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A COMPREHENSIVE REVIEW ON STROKE CEREBROVASCULAR DISORDER

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ABSTRACT

A stroke is a serious medical condition that occurs when the blood supply to part of the brain is cut off. The stroke is of two types namely ischemic stroke and haemorrhagic stroke. Ischemic stroke is the most common type which is caused due to local thrombus formation or to emboli that occlude a cerebral artery. Cerebral atherosclerosis is a causative factor in most causes of ischemic stroke, 30% are of unknown aetiology. Ischemic stroke is again of two types they are cerebral infarction and lacunar infarction. Haemorrhagic accounts for 12% strokes and include subarachnoid haemorrhage intra cerebral haemorrhage and sub-dural hematomas. Subarachnoid haemorrhage may result from trauma or rapture of an intra-cranial aneurysm or arteriovenous malformation. The present review discusses the types, epidemiology, setiology, pathophysiology & treatment.

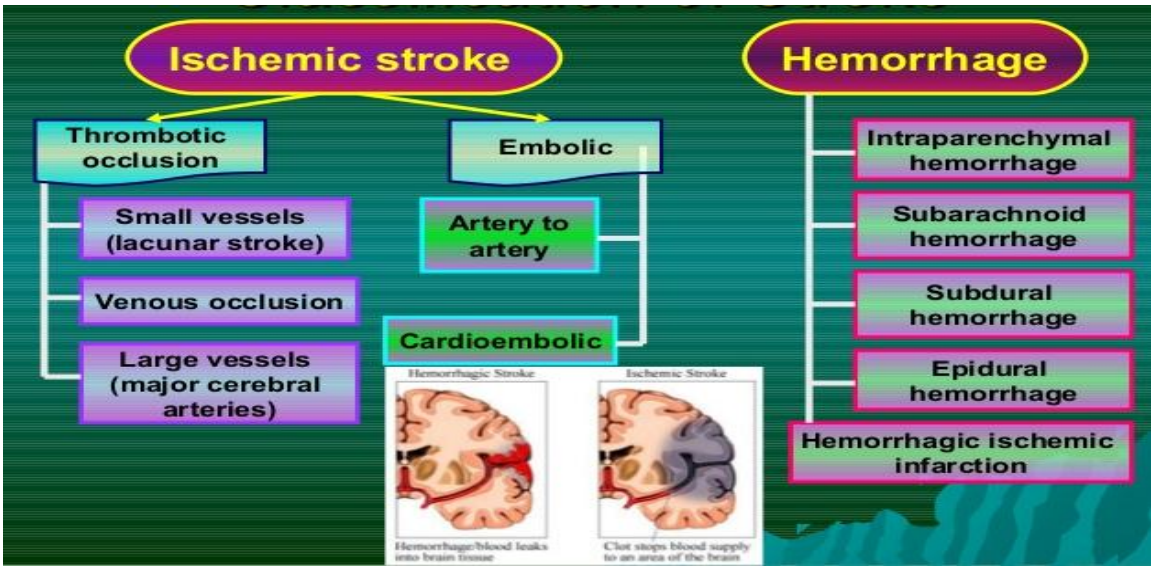
KEYWORDS: Ischemic stroke, haemorrhagic stroke, subarachnoid haemorrhage, cerebral infarction and lacunar infarction.

1. INTRODUCTION

Stroke is a term used to describe an abrupt onset of focal neurological deficit that lasts at least 24 hours and is presumed to be of vascular origin. Transient ischemia attacks (TIAs) are focal ischemic neurologic deficits lasting less than 24 hours and usually less than 30 min. All organs including the brain needs the oxygen and nutrients provided by blood to function properly. If the supply of blood is restricted or stopped, brain cells begin to die, this can lead to brain damage and possible death. Stroke is a medical emergency and prompt treatment is essential because the sooner a person receives treatment for a stroke the less damage is likely

to happen. Stroke is a largely preventable condition but they are some risk factors which cannot be changed, including age, family history, ethnicity, medical history. Stroke is leading cause of adult disability approximately 20% of patients have had a stroke. Stroke is of two types mainly ischemic stroke and haemorrhagic stroke. Ischemic stroke occurs when blood clots blocked on flow of blood to the brain, another possible cause of ischemic stroke is irregular heart beat (atrial-fibrillation). Haemorrhagic stroke usually occurs in the brain bursts and bleeds into the substance of the brain (subarachnoid haemorrhage). The main cause of haemorrhagic stroke is blood pressure (hypertension).

2. Types



a) Ischemic stroke

Ischemic stroke accounts for 88% of all stoke and are due either to local thrombus formation or to emboli that occlude a cerebral artery.

- Cerebral atherosclerosis is a causative factor in most causes of ischemic stroke 30% are of unknown aetiology
- Emboli can arise either from intra or extra cranial arteries.
- 20% of embolic strokes arise from the heart.
- In carotid atherosclerosis, plaques may rapture resulting in collagen exposure platelet aggregation, and thrombus formation. The clot may cause local occlusion are may dislodge and travel digitally, eventually occluding cerebral vessel.
- In the case of carcinogenic embolism stasis of blood flow in the atria or ventricles leads to formation of local clots that can dislodge and travel through the aorta to the cerebral circulation.

- The final result of both thrombus formation and embolism is arterial occlusion decreasing cerebral blood flow and causing ischemic and ultimately infraction distal to the occlusion.

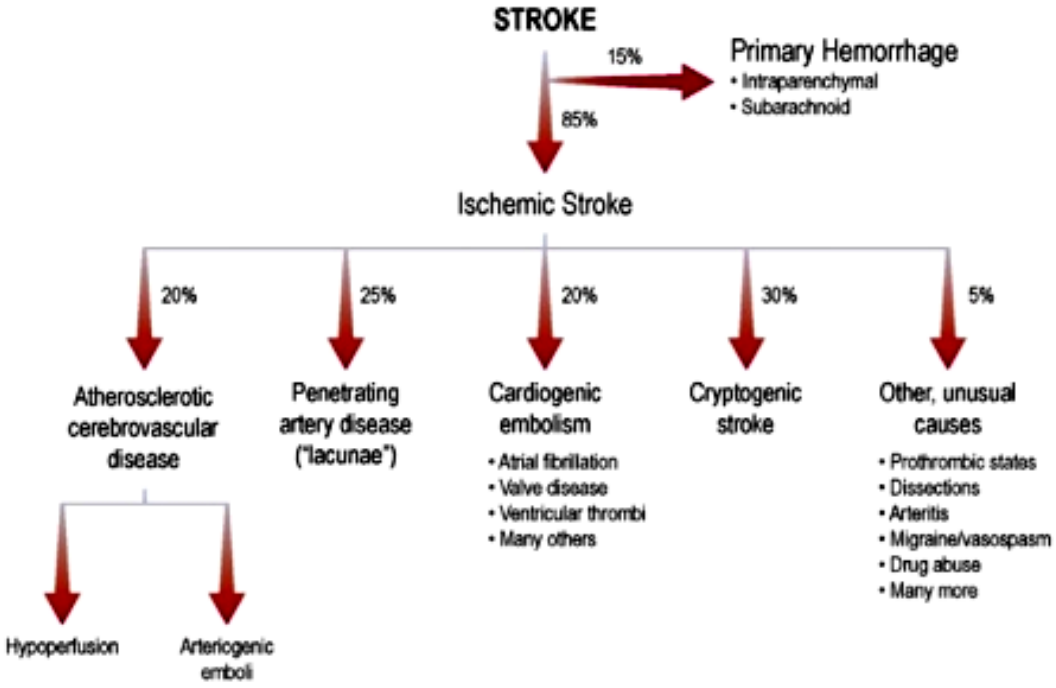
b) Haemorrhagic stroke

- It accounts for 12% strokes and includes subarachnoid haemorrhage intra cerebral haemorrhage and sub duralhematomas.
- Subarachnoid haemorrhage may result from trauma or rapture of an intra-cranial aneurysm or arteriovenous malformation.
- Intracerebral haemorrhage accurse when erupted blood vessel with in the brain parenchyma causes formation of hematoma subdural hematomas are most often caused by trauma.
- The presence of blood in the brain parenchyma causes damage to surrounding tissue through mass effect and the neurotoxicity of blood components and their degradation products. Compression of tissue surrounding nematodes may lead to secondary ischemia. Much of the early mortality of haemorrhagic stroke, it due to the abrupt increase in intracranial pressure that can lead to herniation and death.

3. Epidemiology

- Stroke is the leading cause of adult disability.
- Approximately 20% of patients in nursing homes have had a stroke
- Stroke also a leading diagnosis in inpatient rehabilitation owing in part to the need for this expensive post hospitalization care environment.
- Stroke is also one of the most expensive disease in the us with annual costs greats then $ 50 billions.
- Current projections are that death caused by stroke will increase exponentially in the next 30 years. Owing to aging of the population and in our inability to control risk factors.
- Stroke risk is increase about that of the general population in elderly male individuals and in african americans.
- Such that several areas of the south eastern united states have stroke mortality rates more than twice that of national average.
- This phenomenon originally y describing area of the costal cardigans and georgia has been named the" stroke belt".

4. Etiology



5. Causes

The different forms of stroke have different specific causes.

a) Causes of ischemic stroke

Ischemic stroke is the most common form, accounting for around 85 percent of strokes. This type of stroke is caused by blockages or narrowing of the arteries that provide blood to the brain, resulting in ischemia - severely reduced blood flow that damages brain cells.

These blockages are often caused by blood clots, which can form either in the arteries within the brain, or in other blood vessels in the body before being swept through the bloodstream and into narrower arteries within the brain. Fatty deposits within the arteries called plaque can cause clots that result in ischemia.

b) Causes of hemorrhagic stroke

Hemorrhagic strokes are caused by arteries in the brain either leaking blood or bursting open. The leaked blood puts pressure on brain cells and damages them. It also reduces the blood supply reaching the brain tissue after the hemorrhage point. Blood vessels can burst and spill blood within the brain or near the surface of the brain, sending blood into the space between the brain and the skull.

The ruptures can be caused by conditions such as hypertension, trauma, blood-thinning medications, and aneurysms (weaknesses in blood vessel walls).

Intracerebral hemorrhage is the most common type of hemorrhagic stroke and occurs when brain tissue is flooded with blood after an artery in the brain bursts. Subarachnoid hemorrhage is the second type of hemorrhagic stroke and is less common. In this type of stroke, bleeding occurs in an artery in the subarachnoid space - the area between the brain and the thin tissues that cover it.

c) Causes of transient ischemic attack (TIA)

TIAs are different from the kinds above because the flow of blood to the brain is only briefly interrupted. TIAs are similar to ischemic strokes in that they are often caused by blood clots or other clots.

TIAs should be regarded as medical emergencies just like the other kinds of stroke, even if the blockage of the artery and symptoms are temporary. They serve as warning signs for future strokes and indicate that there is a partially blocked artery or clot source in the heart.

According to the Centres for Disease Control and Prevention (CDC), over a third of people who experience a TIA go on to have a major stroke within a year if they have not received any treatment. Between 10-15 percent will have a major stroke within 3 months of a TIA.

6. Risk factors

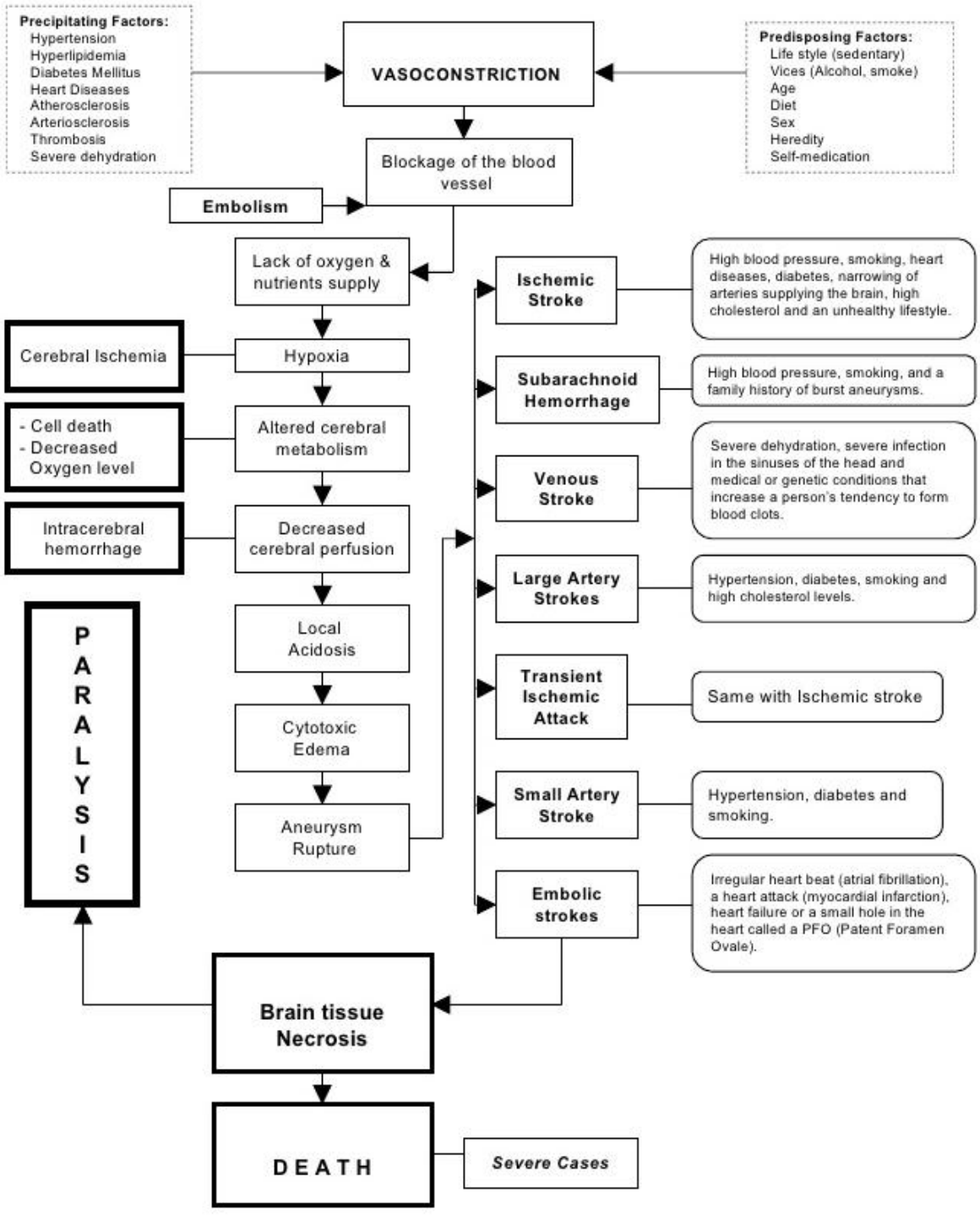
a) Ischemic stroke risk factors include the following:

Age older than 40 years.	Recent childbirth
Heart disease.	Previous history of transient ischemic attack
High blood pressure.	Inactive lifestyle and lack of exercise
Smoking.	Obesity
Diabetes	Current or past history of blood clots
High blood cholesterol levels	Family history of cardiac disease and/or stroke
Illegal drug use	

b) Haemorrhagic stroke risk factors include the following:

- High blood pressure
- Smoking
- Illegal drug use (especially cocaine and "crystal meth")
- Use of warfarin or other blood thinning medicines

7. Pathophysiology



8. Clinical signs and symptoms

a) Signs

- Sudden numbness or weakness in the face/arm/leg, especially on one side of the body.
- Sudden confusion, trouble speaking, or difficulty understanding speech.
- Sudden trouble seeing in one or both eyes.

- Sudden trouble walking, dizziness, loss of balance, or lack of coordination.
- Sudden severe headache with no known cause.

b) Symptoms

Strokes occur quickly, so symptoms often appear suddenly and without warning. The main symptoms of stroke are:

- **Confusion** - Including trouble with speaking and understanding.
- **Headache** - Possibly with altered consciousness or vomiting.
- **Numbness or inability to move parts of the face, arm, or leg** - Particularly on one side of the body.
- **Trouble seeing** - In one or both eyes.
- **Trouble walking** - Including dizziness and lack of co-ordination.

Stroke can lead to long-term problems. Depending on how quickly it is diagnosed and treated, the patient can experience temporary or permanent disabilities in the aftermath of a stroke. Symptoms vary among patients and may range in severity. In addition to the persistence of the problems listed above, patients may also experience the following:

- Bladder or bowel control problems.
- Depression.
- Pain in the hands and feet that gets worse with movement and temperature changes.
- Paralysis or weakness on one or both sides of the body.
- Trouble controlling or expressing emotions.

9. Complications

- Neurological epileptic seizures (3%) infection.
- Urinary tract infection (24%).
- Chest infection (22%).
- Others (19%).
- Mobility related falls (25%) with serious injury (5%).
- Pressure source (21%).
- Thromboembolism deep venous thrombosis (2%).

10. Diagnosis

- Strokes happen fast and will often occur before an individual can be seen by a doctor for a proper diagnosis.
- For a stroke patient to get the best diagnosis and treatment possible, they should be treated at a hospital within 3 hours of their symptoms first appearing.
- Ischemic strokes and hemorrhagic strokes require different kinds of treatment.
- Unfortunately, it is only possible to be sure of what type of stroke someone has had by giving them a brain scan in a hospital environment.

There are several different types of diagnostic tests that doctors can use to determine which type of stroke has occurred:

- **Physical examination** - A doctor will ask about the patient's symptoms and medical history. They may check blood pressure, listen to the carotid arteries in the neck, and examine the blood vessels at the back of the eyes, all to check for indications of clotting.
- **Blood tests** – A doctor may perform blood tests to find out how quickly the patient's blood clots, the levels of particular substances (including clotting factors) in the blood, and whether or not the patient has an infection.
- **CT scan** - A series of x-rays that can show hemorrhages, strokes, tumors, and other conditions within the brain.
- **MRI scan** - Radio waves and magnets create an image of the brain to detect damaged brain tissue.
- **Carotid ultrasound** - An ultrasound scan to check the blood flow in the carotid arteries and to see if there is any plaque present.
- **Cerebral angiogram** - Dyes are injected into the brain's blood vessels to make them visible under x-ray, to give a detailed view of the brain and neck blood vessels.
- **Echocardiogram** - A detailed image of the heart is created to check for any sources of clots that could have travelled to the brain to cause a stroke.

11. Treatment

a) Non pharmacological treatment

- In acute ischemic stroke, surgical interventions are limited.
- In certain cases of ischemic cerebral oedema owing to a large infraction craniotomy to release some of the rising pressure has been tried.
- In cases of significant swelling associate with a cerebral infraction.

b) Pharmacological treatment

- The stroke council of the american stroke association has created and published guidelines that added the management of acute ischemic stroke in general.
- The only two pharmacological agents recommended with a grade a recommendation are intravenous t-pa within 3 hours of onset and aspirin within 48 hours of onset yearly reperfusion (> 3 hours from onset) with intravenous t-pa has been shown to reduce the ultimate disability caused by ischemic stroke.

12. Drugs

a. Anticoagulants: Anticoagulants are drugs that help keep your blood from clotting easily by interfering with the blood clotting process. These are used for preventing ischemic strokes and TIAs. Warfarin is used to prevent blood clots from forming or to prevent existing clots from getting larger. It's often prescribed to people with artificial heart valves or irregular heartbeats or people who have had a heart attack or stroke.

b. Warfarin and Bleeding Risk: Warfarin has also been linked to life-threatening, excessive bleeding. Tell your doctor if you have a bleeding disorder or have experienced excessive bleeding. Your doctor will most likely consider another drug.

c. Antiplatelets: Antiplatelets such as clopidogrel and aspirin can be used to help prevent blood clots. They work by making it more difficult for the platelets in your blood to stick together, which is the first step in the formation of blood clots. They are sometimes prescribed to people who have had ischemic strokes or heart attacks. Your doctor will probably have you take them on a regular basis for an extended period for prevention of heart attack and stroke.

d. TPA: Tissue plasminogen activator (TPA) is the only stroke drug that actually breaks up a blood clot. It is used as a common emergency treatment during a stroke. For this treatment, TPA is injected into a vein or artery so it can get to the blood clot quickly. TPA isn't used for everyone. People at high risk of bleeding into their brain aren't given TPA.

e. Statins: Statin drugs help lower high cholesterol levels. When your cholesterol levels are too high, cholesterol can start to build up along the walls of your arteries. This buildup is called plaque. The drugs block an enzyme in your body that is needed to make cholesterol, so your body makes less of it. This helps reduce the risk of plaque and prevent TIAs and heart attacks caused by clogged arteries.

f. Blood pressure drugs:-Doctor may also prescribe medications to help lower your blood pressure. High blood pressure can play a major role in stroke. It can contribute to chunks

of plaque breaking off, which can lead to the formation of a blood clot. Blood pressure drugs used for this type of treatment include:

i. Beta-blockers.

ii. Angiotensin-converting enzyme (ACE) inhibitors.

iii. Calcium channel blockers.

13. Prevention

The best way to prevent a stroke is to address the underlying causes. This is best done by living healthfully, which means:

- Eating a healthy diet.
- Maintaining a healthy weight.
- Exercise regularly.
- Don't smoke.
- Avoiding alcohol or drink moderately.

Eating a healthful diet means plenty of fruits, vegetables, and healthy whole grains, nuts, seeds, and legumes; eating little or no red or processed meat; limiting intake of cholesterol and saturated fat (typically found in foods of animal origin); and minimizing salt intake so as to support healthy blood pressure.

Other measures taken to help reduce the risk of stroke include:

- Keeping blood pressure under control
- Managing diabetes
- Treating obstructive sleep apnoea (if present).

As well as these lifestyle changes, a doctor can help to reduce the risk of future ischemic strokes through prescribing anti-coagulant and/or anti-platelet medication. In addition to this, the arterial surgery previously mentioned can also be used to lower the risk of repeat strokes, as well as some other surgical options still being studied.

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