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# Stroke : Prevention and Treatment

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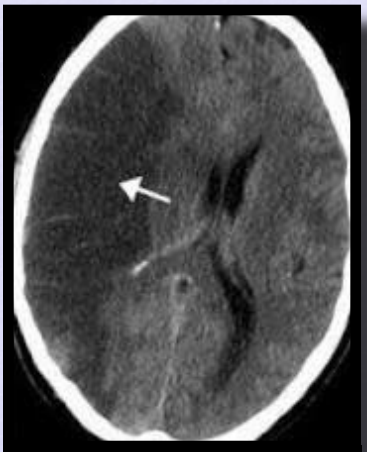
## Background

**Stroke is a condition characterised by very rapid onset of symptoms, hence the term stroke, that is, stroke of time. Rapid onset of symptoms is due to part of the brain being deprived of blood due to blood clot (ischemic stroke) or due to bleeding into the brain substance (hemorrhagic stroke or bleeding type of stroke). Since part of brain stops functioning, part of the body is paralysed. Ischemic stroke is a result of damage to blood vessels over time – wear and tear. Damage to blood vessels, that is, atherosclerosis is an ageing process accelerated by other conditions described as vascular risk factors. Hemorrhagic stroke is caused by rupture of blood vessel due to high blood pressure and rarely by structural abnormalities of blood vessels like aneurysm or other congenital abnormality of blood vessel. We will focus on ischemic stroke in this review since ischemic strokes constitute 85% of all strokes.**



*CT scan of brain showing ischemic stroke affecting right side of brain (arrow).*

*Right sided hemorrhagic Stroke*

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Stroke is also termed as cerebrovascular disease. It is similar to heart attack, that is, myocardial infarction. There is a similar process affecting blood vessels of brain or heart. Hence stroke is also referred as brain attack to signify that brain is the organ involved and also to highlight stroke as an emergency.

## Prevention of Stroke in Population

Stroke affects human population all over the planet with variable occurrence in different countries. For example, in Chinese population, the incidence of stroke is high due to their high salt intake of diet. Other lifestyle factors that influence the incidence of stroke include obesity, level of activity and smoking. Sedentary lifestyle increases rate of atherosclerosis on its own and also by resulting in overweight and obesity. Obesity raises cholesterol levels in blood which in turn accelerates rate of atherosclerosis. Smoking also increases the rate of atherosclerosis resulting in higher incidence of stroke amongst smokers. Family history of stroke at young age also plays an important in causing stroke but in a minority of patients. Incidence of stroke can be reduced in population by modifying these lifestyle factors with exception of family history.

## Primary Prevention of Stroke

Individuals in a population who have certain medical conditions like diabetes mellitus and high blood pressure are more likely to suffer from stroke in future. Identifying and treating these two conditions will result in significant reduction of risk of suffering from stroke. Rise of blood pressure of every 5 mm Hg above 140/85 mm Hg is associated with doubling of risk of stroke. Other less common condition of heart in form of irregular heart rate – atrial fibrillation (AF) – diagnosed by ECG and scan of heart (echocardiogram) is associated with higher incidence and greater severity of stroke due to formation of blood clot in heart which can travel to blood vessels of brain. Stroke caused by AF can be best prevented by giving anticoagulants prescribed by medical professionals.

## Secondary Prevention of Stroke

Ischemic stroke is frequently preceded by transient symptoms caused by transient reduction of brain due to blood clot in blood vessels. These symptoms are exactly like stroke but resolve within 30 minutes to an hour. This condition is called transient ischemic attack (TIA). Occurrence of TIA is associated with higher incidence of ischemic stroke in the following month. Hence one needs to seek medical help as soon as possible within few days. Investigations will be needed to find out the underlying

**conditions as discussed above. Younger person, that is, 50 years or younger will need to undergo imaging of blood vessels of brain, for example CT or MR angiography. It is always advisable not to drive a vehicle for a month due to high likelihood of suffering from a major stroke which will result in an accident.**

## Management of Acute Stroke

**People need to recognise symptoms of stroke by using FAST test which stands for drooping of Face on one side, Arm weakness, impaired Speech – unable to speak and Time to act. If FAST test is positive, one needs to call for help as an emergency, provided above symptoms persist for more than one hour. These symptoms have to be treated as a medical emergency and ambulance should be called to take patient to a hospital with facility of treating patients with stroke as a medical emergency. When brain is deprived of blood supply, brain cells are dying very rapidly and it is extremely important to be treated as soon as possible. Hence the slogan – "Time is Brain". As time passes by, part of brain deprived of blood (ischemic) will die within 4-5 hours, if blood supply to brain is not restored by clot dissolving drug (thrombolytic treatment).**

**Thrombolytic treatment is administered into a vein in well-equipped neurological unit after performing CT scan of head to exclude possibility of haemorrhagic stroke. Unfortunately, thrombolytic treatment is successful only in 40% of patients. If the treating hospital has got skilled and experienced neurologists or interventional radiologist, clot removal can be performed using a catheter (endovascular treatment or mechanical thrombectomy), similar to emergency treatment of heart attack (coronary angioplasty). This is a very complex procedure available only in a small number of hospitals as it requires advanced skills and availability of doctors for 24 hours a day.**

## Recovery After Stroke

**Recovery from symptoms of stroke is based upon practice with physiotherapist (PT) and occupational therapist (OT). It is an active process which requires participation of patient. Also, it is a slow process taking as long as 3-4 months. Initial recovery has to happen in hospital over 3-4 weeks followed by continuing input of PT and OT 2-3 times a week at patient's home. Swallowing and speech problems occur in about 40% of patients. Hence swallow needs to be assessed by Speech and Language Therapist (SALT). Patient may be able to swallow food of modified consistency. If swallow is totally unsafe, patient requires feeding by nasogastric tube in the hospital.**

**Swallow is periodically assessed by SALT and swallow exercises are performed by patient with SALT's guidance. Gradually swallow may improve and patient may be able to eat and drinks normally. But if swallow doesn't improve after 3-4 weeks, patient needs to be fed via percutaneous endoscopic gastrostomy (PEG) for longer periods**

**at home. The procedure of PEG tube insertion is a complex one to be performed by a skilled gastroenterologist in hospital.**

**Role of medical professionals in the recovery phase involves keeping a watch for complications like pneumonia due to aspiration of food into lungs or catheter related urinary tract infection and treating them. One needs to monitor bowel movement as constipation is almost universal after stroke and needs to be treated with laxatives and rectal enema. Also, medical team will be starting medications for secondary prevention of stroke like medications for high BP, diabetes mellitus, cholesterol lowering and antiplatelet drugs like aspirin or oral anticoagulants, as indicated.**

## Major Disability After Stroke

**Stroke is a major illness and results in death of about one third of all patients despite optimal treatment. Recovery from stroke is also not universal in survivors, depending on the degree of damage to brain. As many as one third of patients are left with major disability to the extent that they can't walk about and need to be nursed in bed by family members or carers at home or in a nursing home, if available. Patients may also require feeding via PEG tube if swallow doesn't improve. Patient will be at risk of developing pressure sores and will require a high level of nursing care in a hospital profiling bed with air mattress and frequent change of position in bed.**

## Palliative Care

**It is important to recognise that patient is deteriorating rapidly despite treating all reversible problems. There is no benefit in continuing treatment particularly surgical treatment which is indicated for certain complications rather than as a last resort in a dying patient. If patient is deteriorating rapidly and losing consciousness, there is no benefit in ventilating patient on the intensive care unit (ICU) as patient is unlikely to get better despite prolonged ventilation on the ICU. In these circumstances, medical team needs to explain to the family members the likely outcome and agree for keeping patient comfortable and allow the nature to take its course.**

## Summary

**In conclusion, it is much better to reduce the incidence of stroke in population by improving lifestyle of the whole population with education. Secondly, it is important to identify individuals with risk factors for stroke in future and treat them for preventing stroke. We need to identify symptoms of stroke rapidly and treat it as a medical emergency. If we fail to take these preventive measures, we will have to face the major task of recovering from the effects of stroke including major disability or even worse, death. As always, "Prevention is better than Cure".**

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