Introduction

A cerebral **stroke** is an acute nontraumatic neurological deficit in which the blood supply to a part of the brain is interrupted, also known as **cerebrovascular accident** (**CVA**). A stroke involves the sudden loss of neuronal function due to disturbance in cerebral perfusion. This disturbance in perfusion is commonly arterial, but can be venous ***(Alder et al., 2005)***.

Stroke will soon be the most common cause of death worldwide. Stroke is the third leading cause of death in the Western world, after heart disease and cancer and causes about 10% of world-wide deaths ***(NINDS, 2005)***.

Men are 1.25 times more likely to suffer CVA than women ***(Alder et al., 2005)***.

The incidence of stroke increases from 30 years of age, and etiology varies by age. Risk factors include; advanced age, male sex, hypertension, diabetes mellitus, high cholesterol level in the blood, cigarette smoking, atrial fibrillation, migraine with aura, and thrombophilia. Cigarette smoking is the most important modifiable risk factor of stroke ***(Senelick et al., 2004)***.

Strokes can be classified into two major categories; ischemic and hemorrhagic stroke. In an ischemic stroke, which is the cause of approximately 80% of strokes, a blood vessel becomes occluded and the blood supply to part of the brain is totally or partially blocked. Ischemic stroke is commonly divided into thrombotic stroke, embolic stroke, and systemic hypoperfusion ***(Furei et al., 2005)***.

A hemorrhagic stroke or cerebral hemorrhage is a form of stroke that occurs when a blood vessel in the brain ruptures or bleeds. Like ischemic stroke, hemorrhagic stroke interrupts the brain's blood supply because the bleeding vessel can no longer carry the blood to its target tissue. In addition, blood irritates brain tissue and if the bleeding continues, it can cause increased intracranial pressure which physically compresses on brain tissue and restricts blood flow into the brain. In this respect, hemorrhagic strokes are more dangerous than ischemic strokes. ***(Bullock et al, 1999)***.

Ischemic stroke usually only affects regional areas of the brain perfused by the blocked artery. Hemorrhagic stroke can affect local areas, but often can also cause more global symptoms due to bleeding and increased intracranial pressure. In most cases, the symptoms affect only one side of the body. The defect in the brain is usually on the opposite side of the body (depending on which part of the brain is affected) ***(Coffy et al., 2004)***.

Loss of consciousness, headache, and vomiting usually occurs more often in hemorrhagic stroke than in ischemic stroke because of the increased intracranial pressure from the leaking blood compressing on the adjacent brain tissue. A stroke affecting the brain stem can produce symptoms relating to deficits in the cranial nerves ***(Kushner et al., 2003)***.

Stroke is diagnosed through several techniques: a neurological examination, blood tests, CT scan (with and without contrast enhancements) or MRI scan and Doppler ultrasound for carotid system ***(Chalela et al., 2005)***.

Quantitative tomographic maps of cerebral blood flow (CBF), cerebral blood volume (CBV) cerebral metabolic rate of oxygen ($CMRO_2$), cerebral metabolic rate of glucose (CMRglu) be measured by positron emission tomography (PET) ***(Leender et al., 1998)***.

Various other studies may be performed to determine whether there is a peripheral source of emboli; doppler study of the carotid arteries, echocardiography to identify arrhythmias and angiogram of the cerebral vasculature if the bleeding is thought to have originated from an aneurysm or arteriovenous malformation ***(Szabo et al., 2001)***.

It is important to identify a stroke as early as possible because patients who are treated earlier are more likely to survive and have better recoveries. As many doctors noted, "Time lost is brain lost." ***(Ellekager et al., 1997)***.

As ischemic stroke is due to a thrombus (blood clot) occluding a cerebral artery, the patient is given antiplatlet medications (aspirin, clopidogrel, dipyridamol), or anticoagulant medication (warfarin) depending on the cause, when this type of stroke has been found. If studies show carotid stenosis, and the patient has residual function in the affected side, carotid endarterectomy may decrease the risk of recurrence ***(Halkes et al., 2003)***.

Pharmacologic thrombolysis with the drug Tissue plasminogen activator (tPA) is used to dissolve the clot. However, the use of tPA in acute stroke is controversial. It is endorsed by the American Heart Association and the American Academy of Neurology as the recommended treatment for acute stroke within three hours of onset of symptoms as long as there are not other contraindications (e.g., abnormal lab values, high blood pressure, and recent surgery.) ***(Szabo et al., 2001)***.

Hemorrhagic stroke must be ruled out with imaging, since this therapy would be harmful to patients with that type of stroke. Other immediate strategies to protect the brain during stroke include ensuring that blood sugar

is as normal as possible, and that the stroke patient is receiving adequate oxygen and intravenous fluid ***(Furei et al., 2005)***.

Disability affects 75% of stroke survivors enough to decrease their employability. Stroke can affect patients physically, mentally, emotionally, or a combination of the three. The results of stroke vary widely depending on size and location of the lesion. Dysfunctions correspond to areas in the brain that have been damaged ***(Grattam et al., 2001)***.