

Acute Ischemic Stroke: Understanding, Diagnosis and Treatment

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Introduction

Acute Ischemic Stroke (AIS) is a medical emergency characterized by the sudden interruption of blood flow to a part of the brain, leading to a rapid loss of neurological function. It is one of the leading causes of disability and death worldwide. This article explores the pathophysiology of acute ischemic stroke, its risk factors, symptoms, diagnostic approaches and current treatment strategies.

Description

Pathophysiology of acute ischemic stroke

Acute ischemic stroke occurs when a blood clot obstructs a blood vessel supplying the brain, depriving neurons of oxygen and essential nutrients. The process typically begins with the formation of a clot, either from atherosclerotic plaques (a condition known as embolism) or through clot formation in the heart (cardioembolism). The obstruction leads to two key areas.

Core infarct zone: This is the area of the brain where blood flow is severely reduced or completely stopped, leading to cell death. Neurons in this region cannot recover once they have undergone necrosis.

Penumbra zone: Surrounding the core infarct is the penumbra, where blood flow is reduced but not entirely absent. Neurons in this zone are at risk but may survive if blood flow is restored promptly.

The goal of stroke management is to salvage as much brain tissue in the penumbra as possible while minimizing damage to the core infarct.

Symptoms of acute ischemic stroke

Recognizing the symptoms of an acute ischemic stroke is crucial for timely intervention. The classic symptoms can be remembered using the acronym FAST.

Face drooping: One side of the face may droop or feel numb. Ask the person to smile; the smile may be uneven.

Arm weakness: One arm may become weak or numb. Ask the person to raise both arms; one arm may drift downward.

Speech difficulty: Speech may become slurred or difficult to understand. The person may struggle to repeat simple phrases.

Time to call emergency services: If any of these symptoms are present, it's essential to seek emergency medical help immediately.

Other symptoms may include sudden confusion, difficulty seeing in one or both eyes, dizziness or loss of balance and coordination.

Diagnosis of acute ischemic stroke

Diagnosing an acute ischemic stroke involves a combination of clinical evaluation and imaging studies.

Clinical assessment: A thorough history and physical examination are crucial. The medical team will assess symptoms, their onset and the patient's medical history.

CT scan: A Computed Tomography (CT) scan of the brain is often the first imaging test used to rule out hemorrhagic stroke and identify areas of infarction.

MRI: Magnetic Resonance Imaging (MRI) provides more detailed images of brain tissue and can help identify the extent of ischemia and evaluate the penumbra.

Additional tests: Blood tests, Electrocardiograms (EKGs) and echocardiograms may be performed to identify underlying conditions like atrial fibrillation or other cardiac sources of embolism.

Treatment of acute ischemic stroke

The treatment of acute ischemic stroke focuses on restoring blood flow, minimizing brain damage and addressing underlying risk factors.

Thrombolysis: The use of tissue Plasminogen Activator (tPA) is the primary treatment to dissolve the clot. tPA is most effective when administered within 4.5 hours of symptom onset.

Mechanical thrombectomy: For large clots, mechanical thrombectomy involves physically removing the clot using specialized devices. This procedure is usually performed within 6 to 24 hours of symptom onset, depending on the patient's condition and imaging results.

Antithrombotic therapy: After initial treatment, antiplatelet drugs like aspirin may be used to prevent further clot formation.

Blood pressure management: Controlling blood pressure is crucial to prevent complications and secondary stroke.

Blood glucose control: Managing blood sugar levels is important, especially in diabetic patients.

Rehabilitation: Stroke rehabilitation aims to help patients regain lost functions and improve their quality of life. This may include physical therapy, occupational therapy and speech therapy, tailored to the individual's specific needs.

Preventive measures and long-term management

Preventing a stroke or a recurrent event involves addressing risk factors and making lifestyle changes.

Healthy diet: Adopting a diet low in saturated fats, cholesterol and sodium while rich in fruits, vegetables and whole grains.

Regular exercise: Engaging in regular physical activity to maintain cardiovascular health and manage weight.

Medication adherence: Taking prescribed medications to control blood pressure, cholesterol and blood sugar levels.

Smoking cessation: Quitting smoking to reduce vascular damage and improve overall health.

Conclusion

Acute ischemic stroke is a critical medical condition requiring prompt recognition and treatment to minimize brain damage and improve outcomes. Understanding its pathophysiology, recognizing risk factors and identifying symptoms are essential for effective management. Advances in diagnostic tools and therapeutic interventions, such as reperfusion therapy and mechanical thrombectomy, have significantly improved the prognosis for stroke patients. Ongoing efforts in research and preventive care continue to enhance our ability to manage and prevent this debilitating condition, aiming to reduce its impact on individuals and society.