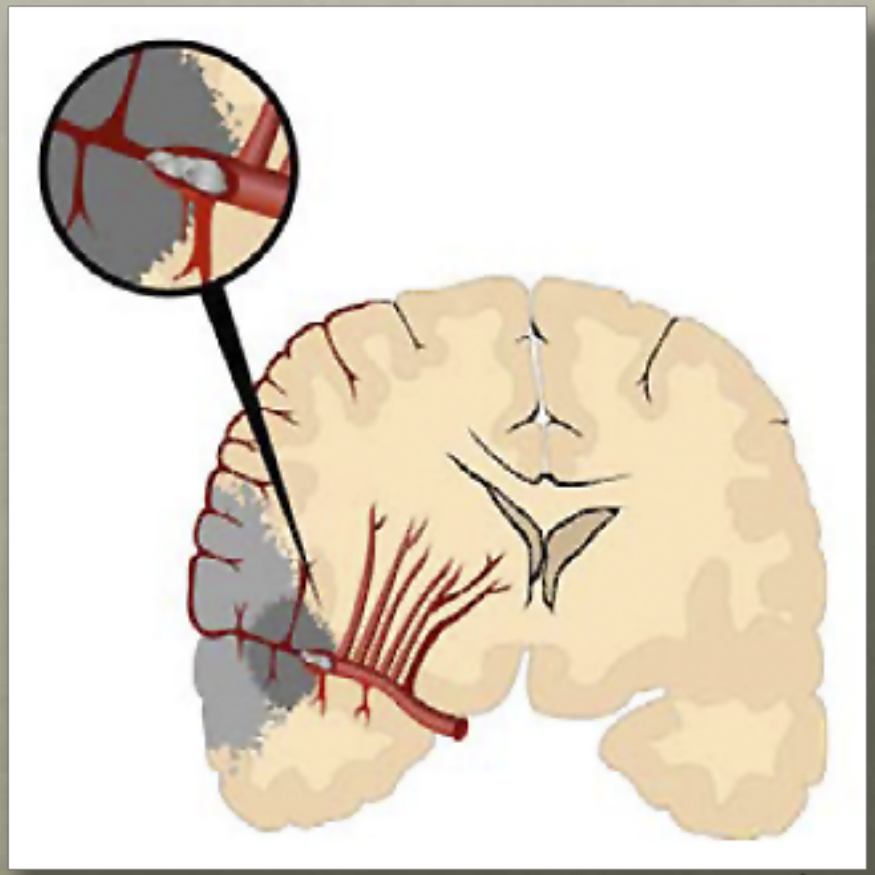
Ischemic (blockage) 88%



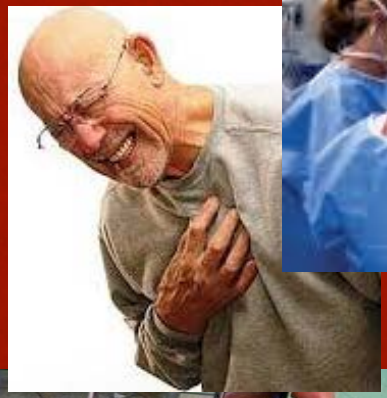
Hemorrhagic (bleeding)12%



Ischemic (blockage) 88%



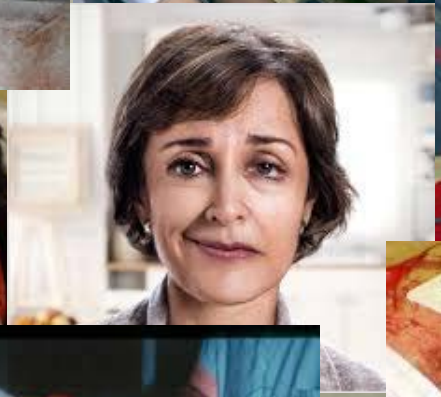
WHICH IS *NOT* A TRAUMA?



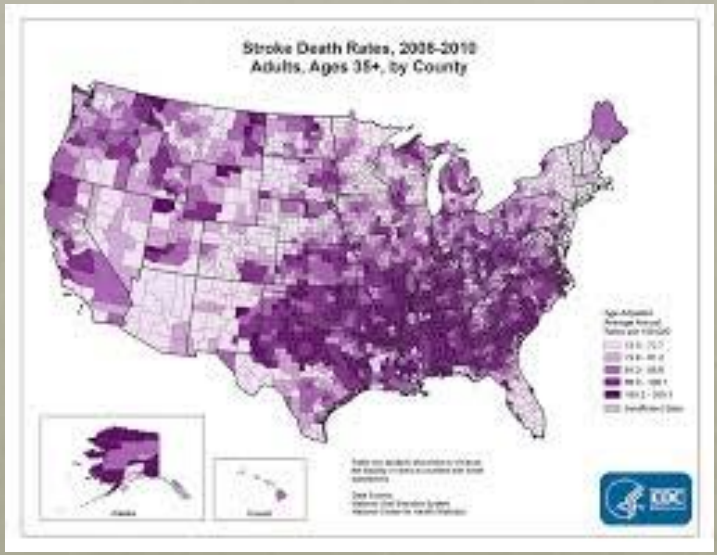









ISCHEMIC STROKE



800,000 people USA/year
- 4th leading cause of death
- leading cause of disability

200,000/year candidates for Stroke Rescue Therapy (SRT)
- 10,000/year actually get SRT

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Risk Factors

Same in Men & Women	Stronger in Women	Specific in Women
AGE	HIGH BLOOD PRESSURE	PREGNANCY
ETHNICITY	ATRIAL FIBRILLATION (AFIB)	PREGNANCY COMPLICATIONS (ex. Preeclampsia, gestational diabetes)
HEART DISEASE	DIABETES	ORAL CONTRACEPTIVES
SMOKING	MIGRAINE WITH AURA	HORMONAL CHANGES
OBESITY	METABOLIC SYNDROMES	POSTMENOPAUSE THERAPY
PHYSICAL INACTIVITY		

TRADITIONAL TIME WINDOWS

<3 (STD of CARE)

3-4.5hrs (Extended Window)

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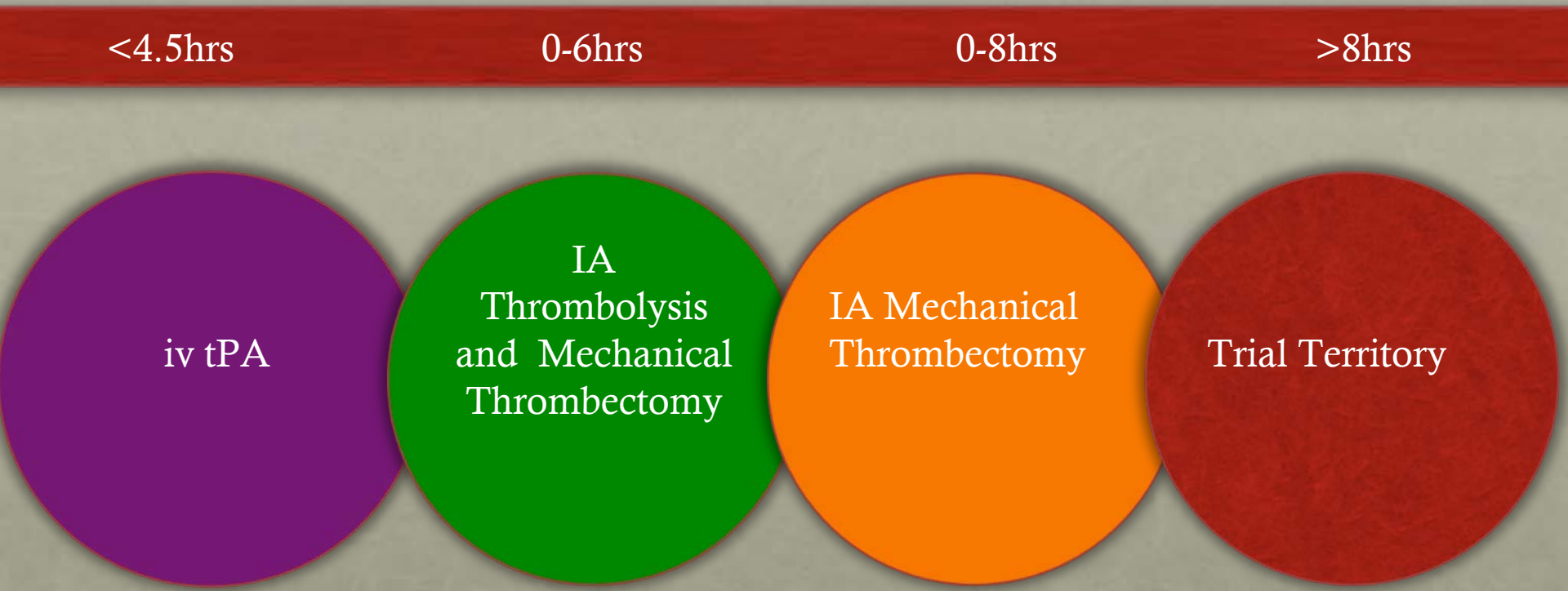
EXPANDED TIME WINDOWS



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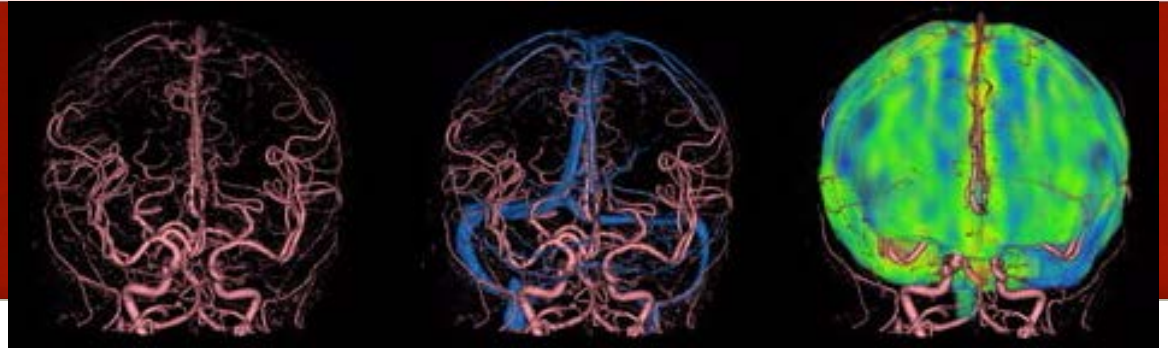

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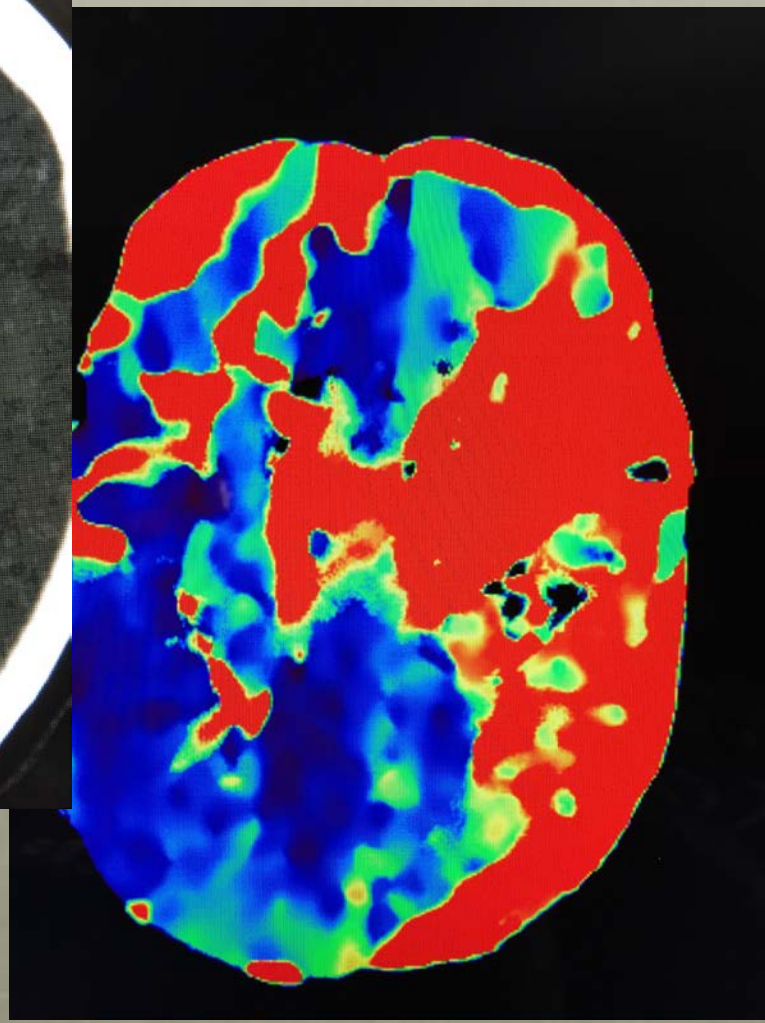

Estimated Pace of Neural Circuitry Loss in Large Vessel Supratentorial Acute Ischemic Stroke (Savers et al.)

Time	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
/min	1.9 Million	14 Billion	12km/7.5mi	3.1 weeks
/hr	120 Billion	830 Billion	714km/447mi	3.6 yrs
/stroke	1.2 Trillion	8.3 Trillion	7140km/4470mi	36 yrs

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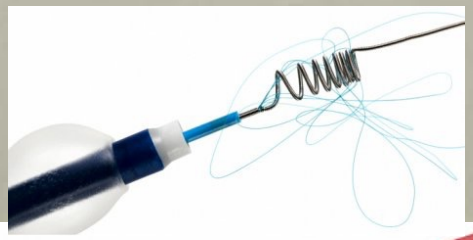

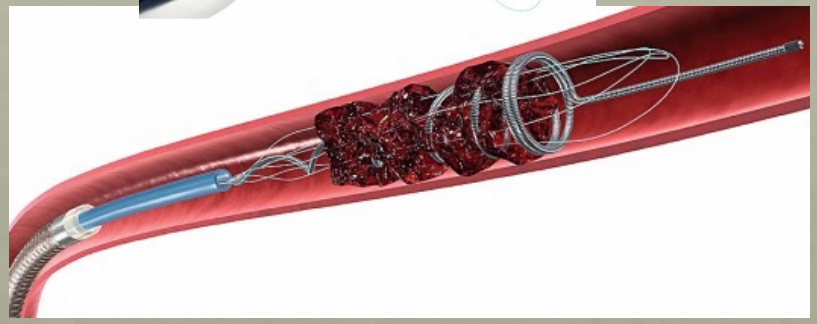

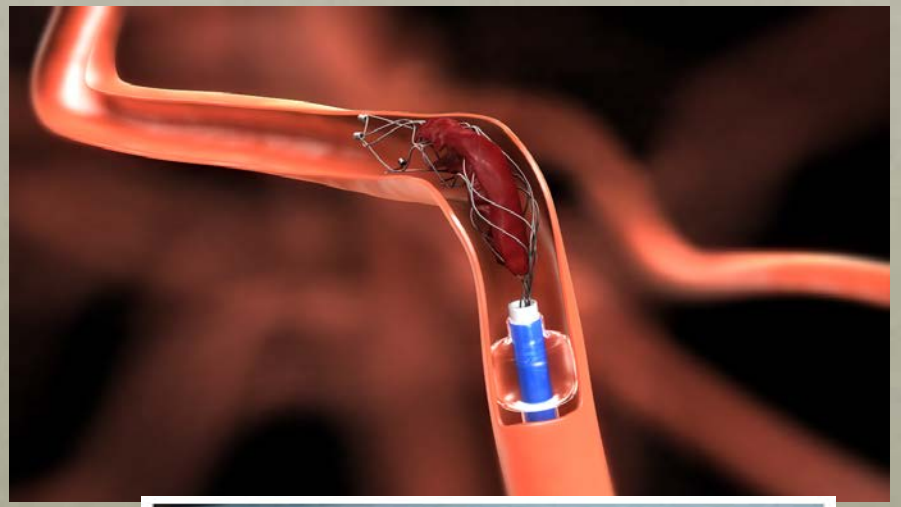

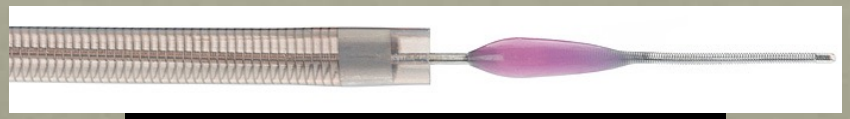

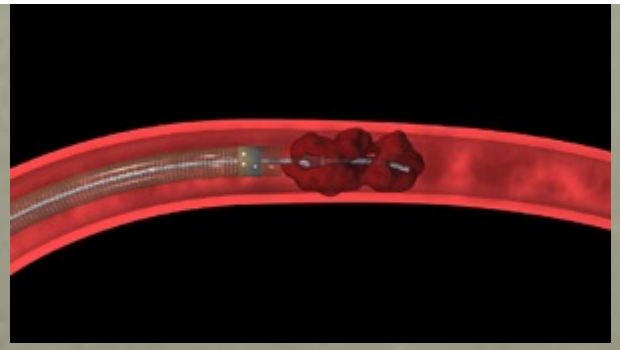

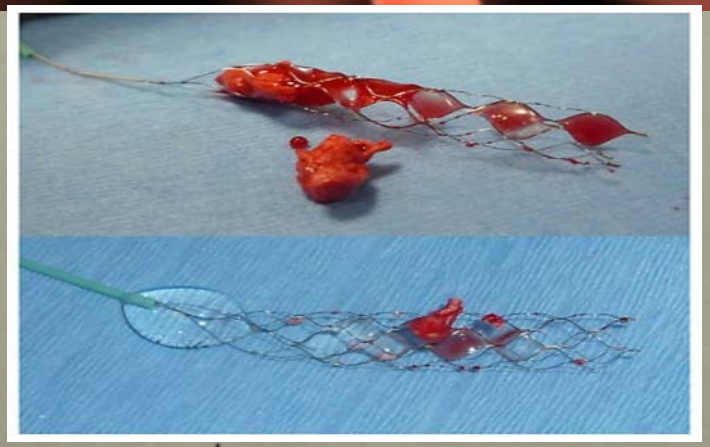

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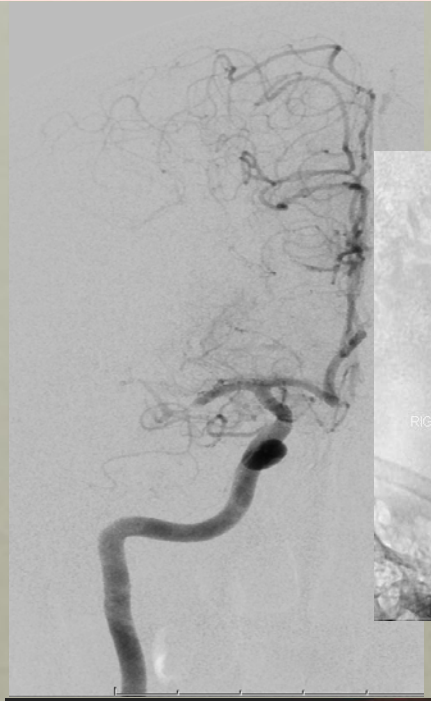

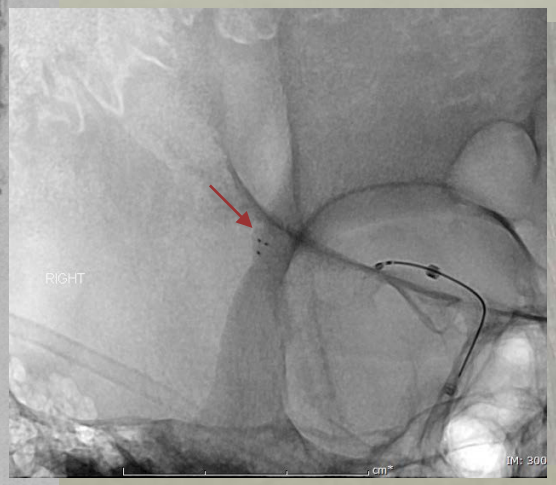
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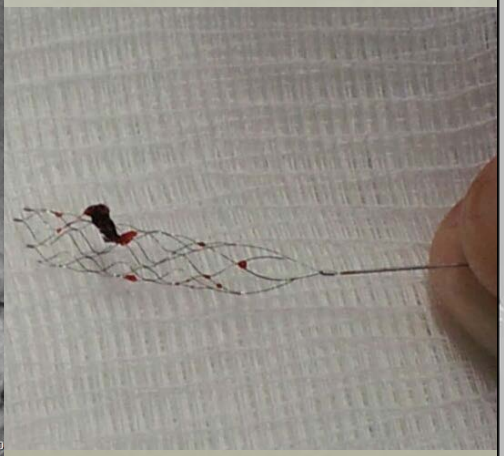


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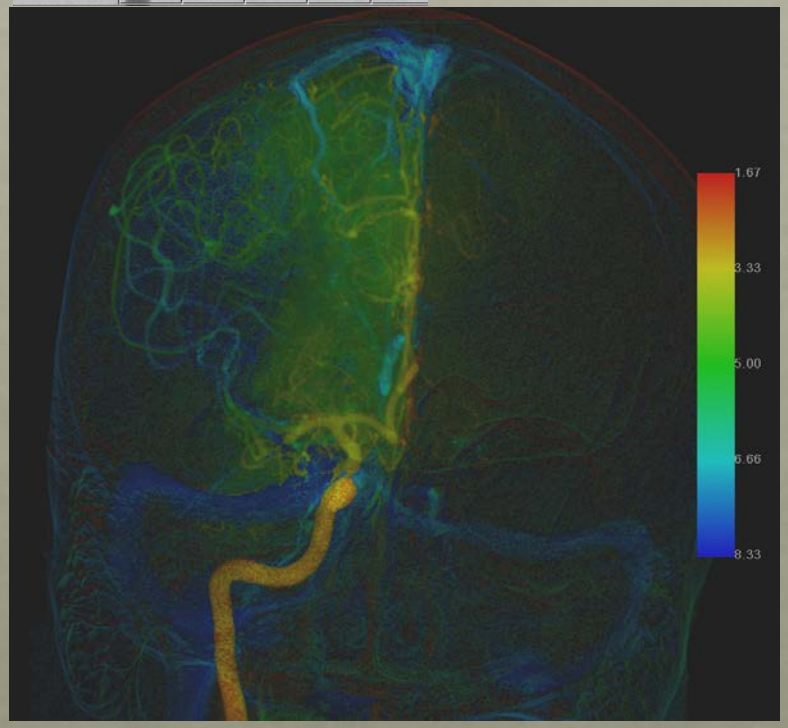
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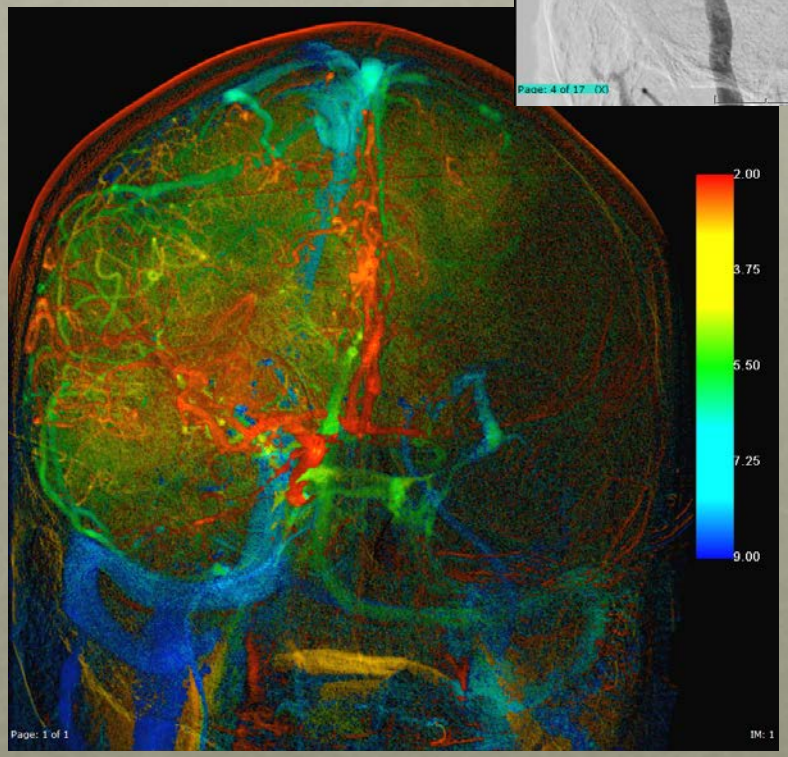
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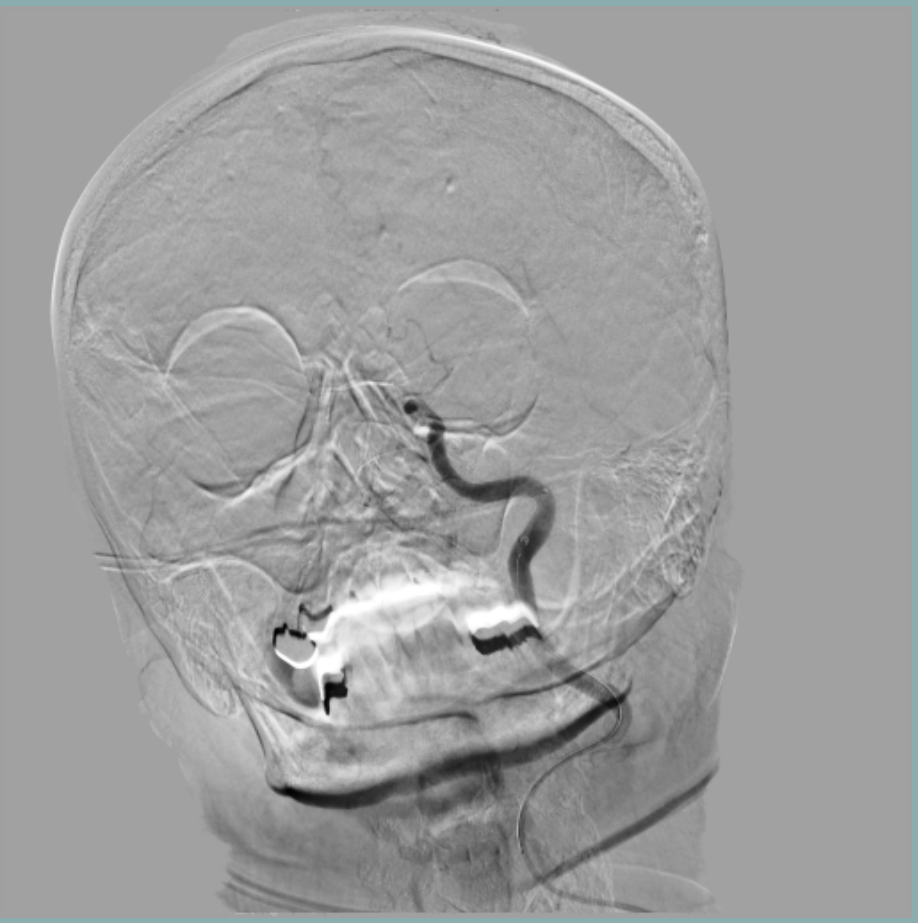
Before



After

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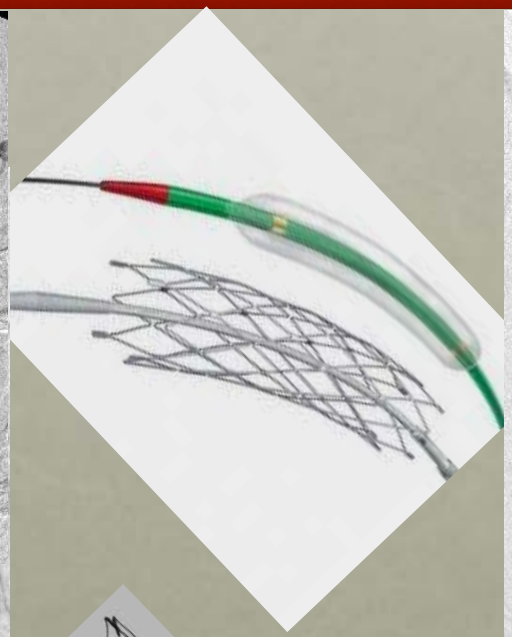
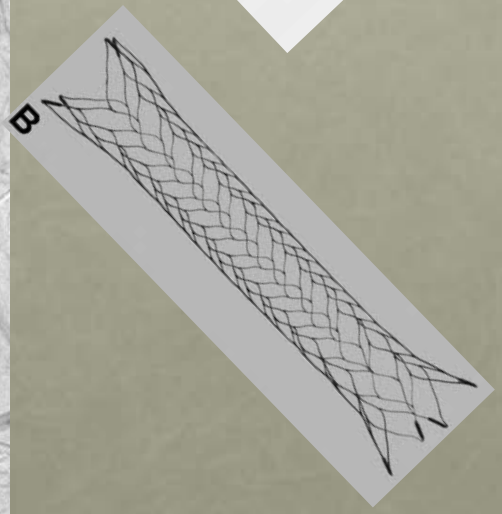
TRAUMATIC CERVICAL CAROTID DISSECTION





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MR CLEAN TRIAL

A RANDOMIZED TRIAL OF INTRAARTERIAL TREATMENT FOR ACUTE ISCHEMIC STROKE. BERKHEMER OA ET AL. NEJM, DEC 30, 2014.

- A Randomized, Phase 3, multicenter, open-label, blinded end-point eval
  - 500 patients, 16 centers, Netherlands
    - ICA, MCA, ACA
  - randomized: iv tPA (<4.5h) alone vs iv tPA + MT (<6 h)
  - functional independence (mRS 0 to 2)
    - **32.6% iv tPA + MT**
    - 19.1% iv tPA
  - **No differences in mortality or ICH**

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Additional Breakthrough Trials in Stroke Rescue Therapy

EXTEND-IA Study:

- 70 patients
- Primary device studied: Solitaire (Solitaire 100%)
- mRS 0-2 at 90 days (71% for Solitaire, 40% for control)
- Death at 90 days (9% for Solitaire, 20% for control)
- sICH (0% for Solitaire, 6% for control)

ESCAPE Study:

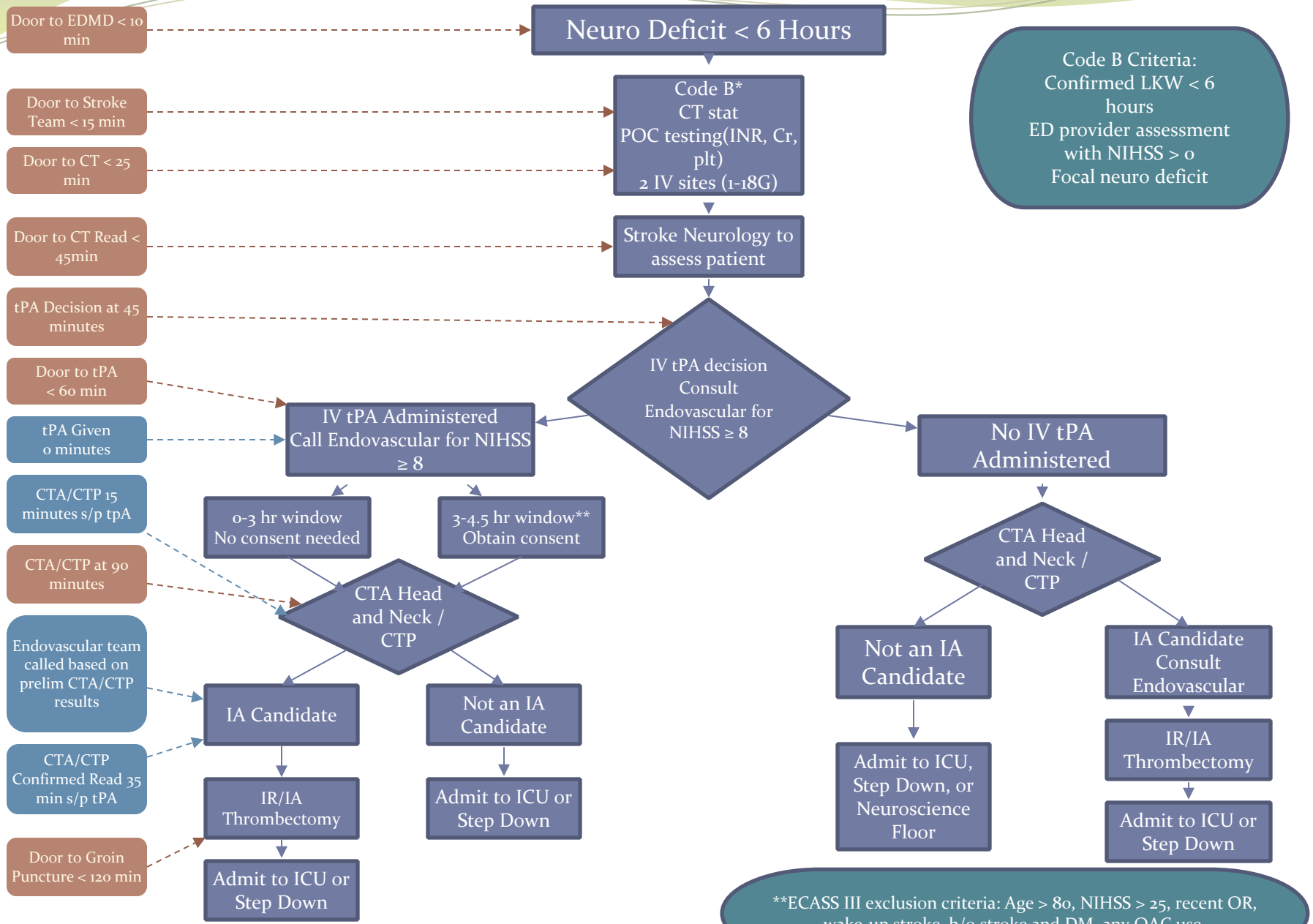
- 316 patients
- Primary device studied: Solitaire (Stent retrievers 86%, Solitaire 77%)
- mRS 0-2 at 90 days (53% for Intervention, 29% for control)
- Death at 90 days (10% for Intervention, 19% for control)
- sICH (3.6% for Intervention, 2.7% for control)

SWIFT PRIME Study:

196 patients

- Primary device studied: Solitaire
- mRS 0-2 at 90 days

Data to be published


Door to EDMD < 10 min
Neuro Deficit < 6 Hours
Code B Criteria:
Confirmed LKW < 6 hours
ED provider assessment with NIHSS > 0
Focal neuro deficit
Door to Stroke Team < 15 min
Door to CT < 25 min
Code B*
CT stat
POC testing(INR, Cr, plt)
2 IV sites (1-18G)
Door to CT Read < 45min
Stroke Neurology to assess patient
tPA Decision at 45 minutes
IV tPA decision
Consult Endovascular for NIHSS ≥ 8
Door to tPA < 60 min
IV tPA Administered
Call Endovascular for NIHSS ≥ 8
tPA Given 0 minutes
No IV tPA Administered
CTA/CTP 15 minutes s/p tpA
0-3 hr window
No consent needed
3-4.5 hr window**
Obtain consent
CTA Head and Neck / CTP
CTA/CTP at 90 minutes
CTA Head and Neck / CTP
Endovascular team called based on prelim CTA/CTP results
IA Candidate
Not an IA Candidate
Not an IA Candidate
IA Candidate
Consult Endovascular
CTA/CTP Confirmed Read 35 min s/p tPA
IR/IA Thrombectomy
Admit to ICU or Step Down
Admit to ICU, Step Down, or Neuroscience Floor
IR/IA Thrombectomy
Door to Groin Puncture < 120 min
Admit to ICU or Step Down
Admit to ICU or Step Down
**ECASS III exclusion criteria: Age > 80, NIHSS > 25, recent OR, wake-up stroke, h/o stroke and DM, any OAC use.

Protocols for Streamlined Care

Time Target	CNI Median	CNY Median Time (2014)
Door to ED Provider Assessment	***1 minute***	3 ***minutes***
Door to CT Complete	***13 minutes***	***19 minutes***
Door to CT Read	***24 minutes***	32 ***minutes***
Door to IV tPA	***36.5 minutes***	51 ***minutes***

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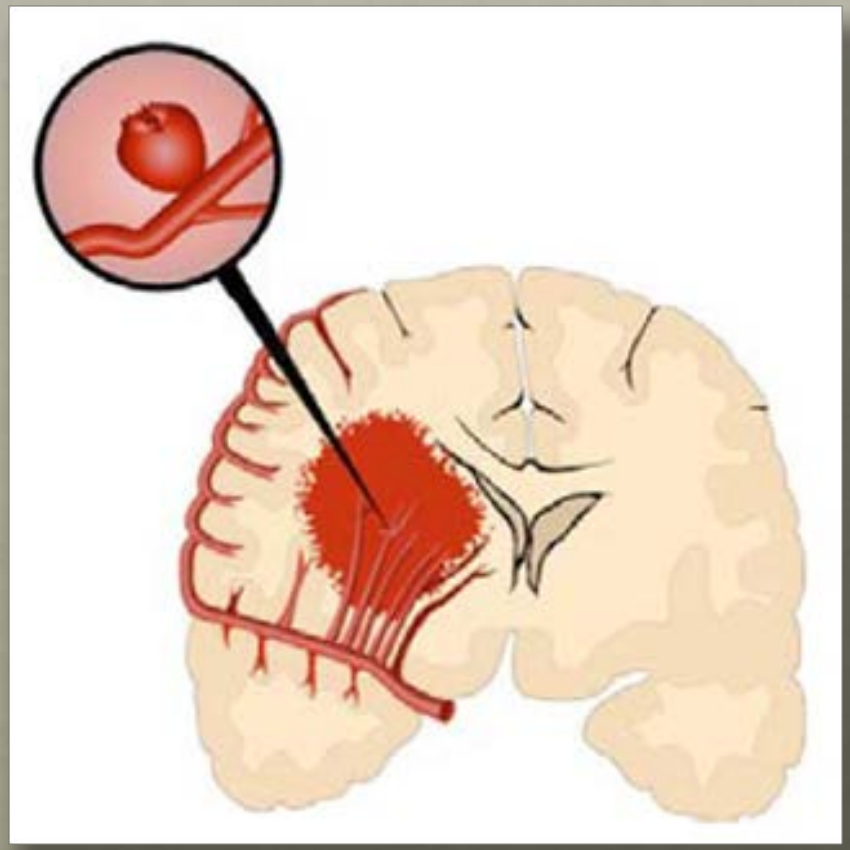
Hemorrhagic (bleeding) 12%



- Intraparenchymal
  - ★ Hypertension
  - ★ Arteriovenous Malformations (AVM)
    - Coagulopathy
    - Trauma
    - Tumors
- Subarachnoid Hemorrhage
  - ★ Brain Aneurysms

HYPERTENSIVE BLEEDS

- Intraparenchymal
  - >100,000 US/yr
  - Fatal 30-50%, survivors major neurological deficits
  - Only Stroke with no effective treatment

MINIMALLY INVASIVE SURGERY PLUS TPA FOR INTRACEREBRAL HEMORRHAGE EVACUATION (MISTIE III), NIH TRIAL

Eligibility Criteria:

INCLUSION:

- Age 18-80.
- Historical Rankin score of 0 or 1.
- Spontaneous supratentorial ICH ≥ 30 mL diagnosed using radiographic imaging, with a Glasgow Coma Scale (GCS) ≤ 14 or a National Institutes of Health Stroke Scale (NIHSS) ≥ 6.
- Six-hour clot size equal to the most previous clot size (within 5 mL) as determined by additional computed tomography (CT) scans at least 6 hours apart using the ABC/2 method.
- Symptoms less than 24 hours prior to diagnostic CT scan.
- Intention to initiate surgery between 12 and 72 hours after diagnostic CT scan.
- Systolic blood pressure < 180 mmHg sustained for six hours recorded closest to the time of randomization.

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ARTERIOVENOUS MALFORMATIONS

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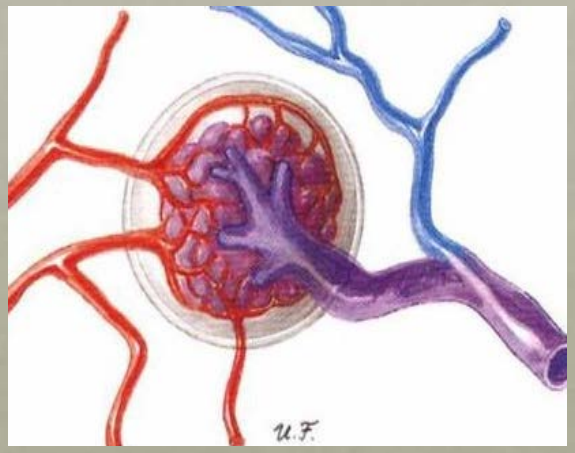
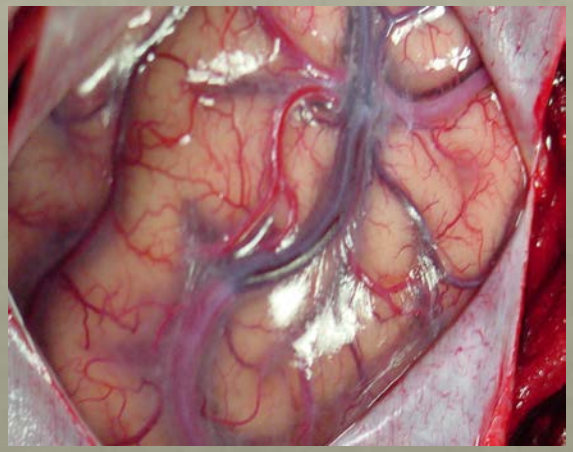
NATURAL HISTORY

- Presentation: Hemorrhage, Neurological deficit, Headaches, Seizures
- Hemorrhage rate 2-4%/year
- Morbidity (25%)/mortality (10%) from each hemorrhage





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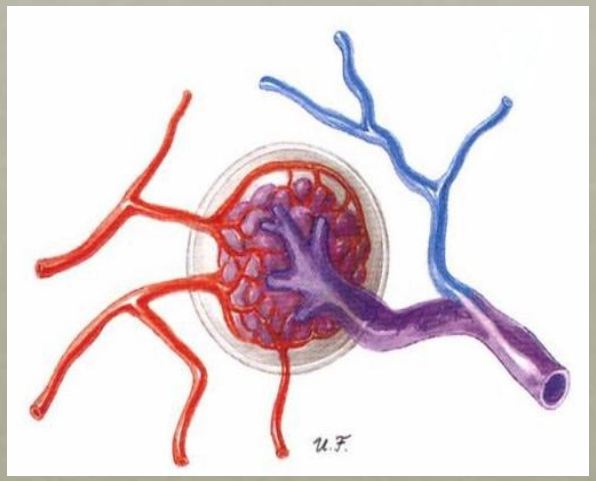
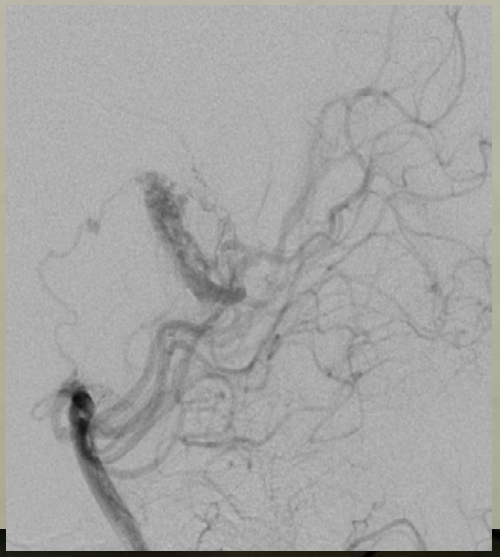
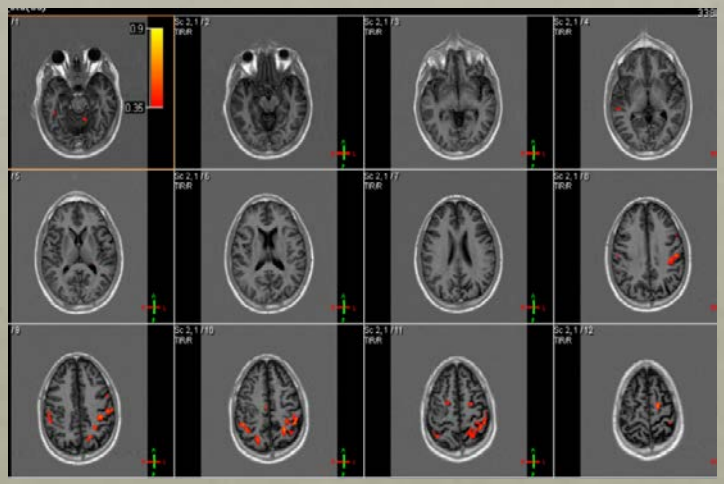
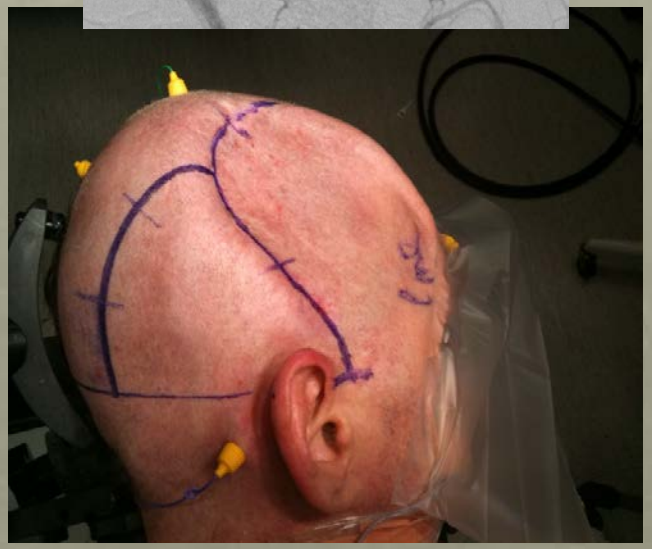
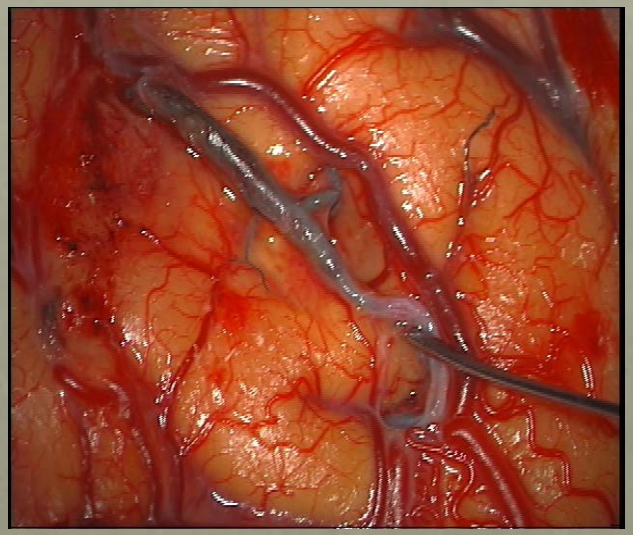
ARTERIOVENOUS MALFORMATIONS (AVM)

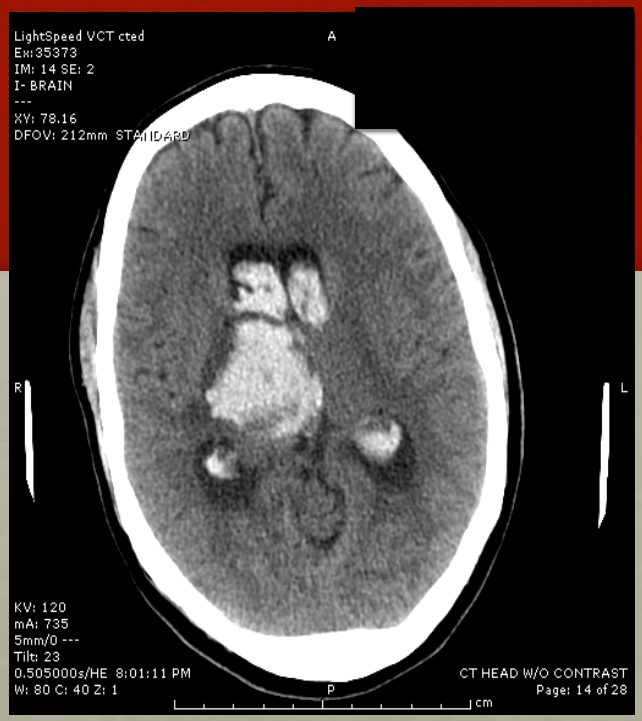


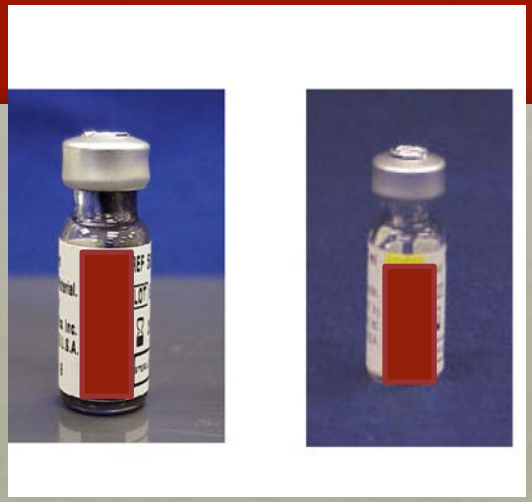


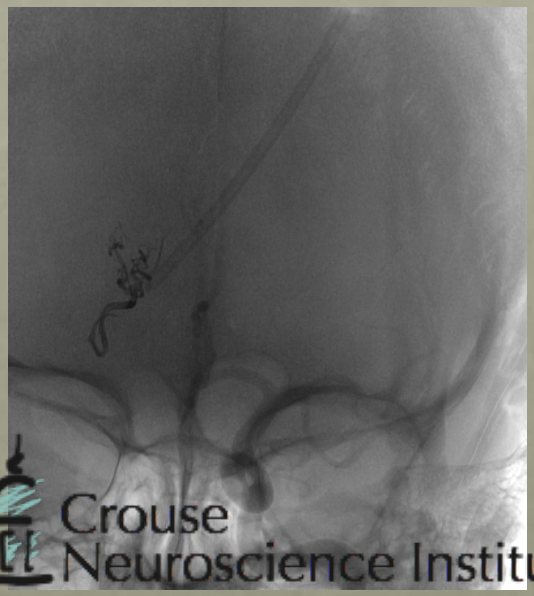












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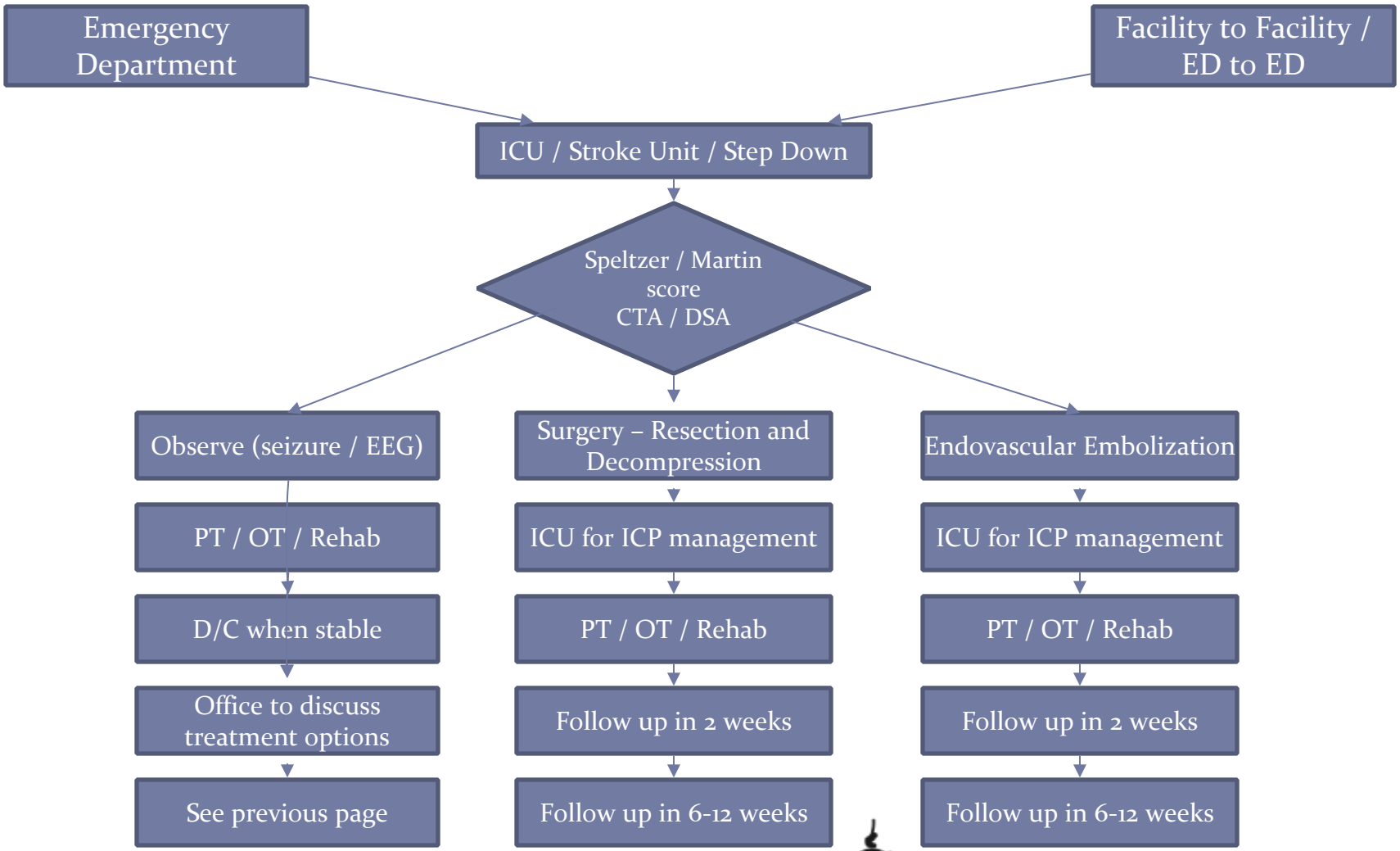
Clinical Pathway – Ruptured AVM



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BRAIN ANEURYSMS

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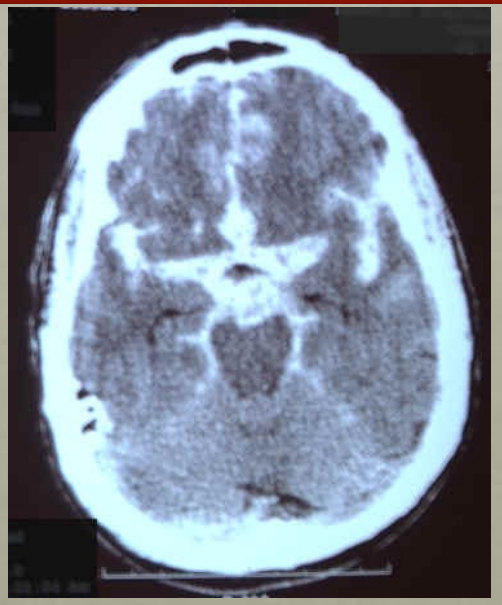
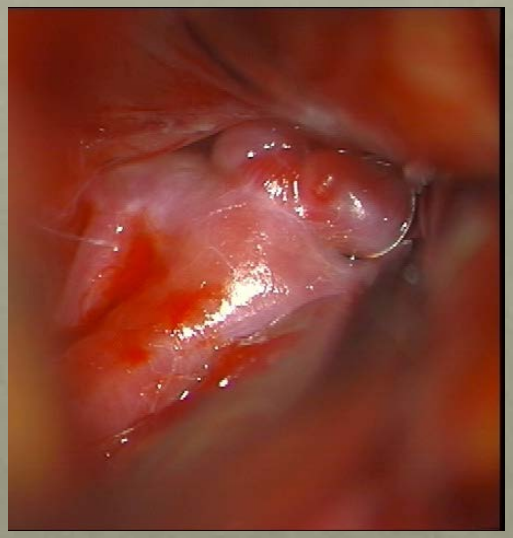
BRAIN ANEURYSM & SAH





RUPTURED ANEURYSM (SAH)

- Blister on the artery, bleeds into the spinal fluid space around the surface of the brain bathing the arteries in toxic substances.
- 10 per 100,000 annually (30,000 U.S./year)
- Rule of Thirds
  - 1/3 die before arrival
  - 1/3 arrive and remain comatose
  - 1/3 recover with treatment
    - ½ have ischemic strokes from vasospasm
- Warning Signs of Subarachnoid Hemorrhage
  - Worst Headache of Life
  - Neck Stiffness (Meningismus)
  - Photophobia

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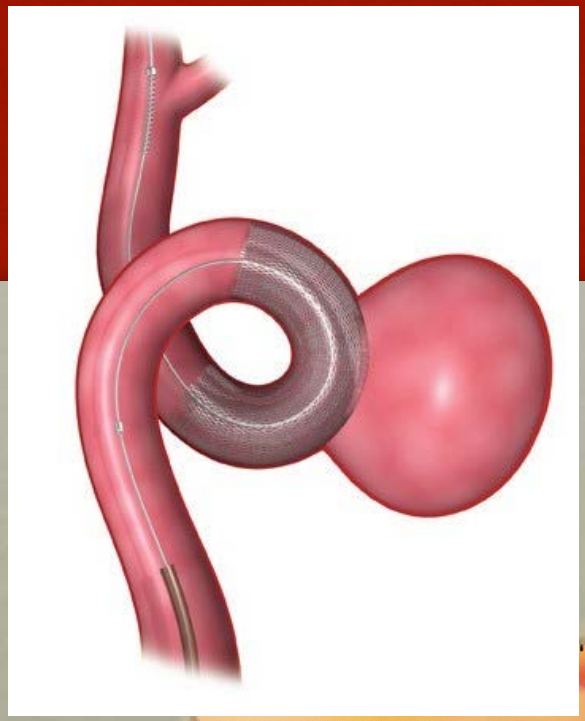

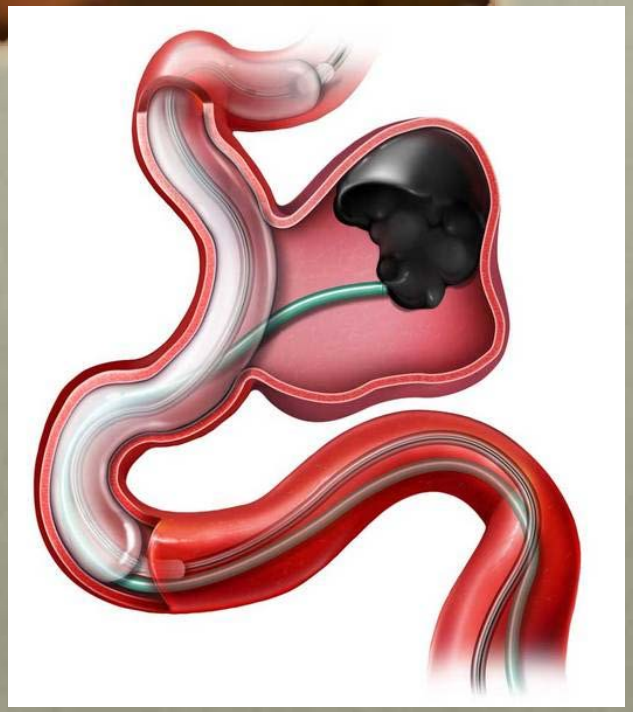

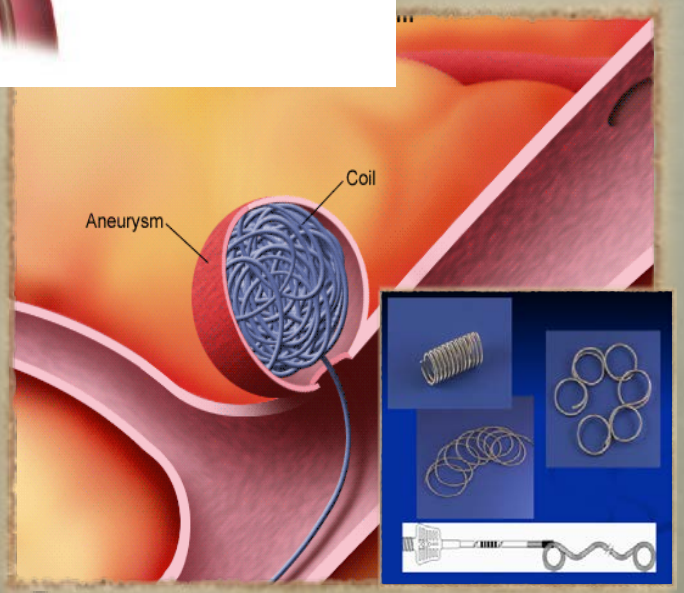

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Subarachnoid Hemorrhage (SAH) Pathway

Hunt Hess Score:
- o Unruptured
- I Asymptomatic or minimal headache, nuchal rigidity
- II Moderate to severe headache, nuchal rigidity, no neurologic deficit other than cranial nerve palsy
- III Drowsiness, confusion, mild focal deficit
- IV Stupor, moderate to severe hemiparesis, possible early decerebrate rigidity and vegetative disturbances
- V Deep Coma, decerebrate rigidity, moribund appearance

All Emergent ED Management

A,B,C,D's
2 peripheral iv's
Labs: stat BMP, CBC, PT/PTT/INR, T&C 2 Units
NSICU Bed Request by ED
Tight BP control
Hunt-Hess Score (HHS)

→ Maintain SBP<130mmHg (Refer to ICH pathway)

HHS≤3

Reassess Airway

HHS 4-5

Emergent ETT & MV using Intubation Neuro Protocols for high ICP

→ Start Propofol and Fentanyl Drip **(NO BENZODIAZAPENES OR LONG-ACTING NARCOTICS)**

STAT
CT head
CTA head/neck

Reassess Patient Q15min Neuro/Vitals
Continue Medical Treatment
Nimodipine within 24 hours

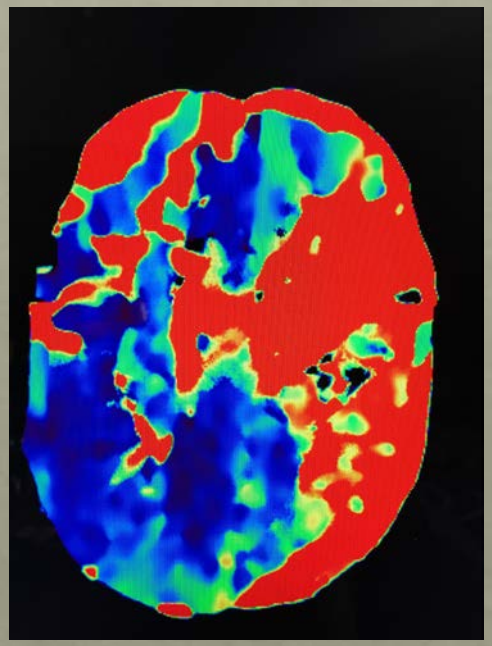
→ Call Vascular Neurosurgery

- Reassess BP (Refer to ICH pathway)
- Identify Need for Anticoagulation Reversal (Refer to ICH pathway)
- ICP Management (Refer to ICH pathway)
- Witnessed Seizure Management (Refer to ICH pathway)
- Maintain Normoglycemia (Refer to ICH pathway)

Nursing prepare for Emergent Ventriculostomy by Neurosurgery Team

- ICU for Further Pre-Intervention Stabilization
- Emergent OR/IR

STROKE IS TRAUMA



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