

МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ: ТЕОРИЯ И ПРАКТИКА

Researchbib Impact factor: 13.14/2024

SJIF 2024 = 5.444

Том 4, Выпуск 02, Февраля

ISCHEMIC STROKE: PATHOPHYSIOLOGY, DIAGNOSIS, AND MODERN THERAPEUTIC APPROACHES

Abduraupova Maftuna Yunusjon qizi

Termez University of Economics and Service

Faculty of Medicine

Abstract

Ischemic stroke is one of the leading causes of mortality and long-term disability worldwide. It occurs due to an abrupt interruption of cerebral blood flow, resulting in neuronal injury and brain infarction. Rapid diagnosis and timely reperfusion therapy are critical for improving outcomes. This article reviews the pathophysiology, diagnostic strategies, acute management, and long-term prognosis of ischemic stroke. Advances in thrombolysis and mechanical thrombectomy have significantly improved survival rates and neurological recovery. However, early recognition and prevention remain essential in reducing disease burden.

Keywords: ischemic stroke, thrombolysis, thrombectomy, cerebral infarction, neuroprotection

1. Introduction

Stroke is a major neurological emergency and the second leading cause of death globally. Approximately 85% of strokes are ischemic in origin, caused by arterial occlusion due to thrombosis or embolism. The sudden reduction in cerebral perfusion initiates a cascade of biochemical events leading to neuronal death.

The concept of the “ischemic penumbra” — a zone of potentially salvageable brain tissue — underlies modern therapeutic strategies. Rapid restoration of blood flow can prevent irreversible damage. Understanding stroke pathophysiology is essential for optimizing treatment and improving functional outcomes.

This article aims to analyze current knowledge regarding mechanisms, diagnosis, and management of ischemic stroke.

2. Methods

A narrative literature review was conducted using PubMed, WHO reports, and guidelines from the American Heart Association (AHA) and European Stroke Organization (ESO). Publications between 2005 and 2024 were prioritized. Keywords included: *ischemic stroke, thrombolysis, mechanical thrombectomy, stroke*

МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ: ТЕОРИЯ И ПРАКТИКА

Researchbib Impact factor: 13.14/2024

SJIF 2024 = 5.444

Том 4, Выпуск 02, Февраля

management, and *neuroprotection*. Systematic reviews, randomized controlled trials, and clinical guidelines were included.

3. Results

3.1 Pathophysiology

Ischemic stroke occurs due to occlusion of a cerebral artery. The interruption of blood flow leads to:

- ATP depletion
- Failure of ion pumps
- Glutamate excitotoxicity
- Calcium influx
- Oxidative stress
- Inflammation

These processes result in neuronal apoptosis and necrosis.

Risk factors include hypertension, diabetes mellitus, atrial fibrillation, smoking, and hyperlipidemia.

3.2 Diagnosis

Early diagnosis relies on:

- Clinical evaluation (FAST criteria)
- Non-contrast CT scan (to exclude hemorrhage)
- MRI with diffusion-weighted imaging
- CT angiography

Biomarkers are under investigation but are not yet standard in clinical practice.

3.3 Treatment

Intravenous thrombolysis (alteplase) within 4.5 hours improves functional outcomes.

Mechanical thrombectomy is effective up to 6–24 hours in selected patients with large vessel occlusion.

Secondary prevention includes:

- Antiplatelet therapy
- Anticoagulation (in atrial fibrillation)
- Blood pressure control
- Lifestyle modification

МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ: ТЕОРИЯ И ПРАКТИКА

Researchbib Impact factor: 13.14/2024

SJIF 2024 = 5.444

Том 4, Выпуск 02, Февраля

4. Discussion

Advances in reperfusion therapy have revolutionized stroke management. However, access to stroke centers remains unequal globally. Delayed hospital arrival significantly limits therapeutic options.

Prevention strategies targeting modifiable risk factors are essential in reducing stroke incidence. Research into neuroprotective agents continues but has not yet produced definitive results.

5. Conclusion

Ischemic stroke remains a major neurological challenge. Rapid diagnosis and timely reperfusion therapy significantly improve outcomes. Prevention, public awareness, and healthcare system preparedness are critical in reducing mortality and disability.

References

1. World Health Organization. Global report on stroke prevention and control. WHO; 2023.
2. Feigin VL, Brainin M, Norrving B, et al. World Stroke Organization (WSO) Global Stroke Fact Sheet 2022. *Lancet Neurol.* 2022;21(10):795–820.
3. Powers WJ, Rabinstein AA, Ackerson T, et al. Guidelines for the early management of acute ischemic stroke. *Stroke.* 2019;50:e344–e418.
4. Goyal M, Menon BK, van Zwam WH, et al. Endovascular thrombectomy after large-vessel ischaemic stroke. *N Engl J Med.* 2015;372:2285–2295.
5. Hacke W, Kaste M, Bluhmki E, et al. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. *N Engl J Med.* 2008;359:1317–1329.
6. Campbell BCV, De Silva DA, Macleod MR, et al. Ischaemic stroke. *Nat Rev Dis Primers.* 2019;5:70.
7. Saver JL. Time is brain—quantified. *Stroke.* 2006;37(1):263–266.
8. Donnan GA, Fisher M, Macleod M, Davis SM. Stroke. *Lancet.* 2008;371:1612–1623.
9. Benjamin EJ, Muntner P, Alonso A, et al. Heart Disease and Stroke Statistics—2023 Update. *Circulation.* 2023.
10. Campbell BCV, Khatri P. Stroke. *Lancet.* 2020;396:129–142.
11. European Stroke Organisation (ESO) Guidelines on mechanical thrombectomy. *Eur Stroke J.* 2021.
12. Amarenco P, Lavallée PC, Labreuche J, et al. One-year risk of stroke after TIA or minor stroke. *N Engl J Med.* 2016;374:1533–1542.

**МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ:
ТЕОРИЯ И ПРАКТИКА**

Researchbib Impact factor: 13.14/2024

SJIF 2024 = 5.444

Том 4, Выпуск 02, Февраля

13. Dirnagl U, Iadecola C, Moskowitz MA. Pathobiology of ischemic stroke. *Trends Neurosci.* 1999;22(9):391–397.
14. Hankey GJ. Secondary prevention of ischemic stroke. *Lancet Neurol.* 2014;13(2):178–194.
15. Johnston SC, Amarenco P, Denison H, et al. Ticagrelor and aspirin in acute ischemic stroke. *N Engl J Med.* 2020;383:207–217.