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Cerebrovascular Pathophysiology and its Diagnosis

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Stroke is a type of cerebrovascular disease involves central nervous system. It occurs with sudden due to the burst of cerebral arteries, haemorrhage, or other particles which leads to ischemia and to focal brain dysfunction [1]. Nerve cells depleted oxygen in the involved vascular territory will be functionally disturbed and die if the circulation is not promptly restored. Two main mechanisms leads to ischemic stroke are occlusion and haemodynamic impairment. These two situations reduce the cerebral perfusion pressure and leads to cellular death. The blood flow in the brain can be maintained by auto-regulation of cerebral arteries and collateral circulation within certain limits. When occlusion of an artery develops, blood flow in the periphery of the infarct core is reduced but still it remains sufficient to avoid structural damage, so that the functional modifications of cells may be reversible if circulation is restored. This ring-like area of reduced blood flow around the ischaemic centre of infarct has been termed penumbra as an analogy of the half-shaded part around the centre of a solar eclipse. It explained the functional improvement occurring after stroke. The neurons which are surviving in this critical area of infarct are reduced at blood flow and may function again as soon as the blood flow and oxygen delivery is restored.

There are two types of stroke: Ischaemic stroke and Brain Haemorrhagic stroke. Ischemic stroke accounts 85% of strokes, and brain haemorrhage accounts 15% of strokes.

Embolism is the major cause of ischemic stroke. Most of the ischaemic strokes are due to embolism. Intracerebral and subarachnoid haemorrhages are related to rupture the artery or arterioles. The morbidity and mortality in haemorrhagic stroke is much higher than in ischaemic stroke.

Atherosclerosis involves in small cerebral arteries in the deep perforated network, especially in individuals with diabetes or hypertension which leads to small deep "lacunar" infarcts, and due to these arteries, those are terminal branches and do not have collaterals. Microatheromatous or lipohyalinotic occlusion is one of the main causes of lacunar infarction. When compared with other types of strokes, patients with lacunar infarction subtypes have better prognosis. The risk of death with primary brain lesion is minimal [2].

The heterogeneity of stroke pathogenesis and the difference between stroke subtypes will hamper the diagnosis and management of the stroke. Generally, the neurological findings help to recognize the lesions location and to predict the mechanism of stroke, which is fundamental to determine the early investigations and therapy. There are different patterns of weakness and may found in lesions of the MCA territory (Middle Cerebral Artery). Hemiplegia is related to MCA infarcts. Lesions in the upper branch of MCA produce hemiparesis with faciobrachial predominance [3].

An initial diagnosis of stroke is identified by the symptoms, reviewing the individual medical history and risk factors, and performing routine tests to assess the individual status and underlying pathology leading to stroke. Clinical examination is very crucial. ECG (Electrocardiography) and plasma tests are to be done firstly in acute stroke. Brain CT scan is one of the most beneficial radiological investigations in the acute phase of stroke [3].

References

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