

## Stroke

1. *In patients presenting with symptoms/signs of stroke, include other diagnoses in the differential diagnosis (i.e. TIA, brain tumour, hypoglycemia, subdural hematoma, SAH)*
2. *In a patient presenting with a stroke, differentiate, if possible, hemorrhagic from embolic/thrombotic (eg thorough hx/px, ancillary testing such as scanning/ecg) as treatment differs*
3. *Asses patients presenting with neurological deficits in a timely fashion to determine their eligibility for thrombolysis*
4. *In a patient dx with stroke, involve other professionals as needed (eg. PT, OT, OT, social work, physiatrist, neurologist) to ensure the best outcome for the patient*
5. *When caring for a stroke patient with severe/serious deficits, involve the patient and her or his family in decisions about intervention (eg resuscitation, use of a feeding tube, treatment of pneumonia)*
6. *In patients who have suffered stroke, diagnose 'silent' cognitive deficits (not associated with sensory or motor symptoms or signs, such as inattention and impulsivity) when they are present*
7. *Provide realistic prognostic advice about their disabilities to stroke patients and their families*
8. *In stroke patients with disabilities, evaluate the resources and supports needed to imptove function (eg cane, walker, home care)*
9. *In the continuing care of stroke patients with deficits, (eg dysphagia, being bedridden) include the prevention of certain complications (eg aspiration pneumonia, decubitus ulcer) in the treatment plan*
10. *In patients at risk of stroke, treat modifiable risk factors (eg a-fib, DM, dyslipidemia, hypertension)*
11. *In all patients with a history of TIA or completed stroke, and in asymptomatic patients at high risk for stroke, offer antihrombotic treatment to appropriate patients to lower stroke risk*

## Stroke

### Definition

- An acute neurological injury that occurs due to either brain ischemia or brain hemmorrhage

### Types

1. Ischemic (87%)
  - a. Thrombotic
  - b. Embolic
  - c. Hypoperfusion related
2. Hemorrhagic
  - a. Intracerebral (10%)
  - b. SAH (3%)

### History

- Typically *sudden onset* of sx
- Weakness, esp unilateral
- Confusion
- Aphasia
- Visual deficit/diplopia
- Dizziness, gait disturbance, ataxia
- Sudden severe HA with no known cause
  
- Atypical sx
  - SOB
  - LOC or syncope
  - Sudden pain in chest, arms, legs
  - Seizure
  - Sudden hiccups, fatigue, palpitations
  - Altered mental status
  
- Risk Factors
  - HTN
  - DM
  - CAD
  - A-fib
  - Valve replacement
  - Recent MI
  - Bleeding diathesis (i.e anticoagulation)

### Physical Exam

- Assess ABCs
- GCS
- Screening neurological exam assessing visual, motor, sensory, coordination, and language functions

### Work Up

- Capillary blood glucose
- CBC, lytes, BUN, Cr
- INR, PTT
- ECG
- Consider: LP, tox screen, CXR (for aspiration) depending on presentation
  
- Imaging
  - Emergent non-contrast CT head
    - *Most acute ischemic strokes are not visualized by non-contrast CT in early hours of a stroke*
    - Role of CT is primarily to exclude intracranial bleeding, tumour, and other stroke mimics
    - Remember to do LP if suspicion of SAH and normal CT

### Management

- Hypertension in ischemic stroke
  - If no thrombolytic therapy, should treat if SBP >220 or DBP >120, or if serious other comorbidities (i.e. ACS, AKI, HF etc)
    - Cautiously lower BP by 15% within first 24h
  - Can restart previous antihypertensives at ~24h if neurologically stable
  - Stricter control if thrombolysis being considered or has been done
- Hyperglycemia
  - Less favourable outcomes in the setting of hyperglycemia, so it should be treated if >10
- Thrombolysis
  - Need to determine time of symptom onset  defined as last moment patient was at baseline
  - Thrombolysis not recommended if time of onset unclear
  - Inclusion criteria
    - Acute ischemic stroke
    - 18-80 y/o
    - Onset of symptoms **3-4.5h** before rtPA administration (time varies between institutions/guidelines)
    - Stroke sx present for at least 30 minutes without significant improvement
  - Exclusion Criteria
    - Lengthy list, but includes ICH, coagulopathy, seizure at onset, significant HTN, or unclear dx
- Antiplatelet therapy (for ischemic stroke)
  - ASA 325mg w/l 24-48h after stroke onset (does not interfere with thrombolysis)
- Other considerations
  - Aspiration risk
    - NPO until swallowing assessment
    - May need NG or PEG feeds  discuss wishes w/ pt/family
  - Elevated head of bed to 30 degrees if concerned about increased ICP, aspiration, oxygen desaturation
  - Maintain normothermia
    - Pneumonia most common cause of fever w/l 1<sup>st</sup> 24h
  - DVT prophylaxis with UFH or LMWH in patients w/ ischemic stroke and limited mobility (wait 24h if thrombolized)
  - Urinary incontinence common
    - Most commonly d/t detrusor hyperreflexia from loss of inhibitory input from CNS
  - Beware of bedsores
    - Frequent repositioning q2h ideally if bedbound
    - Pressure reducing products

- High rates of post-stroke depression (18-61%)
- Multi-disciplinary approach
  - Involve OT, PT, SLP, stroke rehab if available
- D/C planning-consider need for home support, assisted living, placement

### **Secondary Prevention**

- Antiplatelet therapy for non-cardioembolic stroke/TIA
  - ASA 81mg od OR
  - Clopidogrel 75mg od OR
  - ASA + Aggrenox (ER Dipyridamole)
  - Clopidogrel vs ASA
    - Clopidogrel slightly more effective (5.3% vs 5.8% rate of stroke, MI, vascular death annually), but marginal benefit may be offset by cost (CAPRIE Trial)
    - Slightly lower rates of GI bleeding w/ clopidogrel vs ASA
  - Don't use ASA and clopidogrel together-no benefit and increased rates of adverse events-unless there is some other indication (i.e ACS, PCI etc)
- Dyslipidemia/Statin Therapy
  - Conflicting evidence, some suggestion that dyslipidemia is not a strong risk factor for stroke but...
  - Atorvastatin 80mg po od for anyone with TIA or ischemic stroke of atherosclerotic origin
    - ARR of fatal/nonfatal stroke at 5 years = 2.2%
    - ARR of any coronary event 6.5% (SPARCL trial)
  - Consider combining statin with niacin or gemfibrozil if HDL <1
- Treat DM2 and HTN
- Lifestyle modification

### **Primary Prevention**

- Lack of data for ASA in mod –high risk patients (Framingham risk  $\geq 10\%$ ), so use clinical judgement

## **Transient Ischemic Attack**

### **Definition**

- A transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction
- Duration (i.e. <24h) no longer included in definition

### **Prognosis**

- Increased risk of stroke (up to 17% 90 day risk)
- Predictor of imminent stroke (4-10% risk w/i 48h)

### **Clinical Manifestation**

- Low flow (i.e. secondary to carotid stenosis, vertebrobasilar lesion etc)
  - Usually brief (i.e. minutes), recurrent
  - Carotid stenosis/MCA lesion
    - Usually stereotyped
    - Hand, face, arm, leg numbness/weakness
    - Aphasia if dominant hemisphere
  - Vertebro-basilar circulation
    - Not stereotyped
    - Brainstem and cerebellar sx
      - Dizziness w/ or w/o vertigo
      - Dysarthria
      - Diplopia, ptosis
      - Arm/leg numbness or weakness-can be bilateral
      - Facial numbness
- Embolic
  - Typically last hours
  - Sx as above, but if in PCA distribution may include
    - Ataxia
    - Hemianopsia
    - Hearing loss
    - Crossed face and body numbness

### Work-Up

- ABCD<sup>2</sup> score
  - Prognostic scoring tool designed to identify patients at high risk of ischemic stroke in the first two days after a TIA
  - Can be used to determine inpatient vs outpatient therapy
- Imaging
  - CT or MRI brain recommended ASAP, w/i first 24h
- Neurovascular evaluation
  - Most patients will get a duplex u/s of carotids initially, or possibly CTA/MRA
- Cardiac evaluations
  - ECG
  - ECHO if no cause for TIA found on w/u

### Management

- Risk factor reduction-see recommendations for secondary prevention of stroke
- Carotid Endarterectomy (CEA)
  - Symptomatic and  $\geq 50\%$  stenosis, with life expectancy  $\geq 5$  years  refer to vascular surgeon
  - CEA usually recommended in patients w/ recently symptomatic carotid stenosis of 70-99% with a life expectancy of  $\geq 5$  years
  - Symptomatic stenosis 50-69%-CEA usually recommended in men but not women

- <50% stenosis-medical management
- Near occlusion-CEA not beneficial
  - Ideally CES should be done w/ 2 weeks of last event

**Differential diagnosis of transient neurologic symptoms**

	<b>Seizure</b>	<b>Transient ischemic attack</b>	<b>Migraine</b>	<b>Syncope</b>
Demography	Any age, often younger	Older patients Stroke risk factors present Men>women	Younger age Women>men	Any age, often younger Women>men
Central nervous system symptoms	Positive symptoms: limb jerking, head turning, loss of consciousness Negative symptoms may develop, remain postictally, and persist	Negative symptoms: numbness, visual loss, paralysis, ataxia All sensory modalities affected simultaneously	First positive symptoms, then negative in same modality: scintillating scotoma and paresthesia most common; second sensory modality is involved after first clears	Light-headed, dim vision, noises distant, decreased alertness Transient loss of consciousness
Timing	20 to 80 seconds Absence, atonic seizures and myoclonic jerks are shorter Postictal depression Spells occur during years	Usually minutes, mostly <1 hour Spells during days, weeks, months; not usually years	Usually 20 to 30 minutes Sporadic attacks during years	Usually a few seconds Sporadic attacks during years
Associated symptoms	Tongue biting, incontinence, sore muscles, headache after attack	Headaches may occur during time period of TIAs	Headache after attack, nausea, vomiting, photophobia, phonophobia	Sweating, pallor, nausea



\*Note-Above table does not include metabolic causes (i.e. hypoglycemia, other metabolic disturbances), encephalopathy

## Characteristics of stroke subtypes

Stroke type	Clinical course	Risk factors	Other clues
Intracerebral hemorrhage	Gradual progression during minutes or hours	Risk factors include hypertension, trauma, bleeding diatheses, illicit drugs (eg, amphetamines, cocaine), vascular malformations. More common in blacks and Asians than in whites.	May be precipitated by sex or other physical activity. Patient may have reduced alertness.
Subarachnoid hemorrhage	Abrupt onset of sudden, severe headache. Focal brain dysfunction less common than with other types.	Risk factors include illicit drugs (eg, amphetamines, cocaine), bleeding diatheses.	May be precipitated by sex or other physical activity. Patient may have reduced alertness.
Ischemic (thrombotic)	Stuttering progression with periods of improvement. Lacunes develop over hours or at most a few days; large artery ischemia may evolve over longer periods.	Risk factors include atherosclerotic risk factors (age, smoking, diabetes mellitus, etc.). Men affected more commonly than women. May have history of TIA.	May have neck bruit.
Ischemic (embolic)	Sudden onset with deficit maximal at onset. Clinical findings may improve quickly.	Atherosclerotic risk factors as listed above. Men affected more commonly than women. History of heart disease (valvular, atrial fibrillation, endocarditis).	Can be precipitated by getting up at night to urinate, or sudden coughing or sneezing.