

# Class Room

## Management of Acute Ischemic stroke

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### Introduction

Ischemic stroke is a major devastating neurological problem which may result in severe disability and can lead to mortality at times. It is frequently associated with diabetes mellitus, hypertension, hyperlipidemias and cardiac diseases. The advent of acute thrombolysis and endovascular interventions<sup>1</sup> is showing good results in the outcome of acute stroke. There is a limited time window for acute intervention as ischemic tissue may not be salvageable if irreversible damage to the ischemic region sets in. Hence time is very precious in acute management; the concept of "Brain attack", like heart attack is gaining popularity to stress emergency treatment.

### Emergency room management

Acute thrombolysis<sup>2,3,4</sup> is possible only with teamwork involving public, ambulance personnel, emergency physicians, neurologist, intensivists and the nursing staff. The treatment cascade includes selection of cases, evaluation and acute treatment protocol.

When patients with suspected stroke/TIA (Transient Ischemic attack) are received at the emergency department, the stroke team must be activated to ensure adequate and timely evaluation of the high risk patients. Vitals of the patient including pulse oximetry should be monitored, and if need be oxygen therapy has to be instituted. If the patient is hypotensive, normotension has to be established; however, hypertension should not be treated unless there is suspicion of intracranial haemorrhage. Intravenous access should be established. 12-lead ECG should be obtained and patient's capillary blood glucose has to be monitored frequently. Blood should also be sent to test for renal function, serum electrolytes, serum glucose, coagulation (PT, INR, aPTT) and cardiac enzymes (CK, CK-MB, Trop).

Detailed history including the symptoms and time of onset and evolution should be obtained as it is essential for planning and initiating the treatment. Previous treatment history, particularly related to anti-coagulants and antiplatelet agents, previous history of stroke, head injury, previous episode of any brain haemorrhage and major surgeries undergone recently should also be obtained. History related to co-morbidities such as hypertension and diabetes

mellitus and their recent values and medication history should be included. A quick neurological examination should be conducted that includes level of consciousness, focal neurological deficit including arm/leg weakness, speech and visual disturbances and sensory impairment. Carotid pulsations should be felt on both sides to check any reduction or diminished pulsation and also should be auscultated for any bruit. Heart sounds must be auscultated for murmurs, if present.

### Neurological Evaluation

The important phases in the management of patients presenting with stroke like symptoms include suspicion of the diagnosis of stroke based on clinical features, confirmation of the diagnosis, determining the stroke type, etiology and management planning.

When a patient is evaluated for any of the thrombolytic therapies, it is vital to evaluate the patient as soon as practicable. The severity of stroke is quickly evaluated through the NIHSS (National Institute of Health Stroke Scale), which plays an important role in the criteria for intra venous TPA (Tissue Plasminogen Activator), in acute ischemic stroke patients (Table 1).

Investigations recommended before initiating reperfusion therapy are chest X-Ray to rule out aortic dissection which can mimic stroke, routine blood investigations and urine analysis and coagulation studies. Other investigations are required if there is a family history of recurrent miscarriages and vasculo-embolic events including anti-Thrombin III, Protein C and S, G20210A prothrombin gene mutation, APLA (Anti Phospholipid Antibodies) and Factor V Leiden. Pregnancy test should be done, since CT and intravenous thrombolysis is contra-indicated in pregnant women. Blood culture should be done if endocarditis is suspected. Lumbar puncture is mandatory during the hyper acute phase to confirm the diagnosis.

### Neuro Imaging

Early diagnosis of brain hemorrhage can be life-saving. Imaging of brain parenchyma is crucial to exclude or confirm the presence of cerebral hemorrhage. It is essential to assess the extent of brain injury and to select the patients who are likely to benefit from reperfusion

therapy. Imaging of vasculature can identify the vascular lesion responsible for cerebral ischemia.

Stroke patients presenting within the therapeutic time window should receive intravenous r-tPA and vascular imaging should be performed once r-tPA is started to determine the nature and location of arterial occlusion.

**Table 1 - NIHSS**

Level of Consciousness	Alertness (0-3) Orientation (0-2) Ability to follow commands (0-2)
Gaze	Normal eye movements (0) Gaze palsy (1) Forced eye deviation (2)
Vision	Normal (0) Partial hemianopia (1) Complete hemianopia (2) Blindness (3)
Facial palsy	Symmetric face (0) Mild paralysis (1) Partial paralysis (2) Complete paralysis (3)
Motor strength (Arms and Legs)	Separate score for each limb- No drift (Can hold limb up for 10 seconds) (0) Drift present (1) Some effort against gravity (2) No effort against gravity (3) No detectable movements (4)
Limb ataxia	Only scored, if out of proportion to weakness – Absent (0) Present in one limb (1) Present in two limbs (2)
Sensory loss	Measured to pin-prick or noxious stimuli present (0) Mild to moderate loss of sensation (1) Severe to total loss of sensation (2)
Best language	Testing both expressive and receptive aphasia and dysarthria- No Aphasia (0) Mild to Moderate Aphasia (1) Severe Aphasia (2) Global Aphasia/Mute (3)
Dysarthria	Normal Speech (0) Mild to Moderate slurred speech (1) Severe, unintelligible slurred speech (2)
Extinction and Inattention	No Neglect (0) Neglects Visual, tactile, auditory, spatial stimuli (1) Has profound hemi-attention/ does not recognize own body part (2)

minimum score = 0.

maximum score (maximum disability i.e., coma) = 42.

minimum disability is by nihss score of less than 4.

maximum disability is reflected by a NIHSS score of more than 20.

## Thrombolysis

Once a diagnosis of ischemic stroke is made, patient's eligibility for re-perfusion therapy is to be assessed. Re-perfusion therapy include:

- Intravenous thrombolysis.
- Intra-arterial thrombolysis.
- Endovascular treatment.
- Combination therapy.
- Hypertensive therapy.

Thrombolysis is indicated in patients more than 18yrs of age, in cases of ischemic stroke causing a measurable neurological deficit (NIHSS) and when stroke onset to needle time is less than 3 hours (Table 1).

Absolute contra-indications include minor or rapidly resolving stroke symptoms, other stroke or serious head trauma within the past 3 months, major surgeries within 14 days, known history of intracranial hemorrhage, sustained systolic blood pressure of more than 185 mmHg or diastolic blood pressure of more than 110 mmHg, symptoms suggestive of SAH, gastrointestinal or urinary tract hemorrhage within the past 21 days, arterial puncture at non compressible site within the past 7 days, heparin therapy within the last 48 hours and platelet count less than 1,00,000/cu.mm. Relative contra-indications include seizure at the onset of stroke, serum glucose < 50mg/dl or >400mg/dl, haemorrhagic eye disorder, myocardial infarction in the past 6 weeks, suspected septic embolism, infective endocarditis and International Normalized ratio (INR) > 1.7.

## IV Thrombolysis

If an acute stroke patient fulfills all the inclusion and none of the absolute exclusion criteria, treatment with IV r-tPA at a dose of 0.9mg/kg. (max.Dose of 90mg) with a 10 % bolus over 1 min and remaining dose over 60 minutes should be considered. After administration, BP should be kept within the above parameters & ICU admission with neurological examination, monitoring every hour is essential for atleast 24 hours. Nasogastric tube, foley's catheter and central line should be avoided for 24 hours after thrombolytics are given. There are around seven major trials evaluating the use of thrombolytic agents in the treatment of acute ischemic stroke.

## IA Thrombolysis

Intra-arterial (IA) r-tPA is not superior to intravenous (IV) treatment. IA is particularly helpful when IV is contra-indicated, for example, in post-operative stroke. Studies suggest that IA thrombolysis is an effective and relatively safe therapy in patients with large vessel occlusions who are otherwise expected to have poor re-cannulation with IV thrombolytic agents. Mechanical disruption of the clot can be used with IA thrombolysis and it is helpful when IV is contra-indicated.

New re-perfusion therapies are Desmoteplase, a plasminogen activator, Abciximab, glycoprotein IIb, IIIa receptor inhibitor, use of external Trans cranial

Doppler (TCD), permissive hypertensive therapy and high dose albumin. Use of aspirin 160-300 mg daily and IV heparin can be useful in patients who are not eligible for reperfusion therapy.

## Management of hydration and fluid status

Hypovolemia should be avoided in embolic and carotid strokes. Isotonic crystalloids (0.9 % NS) can be used. Hypotonic fluids (0.45 % saline or D5W) aggravate cerebral edema and should be avoided. Also, hypervolemia should be avoided in hemorrhagic or large strokes.

## Management of blood sugar

Hyperglycemia promotes anaerobic metabolism and lactic acidosis within the ischemic tissue, thus worsening outcome. It also increases the risk of hemorrhagic transformation after thrombolysis. Hyperglycemia is best managed by short acting insulin and the target glucose level should be less than 200 mg /dl.

## Management of blood pressure

Most of the time high blood pressure comes down spontaneously. There is no need to lower BP urgently. Anti-hypertensive drugs are required if systolic BP is more than 210 and diastolic BP more than 110. There are certain situations in which BP has to be brought down, like thrombolysis, aortic dissection, myocardial infarction and heart failure.

## Conclusion

Initial few hours are critical in the outcome of acute ischemic stroke. An expert team working quickly and efficiently can minimize the mortality and morbidity. Newer therapeutic options like endovascular technology improves stroke outcome.

## References

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### Baked Fish is Brain's relish!

As the average lifespan of humans lengthens, dreaded diseases of the advancing age like dementia (particularly Alzheimer's) are becoming more common. According to one estimate, there will be around 80 million people with dementia by 2040. So, how to retain a healthy brain as we grow older? Several past studies have linked high intake of omega-3 fatty acid rich foods (fish, nuts, certain vegetable oils) to improved brain health. Until now it was considered to be due to the anti-oxidant properties of fish irrespective of how it was consumed. But now in a new study carried out in UCLA (Cyrus A. Raji et al, Regular Fish Consumption and Age-Related Brain Gray Matter Loss. *American Journal of Preventive Medicine*, 2014; DOI: 0.1016/j.amepre.2014.05.037), the investigators found that individuals who ate fish baked or broiled at least once a week, had enlarged grey matter in the regions of brain connected with cognition and memory and were also more likely to have college education compared with those who did not eat fish. This was not related to the levels of omega-3 fatty acid. So, life style (how we eat) also contributes to brain health. Remember to eat your fish baked or broiled, so that you can remember!

- Dr. K. Ramesh Rao