

## **NOTICE**

It is a booklet.

Please print it landscape A4 size paper two side  
and bind in middle. Then you can read easily.

**DRAFT**

# **STROKE MANAGEMENT GUIDELINE**

Line director, Improved Hospital Services Management  
& Director Hospitals & Clinics

**Directorate General of Health Services  
Mohakhali, Dhaka**

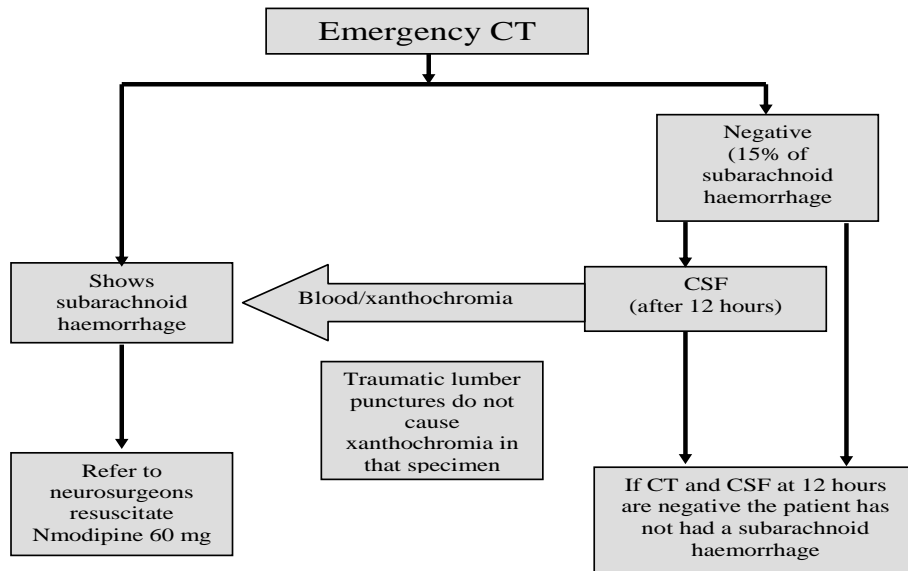
December, 2008

## **CONCLUSION:**

Among the non communicable diseases stroke is an important cause of morbidity & mortality which can be minimized largely by adopting the following important measures-

1. Meticulous control of risk factors (prohibition of smoking and minimizing alcohol intake, control of DM, HTN & dyslipidaemia)
2. Proper evaluation & correction of cardiac lesion (like valvular heart disease, ischaemic heart disease, cardiomyopathy & arrhythmia)
3. Modification of life styles (adequate physical exercise, avoidance of excessive fat intake, avoidance of excessive worriness & anxiety)
4. Proper & prompt treatment of an acute attack.
5. Stroke awareness programme should be conducted at various levels like mass media.

## The investigation of sudden severe headache



### Management:

#### General measures-

- Bed rest
- Stool softeners to avoid straining
- Analgesic (Non NSAID) for headache
- Sedation (Cautiously) if restless
- Adequate hydration
- Nimodipine (60mg 4 hourly) - to be started within 48 hours & continued for 3 weeks. (to prevent vasospasm)
- Control of HTN

#### Specific measures:

- Intraluminal platinum coil
- Craniotomy & clipping of aneurysms

## FORWARD

Patients with stroke are the commonest admission in most of the medical wards in different hospital and Neurology ward. In the developing countries management of such Patients in specialized stroke unit has made considerable impact on the morbidity and mortality. Stroke Units may not be possible every where but following guidelines may improve overall management and out come measures.

Director, Hospitals & Clinics

**Investigation:**

- ❖ CT scan-blood in sylvian fissure & sulci (85%+ve)
- ❖ LP-Examination of CSF (after 12 hours) (if CT scan is inconclusive)
  - yellow CSF (xanthochromia)-
    - Visual
    - Spectrophotometric (to estimate bilirubin)
- ❖ MR angiography
- ❖ Angiography/DSA

**Complication:**

- ❖ Vasospasm-ischaemic stroke
- ❖ Rebleeding (in 30%)
- ❖ hydrocephalus
- ❖ Hyponatraemia

## SUBARACHNOID HAEMORRHAGE:

### ***Clinical feature:***

#### **Symptoms-**

- ❖ Headache-sudden severe, Thunderclap (Typically occipital)
- ❖ Vomiting
- ❖ Altered level of consciousness
- ❖ Focal sign (if associated intracerebral haemorrhage or ischaemic stroke from vasospasm)
- ❖ Convulsion

#### **Signs-**

Neck stiffness	Takes 6 hours to develop
Positive Kernig's sign	

-Consciousness may be impaired

#### Cranial nerves-

- ❖ Papilloedema-sometimes
- ❖ (accompanied by retinal & subhyaloid haemorrhage)
- ❖ 3rd n palsy (PCOM aneurysm)
- ❖ 6th n palsy

## SECTION-A

## STROKE MANAGEMENT GUIDELINE

## STROKE MANAGEMENT GUIDELINE

### Introduction:

Stroke is a global problem. In developed countries like America at least 750,000 people experience a new or recurrent stroke every year. Stroke is the 3rd commonest cause of death in developed countries. Although there is no published study about prevalence of stroke in Bangladesh, a recently unpublished data suggests the prevalence of stroke in Bangladesh is between 5-12 per 1000 population (about 1% of population). This figure depends on the age & sex structure of the population.

The death rate of stroke patient is 19% if not appropriately treated within one month. Death rate is 31% among the patient within one year. 35% of the survived patient become permanently disabled & depends on other completely. In Bangladesh the estimated economic loss stands to 408 million US dollar per year due to stroke morbidity and mortality. The incidence of stroke is predicted to rise because of the rapidly aging population. Socioeconomic factors, dietary and lifestyle behaviors, different pattern of risk factors, and environmental conditions may explain the different incidences of stroke observed in different parts of the world. However, over the past two decades, findings of randomized trials have identified several interventions that are effective in prevention of stroke. Reliable data on time-trends in stroke incidence, major risk factors, and use of preventive treatments in an aging population are required to ascertain whether implementation of preventive strategies can offset the predicted rise in stroke incidence.

Mild stenosis (<30%)-anti-platelet drug

Moderate stenosis (30-70%)-place of surgery remains unclear.

Angioplasty (+ stenting)-Correction of any valvular lesion if present

### 2) Rehabilitation: Physiotherapy & speech therapy

Physiotherapy to be started as early as possible in ischaemic stroke.

In haemorrhagic stroke it should be started after the vital parameters have settled down.

Skilled physiotherapy relieves spasticity, prevents contractures and teaches patients to use walking aids.

### PRIMARY PREVENTION OF STROKE:

Incidence of first stroke may be reduced by altering 10 modifiable risk factors-

1. Cigarette smoking.
2. Alcohol consumption.
3. Physical inactivity.
4. Diet.
5. Hypertension.
6. Myocardial infarction.
7. Atrial fibrillation.
8. Diabetes mellitus.
9. Blood lipid levels.
10. Asymptomatic carotid artery stenosis.

Systemic antibiotics which are effective in skin infection are those which are active against Staphylococci such as -

- a. Cap. Flucloxacillin 500 mg 6 hourly oral or I.V.
- b. Amoxicillin + Clavulanic acid 625 mg thrice daily orally or I.V.
- c. Tab. Gatifloxacin 400 mg once daily for 10 to 14 days.

### Epileptic seizure

- ❖ Maintain cerebral oxygenation
- ❖ Avoid metabolic disturbance
- ❖ Anticonvulsant

### Deep venous thrombosis/pulmonary embolism

- ❖ Maintain hydration
- ❖ Early mobilisation
- ❖ Anti-embolism stockings
- ❖ Heparin (for high-risk patients only)
- ❖ Anticoagulation (exclude haemorrhagic stroke first)

#### 1) Surgical approaches:

Carotid endarterectomy-

Two recent trials-European carotid surgery trial (ECST) & North American symptomatic carotid endarterectomy trial (NASCET) have defined its role in treatment.

Severe stenosis (>70%)-should be operated on by an experienced surgeon.

### Definition of stroke:

Stroke may be defined as sudden focal rather than global cerebral dysfunction of vascular origin (non-traumatic, non-epileptic) lasting for > 24 hours or the patient dies with this period.

### Type of stroke:

#### Transient ischaemic attack:

It means a focal deficit such as a weak limb, aphasia or loss of vision lasting from a few seconds to 24 hours. There is complete recovery. The attack is usually sudden. TIAs have tendency to recur, and may herald thrombo-embolic stroke.

#### Cause:

- ❖ Usually micro embolic
- ❖ Fall in cerebral perfusion  
(e.g. a cardiac dysrhythmia, postural hypotension or reduced flow through atheromatous carotid and vertebral artery)

#### Completed stroke:

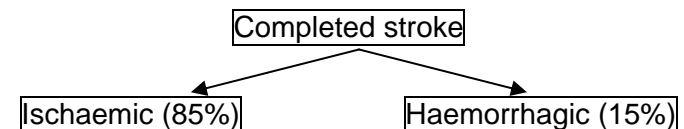
If the focal deficit is persistent and not worsening. (maximal deficit usually within 6 hours)

#### Stroke in evolution (evolving stroke):

If the focal deficit continues to worsen after about 6 hours from onset.

#### Minor stroke:

Patient usually recover without significant deficit usually within a week.



### **Difference between haemorrhagic and ischaemic stroke**

- ❖ Clinical differentiation between the 2 types is not possible accurately.
- ❖ But some points in history & examination favors the diagnosis of haemorrhagic stroke-
  1. Onset of stroke at the state of exertion
  2. Associated with or preceded by headache
  3. Presence of vomiting, alteration of level of consciousness, convulsion.
  4. H/o irregularly treated HTN
  5. H/o intake of anticoagulants or thrombolytics
  6. Associated bleeding/coagulation disorder
  7. Neck rigidity.
- ❖ Presence of following factors in the history is suggestive of ischaemic stroke.
  1. Onset at night/sleep
  2. Previous H/o TIA
  3. Evidence of involvement of other vascular territories. e.g. angina, H/o MI, intermittent claudication. Post-prandial abdominal pain etc
  4. Evidence of valvular heart disease, thyrotoxicosis
  5. Presence of multiple risk factor-DM, HTN, Dyslipidemia, Family history
  6. Usually no coma,

### **Risk factors**

#### **Unmodifiable-**

1. Age
2. Sex (M>F)

- a. Inj. Gentamicin 80 gm I.V. 8 hourly for 7 to 14 days
- b. The Fluoroquinolones of which Ciprofloxacin 500 mg orally twice daily or 200 to 400 mg IV 12 hourly for 3 to 14 days or Tab. Gatifloxacin 400 mg orally once daily. If the culture sensitivity report shows that the isolated organism is resistant to the antibiotic that is being used should be continued as in vitro sensitivity may sometimes be different to in vivo sensitivity. If the patient is not improving with the antibiotic being used then the antibiotic to which the organism is most sensitive should be used.

Oral infections are often due to fungi or anaerobic organisms. White patches on the tongue and oral mucosa are due to candidiasis and should be treated with Mycostatin oral drops at a dose of 100,000 units every 4 hourly for 3 to 5 days. If suspect anaerobic infection within the oral cavity then the antibiotic of choice is Metronidazole 400 mg thrice daily for 5 days.

Skin infection usually occurs if bed sores are present. Discharge from the skin should be sent for culture and sensitivity and an antibiotic started both locally and also systemically depending on the degree of infection. If there is only mild skin infection then a locally applied antibiotic preparation should be used.

- a. Povidone-Iodine cream or solution (available as Povisept) if there is no breach of skin.
- b. Neomycin Sulphate, Bacitracin Zinc and Polymyxin B sulphate (available as Nebanol Plus) are effective in mild skin infections when applied locally.



## Hyponatraemia

In patients of hyponatraemia serum sodium should be calculated so that the sodium level can be restored to 130meq/L, the sodium deficit can be calculated as follows: Sodium deficit = (Sodium desired – Sodium actual) x 0.6 x weight in kg. Desired sodium = 130.

The desired volume of normal saline required to correct the deficit can then be calculated by keeping in mind that its sodium concentration is 154 meq/L, and that of 3 percent (hypertonic) saline is 462 meq/L. The hyponatraemia should be corrected by no more than 10 meq/L in the initial 24 hour and by no more than 21 meq/L in the initial 48 hours to prevent the development of the devastating complication of Central Pontine Myelinolysis (CPM). If volume overload than 3% NaCl should be used.

## Infection in the Urine

Oral cavity, skin and lungs are common. Most of the consciousness impaired patients usually have an indwelling catheter which is an important source of infection. If fever develops and there are no obvious foci of infection, the urine should be sent for culture and sensitivity and an antibiotic started. If patient was already receiving an antibiotic for several days then that antibiotic should be changed. Antibiotics which are effective against most of the organisms commonly causing urinary infection include

3. Race (Afro-Caribbean>Asian>European)
4. Family history
5. Previous vascular events  
e.g. MI, stroke or peripheral embolism

### Modifiable-

1. DM
2. HTN
3. Dyslipidaemia
4. Smoking
5. Heart disease (HF,AF, Endocarditis, patent foramen ovale in childhood stroke)
6. Excess alcohol consumption
7. Polycythaemia
8. Sedentary life style
9. Obesity

### ISCHAEMIC STROKE:

- Causes
1. Atherosclerosis in the major extra cranial artery (Carotid & aortic arch) (60%)
  2. Embolism from the heart or great vessels
  3. Occlusion of the small leucostriate perforating vessels by producing so-called "LACUNAR" infarction.  
  
(30% of the ischaemic stroke remains unexplained despite extensive investigation)

## HAEMORRHAGIC STROKE:

May be –

1. Intraparenchymal haemorrhage.
2. Subarachnoid haemorrhage (SAH).

### Causes of intraparenchymal & associated risk factors-

1. Charcot-Bouchard micro aneurysms (Age, HTN)
2. Amyloid angiopathy (Familial, Age)
3. Impaired blood clotting (Anticoagulant therapy, blood dyscrasia, thrombolytic therapy)
4. Vascular anomaly (AVM, Cavernous haemangioma)
5. Substance misuse (Alcohol, amphetamine, cocaine)

### Site of primary ICH

- ❖ Most common site-gangliothalamic region
- ❖ May occur at any site.

## Pneumonia

Aspiration or hypostatic occurs most often. If the patient is coughing, fever has developed and there are crepitations present, a chest x-ray should be done which will show patchy opacities in the basal regions of the lungs bilaterally or a consolidation in the lower part of any one lung. If the fever has developed when the patient is already on an antibiotic then that antibiotic should be changed. Effective antibiotics for this condition include.

- a. Inj. Amoxicillin + Clavulanic acid 1.2 gm I.V. 8 hourly for 7 to 14 days,
- b. Inj. Ceftriaxone 1 gm IV once or twice daily for 2 weeks and
- c. Inj. Ampicillin 500 mg 6 hourly + Inj. Gentamicin 80 mg I.V. 8 hourly for 2 weeks. Inj. Metronidazole 500 mg I.V for 2 weeks should be used if anaerobic infection is suspected.

### Prevention

1. Adequate lateral positioning of the patient so that oral secretions do not pass into the lungs
2. Attendants to be strictly instructed not to give any oral feeding in a patient who has impaired deglutition reflex.
3. Faulty feeding through the Ryles tube is a common cause of aspiration pneumonia. Ryles tube placement should be checked so that it is in the stomach correctly and the head should be raised to 30 degrees during each feeding and for 15 minutes after.

## Management of commonest complications

### Treatment of raised ICP

#### a. Medical measures-

- i. Keep the head end of the bed raised, at an angle of 30 degrees from horizontal.
- ii. Do not give excess fluids, rather keep the patient a little dehydrated
- iii. Hyperventilation with a goal to maintain PCO<sub>2</sub> between 30 to 35 mm of Hg till ICP is controlled.
- iv. Inj. Mannitol at a dose of 1 gm/Kg body wt/stat to be given very rapidly I.V. can be repeated as same dose for 72 hours but blood osmolarity should be checked and should not be given if osmolarity is >330 mmol/L. Acts as an osmotic diuretic.
- v. Inj. Dexamethasone 5 to 10 mg every 6 to 8 hourly.
- vi. Diuretics may also be used
- vii. Sedation should be given to a patient who is restless, like Tab. Diazepam 5 mg twice daily, or Tab. Haloperidol 5 to 10 mg daily in two divided doses.

#### b. Surgical measures – should be instituted if medical measures fail.

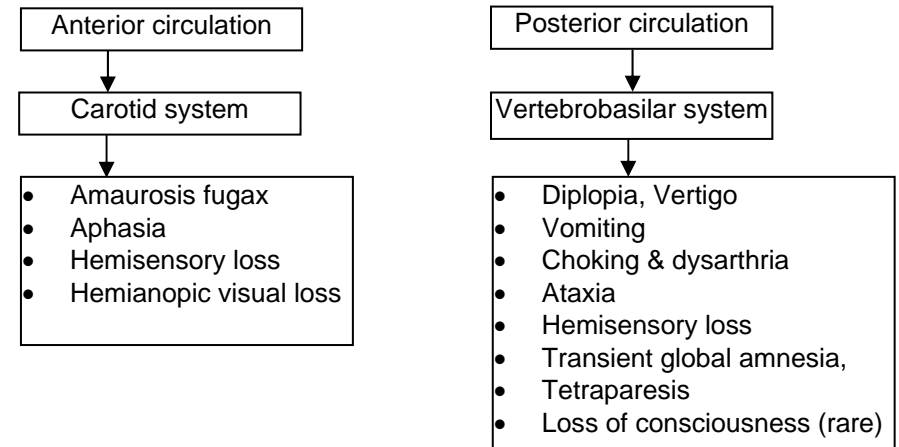
- i. Hemicraniotomy for intracerebral haemorrhage
- ii. Open Ventricular drainage for SAH.
- iii. VP or VA shunt (Ventriculo-Peritoneal or Ventriculo-Atrial) for communicating hydrocephalus.

## TRANSIENT ISCHAEMIC ATTACK (TIA)

TIAs cause sudden loss of function usually within seconds and last for minutes or hours (but by definition <24 hours)

The site is often suggested by the type of attack. This is said to be the forerunner of stroke.

### Features



**There may be clinical evidence of a source of embolus, such as-**

1. Carotid a. bruit (stenosis)
2. AF & other dysrhythmias
3. Valvular heart disease/endocarditis
4. Recent MI
5. Difference between rt. & lt. brachial pressure.

**An underlying condition may be evident-**

1. Atheroma
2. HTN
3. Postural Hypotension

4. Bradycardia/low cardiac output
5. DM
6. Arteritis, polycythaemia (rare)
7. Antiphospholipid antibody syndrome.

### **STROKE SYNDROMES:**

The clinical feature depends on-

1. Site of infarct
2. Extent of infarct

Site - Cerebral cortex

- ❖ Internal capsule (most common)
- ❖ Corona radiata
- ❖ Brain stem
- ❖ Cerebellum
- ❖ Basal ganglia

### **Cerebral cortex:**

Depends on site of involvement

Contralateral	Hemiparesis Aphasia (when dominant hemisphere is involved) Hemisensory loss(parietal lobe) Facial palsy ±
---------------	--

### **Internal capsule:**

Contralateral dense hemiplegia

Commonly used antihypertensive agents (preferably ACE inhibitor and ARBs) can be employed in patients of stroke also. It is better to avoid agents which can cause a precipitous fall in blood pressure, like the direct vasodilators (e.g.nificap) Beta-blocker may mask the bradycardia caused by raised intra-cranial pressure, so it is better to avoid them.

Factors which affect the decision of starting anti-hypertensive drugs are:

1. Previous history of hypertension or not.
2. Previously getting anti-hypertensive drugs or not.
3. End organ involvement which is evidence of long standing hypertension like left ventricular hypertrophy, hyper-tensive retinopathy, proteinuria due to hypertensive nephropathy, etc.
4. Type of stroke.
5. Duration of stroke.
6. Age of the patients.

### **e) Management of diabetes:**

The blood glucose is >11.1mmol/L it should be reduced with short acting insulin.

### **f) Management of dyslipidaemia:**

Statins should be used when the LDL is > 100mg/dl (with monitoring of LFT)

Treatment is usually started when systolic blood pressure is greater than 220 mm Hg and diastolic blood pressure is greater than 120 mm Hg (in the NINDS trial, intravenous treatment with antihypertensive agents was used when the systolic pressure was >180 mm Hg and/or the diastolic blood pressure was >110 mm Hg.) Treatment should aim to maintain a mean arterial pressure below 130 mm Hg in patients with chronic hypertension. Even when high blood pressure is treated, the goal should be to reduce the diastolic blood pressure only up to 100 mmHg.

There are few indications for immediate antihypertensive therapy in the first few hours after symptom onset. These are:

1. To allow administration of thrombolytic drugs.
2. In the setting of acute myocardial ischaemic although extreme lowering of BP is not good for patients with this condition.
3. Cardiac failure.
4. Acute renal failure.
5. Acute hypertensive encephalopathy.
6. If the CT scan shows a haemorrhagic cause of stroke, such as subarachnoid haemorrhage, intracranial haemorrhage, or epidural haematoma, antihypertensive treatment may also be started.

### Brain stem infarction:

- ❖ Hemiparesis/tetraparesis
- ❖ Sensory loss
- ❖ Cranial nerve involvement
- ❖ Nystagmus, vertigo.
- ❖ Dysphagia, Dysarthria
- ❖ Dysarthria, ataxia, hiccups, vomiting
- ❖ Horner's syndrome
- ❖ Altered consciousness

### Physical examination of stroke patients:

#### A) Eyes-

- ❖ Xasthelesma
- ❖ Arcus senilis
- ❖ Diabetic retinopathy
- ❖ Hypertensive retinopathy
- ❖ Retinal emboli

#### B) CVS-

- ❖ Pulse (rate, rhythm, volume)-? AF
- ❖ Blood pressure
- ❖ Jugular venous pressure
- ❖ All peripheral pulses & bruits (carotid)
- ❖ Precordium- any valvular heart disease

#### C) Respiratory system –

- ❖ Pulmonary oedema
- ❖ Respiratory infection
- ❖ Mass lesion

## D) Abdomen-

- ❖ Urinary retention
- ❖ Any lump
- ❖ Testis

### **INTRACRANIAL HAEMORRHAGE:**

This comprises-

1. Intracerebral & cerebellar haemorrhage
2. Subarachnoid haemorrhage (SAH)

### **INTRAPARENCHYMAL HAEMORRHAGE:**

**Recognition:** Onset is more dramatic with severe headache.

**Site:** Ganglio-thalamic region

- ❖ Pons
- ❖ Cerebellum
- ❖ Lobar

### **CEREBELLAR HAEMORRHAGE:**

Features- Headache

- ❖ Rapid deterioration of consciousness
- ❖ Imbalance
- ❖ Vomiting
- ❖ Brain stem signs (e.g. nystagmus, ocular palsies)
- ❖ Gaze deviates towards the lesion.
- ❖ Unilateral/bilateral cerebellar signs. (if the patient is awake)

**Complication-** Acute hydrocephalus (urgent neuro-surgical referral is required)

## 2. Specific medical treatment:

### **Ischaemic stroke**

a) Aspirin: 300mg stat and there after 75 to 150mg per day if not contraindicated. (Currently the combination of aspirin & clopidogrel is recommended only in patients with unstable angina with ECG or enzyme changes)

b) Thrombolysis & other revascularisation treatments:

Only at tertiary level and highly specialized centre. Should be done within 3 hours of onset of symptoms if there is no contraindication.

c) Anticoagulants: Heparin & warfarin should be given when there is-

1. Atrial fibrillation & other paroxysmal dysrhythmias
2. Cardiac valve lesion (Uninfected)
3. Cardiomyopathies
4. DVT

(Brain haemorrhage must be excluded by CT/MRI before giving anticoagulant)

d) **Control of hypertension:**

Normally cerebral blood flow (CBF) is maintained by auto regulation. The brain's ability to regulate cerebral blood flow is impaired immediately after stroke. Rapid decrease in systemic blood pressure cause decrease brain perfusion to the area of the stroke, causing ischaemia to the penumbra and further increasing the damage to the brain. Treatment of hypertension should be initiated only when the level of blood pressure is so high that it may damage other organs.

In the Ryles tube, all kinds of food can be given which can be made into a paste and introduced through the Ryles tube. Ideally a combination of different types of food should be given. Only one type of food like milk should not be given. One to two teaspoonful of salt (5 to 10 gm) should be given during each 24 hours feeding as stroke patients tend to develop hyponatraemia. Diabetic patients should not be given any sweet like horlicks, tinned sweet food, etc. One feed may contain juice of a sweet fruit like orange juice, pomegranate juice, grape or grape fruit juice, etc., in a diabetic patient.

Feeds should not be more than 100 to 200 ml per each feed. They can be given at 1, 2 or 4 hours interval. Feeds should not be given between 10 p. m and 6 a. m. to maintain physiological timing of feeding. If the attendants complain of regurgitation of given feeds than the head should be raised during feeding and kept raised for 15 minutes after the feed. Regurgitation occurs due to loss of tone of the gastro-esophageal sphincter at the lower end of the esophagus and keeping the head end raised prevents the back flow to the esophagus. Tab. Domperidone 10 mg thrice daily given through the Ryles tube causes tightening of the LES (lower oesophageal sphincter), and may prevent regurgitation of food.

### **The 3 oz water swallow test**

The 3 oz water swallow test is carried out by giving each patient 9 ml water and asking him to drink from a cup without interruption. Coughing during or for up to one minute after completion or the presence of a post-swallow wet or hoarse voice quality are considered positive signs of the presence of an abnormal situation.

### **INVESTIGATION:**

Aim:

1. To confirm clinical diagnosis and type of stroke.
2. To evaluate aetiology and risk factor.

### **Investigation:**

First line-

- ❖ Blood count
- ❖ Blood glucose
- ❖ Fasting lipid profile
- ❖ S. electrolytes, S. creatinine
- ❖ Urine R/E
- ❖ Chest X-ray
- ❖ ECG
- ❖ CT scan of the head-

(Haemorrhagic stroke-hyperdense area is noted immediately Ischaemic stroke-changes (hypodense area) appear 12 hours or more after the attack).

In case of infratentorial lesion or brainstem stroke MRI is the investigation of choice. DWI can detect ischaemic stroke earlier than CT scan.

Second line-

- ❖ Echocardiography
- ❖ Carotid Doppler
- ❖ Angiogram, DSA

## Causes & investigation of acute stroke in young patients:

	<u>Investigation</u>
1. Cardiac embolism	Echocardiography ( + trans esophageal echocardiography)
2. Premature atherosclerosis	Fasting lipid profile
3. Arterial dissection	MRI, Angiography (DSA)
4. Thrombophilia	Protein C Protein S Antithrombin
5. Homocystinuria	urinary amino acid, methionine loading test
6. Anticardiolipin antibody (Antiphospholipid antibody syndrome)	Anticardiolipin antibody
7. SLE	ANA
8. Vasculitis	ESR, CRP, ANCA\
9. Mitochondrial cytopathy	Serum lactate, muscle biopsy
10. Primary intracerebral haemorrhage	
AVM	Angiography
Drug misuse	Drug screen (amphetamine, cocaine)
Coagulopathy	Prothrombin time (PT) & APTT platelet count
11. Subarachnoid haemorrhage	
Berry aneurysm	Angiography
AVM	
Carotid dissection	

## Stroke Management in Tertiary level

### Immediate management:

#### 1. If the patients is unconscious-

- a) Maintenance of airway, breathing & circulation
- b) Patient should be placed in lateral position with no pillow & head down so that oral secretions drain outwards. Patient should be bent at an acute angle at the waist as this ensures a full lateral position. If the patient improves than he/she can be mobilized.
- c) Change of posture every 2 hourly to prevent pressure sore.
- d) Care of the bladder (Catheterization if needed)
- e) Care of eyes & oral cavity
  - It eyes are open it should be tapped shut.
  - Antibiotic eye drop & ointment.
  - Oral mouth wash/nystatin suspension.
- f) Maintenance of nutrition:

In a patient of ischaemic stroke feeding should be given as much as is required, that is 2,000 to 2,500 ml per 24 hour according to the weight of the patient and associated insensible loss. If the patient is febrile or weather is very hot then additional amounts should be given. In Haemorrhagic stroke-500 to 1,000 ml less than the usual requirement. In Subarachnoid Haemorrhage-500 to 1,000 ml more than the usual requirement.

Regarding I.V. fluids, only Normal Saline should be used intravenously, no other fluid to be used unless there is a compelling indication. Even if the blood pressure of the patient is very high, normal saline can be used as this small amount will not affect the blood pressure.



## Stroke Management in Secondary Level

- ❖ Review of the diagnosis of stroke
- ❖ Review of the danger assessment
- ❖ Find out the complication
- ❖ Investigation asked for :
  - CBC
  - RBS
  - Urine for R/E
  - CXR
  - ECG
  - Echocardiography
  - Lipid profile
  - Electrolytes
  - CT/MRI

### **Management**

1. General Management
2. Specific Management
3. Risk Factor Management
4. Management of Complication
5. Rehabilitation
6. Plan for referral to tertiary centre
  - a. Patients requiring ICU management.
  - b. Patients requiring neurovascular interventional management.
  - c. Patients requiring neurosurgical management.
  - d. Complicated patients difficult to investigate & manage in secondary level.

## TREATMENT OF ISCHEMIC STROKE:

All patients with stroke does not require hospital admission. If required, ideally the patient should be admitted to a multidisciplinary stroke unit comprising neurologist, neurosurgeon, critical care physician, and cardiologist.

### **Indication of hospitalisation in stroke patients:**

1. Stroke with unconsciousness or gradual deterioration of consciousness.
2. Stroke with convulsion.
3. Haemorrhagic stroke.
4. Stroke with complications.  
(e.g. electrolyte imbalance, aspiration pneumonia, hydrocephalus etc.).
5. Stroke with associated comorbidities.  
(e.g. uncontrolled HTN. DM. IHD, heart failure etc.)

### **Indication for referral to higher centre:**

1. Suspected subarachnoid haemorrhage/intracerebral haemorrhage.
2. If there is evidence of raised ICP/mass effect-
  - ❖ Bradycardia, HTN, papilloedema
  - ❖ Rapid deterioration of level of consciousness
  - ❖ Asymmetry of the pupil
  - ❖ Respiratory embarrassment
  - ❖ Haemodynamic instability
3. If there is complication
  - ❖ Aspiration pneumonia
  - ❖ DVT
  - ❖ Electrolyte imbalance

- ❖ Acute hydrocephalus
- ❖ Convulsion

4. If there is doubt about diagnosis
5. If there is associated comorbid condition (e.g. IHD renal failure, hepatic failure, uncontrolled DM, HTN).

### **Immediate management:**

#### **1. If the patients is unconscious-**

- a) Maintenance of airway, breathing & circulation
- b) Patient should be placed in lateral position with no pillow & head down so that oral secretions drain outwards. Patient should be bent at an acute angle at the waist as this ensures a full lateral position. If the patient improves than he/she can be mobilized.
- c) Change of posture every 2 hourly to prevent pressure sore.
- d) Care of the bladder (Catheterization if needed)
- e) Care of eyes & oral cavity
  - It eyes are open it should be tapped shut.
  - Antibiotic eye drop & ointment.
  - Oral mouth wash/nystatin suspension.
- f) Maintenance of nutrition

In a patient of ischaemic stroke feeding should be given as much as is required, that is 2,000 to 2,500 ml per 24 hour according to the weight of the patient and associated insensible loss. If the patient is febrile or weather is very hot then additional amounts should be given. In Haemorrhagic stroke-500 to 1,000 ml less than the usual requirement. In Subarachnoid Haemorrhage-500 to 1,000 ml more than the usual requirement.

Regarding I.V. fluids, only Normal Saline should be used intravenously, no other fluid to be used unless there is a compelling indication. Even if the blood pressure of the patient is very high, normal saline can be used as this small amount will not affect the blood pressure.

#### **▪ Hemorrhagic**

- Intracerebral (mass effect, altered consciousness – hospitalization / referred to higher centre).
- Subarachnoid
  - Hospitalization/referred to higher centre.

#### **Stroke (Not confirmed by CT/MRI)**

- Only general management
- Complicated patient – referred to higher centre.

#### **2. Risk Factor Management**

- Body weight reduction & regular exercise
- Stopping of smoking and tobacco use
- Control of hyper tension
- Control of DM
- Control of Dyslipidemia

#### **3. Management of Complication**

- Referred to higher centre

#### **4. Rehabilitation**

- Physiotherapy
- Occupational therapy

## Stroke Management in Primary Level

### Stroke Diagnosis depends on:

1. Presence of Risk Factors
2. Clinical Symptoms
3. Clinical Signs
4. ± CT / MRI of Brain

### Management

1. General Management
2. Specific Management
3. Risk Factor Management
4. Management of Complication
5. Rehabilitation

#### 5. General Management

- Unconscious Patient
- Conscious Patient & able to swallow

#### 6. Specific Management

- Ischaemic
- Hemorrhagic
- **Ischaemic**
  - Antiplatelet

In the Ryles tube, all kinds of food can be given which can be made into a paste and introduced through the Ryles tube. Ideally a combination of different types of food should be given. Only one type of food like milk should not be given. One to two teaspoonful of salt (5 to 10 gm) should be given during each 24 hours feeding as stroke patients tend to develop hyponatraemia. Diabetic patients should not be given any sweet like horlicks, tinned sweet food, etc. One feed may contain juice of a sweet fruit like orange juice, pomegranate juice, grape or grape fruit juice, etc., in a diabetic patient.

Feeds should not be more than 100 to 200 ml per each feed. They can be given at 1, 2 or 4 hours interval. Feeds should not be given between 10 p. m and 6 a. m. to maintain physiological timing of feeding. If the attendants complain of regurgitation of given feeds than the head should be raised during feeding and kept raised for 15 minutes after the feed. Regurgitation occurs due to loss of tone of the gastro-esophageal sphincter at the lower end of the esophagus and keeping the head end raised prevents the back flow to the esophagus. Tab. Domperidone 10 mg thrice daily given through the Ryles tube causes tightening of the LES (lower oesophageal sphincter), and may prevent regurgitation of food.

#### 2. Specific medical treatment:

- a) **Aspirin:** 300mg state and there after 75 to 150mg per day if not contraindicated.

(Currently the combination of aspirin & clopidogrel is recommended only in patients with unstable angina with ECG or enzyme changes)

#### b) **Thrombolysis & other revascularisation treatments:**

Only at tertiary level and highly specialized centre.

Should be done within 3 hours of onset of symptoms if there is no contraindication

**c) Anticoagulants: Heparin & warfarin should be given when there is-**

- ❖ Atrial fibrillation & other paroxysmal dysrhythmias
- ❖ Cardiac valve lesion (Uninfected)
- ❖ Cardiomyopathies

(Brain haemorrhage must be excluded by CT/MRI before giving anticoagulant)

**d) Control of hypertension:**

Normally cerebral blood flow (CBF) is maintained by auto regulation. The brain's ability to regulate cerebral blood flow is impaired immediately after stroke. Rapid decrease in systemic blood pressure cause decrease brain perfusion to the area of the stroke, causing ischaemia to the penumbra and further increasing the damage to the brain. Treatment of hypertension should be initiated only when the level of blood pressure is so high that it may damage other organs. Treatment is usually started when systolic blood pressure is greater than 220 mm Hg and diastolic blood pressure is greater than 120 mm Hg (in the NINDS trial, intravenous treatment with antihypertensive agents was used when the systolic pressure was >180 mm Hg and/or the diastolic blood pressure was >110 mm Hg.) Treatment should aim to maintain a mean arterial pressure below 130 mm Hg in patients with chronic hypertension. Even when high blood pressure is treated, the goal should be to reduce the diastolic blood pressure only up to 100 mmHg.

There are few indications for immediate antihypertensive therapy in the first few hours after symptom onset. These are:

- I. To allow administration of thrombolytic drugs.
- II. In the setting of acute myocardial ischaemic although extreme lowering of BP is not good for patients with this condition.
- III. Cardiac failure.
- IV. Acute renal failure.
- V. Acute hypertensive encephalopathy.

## Section-B

### Stroke Management in different Level

**Management:**

## General measures-

- Bed rest
- Stool softeners to avoid straining
- Analgesic (Non NSAID) for headache
- Sedation (Cautiously) if restless
- Adequate hydration
- Nimodipine (60mg 4 hourly) - to be started within 48 hours & continued for 3 weeks. (to prevent vasospasm)
- Control of HTN

**Specific measures:**

- Intraluminal platinum coil
- Craniotomy & clipping of aneurysms

- VI. If the CT scan shows a haemorrhagic cause of stroke, such as subarachnoid haemorrhage, intracranial haemorrhage, or epidural haematoma, antihypertensive treatment may also be started.

Commonly used antihypertensive agents (preferably ACE inhibitor and ARBs) can be employed in patients of stroke also. It is better to avoid agents which can cause a precipitous fall in blood pressure, like the direct vasodilators (e.g. nifedipine) Beta-blocker may mask the bradycardia caused by raised intra-cranial pressure, so it is better to avoid them.

Factors which affect the decision of starting anti-hypertensive drugs are:

- I. Previous history of hypertension or not.
- II. Previously getting anti-hypertensive drugs or not.
- III. End organ involvement which is evidence of long standing hypertension like left ventricular hypertrophy, hypertensive retinopathy, proteinuria due to hypertensive nephropathy, etc.
- IV. Type of stroke.
- V. Duration of stroke.
- VI. Age of the patients.

**e) Management of diabetes:**

If the blood glucose is > 11.1mmol/L it should be reduced with short acting insulin.

**f) Management of dyslipidaemia:**

Statins should be used when the LDL is > 100mg/dl (with monitoring of LFT)

### 3. Surgical approaches:

#### Carotid endarterectomy-

Two recent trials-European carotid surgery trial (ECST) & North American symptomatic carotid endarterectomy trial (NASCET) have defined its role in treatment.

Severe stenosis (>70%)-should be operated on by an experienced surgeon.

Mild stenosis (<30%)-anti-platelet drug

Moderate stenosis (30-70%)-place of surgery remains unclear.

Angioplasty (+ stenting)-Correction of any valvular lesion if present

### 4. Rehabilitation: Physiotherapy & speech therapy

Physiotherapy to be started as early as possible in ischaemic stroke

In haemorrhagic stroke it should be started after the vital parameters have settled down.

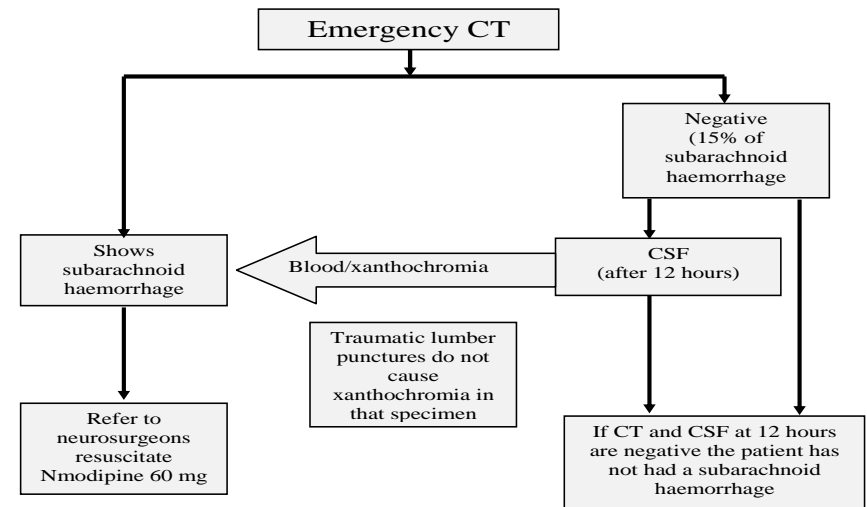
Skilled physiotherapy relieves spasticity, prevents contractures and teaches patients to use walking aids.

### Investigation:

1. CT scan-blood in sylvian fissure & sulci (85%+ve)
2. LP-Examination of CSF (after 12 hours) (if CT scan is inconclusive)  
yellow CSF (xanthochromia)-
  - Visual
  - Spectrophotometric (to estimate bilirubin)
3. MR angiography
4. Angiography/DSA

### Complication:

1. Vasospasm-ischaemic stroke
2. Rebleeding (in 30%)
3. hydrocephalus
4. Hyponatraemia



The investigation of sudden severe headache

- a) Acute bacterial meningitis
- b) Brain tumors (e.g. metastatic melanoma)
- c) Arteritis (e.g, SLE)
- d) Spinal AVM (Spinal haemorrhage only)
- e) Coarctation of the aorta
- f) Marfan's syndrome. Ehlers-Danlos syndrome
- g) Polycystic kidneys

**Clinical feature:**

**Symptoms-**

- Headache-sudden severe, Thunderclap (Typically occipital)
- Vomiting
- Altered level of consciousness
- Focal sign (if associated intracerebral haemorrhage or ischaemic stroke from vasospasm)
- Convulsion

**Signs-**

- Neck stiffness
  - Positive Kernig's sign
- | Takes 6 hours to develop
- Consciousness may be impaired

**Cranial nerves-**

- Papilloedema-sometimes
- (accompanied by retinal & subhyaloid haemorrhage)
- 3rd n palsy (PCOM aneurysm)
- 6th n palsy

**Management of complication of acute stroke:**

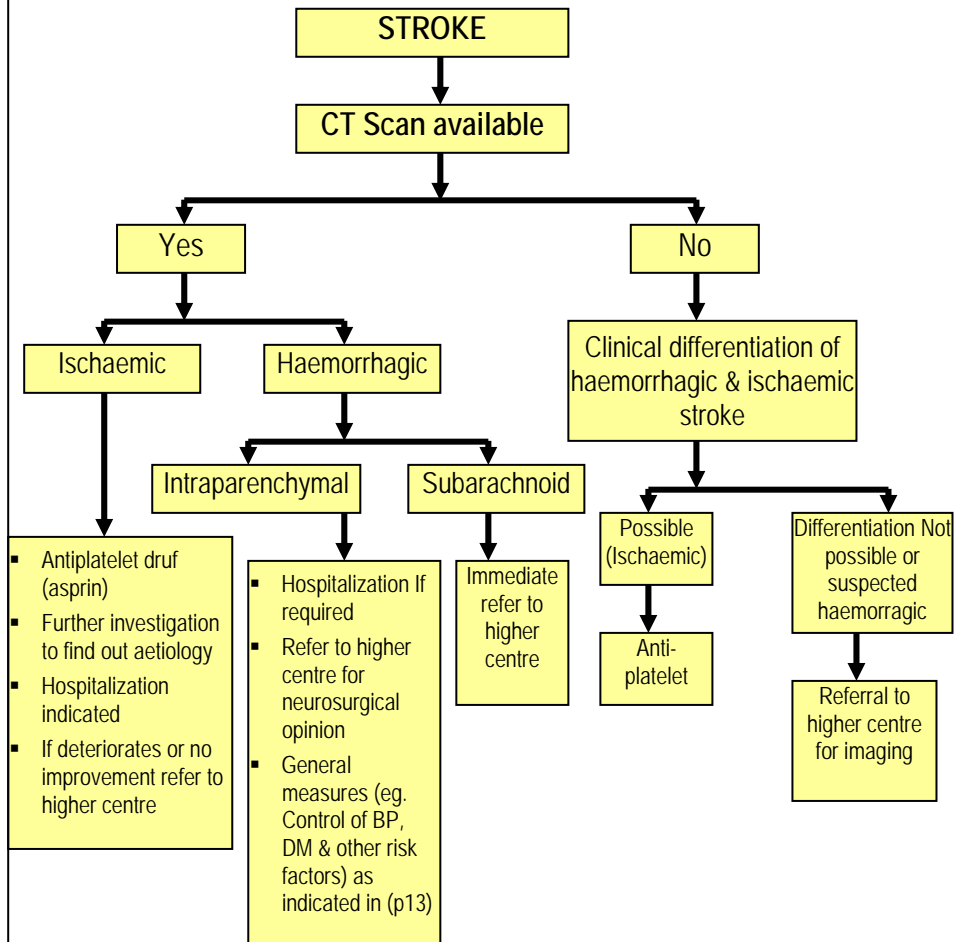
Complication	Prevention	Treatment
Chest infection	<ul style="list-style-type: none"> <li>▪ Nurse semi-erect</li> <li>▪ Avoid aspiration</li> </ul>	Appropriate antibiotics Physiotherapy
Epileptic seizure	<ul style="list-style-type: none"> <li>▪ Maintain cerebral oxygenation</li> <li>▪ Avoid metabolic disturbance</li> </ul>	Anticonvulsant
Deep venous thrombosis/pulmonary embolism	<ul style="list-style-type: none"> <li>▪ Maintain hydration</li> <li>▪ Early mobilisation</li> <li>▪ Anti-embolism stockings</li> <li>▪ Heparin (for high-risk patients only)</li> </ul>	Anticoagulation (exclude haemorrhagic stroke first)
Painful shoulder	<ul style="list-style-type: none"> <li>▪ Avoid traction injury</li> <li>▪ Shoulder/arm supports</li> </ul>	Physiotherapy Local corticosteroid injection
Pressure sore	<ul style="list-style-type: none"> <li>▪ Frequent turning</li> <li>▪ Monitor pressure areas</li> <li>▪ Avoid urinary damage to skin</li> </ul>	Nursing care Pressure-relieving matters
Urinary infection	<ul style="list-style-type: none"> <li>▪ Avoid catheterization if possible</li> <li>▪ Use penile sheath</li> </ul>	Antibiotics
Constipation	<ul style="list-style-type: none"> <li>▪ Appropriate aperients and diet</li> </ul>	Appropriate aperients
Depression and anxiety	<ul style="list-style-type: none"> <li>▪ Maintain positive attitude and provide information</li> </ul>	Antidepressants

**PRIMARY PREVENTION OF STROKE:**

Incidence of first stroke may be reduced by altering 10 modifiable risk factors-

1. Cigarette smoking.
2. Alcohol consumption.
3. Physical inactivity.
4. Diet.
5. Hypertension.
6. Myocardial infarction.
7. Atrial fibrillation.
8. Diabetes mellitus.
9. Blood lipid levels.
10. Asymptomatic carotid artery stenosis.

## FLOW CHART OF ACUTE STROKE MANAGEMENT



## SUBARACHNOID HAEMORRHAGE:

It means spontaneous arterial bleeding into the subarachnoid space, and is usually clearly recognizable by its dramatic onset. It accounts for some 5% of strokes & has an annual incidence of 6/100.000.

### Causes:

#### 1) Saccular (berry aneurysms) 70%

Develop on the circle of Willis & adjacent arteries. Common sites are at the following arterial junctions-

- b) Between posterior communicating & internal carotid artery- PCOM aneurysm.
- c) Between anterior communicating & anterior cerebral a- ACOM aneurysm.
- d) At the bifurcation or at the trifurcation of the middle cerebral a- MCA aneurysm.
- e) Other aneurysm sites are on the basilar, posterior inferior cerebellar, intracavernous internal carotid and ophthalmic arteries.

Aneurysm cause symptoms either by

- Spontaneous rupture
- or
- By direct pressure (e.g. an enlarging unruptured PCOM is the commonest cause of painful 3rd n palsy).

#### 2) Arterio-veous malformation (AVM): 10%

This is a collection of arteries & veins of developmental origin, usually within the cerebral hemisphere. They may remain asymptomatic or may be symptomatic (headache, convulsion, focal sign)

#### 3) No lesion found (in 20%)

Rare association -

- h) Bleeding disorder
- i) Mycotic aneurysms (endocarditis)