

# Cerebrovascular accident



جامعة ساووة



كلية التقنيات الصحية والطبية

قسم تقنيات التخدير

المرحلة الثالثة

الطبيب الاختصاص  
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المحاضرة الثالثة

# Introduction

- Stroke is the third most common cause of death worldwide after Myocardial infarction & cancer.
- frequent cause of adult disability in developed countries.
- Stroke is also an important condition in young people and can occur at any age, including in utero and in the neonatal period – it is a major cause of cerebral palsy, in childhood and young adult life.
- One-quarter of all strokes occur in people below the age of 65.

# **Definition**

- Stroke can be briefly defined as an acute focal neurological deficit resulting from vascular disease.
- or Rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin.

# *Pathophysiology of ischaemic stroke*

- There are three potential mechanisms of ischaemic stroke:
  - 1 Thrombosis
  - 2 Embolism, and
  - 3 Hypoperfusion (hemodynamic failure)
- **Territorial infarcts** are caused by an occlusion of arteries supplying defined brain territories by atherothrombosis or embolizations.
- **Borderzone infarcts** develop at the borderzone between vascular territories and are the result of a critically reduced cerebral perfusion pressure (prolong hypotension).
- **Lacunar infarcts** are mainly caused by small-vessel disease.

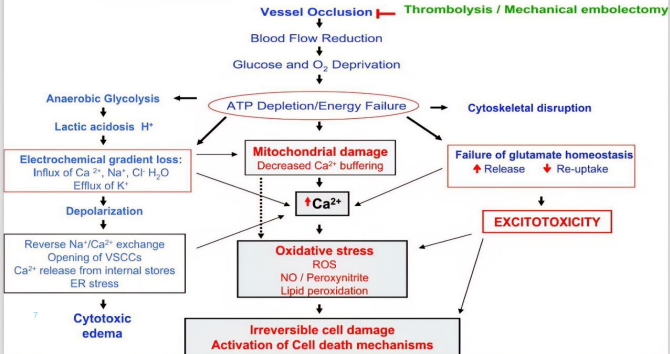
Focal cerebral infarction occurs via two distinct pathways

- (1) a necrotic pathway in which cellular cytoskeletal breakdown is rapid, due principally energy failure of the cell
- (2) an apoptotic pathway in which cells become programmed to die.

Ischemia produces necrosis by starving neurons of glucose and oxygen, which in turn results in failure of mitochondria to produce ATP. Without ATP, membrane ion pumps stop functioning and neurons depolarize, allowing intracellular calcium to rise. Cellular depolarization also causes glutamate release from synaptic terminals; excess extracellular glutamate produces neurotoxicity.

- increase neuronal calcium influx. Free radicals are produced by degradation of membrane lipids and mitochondrial dysfunction. Free radicals cause catalytic Destruction membranes and likely damage vital functions of cells

# Acute Neurochemical Changes after Ischemic Stroke



# **Risk factors**

- **Non modifiable risk factors:-**
- Age :-risk factor double over age of 55
- Sex:-25%-30% more in male
- Race:- more in african
- Hereditery:- increased in first degree relative



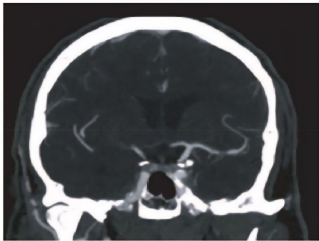
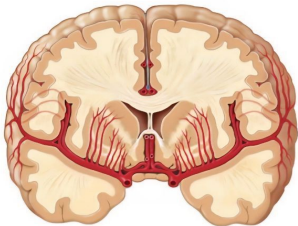
# **Modifiable risk factor**

## **Major risk factors for stroke.**

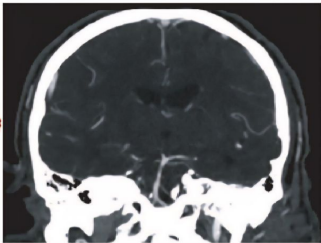
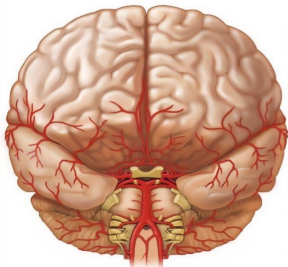
- Hypertension
- Smoking
- Diabetes mellitus
- Atrial fibrillation
- Heart disease
- Dyslipidaemia
- Alcohol
- Obesity
- Symptomatic and asymptomatic carotid stenosis
- Drug misuse

## **Clinical presentation :-**

- **Left middle cerebral artery distribution :-** Aphasia, right hemiparesis/hemisensory disturbance, right homonymous hemianopia, left head and gaze preference
- **Right middle cerebral artery distribution :-**, left hemiparesis/hemisensory disturbance, left homonymous hemianopia, right head and gaze preference, Left hemi spatial neglect ,anosognosia



- **Left posterior cerebral artery distribution :-**Right visual field defect, impaired reading with intact writing ,poor color naming, right hemisensory disturbance.
- **Right posterior cerebral artery distribution:-**Left visual field defect, visual neglect, left hemisensory disturbance.
- **Vertebrobasilar distribution :-**Dizziness, vertigo, nausea, diplopia, quadriparesis, crossed motor or sensory findings (ipsilateral face, contralateral body), truncal or limb ataxia, visual loss/dimming, impaired consciousness



# *Transient ischemic attack TIA*

- TIAs are episodes of stroke symptoms that last only briefly; the standard definition of duration is  $<24$  h, but most TIAs last  $<1$  h. If a relevant brain infarction is identified on brain imaging, the clinical entity is now classified as stroke regardless to the duration of symptoms.
- The causes of TIA are similar to the causes of ischemic stroke, but because TIAs may herald stroke, the TIA is ~10–15% in the first 3 months, with most events occurring in the first days. The risk can be directly estimated using the well-validated ABCD<sub>2</sub> score .

## **ABCD2 score:-**

- A: Age  $\geq 60$  years 1
- B: SBP  $> 140$  mmHg or DBP  $> 90$  mmHg 1
- C: Clinical symptoms
  - Unilateral weakness 2
  - Speech disturbance with-out weakness 1
- D: Duration
  - $> 60$  min 2
  - 10–59 min 1
- D: Diabetes (oral medications or insulin) 1

## **Lacunar infarction:-**

- Lacunar are small, subcortical or brainstem infarcts ranging from 1 to 15 mm in size.

### **Common lacunar syndromes:-**

- Pure motor
- Sensorimotor
- Pure sensory
- Ataxic hemiparesis
- Dysarthria/clumsy hand



## ***Stroke mimics or differential:-***

- Postictal deficits (Todd paralysis)
- Hypoglycemia
- Migraine (hemiplegic, migraine with aura)
- Hypertensive encephalopathy
- Reactivation of prior deficits
- Mass lesions
- Subarachnoid hemorrhage
- Conversion reaction

# **Evaluation of stroke**

- **Physical Examination**

- Temperature
- Cardiac auscultation
- Assessment of jugular venous pressure or peripheral edema
- Lung auscultation
- Retinal examination
- Skin examination

- **Imaging Studies**

- CT/MRI of brain
- Vascular imaging(doppler carotid)
- Chest x-ray

- **Electrocardiography**

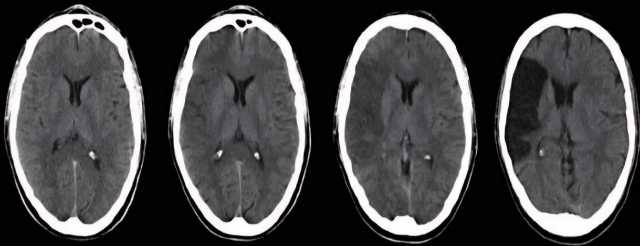
- Serial ECG
- Extended cardiac monitoring

- **Echocardiography**

- Transthoracic
- Transesophageal

- **Laboratory Studies**

- Random blood sugar???????
- White blood cell count
- Erythrocyte sedimentation rate
- C-reactive protein
- Blood cultures
- Thyroid function tests
- Troponin
- Antiphospholipid antibodies



## *Mangement of stroke:*

- The patient's "last known well" time determines potential treatment options.
- IV thrombolysis, specifically using rtPA, should be considered for patients for whom it can be administered within 4.5 hours of onset.
- IV rtPA (at the dose 0.9 mg/kg, maximum dose 90 mg, with 10% given as an initial bolus) has been shown to improve clinical outcomes for patients within 3 hours of Onset.

## *Eligibility for rtPA*

- Age 18 years or older
- Clinical diagnosis of acute ischaemic stroke
- Assessed by experienced team
- Measurable neurological deficit
- Glasgow Coma Score >8
- Timing of symptom onset well established
- CT or MRI and blood tests results available
- CT or MRI consistent with diagnosis
- Time since onset <4.5 hours at start of infusion

## IV thrombolytic exclusion criteria:

1. Stroke or significant head trauma within 3 months
2. Major surgery or serious trauma within 14 days
3. Gastrointestinal or urinary hemorrhage within 21 days
4. Arterial puncture at a noncompressible site within 7 days
5. History of intracranial hemorrhage
6. Intracranial neoplasm, arteriovenous malformation, or aneurysm

- ❖ Symptoms of subarachnoid hemorrhage
- ❖ Active internal bleeding
- ❖ Pretreatment blood pressure with systolic greater 185 & diastolic pressure more than 110
- ❖ Clear and large hypodensity on CT scan
- ❖ Current bleeding diathesis including
  - 1) International normalized ratio (INR) more than 1.7
  - 2) Heparin within 48
  - 3) Platelets less than 100,000/mm
- Serum glucose less than 50



## **Relative contraindication for rtPA**

- ❖ Minor deficit:- Rapidly improving deficits should not be considered a contraindication unless the remaining deficit is minor.
- ❖ Myocardial infarction within 3 months
- ❖ Seizure at presentation
- ❖ pregnancy

## ***Secondary prevention for stroke:***

1. Antiplatelet (aspirin, clopidogrel, dipyridamol)
2. Antihypertensive (BP less 140\90)
3. Antilipid (statin, fibrate) target LDL less 100
4. Anti diabetic drug (HbA1C less than 7)
5. Stop smoking
6. Stop alcoholism or once daily for male
7. Exercise by 30 minute\day twice weekly
8. Life style change (BMI between 18.5-24)

## **Complication of stroke:-**

- ☐ DVT&Pulmonary embolism
- ☐ pressure ulceration
- ☐ Cerebral edema&seizure
- ☐ Infection (chest infection,UTI)
- ☐ Malnurtioment (dysphagia,dehydration)
- ☐ Depression
- ☐ Musculoskeletal (frozen shoulder,sublaxation)