Georgian Scientists
ქართველი მეცნიერები
Vol. 8 Issue 4(1), 2026
https://doi.org/10.52340/gs.2026.08.04(1).89



CUSHING'S TRIAD AS A CLINICAL INDICATOR OF IMPENDING BRAIN HERNIATION: DIAGNOSTIC VALUE AND EMERGENCY MANAGEMENT

Mariam Varazashvili[1], Velodi Gakharia[2]

[1]Faculty of Medicine, Caucasus University, Tbilisi, Georgia

[2]First University Clinic, Tbilisi State Medical University, Tbilisi, Georgia

Background: Acute brain herniation is a life-threatening neurological emergency requiring immediate recognition and treatment. Cushing's triad, consisting of hypertension, bradycardia, and irregular respiration, is associated with critically increased intracranial pressure and possible brainstem compression. It is generally a late warning sign, and its absence does not exclude impending herniation.

Objective: To propose an educational strategy to improve emergency medicine trainees' recognition of Cushing's triad, understanding of its diagnostic limitations, and initial response to suspected brain herniation.

Methods: The proposed strategy integrates clinical reviews and emergency management guidelines. It uses a simulated emergency department scenario, interpretation of vital-sign trends, focused neurological assessment, and a structured response checklist. Learners identify changes in blood pressure, heart rate, respiration, consciousness, and pupillary responses, then prioritize stabilization, urgent specialist consultation, and definitive investigation.

Results: The proposed intervention aims to improve recognition of neurological deterioration before the complete triad develops, discourage reliance on a single clinical sign, and promote timely emergency action. Its effectiveness could be evaluated through pre- and post-session knowledge tests, simulation performance, and adherence to the response checklist. These outcomes have not yet been evaluated.

Conclusion: Cushing's triad is an important warning sign of critically elevated intracranial pressure, but waiting for all three components may delay intervention. Simulation-based education may help trainees recognize neurological deterioration, understand diagnostic limitations, and follow a structured emergency management approach. Prospective evaluation is needed to determine its educational effectiveness.

Keywords: Cushing's triad; brain herniation; intracranial pressure; emergency medicine; clinical education