

STROKE

an illness of sudden onset causing injury to the brain that results from occlusion or rupture of vessel to a specific region

Epidemiology: blacks have highest rate of death

Pathophysiology: Ischemic due to blockage of artery (85-90%)
hemorrhagic → vessel breaks
• subarachnoid → aneurism ruptures

Etiologies: 35% idiopathic
• atherothrombotic (20%)
• embolism (20%)
• lunar small vessel disease (25%)

Clinical Manifestations:

unilateral weakness and numbness, facial droop, speech problems, visual disturbance, dizziness, ataxia, altered mental status, severe headache

Physical exam: brief neuro → LOC, speech, persistent gaze deviation, facial droop, hemiparesis
Calculate NIH stroke scale - LOC, gaze, visual, palsy, motor, ataxia, sensory, language, dysarthria, extinction and inattention

Diagnostics blood glucose ≥ 50 , platelets ≥ 100 , INR ≤ 1.7 , PT ≤ 15 seconds

Imaging → non-contrast CT needed to determine type of stroke and treatment

Management

For acute stroke:

tPA intravenous tissue plasminogen activator. Clot buster thrombolytic
• administered IV within 3 hours of symptom onset. Has benefit as far out as 4.5 hours
60 minute door-to-needle = "golden hour"

Risks: bleeding, angioedema (rare)

Contraindications: last known normal > 4.5 hrs, CT shows intracranial hemorrhage (or +hx)
• Past 3 months → ischemic stroke, severe head trauma, CNS surgery
• BP $> 185/110$, infective endocarditis, aortic arch dissection, intra-axial intracranial neoplasm
• Pt receiving LMWH within 24hrs, direct inhibitor within 48hrs
• Plt $< 10,000$, INR > 1.7 , aPTT $> 40s$, PT $> 15s$

intra-arterial mechanical clot retrieval. Done w/ or w/out tPA

Mechanical devices: merci retriever, Solitaire FR, Penumbra system, trevo, embotrap
• 6hr window but up to 24hrs in certain cases
Imaging helps guide IA intervention → CT angiogram (occlusion), perfusion (size of infarct)

TRANSIENT ISCHEMIC ATTACK

reversible episode of local ischemic brain dysfunction

Signs/symptoms usually last only minutes to several hours

Most important forecaster of stroke:

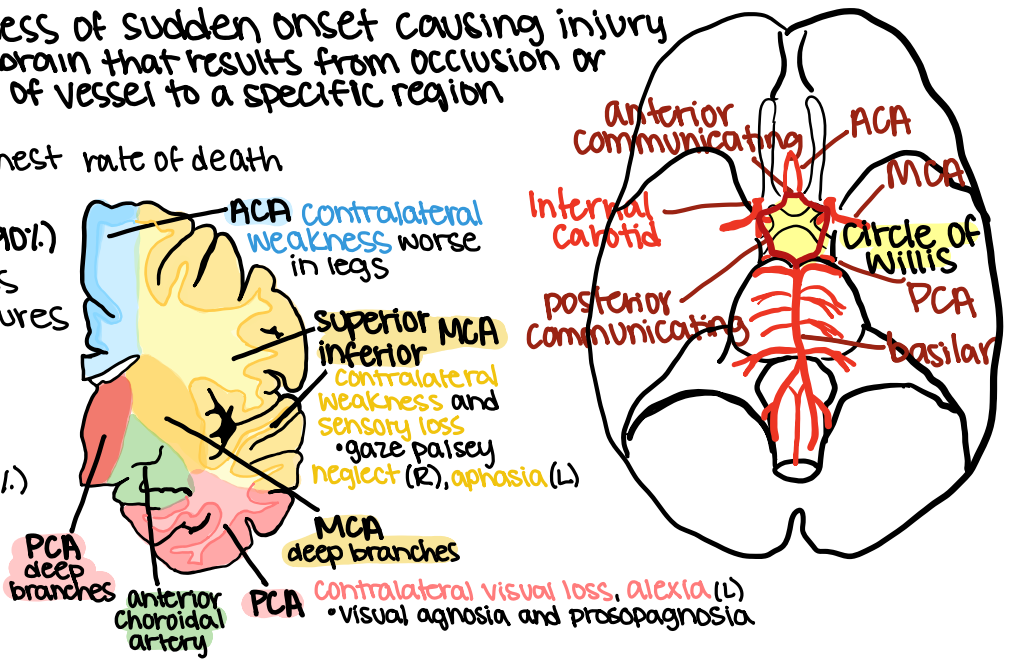
- Age 1pt if > 60
- BP 1pt if $\geq 140/90$ at acute evaluation
- Clinical 2pts unilateral weakness. 1pt speech disturbance (w/out weakness)
- Duration 1pt 10-59 min. 2pt ≥ 60 min.
- Diabetes 1pt

WORKUP

Stroke → MRI, carotid imaging, echo, cardiac monitor, blood work (fasting lipid, A1C)

Risk factors: afib, carotid stenosis, HTN, dyslipidemia, diabetes, smoking, sleep apnea, dyslipidemia

Prevention: anticoag (aspirin vs. clopidogrel), statin recommended for dyslip, target A1C $< 7\%$, smoking cessation.



HEMORRHAGIC STROKE

SUBARACHNOID (41%)

Epi: F > M. Elderly.

- smoking, HTN, alcohol, cocaine abuse

Pathophys: 85% **aneurysmal** →

ruptured berry aneurysm

Bleeding into space between pia mater and arachnoid membrane

- **trauma** is most common cause

Clinical: **severe, abrupt headache**

neck stiffness/rigidity, N/V, photophobia, CN palsies, transient alteration in LOC.

Diagnostics: **non contrast CT** - high sensitivity in first 24hrs → declines

Lumbar puncture - elevated RBCs that don't clear or xanthochromia

- **ALWAYS** done if suspect SAH

Management: **supportive**

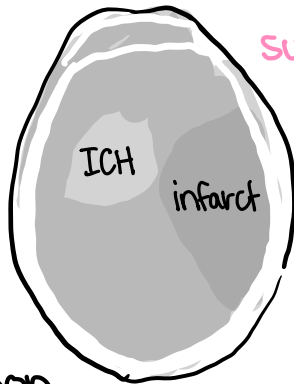
Aneurysm clipping

craniotomy to isolate aneurysm → clip placed across neck to block flow

IF >50mL or **middle cerebral artery**

Aneurysm coiling blocks flow and prevents rupture

IF >70yo, **poor grade, basilar apex**



INTRACEREBRAL (59%)

Epi: trauma, older age, high alcohol intake, and coagulopathy

Pathophys: rupture of blood vessels → blood **accumulation in parenchyma**

- most commonly due to **hypertension** and amyloid angiopathy

Clinical: focal neurologic SX increase within minutes to hours (hemiplegia, seizures)

- Headache, N/V, syncope, altered mental status

Diagnostics: Clinical. CT imaging of choice

Management: initial → ABCs, **BP control**

Goal SBP <180 (SBP <140 may be safe)

- **labetalol** IVP prn. **Nicardipine** IV drip

Monitor for **↑ICP** (worsening HA, LOC, neuro)

Suboccipital craniotomy w/ clot evacuation

- neurologic deterioration,
- brainstem compression and/or hydrocephalus from ventricular obstructions

IF lobar clots within 1cm of the surface →

Standard craniotomy w/ supratentorial evac

HEMATOMAS

SUBDURAL more common
Bleeding **UNDER** dura

Epi: elderly, alcoholics, anticoagulation, shaken baby/child abuse

Pathophys: blood clot located in space between **arachnoid and dura matter**

- Commonly due to tearing of a **bridging vein** by inertial forces
- most commonly due to **trauma**

Clinical: gradual increase in **generalized neurologic sx** (headache, N/V, dizzy)

Diagnostics: CT w/out contrast

CT → **biconcave**, high density mass

- **CAN** cross suture lines
- may cause **midline shift**

Management: **surgical evacuation** IF

- size >10mm thickness or shift >5mm
- neuro deficits, ICP >20, or decline in GCS

Nonoperative if stable, small, shift <5mm, no signs of ↑ICP

EPIDURAL

Bleeding **OUTSIDE** dura

Epi: male. Age 2-60yo. Pregnancy

Pathophys: blood clot located in epidural space between **skull and dura matter**

- typically due to **temporal bone fracture** and tearing of a meningeal artery → **middle meningeal artery**
- Mass effect** can lead to **herniation**

Clinical: rapid onset LOC followed by lucid moment → **neurologic deterioration/coma**

Diagnostics: CT w/out contrast

CT → **biconvex**, high density mass

- doesn't cross suture lines
- may cause **midline shift**

Management: **hematoma evacuation or craniotomy** indicated IF

- EDH >2cm regardless of GCS
- **active bleeding**

Medical management possible when:

- depth <15mm with <5mm midline shift if GCS >8 and no focal neuro deficits