

MANAGEMENT OF PATENTS WITH Cerebrovascular Disorders

Definition:

A **cerebrovascular disorder** is an umbrella term that refers to a functional abnormality of the central nervous system (CNS) that occurs when the normal blood supply to the brain is disrupted.

Burden of CVD

Stroke is the primary cerebrovascular disorder in the United States, and it is the third leading cause of death after heart disease and cancer. Approximately 780,000 people experience a stroke each year in the United States. Approximately 600,000 of these are new strokes, and 180,000 are recurrent strokes stroke is a leading cause of serious, long-term disability in the United States. The financial impact of stroke is profound, with estimated direct and indirect costs of \$65.5 billion in 2008.

CLASSIFICATION

Strokes can be divided into two major categories:

1. Ischaemic (85%), in which vascular occlusion and significant hypoperfusion occur, and
2. Haemorrhagic (15%), in which there is extravasation of blood into the brain or subarachnoid space. Although there are some similarities between the two broad types of stroke, differences exist in aetiology, pathophysiology, medical management, surgical management, and nursing care.

Differences between Ischaemic and Haemorrhagic Stroke

ITEMS	ISCHAEMIC	HAEMORRHAGIC
Causes	Large artery thrombosis Small penetrating artery thrombosis Cardiogenic embolic Cryptogenic (no known cause)	Intracerebral hemorrhage Subarachnoid hemorrhage Cerebral aneurysm Arteriovenous malformation
Main presenting symptoms	Numbness or weakness of the face, arm, or leg, especially on one side of the body	“Exploding headache Decreased level of consciousness
Functional recovery	Usually plateaus at 6 months	Slower, usually plateaus at about 18 months

CARDIOVASCULAR ACCIDENT (CVA)

An ischaemic stroke, cerebrovascular accident (CVA), or “brain attack” is a sudden loss of function resulting from disruption of the blood supply to a part of the brain. The term *brain attack* is being used to suggest to health care practitioners and the public that a stroke is an urgent health care issue similar to a heart attack.

Ischaemic strokes are subdivided into five different types based on the cause: large artery thrombotic strokes (20%), small penetrating artery thrombotic strokes (25%), cardiogenic embolic strokes (20%), cryptogenic strokes (30%), and other (5%).

1. Large artery thrombotic strokes are caused by atherosclerotic plaques in the large blood vessels of the brain. Thrombus formation and occlusion at the site of the atherosclerosis result in ischemia and **infarction** (deprivation of blood supply).
2. Small penetrating artery thrombotic strokes affect one or more vessels and are the most common type of ischaemic stroke. Small artery thrombotic strokes are also called lacunar strokes because of the cavity that is created after the death of infarcted brain.
3. Cardiogenic embolic strokes are associated with cardiac dysrhythmias, usually atrial fibrillation.
4. Embolic strokes can also be associated with valvular heart disease and thrombi in the left ventricle. Emboli originate from the heart and circulate to the cerebral vasculature, most commonly the left middle cerebral artery, resulting in a stroke. Embolic strokes may be prevented by the use of anticoagulation therapy in patients with atrial fibrillation.
5. The last two classifications of ischemic strokes are cryptogenic strokes, which have no known cause, and strokes from other causes, such as illicit drug use, coagulopathies, migraine, and spontaneous dissection of the carotid or vertebral arteries.

PATHOPHYSIOLOGY

In an ischaemic brain attack, there is disruption of the cerebral blood flow due to obstruction of a blood vessel. This disruption in blood flow initiates a complex series of cellular metabolic events referred to as the ischaemic cascade.

The ischemic cascade begins when cerebral blood flow decreases to less than 25 mL per 100 g of blood per minute. At this point, neurons are no longer able to maintain aerobic respiration. The mitochondria must then switch to anaerobic respiration, which generates large amounts of lactic acid, causing a change in the pH. This switch to the less efficient anaerobic respiration also renders the neuron incapable of producing sufficient quantities of adenosine triphosphate (ATP) to fuel the depolarization processes.

The membrane pumps that maintain electrolyte balances begin to fail, and the cells cease to function.

Early in the cascade, an area of low cerebral blood flow, referred to as the **penumbra region**, exists around the area of infarction. The penumbra region is Ischaemic brain tissue that may be salvaged with timely intervention. The ischaemic cascade threatens cells in the penumbra because membrane depolarization of the cell wall leads to an increase in intracellular calcium and the release of glutamate.

The influx of calcium and the release of glutamate, if continued, activate a number of damaging pathways that result in the destruction of the cell membrane, the release of more calcium and glutamate, vasoconstriction, and the generation of free radicals. These processes enlarge the area of infarction into the penumbra, extending the stroke. A person experiencing a stroke typically loses 1.9 million neurons each minute that a stroke is not treated.

CLINICAL MANIFESTATION

The patient may present with any of the following signs or symptoms

- Numbness or weakness of the face, arm, or leg, especially on one side of the body

- Confusion or change in mental status
- Trouble speaking or understanding speech
- Visual disturbances
- Difficulty walking, dizziness, or loss of balance or coordination
- Sudden severe headache
- **Dysarthria** (difficulty in speaking), caused by paralysis of the muscles responsible for producing speech
- Dysphasia (impaired speech) or **aphasia** (loss of speech), which can be **expressive aphasia, receptive aphasia**, or global (mixed) aphasia
- **Apraxia** (inability to perform a previously learned action), as may be seen when a patient makes verbal substitutions for desired syllables or words
- Homonymous **hemianopsia** (loss of half of the visual field) may occur from stroke and may be temporary or permanent.
- Ataxia
- Dysphagia
- Loss of self-control
- Emotional lability
- Decreased tolerance to stressful situations
- Depression
- Withdrawal
- Fear, hostility, and anger
- Feelings of isolation

Prevention

Primary prevention of ischaemic stroke remains the best approach.

Leading a healthy lifestyle, which includes not smoking, maintaining a healthy weight, following a healthy diet (including modest alcohol consumption), and daily exercise, can reduce the risk of having a stroke by about one half.

The risk of coronary heart disease and stroke has decreased in women on the Dietary Approaches to Stop Hypertension (DASH) diet. The DASH diet is high in fruits and vegetables, moderate in low-fat dairy products, and low in animal protein (has a substantial amount of plant protein from legumes and nuts).

MANAGEMENT

MEDICAL MANAGEMENT

Patients who have experienced a TIA or stroke should have medical management for secondary prevention. Those with atrial fibrillation (or cardioembolic strokes) are treated with dose-adjusted warfarin (Coumadin) unless contraindicated. If warfarin is contraindicated, aspirin is the best option, although other medications may be used if both are contraindicated

After the acute stroke period, antihypertensive medications are also used

Angiotensin-converting enzyme (ACE) inhibitors and thiazide diuretics may also have benefits in stroke prevention.

SURGICAL MGT

The main surgical procedure for selected patients with TIAs and mild stroke is carotid endarterectomy, which is currently the most frequently performed non cardiac vascular procedure.

A carotid endarterectomy is the removal of an atherosclerotic plaque or thrombus from the carotid artery to prevent stroke in patients with occlusive disease of the extracranial cerebral arteries. This surgery is indicated for patients with symptoms of TIA or mild stroke found to be caused by severe (70% to 99%) carotid artery stenosis or moderate (50% to 69%) stenosis with other significant risk Factors.

Carotid stenting, with or without angioplasty, is a less invasive procedure that is used, at times, for severe stenosis. It is used for selected patients who are at high risk for surgery, and its efficacy continues to be investigated.

NURSNG MANAGEMENT

Nursing Diagnoses

Based on the assessment data, the major nursing diagnoses for a patient with a stroke may include the following:

1. Impaired physical mobility related to hemiparesis, loss of balance and coordination, spasticity, and brain injury
2. Acute pain (painful shoulder) related to hemiplegia and disuse
3. Self-care deficits (bathing, hygiene, toileting, dressing, grooming, and feeding) related to stroke sequelae
4. Disturbed sensory perception (kinesthetic, tactile or visual) related to altered sensory reception, transmission, and/or integration
5. Impaired swallowing
6. Impaired urinary elimination related to flaccid bladder, detrusor instability, confusion, or difficulty in communicating
7. Disturbed thought processes related to brain damage
8. Impaired verbal communication related to brain damage
9. Risk for impaired skin integrity related to hemiparesis, hemiplegia, or decreased mobility
10. Interrupted family processes related to catastrophic illness and caregiving burdens
11. Sexual dysfunction related to neurologic deficits or fear of failure.

✓ Planning and Goals

- ✓ Although rehabilitation begins on the day the patient has the stroke, the process is intensified during convalescence and requires a coordinated team effort. It is helpful for the team to know what the patient was like before the stroke: his or her illnesses, abilities, mental and emotional state, behavioral characteristics, and activities of daily living (ADLs).

The major goals for the patient (and family) may include

- ✓ improved mobility,
- ✓ avoidance of shoulder pain,
- ✓ achievement of self-care,
- ✓ relief of sensory and perceptual deprivation,
- ✓ prevention of aspiration, continence of bowel and bladder,
- ✓ improved thought processes,
- ✓ achieving a form of communication,
- ✓ maintaining skin integrity,
- ✓ restored family functioning,
- ✓ improved sexual function, and
- ✓ absence of complications

Nursing Interventions

Improving Mobility and Preventing Joint Deformities

A patient with hemiplegia has unilateral paralysis (paralysis on one side). When control of the voluntary muscles is lost, the strong flexor muscles exert control over the extensors.

- Correct positioning is important to prevent contractures;
- measures are used to relieve pressure,
- assist in maintaining good body alignment, and prevent compressive neuropathies, especially of the ulnar and peroneal nerves. Because flexor muscles are stronger than extensor muscles, a splint applied at night to the affected extremity may prevent flexion and maintain correct positioning during sleep.

Preventing shoulder adduction

To prevent adduction of the affected shoulder while the patient is in bed, a pillow is placed in the axilla when there is limited external rotation; this keeps the arm away from the chest.

A pillow is placed under the arm, and the arm is placed in a neutral (slightly flexed) position, with distal joints positioned higher than the more proximal joints (ie, the elbow is positioned higher than the shoulder and the wrist higher than the elbow). This helps to prevent edema and the resultant joint fibrosis that will limit range of motion if the patient regains control of the arm.

CHANGING POSITIONS

The patient's position should be changed every 2 hours.

To place a patient in a lateral (sidelying) position, a pillow is placed between the legs before the patient is turned.

To promote venous return and prevent edema, the upper thigh should not be acutely flexed. The patient may be turned from side to side, but if sensation is impaired, the amount of time spent on the affected side should be limited.

If possible, the patient is placed in a prone position for 15 to 30 minutes several times a day. A small pillow or a support is placed under the pelvis, extending from the level of the umbilicus to the upper third of the thigh.

This position helps promote hyperextension of the hip joints, which is essential for normal gait and helps prevent knee and hip flexion contractures. The prone position also helps drain bronchial secretions and prevents contractural deformities of the shoulders and knees. During positioning, it is important to reduce pressure and change position frequently to prevent pressure ulcers.

ESTABLISHING AN EXERCISE PROGRAM

The affected extremities are exercised passively and put through a full range of motion four or five times a day to maintain joint mobility, regain motor control, prevent contractures in the paralyzed extremity, prevent further deterioration of the neuromuscular system, and enhance circulation.

Exercise is helpful in preventing venous stasis, which may predispose the patient to thrombosis and pulmonary embolus.

Repetition of an activity forms new pathways in the CNS and therefore encourages new patterns of motion. At first, the extremities are usually flaccid. If tightness occurs in any area, the range-of-motion exercises should be performed more frequently.

ASSIGNMENT

DRAW UP A CARE PLAN FOR A PATIENT WITH STROKE