Stroke or Brain Attack
5th Leading cause of Death for men
4th leading cause of Death for women
Acute brain injury due to a vascular etiology
Sudden onset
Persist at least 24 hours
Neurological deficit

TIA
Neurological deficits lasting less than 24 hours
Calculating Risk

ABCD2

To identify individuals at high early risk of stroke after transient ischemic attack.

A (Age); 1 point for age ≥60 years,

B (Blood pressure ≥ 140/90 mmHg); 1 point for hypertension at the acute evaluation,

C (Clinical features); 2 points for unilateral weakness, 1 for speech disturbance without weakness,

D (symptom Duration); 1 point for 10–59 minutes, 2 points for ≥60 minutes.

D (Diabetes); 1 point

Total scores ranged from 0 (lowest risk) to 7 (highest risk).

Scale:
Stroke risk at 2 days, 7 days, and 90 days:
Scores 0-3: low risk
Scores 4-5: moderate risk
Scores 6-7: high risk
Types of Stroke

**Ischemic** - most common >70%
- Thrombotic
- Atherosclerosis
- Embolic
  - Emboli form the Heart or Vessels

**Hemorrhagic**
- Intracerebral
  - Hypertension or Amyloid Angiopathy
- Subarachnoid
  - Berry Aneurysms
Stroke and Multiple Sclerosis

Blood begins to fill the space inside the brain.
Thrombotic Strokes

Atherosclerosis
  Internal Carotid
  Middle Cerebral
  Vertebrobasilar

Symptoms
  Slow stepwise progression of symptoms
  Usually preceded by TIA’s

Other Causes
  Lupus anticoagulant
  Polycythemia
  Syphilis
  Thrombocytosis
  Dissecting Aortic Aneurysm
Stroke and Multiple Sclerosis

**Embolic Stroke**

- Not usually preceded by TIA
- Emboli
  - Heart
  - Large Blood vessel
  - Usually effects middle > posterior > anterior cerebral
- Symptoms
  - Neurodeficits worst at onset
  - Weakness is greater in distal extremities
Stroke and Multiple Sclerosis

Stroke Symptoms By Region

- Middle cerebral
- Anterior cerebral
- Posterior cerebral
- Single Hemisphere
- Vertebobasilar
- Lateral Medullary syndrome
- Lacunar-small vessel
Middle Cerebral Artery Occlusion

Contralateral hemiplegia
Contralateral hemianesthesia
Homonymous hemianopsia
Impaired conjugate gaze in opposite direction
Impaired spatial- nondominant
Impaired language-dominant
If lesion high- >loss face/upper ext
If it is in the main trunk- same throughout
Anterior Cerebral Artery Occlusion
Most affected in distal contralateral leg
Urinary incontinence
Gait abnormalities
If includes corpus callosum the patient will have tactile anomia (cannot name what they touch)
Posterior Cerebral Artery Occlusion

Contralateral homonymous hemianopsia
Usually upper quadrant anopsia
Mild contralateral hemiplegia/anesthesia
Color anomia = corpus callosum damage
Memory loss
If occlusion bilateral memory will be severe/persistent
Single Hemisphere injury

Does not affect paraspinal muscles
Does not affect pharynx
Does not affect jaw
Does not affect the forehead
If any or all of the above are affected think:
   Bilateral hemispheric infarct
   Brainstem infarct
Vertebrobasilar Artery Occlusion
Associated with brain stem strokes
Bilateral extremity motor/sensory dysfunction
Quadraplegia in severe cases
Crossed motor and sensory deficits
Horner syndrome
Cerebellar signs/stupor/coma
Cranial nerve dysfunction
Lateral Medullary Syndrome

Also called *Wallenberg Syndrome*

- Nausea
- Vomiting
- Nystagmus
- Ipsilateral Horner Syndrome
- Ipsilateral palate and vocal cord weakness
- Ipsilateral face hemianesthesia
- Contralateral body hemianesthesia

Stroke and Multiple Sclerosis
Lacunar Strokes

Due to hypertension
Occlusion of very small arterioles
Over time they form cysts in the brain
Pure hemiplegia
Pure hemisensory
Multiple bilateral frontal lobe “lacunes” can cause pseudobulbar palsy
Stroke and Multiple Sclerosis

Work up:

- History
- Computerized Tomography Brain
- CBC with platelets
- Electrolytes, Glucose, Bun, Cr, Coagulation profile
- EKG
- Trans-thoracic Echocardiogram
- Carotid Ultrasound/Trans-cranial Doppler
- MRI if suggested brainstem
Ischemic Stroke Treatment

Alteplase

>18 yrs old with an ischemic stroke Dx

Onset time – 3 hours (3-4.5 with caveats)

Oxygen

Treat BP-gradually

Aspirin

Heparin
CONTRAINDICATIONS TO ALTEPLASE

- Evidence of intracranial hemorrhage on pretreatment CT
- Only minor or rapidly improving stroke symptoms
- Clinical presentation suggestive of subarachnoid hemorrhage
- Active internal bleeding
- Known bleeding diathesis, including but not limited to:
  - **Platelet count < 100,000/mm**
    - Patient has received heparin within 48 hours and has an elevated aPTT
    - Current use of oral anticoagulants (e.g., warfarin sodium) or recent use with an elevated prothrombin time > 15 seconds
- Patient has had major surgery or serious trauma excluding head trauma in the previous 14 days
- **Within 3 months any intracranial surgery, serious head trauma, or previous stroke.**
- History of gastrointestinal or urinary tract hemorrhage within 21 days
- Recent arterial puncture at a non compressible site
- Recent lumbar puncture.
- **On repeated measurements, systolic blood pressure greater than 185 mm Hg or diastolic blood pressure greater than 110 mm Hg at the time treatment is to begin**
- History of intracranial hemorrhage
- Abnormal blood glucose ( < 50 or > 400 mg/dL)
- Post myocardial infarction pericarditis
- Patient was observed to have seizure at the same time the onset of stroke symptoms were observed
- Known arteriovenous malformation, or aneurysm
Stroke and Multiple Sclerosis

Post Acute Care Therapy

Antiplatelets

ASA (50-325 mg)/Aggrenox
Clopidogrel(Plavix)
Coumadin
Dabigatran(Pradaxa)- (non valvular Atrial Fibrillation)

Manage underlying causes

Cardiac-
HTN- JNC VIII guidelines
Diabetes- HbA1C <6.5-7.0
Tobacco abuse
Hyperlipidemia- LDL <70
If >70% carotid stenosis- surgical evaluation
# Stroke and Multiple Sclerosis

**CHADS²**

## Score for Atrial Fibrillation Stroke Risk

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive Heart Failure</td>
<td>1pt</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1pt</td>
</tr>
<tr>
<td>Age &gt; 75</td>
<td>1pt</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>1pt</td>
</tr>
<tr>
<td>Stroke or TIA Symptoms</td>
<td>2pt</td>
</tr>
</tbody>
</table>

- **Score > 2**: High, **oral anticoagulant**
- **Score > 1 < 2**: Moderate, **oral anticoagulant or ASA**
- **Score 0**: Low, **ASA 75-325mg**
Intracerebral Hemorrhage

Amyloid Angiopathy

Commonly causes recurrent bleeds

>65 yrs old

Subcortical, rarely affects deep structures

Can cause multiinfarctional dementia

Also found in alzheimers patients- unclear association

Occasionally can be associated with subarachnoid stroke and multiple sclerosis
Intracerebral Hemorrhage

Hypertension
Gradual and smooth onset of symptoms
Putamen > Thalamus > Pons > Cerebellum

Putamen
Contralateral hemiparesis/sensory loss/hemianopsia
Acts just like a middle cerebral infarct

Thalamus
Contra hemiplegia/hemianesthesia/sensory > motor

Pons
Coma/pinpoint pupils/complete paralysis
Can have decerebrate posturing bilaterally

Cerebellum
Acute dizziness/ataxia/vomiting
No mentation change or loss of consciousness
Subarachnoid Hemorrhage

Cerebral saccular aneurysm bleed
   Usually Circle of Willis
   IC=40%/AC=35%/MC=20%
Hypertensive hemorrhages with ventricular rupture
A-V Malformations

Symptoms
   Acute/Severe headache (thunderclap)-unresponsive to meds
   May be alert/confused/comatose
   No focal neurological signs
   Neck stiffness is classic- but not always present
**Hemorrhagic Stroke Work Up**

- Computerized Tomography (CT misses 10% of Bleeds)
- Lumbar Puncture
  - Xanthochromic supernatent is diagnostic
- If LP (-) can be hours before blood gets in CSF
- Cerebral Angiography
  - Can rebleed in 24 hours/Vasospasm

**Treatment**

- Neurosurgery consult
- ABC’S/Hemodynamic control/Nimodipine/Mannitol
Multiple Sclerosis

Myelin deterioration
- Brain
- Spinal Cord
- Optic Nerve

Pathophysiology
- 10x more common in northern latitudes
- May be viral in origin—Female 2:1 Males
- Autoimmune but does have genetic components
- Onset 20-50 yrs of age

Plaques
- Cause a mononuclear inflammation
- Demyelination with axonal sparing
- Oligodendroglial cell loss and astrocyte proliferation
- Long standing lesion Astrogliosis
Symptoms

Mononeuropathy +/- multiplex
Optic neuritis
Ophthalmoplegia
Intermittent Diplopia
Extremity weakness
Tremors
Lhermitte sign

(Paresthesias radiating down the spine into extremities on neck flexion)
Types of Multiple Sclerosis

**Benign**
- No occurrence after initial

**Relapsing-remitting**
- Most common
- Has attacks followed by none then reoccurs

**Primary-Progressive**
- Men
- Gradual decline few plateaus

**Secondary-progressive**
- Stage II relapsing-remitting. No periods of remission

**Progressive-relapsing**
- Rare. Progressive form until the end

**Malignant (Marburg Variant)**
- Very rare. Decline to death in few months

Stroke and Multiple Sclerosis
Stroke and Multiple Sclerosis

- Diagnostic Tests
  - MRI – TEST OF CHOICE - Brain/Spinal Cord
    - White plaques
  - Evoked Action Potentials
    - Silent lesions
  - Lumbar Puncture
    - Increased IgG / Oligoclonal IgG bands in CSF
    - Elevated protein

Stroke and Multiple Sclerosis
Stroke and Multiple Sclerosis
Treatment

Acute Phase/Initial
Steroids  500mg daily x 5 days

Oral Immunomodulator- Fingolimod(Gilenya), Aubagio, Tecfidera

Relapsing-Remitting
Beta-interferons (1-a, 2-b)
  Avonex
  Rebif
  Betaseron
  Extavia
  Tysarbi
Copolymer
  Copaxone

Chronic/Advanced
  Novantrone

Stroke and Multiple Sclerosis
34 yr old with history of ataxia, ophthalmoplegia and paresthesia of the legs intermittently with a massive weight loss over the past few months.

His history is significant for HIV and has been on gancyclovir and protease inhibitors and T-cell counts have remained <200.

His mentation is going quickly and he has no memory and has stopped eating.

What is your diagnosis?
PML
Progressive Multifocal Leukencephalopathy

PML is caused by the JC Virus but there are some drugs that can create a reversible leukencephalopathy.
Central Pontine Myelinolysis

- Occurs in patients with severe hyponatremia
- Their sodium is corrected too aggressively

Quadraparesis
Mutism
Pseudobulbar palsy
Swallowing dysfunction

Treatment

Correct Na slowly