

COMPARATIVE DIAGNOSTIC VALUE OF CT AND MRI IN THE DETECTION OF ISCHEMIC STROKE

Gaybullayev Sherzod Obid ugli

Toyirov Dostonbek Xolmatjon ugli

Samarkand State Medical University

Relevance: Ischemic stroke remains one of the leading causes of mortality and long-term disability worldwide. Early and accurate diagnosis is crucial for timely therapeutic interventions, including thrombolysis and mechanical thrombectomy. Neuroimaging plays a pivotal role in the diagnostic pathway of acute ischemic stroke. Computed Tomography (CT) is widely available and allows rapid exclusion of intracranial hemorrhage, whereas Magnetic Resonance Imaging (MRI), particularly diffusion-weighted imaging (DWI), offers higher sensitivity for detecting early ischemic changes. Comparative evaluation of these imaging modalities is essential for optimizing diagnostic strategies and improving patient outcomes.

Objective: to compare the diagnostic capabilities of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) in the early detection of ischemic stroke.

Materials and Methods: A retrospective study was conducted involving 84 patients with clinical suspicion of acute ischemic stroke who were admitted to the neurological department within 24 hours of symptom onset. The study population consisted of 49 men (58.3%) and 35 women (41.7%), with a mean age of 64.2 ± 10.8 years.

All patients underwent non-contrast CT examination within the first 6 hours after admission, followed by MRI including diffusion-weighted imaging (DWI) and fluid-attenuated inversion recovery (FLAIR) sequences within the subsequent 24 hours.

The diagnostic performance of CT and MRI was assessed using sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy. Statistical analysis was performed using SPSS 27.0 software. Quantitative variables were expressed as mean $\pm$ standard deviation ($M \pm SD$). Categorical variables were compared using the Chi-square (χ^2) test. A p-value < 0.05 was considered statistically significant.

Results: MRI confirmed ischemic stroke in 76 of 84 patients (90.5%), whereas CT detected ischemic lesions in 58 patients (69.0%). The sensitivity of MRI for detecting acute ischemic stroke was 96.1% (95% CI: 89.2–99.2%), significantly

higher than that of CT, which was 73.7% (95% CI: 62.4–82.7%) ($\chi^2 = 12.48$, $p < 0.001$). The specificity was 87.5% for MRI and 75.0% for CT ($p = 0.284$). Diagnostic accuracy reached 95.2% for MRI compared with 73.8% for CT ($p < 0.001$). Among patients examined within the first 6 hours after symptom onset, MRI detected ischemic lesions in 94.4% of cases, while CT identified lesions in only 63.9% of cases ($p < 0.001$). The average lesion volume measured on MRI was $18.6 \pm 7.4 \text{ cm}^3$, significantly larger than the lesion volume visualized on CT ($12.1 \pm 5.8 \text{ cm}^3$; $p = 0.003$), indicating superior sensitivity of MRI for early ischemic tissue changes.

Conclusion: MRI demonstrated significantly higher sensitivity, specificity, and diagnostic accuracy than CT in the early detection of ischemic stroke. Diffusion-weighted MRI was particularly effective in identifying acute ischemic lesions during the hyperacute stage of stroke. Nevertheless, CT remains an indispensable first-line imaging modality due to its rapid availability and ability to exclude intracranial hemorrhage. The combined use of CT and MRI provides the most comprehensive diagnostic approach for patients with suspected acute ischemic stroke.

Keywords: ischemic stroke, computed tomography, magnetic resonance imaging, diffusion-weighted imaging, neuroimaging, diagnostic accuracy, sensitivity, specificity, statistical analysis.