



Original Article

Role of Diffusion-Weighted MRI in Early Detection of Acute Ischemic Stroke: A Radiological Study

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ABSTRACT

Background: Acute ischemic stroke is a leading cause of morbidity and mortality worldwide. Early diagnosis is critical for timely intervention and improved outcomes. Diffusion-Weighted Imaging (DWI) in MRI has emerged as a highly sensitive modality for detecting early ischemic changes.

Objective: To evaluate the role of Diffusion-Weighted MRI in the early detection of acute ischemic stroke and to assess its diagnostic accuracy compared to conventional imaging.

Methods: A prospective observational study was conducted on 20 patients presenting with acute neurological deficits within 24 hours of symptom onset. All patients underwent MRI brain including DWI sequences. Findings were correlated with clinical presentation and follow-up imaging.

Keywords: Diffusion, Weighted MRI, Radiological, DWI.

INTRODUCTION

Acute ischemic stroke is a leading cause of morbidity and mortality worldwide. Early diagnosis is critical for timely intervention and improved outcomes. Diffusion-Weighted Imaging (DWI) in MRI has emerged as a highly sensitive modality for detecting early ischemic changes.

OBJECTIVE

To evaluate the role of Diffusion-Weighted MRI in the early detection of acute ischemic stroke and to assess its diagnostic accuracy compared to conventional imaging.

MATERIALS AND METHODS

Study Design

Prospective observational study

Study Duration

6 months

Study Population

- Total patients: 20
- Inclusion: Patients with acute neurological deficit (<24 hours)
- Exclusion: Hemorrhagic stroke, brain tumors, trauma

Imaging Protocol

- **MRI Brain using 1.5T scanner sequences:**
 - T1-weighted

- T2-weighted
- FLAIR

Diffusion-Weighted Imaging (DWI)

- ADC mapping

METHODS

A prospective observational study was conducted on 20 patients presenting with acute neurological deficits within 24 hours of symptom onset. All patients underwent MRI brain including DWI sequences. Findings were correlated with clinical presentation and follow-up imaging.

RESULTS

Imaging Findings

Parameter	Number.	%
DWI positive lesions	18	90
Conventional MRI. detection	13	65
Reduced ADC values	18	90
Early intervention guided	8	40

- DWI detected ischemic lesions in 90% (18/20 patients) within the first 6 hours
- Conventional MRI sequences detected lesions in 65% of cases
- Apparent Diffusion Coefficient (ADC) values were significantly reduced in affected areas
- Early thrombolysis was guided in 40% of patients based on DWI findings.

Conclusion
DWI is a highly sensitive and reliable imaging modality for early detection of acute ischemic stroke. It plays a crucial role in guiding timely therapeutic decisions and improving patient outcomes.

REFERENCES

1. Warach S, et al. Diffusion MRI in acute stroke.
2. Kidwell CS, et al. MRI vs CT in stroke. Lancet.
3. González RG. Clinical MRI of stroke. J Magn Reson Imaging.
4. Lansberg MG, et al. DWI in stroke management.
5. Schellinger PD, et al. Imaging in acute stroke.