Cerebrovascular Disease: Detection, Diagnosis, and Treatment
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Introduction
- Cerebrovascular disease can be broken down into many different types of strokes with different etiologies and treatment regimens
- Accounts for more than 20,000 deaths every year in the United States
- Each patient must be evaluated individually before a proper treatment regimen can begin
- If treated quickly, results are promising, however delayed treatment can result in irreversible consequences

Definitions
- Syncope
  - generalized reduction in blood flow (systemic hypotension), that can result in fainting
- Cerebrovascular Accident (CVA)
  - abrupt onset of neurological symptoms that can be directly related to a focal vascular cause
- Cerebrovascular disease can be broken down into three major categories
  - Ischemic Stroke
    - reduction in blood flow that lasts longer than several seconds
    - if the reduction in blood flow lasts longer than a few minutes, infarction (cell death) occurs
    - Transient Ischemic Stroke
      - If blood flow is returned rapidly, the patient can usually recover within 24 hours
  - Hemorrhagic Stroke
    - bleeding occurs directly into and/or around the brain producing neurological symptoms from
      - the toxic effects of blood, and/or
      - an increase in intracranial pressure
  - Other anomalies
    - Intracranial aneurysms, arteriovenous malformations, etc.

Risk Factors
- Elderly population
- Family history
- DM
- HTN
- Smoking
- ↑ LDL
- ↓ HDL
- Inherited hypercoaguable state
- History of CVA
- A-fib
- MI
- Certain medications (OC, HRT)
Pathophysiology

- Reduction in blood flow will cause ischemia or infarct to that area of the brain of which it supplies
- The most common cause of a stroke is a blood clot
- The degree of blockade will determine the severity of the CVA
  - Zero blood flow – infarct of tissue within 4-10 minutes
  - <12-18 mL/100g tissue/min – infarct within 60 minutes
  - <20 mL/100g tissue/min – only ischemia (infarct can occur, if not treated, over several hours to days)
- It is critical to restore blood flow to the affected area of the brain as soon as possible

Signs and Symptoms

- Many times, people will not be able to recognize that they have had a stroke
  - No associated pain
  - Lose neurological capabilities
- Call EMS immediately if you notice someone who suddenly develops these symptoms
  - Loss of sensory/motor function of one side of the body
    - 85% of strokes are associated with hemiparesis
  - Change in vision, gait, or ability to speak/understand
  - Sudden, severe headache

Differential Diagnosis

- Seizures
- Intracranial tumor
- Migraine
- Metabolic Encephalopathy (altered mental status)

General Treatment (Ischemic Stroke)

- It is important to begin treatment as soon as possible (within 3 hours) for maximal reduction in morbidity and mortality (Figure 364-1)
- Goals of therapy
  - Prevent/reverse brain injury
  - Attend to the patient’s ABC’s (airway, breathing, and circulation)
  - Treat hypo- or hyperglycemia, if needed
  - Perform a CT scan as soon as possible
    - This will help determine the cause of the stroke
      - Ischemic stroke – candidate for thrombolytics
      - Hemorrhagic – thrombolytics are contraindicated
  - Therapy then falls into six general steps
    - Medical Support
      - If BP >185/110, treat with esmolol
      - If fever present, treat with antipyretics
      - If glucose >110, treat with insulin
- Intravenous thrombolytics
  - Only if within 3 hours from symptom onset and does not have one of the listed contraindications (Table 364-1)
  - Alteplase
    - Patients <100kg
      - Load with 0.09mg/kg over one minute (10%)
      - Maintain with 0.81mg/kg over 60 minutes (90%)
    - Patients >100kg
      - Load with 9mg over one minute (10%)
      - Maintain with 81mg over 60 minutes (90%)
- Endovascular techniques
  - Endovascular mechanical thrombectomy
    - Can be used in patients who are not candidates for intravenous thrombolytics
    - Can be used in patients who have failed on thrombolytics
- Antithrombotic therapy
  - ASA can be administered (24-48 hours after stroke onset)
- Neuroprotection
- Rehabilitation

Secondary Stroke Prevention
- Minimize modifiable risk factors
  - smoking cessation, removing OC or HRT, etc
- Consider statin therapy
  - Atorvastatin 80mg daily (SPARCL trial)
- Consider antiplatelet therapy
  - ASA 325mg daily
  - Clopidogrel 75mg daily
    - Studies have found that Plavix + ASA is no more effective than ASA alone (MATCH trial)
    - However, this combination may be most effective immediately post-stroke
  - Dipyridamole 200mg (plus ASA 25mg)
    - Studies have found this to be a more beneficial combination (ESPRIT trial)
    - Any forms of these therapies are beneficial in secondary stroke prevention
- Consider anticoagulation therapy
  - Warfarin varying doses for lifelong therapy
    - INR goal range 2-3
References


