Stroke Treatments
Information Guide

INDIAN ACADEMY OF
NEUROLOGY

A Public Information Initiative

Stroke or "brain attack" is a sudden development of neurological deficit due to lack of blood supply to the brain either due to blockage of the artery or due to rupture and bleeding from a blood vessel.

Stroke is the second commonest cause of death in India, and in the developing world besides being the leading cause of disability. Stroke burden in India is enormous. The absolute number of cases in India for the year 2010 is: prevalent cases 2.82 million, incidence cases 1.57 million, deaths 605.888, and disabilities 12 million. The incidence of stroke in India varies from 119 to 145/100,000 based on the recent population-based studies. The death rates due to stroke have been reported to be as high as 42%. The stroke burden is greater in low-middle income countries like India, more so among younger and middle-aged people.

The world over, every 40 seconds someone sustains a stroke and every 4 minutes someone dies of stroke. Only heart diseases and cancer can match this enormous rate of death and disability.

What are the types and causes of stroke?

There are two main types of strokes: Ischemic strokes and hemorrhagic strokes. *Transient ischemic strokes (TIAs)* also referred to as mini-strokes have an independent importance. Another variety of stroke is the *venous strokes* wherein, it is the veins which are blocked and not the arteries. Stroke occurs due to problems with blood supply to the brain. Either the blood supply is blocked or a blood vessel within the brain ruptures. When this happens, the brain does not get enough oxygen or essential nutrients which cause brain cells to die rapidly. Following an ischemic stroke (where the blood vessel is blocked), every minute, 1.9 million neurons are lost, and every hour, 120 million neurons are lost, and the person can age by 3.6 years. Every stroke that goes untreated in the "golden hours (i.e., the first 4.5 hours)", 1.2 billion neurons are lost and the person ages by 3.6 years. Therefore, every minute counts after a stroke occurs.

Causes of ischemic strokes

Ischemic strokes are the most common form of stroke, accounting for 85% of all strokes. The blockade or clot can be formed either in the arteries connecting to the brain or further away before being swept through the blood stream (embolic) and into the narrower arteries within the brain. Clots can be caused by fatty deposits within the arteries (known as atherosclerotic plaques) due to excessive bad cholesterol, high blood pressure and other risk factors. These can lead to progressive narrowing or stenosis of the artery.

What are the risk factors for stroke?

There are several risk factors that are non-modifiable or cannot be changed. These include age, gender, race and genetics. Age is still the biggest risk factor. As the age advances, the stroke risk increases. However, there are numerous modifiable and preventable risk factors, which if tackled and controlled can eminently reduce the stroke risk and recurrence to a significant extent.

- *High blood pressure or hypertension:* High blood pressure is the most important risk factor for all types of stroke and stroke recurrence. Reducing high blood pressure to optimal levels can reduce stroke risk by nearly 40%.
- *Cigarette smoking:* Smoking and tobacco consumption in any form (smoking, chewing) have been established as definitive risk factors for increasing cardiovascular risk including stroke and heart attacks, besides cancer. Nicotine and carbon monoxide in cigarette smoke damage the cardiovascular system in many ways.

- *Diabetes mellitus:* Many people with diabetes also suffer from a metabolic syndrome which includes obesity, high blood pressure and high cholesterol levels in blood. These individuals are especially prone to stroke.
- *Carotid and other large vessel diseases:* The main blood supply to the brain is through major blood vessels in the neck called carotid and vertebral arteries. Any obstruction in these vessels including stenosis, clots, dissection or tearing can result in strokes.
- *Heart disease:* Many heart diseases are intricately related to occurrence of stroke and vice versa. They primarily result in clots being formed in the heart and are pumped into the blood vessels supplying the brain. This phenomenon is called as cardioembolic source causing stroke.
- *High blood lipids:* High blood cholesterol, high levels of bad cholesterol (such as, low density cholesterol or LDL), can result in accelerated plaque formation in arteries and predisposes to progressive stenosis as well as propensity to clot formation resulting in blockage.
- Besides the above mentioned factors, several inherited or familial disorders can also cause stroke.

How do you recognize a stroke?

It is imperative to recognize a stroke in order to reach out for an emergent management. This is of paramount importance since, every minute that elapses without treatment after a stroke can result in permanent damage of millions of neurons.

Stroke is generally sudden. Hence, by rule of thumb, any problem that happens over several days to months is not stroke. The acronym FAST has been in use across several countries of the world for general public to recognize a stroke. However, FAST may not recognize all strokes and may need to be modified according to regional preferences.

The 'FAST' acronym stands for:

Face drooping: If the person tries to smile, does one side of the face droop?
Arm weakness: If the person tries to raise both arms, does one arm drift downward?
Speech difficulty: If the person tries to repeat a simple phrase, is the speech slurred or strange?
Time to call emergency: If any of these signs are observed, it may be stroke and you need to immediately call emergency services.

The main symptoms and signs would be a sudden change or loss of a body function depending on the part of the brain that has been affected due to lack of blood supply.

- Sudden confusion, including trouble with speaking and understanding.
- Sudden severe headache that may be associated with vomiting and alteration in senses or lapsing into coma.
- Sudden paralysis or weakness of one half of the body including facial droop.
- Sudden numbness of one half of the body.
- Sudden trouble seeing with one or both eyes.

- Sudden imbalance especially in walking, including severe dizziness and lack of co-ordination.

What are the diagnostic tests for stroke?

Minimum set of tests required:

- Computed tomography (non-contrast)
- Electrocardiography
- Full blood examination
- Electrolytes
- Coagulation profile
- Blood glucose

A non-contrast CT scan helps in ruling out a bleed in the brain and also stroke mimics which can masquerade as strokes. It is essential to rule out stroke mimics since the management will be different in such cases.

The common *stroke mimics* are:

- Focal seizures with post ictal palsy
- Drug poisoning
- Sinus venous thrombosis
- Brain abscess, encephalitis, meningitis
- Hypoglycemia
- Hypnatremia
- Hemiplegic migraine
- Subdural hematoma
- Brain tumor
- Demyelinating disorders
- Functional

Magnetic resonance imaging (MRI) can be performed which is more sensitive to detect an acute ischemic lesion. Irrespective of what imaging protocols can be done, the most important parameter to observe would be to complete the tests in as less time interval as possible before initiation of definitive treatment.

Treatment of stroke

Stroke is a medical emergency. It is imperative to react to stroke on an emergent basis and reach the hospital which is geared up to deal with stroke in time. Treatment can begin with drugs to break down or lyse the clot and prevent further ones from developing. It is important to recognize and have a guide map of which healthcare centres in the vicinity provide stroke care and reach there in time for optimal stroke management.

Acute therapies are followed by stroke care in a stroke unit set-up which include dedicated management strategies for optimizing blood pressure, blood glucose, temperature control, fluid and electrolyte balance, prevention of infections, deep venous thrombosis or clots in leg vessels and comprehensive rehabilitation strategies which are geared towards the neurological deficits. The goal would be to restore neurological function to such an extent that he/she can be integrated as a useful member of the society as soon as and as much as possible.

Stroke outcome

A minor stroke or mini-stroke can reverse and not result in measurable change in daily activities. However, a significant stroke can result in major disabilities. These are measured in validated scales of daily living such as modified Rankin Score and Barthel Index. Transient ischemic attacks or mini strokes have a special significance here since they are a forerunner for stroke and provide a window of opportunity to prevent it from happening. An aggressive and comprehensive evaluation for preventable and reversible causes of stroke needs to be done in these individuals.

Loss of memory, mood disturbances, and change of personality can be the result of major, or recurrent minor strokes. This constellation of changes is called as vascular dementia and is one of the major causes of dementias in India.

Strokes happening in young people are of special significance since these individuals are at the threshold of decisive career moves, have an active social life and are responsible for running their families.

The important message is, *"With prompt and optimal treatment and rehabilitation, stroke need not necessarily kill or disable".*

Stroke prevention

Stroke is eminently preventable. Being able to recognize the risk factors and optimal control of these risk factors itself can go a long way in preventing a stroke from happening and if it does, at least to prevent a recurrence. For cases of hypertension, a common mistake is stopping blood pressure agents once the blood pressure is under control. This is one of the most important reasons for recurrence of stroke.

Primary prevention

Stroke is caused by a set of risk factors like unhealthy diet (low fruit and vegetable intake), physical inactivity, tobacco use, harmful use of alcohol and stress. High blood pressure, high cholesterol, and obesity are other physiological risk factors. Alcohol consumption, specifically binge-drinking leads to acute hypertension, stroke, and in some individuals atrial fibrillation and cardiomyopathy.

- Risk factors are cumulative and operate on a life course perspective (i.e., they influence the risk throughout the life course). For example, childhood obesity is a major risk factor for adult obesity, and consequently, diabetes and cardiovascular diseases. Detection and treatment of obstructive sleep apnea is important.
- Normally, for all practical purposes it is seen that these risk factors occur together. A person who has high blood sugar levels may also have high blood pressure, high cholesterol, and obesity.
- Risk factors operate on a continuum. This means that even within the normal ranges, people with higher level have higher risks. For example, individuals with systolic blood pressure of 140 mmHg have a higher risk of cardiovascular diseases, stroke and future death than those with 120 mmHg

even though both are within the 'normal' range. This applies to all the risk factors of cardiovascular disease and stroke.

- The risk factors are additive. This means cumulative small elevations of risk factors are much more harmful than isolated elevation of single risk factors.

It is important to note that all these risk factors are amenable to modification through lifestyle changes.

Strategies for primary prevention

Salt reduction and control of hypertension

Cost-effective primary prevention strategies include tobacco control, action against an unhealthy diet and encouragement of physical activity. A modest reduction in salt intake has a significant effect on blood pressure in both individuals with normal and increased blood pressure. The World Health Organization (WHO) has set a global target for maximum intake of salt for adults at 5 g/day (i.e., 2000 mg/day of sodium) or lower if specified by national targets.

Tobacco control

WHO Framework Convention for Tobacco Control to reduce demand includes strategies like increased taxation, legislated restriction on smoking in public places, comprehensive bans on advertising of tobacco products, information dissemination through health warning labels, counter advertising, and various consumer information packages. Personal health interventions include nicotine replacement therapy and physician advice.

Drugs

Availability of state sponsored health insurance will prove to be tremendously beneficial in assuring compliance and adherence to both primary and secondary preventive regimes. Health has to be a primary right of every citizen of the country.

Secondary prevention

Proven secondary prevention interventions include, tobacco cessation, antihypertensive therapy, and cholesterol reduction.

Prompt assessment and investigation of a transient ischemic attack (TIA), followed by initiation of secondary prevention measures is effective in reducing recurrent strokes. The risk of early stroke following a TIA may be as high as 12% at 7 days and 20% at 90 days. The TIA therefore requires urgent medical attention.

Stroke in peri-pregnancy period

Peri-partum strokes (strokes that occur around delivery period) are particularly common in India. These are attributed to a number of causes including a genetic predisposition, poor obstetric practices, poor antenatal care, anemia, nutritional deficiencies and infections. They are eminently treatable and largely have a good outcome if adequately treated in time.

Post-stroke rehabilitation

Strokes are life-changing events and can be devastating. Several measures can be employed comprehensively and tailored to the individual's specific neurological deficits for alleviating the problems at

the physical, emotional, social and behavioural levels.

- *Speech therapy* can help with problems producing or understanding speech. Speech practice, changing communication styles and modes, using gestures and other modalities of intervention can help.
- *Physical therapy* helps in relearning movement and coordination. Enormous advances in this field have now made it possible to enhance the brains natural tendency to recover (neural plasticity). There are now several physical and mechanical appliances available, including robotics which can help in these interventions.
- *Occupational therapies* help in improving and carrying out the daily activities such as bathing, dressing, cooking, eating, reading and other essential activities.
- *Support from family and friends* is of paramount importance in reintegrating the individual into society. Neuropsychological help may also be required to deal with acute depression which can occur after stroke.

Dispelling some common stroke myths

It is imperative to understand that stroke is no longer a condition which affects only the elderly, is untreatable, or cannot be prevented. It is also disheartening to see that largely people still believe that stroke happens in the heart. Strokes are extremely common, and as you are reading this article, there are strokes happening every 40 seconds. Strokes can happen to anyone. Stroke is a "brain attack". It can be easily prevented, provided one can recognize the risk factors and take care of them. Stroke recovery can be a life-long process and one must not give up on rehabilitation efforts. With the enormous advances of our understanding of stroke and its management, past nihilism is no longer acceptable. It is very important to recognize a stroke and react to it as an emergency and reach out for emergent management to centres best equipped with stroke care. It is absolutely relevant to understand that *"time is brain"* and, *"stroke need not necessarily kill or disable"*.

Disclaimer:

This brochure is for the general information of the public and the patients. People should not self-medicate themselves with the medicines and treatments mentioned here. Before taking any of the medications mentioned in the information brochure, please consult your neurologist.

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