Cerebrovascular accident (CVA)

- third most common cause of death in the developed world
- common cause for physical disability in older age.
- CVA denotes either ischaemia from occlusion of blood vessels (producing cerebral ischaemia and infarction) or haemorrhage through their rupture.
### 22.52 STROKE RISK FACTORS

#### Irreversible
- Age
- Gender (male > female, except in the very young and very old)
- Race (Afro-Caribbean > Asian > European)
- Heredity
- Previous vascular event, e.g. myocardial infarction, stroke or peripheral embolism

#### Modifiable
- Hypertension
- Heart disease (heart failure, atrial fibrillation, endocarditis)
- Diabetes
- Hyperlipidaemia
- Smoking
- Excess alcohol consumption
- Polycythaemia
- Oral contraceptives
Clinical features

- Depend on vascular territory involved.
  - Hemisphere localized or extensive
  - Basal ganglia level (internal capsule and thalamus)
  - Brainstem
  - Cerebellum
- Repeated small infarcts may lead to dementia or parkinsonism
- Hemorrhage into the subarachnoid space may present as sudden onset severe headache associated with vomiting and neck stiffness.
Clinical classification

• Transient ischemic attack (TIA) or minor stroke or transient stroke
• Evolving stroke
• Reversible ischemic neurological deficit (RIND)
• Completed stroke
## Differential Diagnosis of Acute Stroke

<table>
<thead>
<tr>
<th>Primary cerebral tumours</th>
<th>Demyelination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metastatic cerebral tumours</td>
<td>Hypoglycaemia</td>
</tr>
<tr>
<td>Subdural haematoma</td>
<td>Encephalitis</td>
</tr>
<tr>
<td>Cerebral abscess</td>
<td>Hysterical conversion</td>
</tr>
<tr>
<td>Todd’s paresis (after epileptic seizure)</td>
<td></td>
</tr>
</tbody>
</table>
TIA

• A signal for major stroke in future
• Clinical features may be hemiparesis, aphasias, sensory disturbances, transient monocular blindness (amaurosis fugax), lower cranial nerve deficit etc.
• Brain imaging is strongly recommended to rule out small hemorrhage.
• Demarcates time for implementation of secondary preventive measures
Completed stroke

- About 85% are due to infarction and remaining 15% are due to hemorrhage.
- Deficit is maximum at presentation
- Headache vomiting, transient loss of consciousness favor hemorrhage but this distinction is arbitrary
### General Examination of Stroke Patients

**Eyes**
- Diabetic changes
- Hypertensive changes
- Retinal emboli
- Arcus senilis

**Cardiovascular System**
- Blood pressure (hypertension, hypotension)
- Heart rhythm (atrial fibrillation)
- Murmurs (sources of embolism)
- Jugular venous pressure (heart failure, hypovolaemia)
- Peripheral pulses and bruits (generalised arteriopathy)

**Respiratory System**
- Pulmonary oedema
- Respiratory infection

**Abdomen**
- Urinary retention
<table>
<thead>
<tr>
<th>Diagnostic question</th>
<th>Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it a vascular lesion?</td>
<td>CT/MRI</td>
</tr>
<tr>
<td>Is it ischaemic or haemorrhagic?</td>
<td>CT</td>
</tr>
<tr>
<td>Is it a subarachnoid haemorrhage?</td>
<td>CT Lumbar puncture</td>
</tr>
<tr>
<td>What is the underlying vascular disease?</td>
<td>ECG Cardiac ultrasound MRA Doppler ultrasound Contrast angiography</td>
</tr>
<tr>
<td>What are the risk factors?</td>
<td>Blood count Cholesterol Clotting/thrombophilia screen Blood glucose</td>
</tr>
</tbody>
</table>
Cerebral infarction
• Sources of thrombi
  – Carotid bifurcation (embolic-artery to artery)
  – In situ formation (thrombotic)
  – Heart (cardioembolic- atrial fibrillation,
    Infective endocarditis, left ventricular failure)

• Sequential events after occlusion
Events following cerebral ischemia

- Increased oxygen extraction
- Failure of electrical function
  - Symptoms
  - Failure of ionic pumps
    - Potassium efflux
    - Sodium influx
  - Cell death
Investigations

- **Computed Tomographic Scans**
  - Usually demonstrates the lesion, more ever it is very useful to exclude hemorrhagic lesion.
  - In ischemic stroke, occasionally CT may be normal in first 24 hours.
  - Small posterior fossa or lacunar infarction may be easily missed by CT.

- Other imaging techniques (MRI, angiography, transcranial doppler) can be applied in selected cases.
- Carotid doppler
- ECG, echocardiogram in suspected Cardiac emboli
- Assessment of the risk factors for stroke: blood sugar, serum lipids, polycythemia
Management

(1) Supportive measures
(2) Antiplatelet agents
(3) Thrombolysis
(4) Anticoagulation
(5) Secondary prevention
supportive measures

- Treat complications of bedridden patients (pneumonia, UTI, bowel and bladder care, prevention of DVT)
- For those who are unable to swallow or tend to regurgitate or aspirate, put a nasogastric tube and start feeding.
- Control of the blood pressure:
  - Continue regular anti-hypertensive drugs
  - Don’t treat new hypertension unless BP is >185/110 or ongoing TOD.
- Control of blood sugar, maintenance of hydration and electrolyte balance
- Infarctions are complicated by late cerebral edema (3-10 days after infarction) so judicious use of mannitol, restriction of salt and water is important.
• Anti-platelet agents
  – Aspirin 325 mg per day
  – Contraindicated in associated hemorrhage
  – Active bleeding lesion (e.g. bleeding peptic ulcer)

• Anticoagulation
  – Indicated in cardiac emboli in presence of atrial fibrillation or thrombus in left ventricle
  – Start with heparin infusion continue with warfarin (target INR is 2-3)
  – Complication : hemorrhagic transformation
• Thrombolysis
  – Frequently associated with hemorrhagic transformation of ischemic stroke
  – Still can be tried if patients presents within 6 hours of onset, absence of hypertension, when CT does not show excessive low density, or there are no other obvious contraindication.
  – Drugs that can be used are streptokinase and Rt-PA.

• Secondary prevention
  – Control of risk factors
  – Antiplatelet agent (aspirin, ticlopidine, Dipyridamole, clopidogrel)