



Original Research Article

MRI VERSUS CT IN ACUTE STROKE EVALUATION: DIAGNOSTIC ACCURACY AND CLINICAL OUTCOMES: A PROSPECTIVE COMPARATIVE OBSERVATIONAL STUDY

Sudhakar P¹, Arunkumar², Haripriya³

¹HOD, Department of Radiology, Kumaran Medical Center, 499/500, near Saravanampatti, Kurumbapalayam SSKulam, Coimbatore, Tamil Nadu 641107, India.

²Radiologist, Department of Radiology, Kumaran Medical Center, 499/500, near Saravanampatti, Kurumbapalayam SSKulam, Coimbatore, Tamil Nadu 641107, India.

³Radiologist, Department of Radiology, Kumaran Medical Center, 499/500, near Saravanampatti, Kurumbapalayam SSKulam, Coimbatore, Tamil Nadu 641107, India.

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Corresponding Author:

Dr. Sudhakar P,

HOD, Department of Radiology,
Kumaran Medical Center, 499/500, near
Saravanampatti, Kurumbapalayam
SSKulam, Coimbatore, Tamil Nadu
641107, India.

Email: kumaranradiology@gmail.com

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ABSTRACT

Background: Rapid and accurate neuroimaging is essential in acute stroke management for timely diagnosis and therapeutic decision-making. Computed tomography (CT) remains the usual first imaging modality due to its speed and accessibility, although magnetic resonance imaging (MRI), particularly diffusion-weighted imaging (DWI), has a higher sensitivity for early ischemia alterations. Comparative evidence regarding diagnostic accuracy and clinical outcomes between MRI and CT in real-world emergency settings remains limited. **Objectives:** To compare MRI and CT in acute stroke evaluation with respect to diagnostic accuracy, lesion detection, treatment decision-making, and clinical outcomes.

Materials and Methods: From December 2024 to November 2025, Kumaran Medical Center in Coimbatore conducted prospective comparative observational research. A total of 200 adult patients presenting within 24 hours of suspected acute stroke start were included. All patients underwent initial non-contrast CT brain imaging followed by MRI whenever feasible. Clinical evaluation, imaging results, therapy measures, and 90-day functional outcomes using the modified Rankin Scale (mRS) were documented. Diagnostic performance metrics for CT and MRI were compared.

Results: Among 200 patients, 162 (81.0%) had acute ischemic stroke. MRI demonstrated significantly higher sensitivity than CT for detection of acute ischemic stroke (96.3% vs 78.4%; $p < 0.001$), with superior identification of posterior circulation and lacunar infarcts. Overall diagnostic accuracy was significantly greater with MRI (95.0%) compared with CT (81.5%) ($p < 0.001$). CT showed significantly shorter door-to-imaging and door-to-needle times. MRI findings altered treatment decisions in 18% of patients. Favorable functional outcome at 90 days (mRS 0–2) was observed more frequently in the MRI group.

Conclusion: In acute stroke evaluation, MRI outperformed CT in terms of diagnostic accuracy and lesion definition, although CT was still useful for quick emergency assessment. Integration of MRI into stroke imaging pathways may improve diagnostic precision and clinical outcomes in selected patients.

Keywords: Acute ischemic stroke; Magnetic resonance imaging; Computed tomography; Diagnostic accuracy; Clinical outcomes; Diffusion-weighted imaging.

INTRODUCTION

Stroke is a significant public health concern and one of the main causes of death and permanent disability in the globe. Nearly 80–85% of stroke cases are acute ischemic stroke, which is linked to severe neurological morbidity, cognitive impairment, and socioeconomic hardship. Early diagnosis and timely initiation of reperfusion therapy are critical determinants of patient survival and functional recovery. The concept of “time is brain” emphasizes that rapid restoration of cerebral blood flow can substantially reduce irreversible neuronal injury and improve long-term neurological outcomes. Consequently, accurate and prompt neuroimaging plays a pivotal role in the emergency evaluation and management of acute stroke patients.^[1]

Neuroimaging serves multiple purposes in acute stroke care, including differentiation between ischemic and hemorrhagic stroke, identification of infarct location and extent, detection of salvageable brain tissue, and selection of patients for thrombolysis or mechanical thrombectomy. Because of its quick collection time, broad availability, affordability, and superior ability to rule out cerebral bleeding, computed tomography (CT) continues to be the most popular first imaging modality in emergency rooms. Non-contrast CT (NCCT) is advised in many worldwide stroke guidelines and is regarded as the cornerstone of acute stroke imaging procedures. However, despite these advantages, CT has limited sensitivity in detecting hyperacute ischemic changes during the early hours following symptom onset, especially in small cortical infarcts, lacunar infarcts, and posterior circulation strokes.^[2-4]

Diffusion-weighted imaging (DWI), a kind of magnetic resonance imaging (MRI), has become a very specific and sensitive method for early cerebral ischemia identification. DWI can identify cytotoxic edema within minutes of arterial occlusion and demonstrates significantly greater diagnostic accuracy compared with CT in hyperacute stroke evaluation. MRI additionally provides superior tissue characterization, infarct volume estimation, and detection of stroke mimics such as seizures, demyelinating lesions, or migraine-related neurological deficits. Advanced MRI techniques including perfusion-weighted imaging and MR angiography further assist in assessing penumbral tissue and vascular occlusion.^[5-7] However, MRI has several practical limitations including longer acquisition time, limited availability in emergency settings, higher cost, patient contraindications, and challenges in unstable or claustrophobic patients. These limitations often restrict its routine use in acute stroke workflows.^[8]

In recent years, several studies have compared MRI-based and CT-based stroke imaging paradigms in terms of diagnostic accuracy, therapeutic decision-making, workflow efficiency, and clinical outcomes. Improved diagnostic confidence has been reported

with combined CT and MRI imaging compared with CT alone, while MRI-guided stroke evaluation has shown favorable long-term clinical outcomes.^[9,10] Nevertheless, conflicting evidence exists regarding whether the superior diagnostic capability of MRI translates into significantly improved functional outcomes in real-world emergency practice.

Furthermore, limited prospective comparative observational studies from tertiary care centers in India have evaluated the practical utility of MRI versus CT in acute stroke management. Differences in healthcare infrastructure, imaging accessibility, patient presentation, and emergency workflow may influence imaging selection and treatment outcomes in developing countries.

Therefore, the present study was undertaken to compare MRI and CT in acute stroke evaluation with respect to diagnostic accuracy, lesion detection, treatment decision-making, and clinical outcomes among patients presenting to a tertiary care center in South India.

MATERIALS AND METHODS

Study Design

The purpose of this prospective comparative observational research was to assess and contrast the clinical value and diagnostic performance of computed tomography (CT) and magnetic resonance imaging (MRI) in patients who were suspected of having an acute stroke. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for observational studies were followed in the design of the study. The primary objective was to compare the diagnostic accuracy of MRI and CT in detecting acute ischemic stroke, while secondary objectives included comparison of lesion localization, treatment decisions, and clinical outcomes. A prospective observational design was chosen to facilitate systematic evaluation of imaging findings, therapeutic interventions, and outcomes in a real-world emergency stroke setting.

Study Setting

The study was conducted at Kumaran Medical Center, Coimbatore, Tamil Nadu, India. The institution is a tertiary care teaching hospital equipped with emergency stroke care services, advanced neuroimaging facilities, intensive care support, and round-the-clock neurology and radiology services.

Study Duration

The study was carried out over a period of 12 months from December 2024 to November 2025. Patient recruitment, imaging evaluation, clinical assessment, follow-up, and data analysis were performed during this period.

Study Population

The study population included consecutive adult patients presenting to the emergency department with

clinical suspicion of acute stroke within 24 hours of symptom onset.

Clinical suspicion of stroke was based on sudden onset neurological deficits including hemiparesis, facial deviation, aphasia, dysarthria, sensory disturbances, visual symptoms, altered sensorium, or cerebellar signs. Consecutive sampling was used to reduce selection bias and improve representation of routine emergency stroke presentations.

Sample Size

The research involved 200 patients in total. Previous studies comparing the diagnostic accuracy of MRI and CT in acute ischemic stroke were used to estimate the sample size. Considering the expected difference in sensitivity between the two imaging modalities and feasibility within the study duration, a sample size of 200 was considered adequate for meaningful statistical analysis and subgroup evaluation.

Eligibility Criteria

Inclusion Criteria

The research comprised patients who met all of the following requirements:

1. Age 18 years or older.
2. Clinical suspicion of acute ischemic or hemorrhagic stroke based on neurological examination.
3. Presentation to the emergency department within 24 hours of symptom onset.
4. Patients willing to provide written informed consent either directly or through legally authorized representatives.

Exclusion Criteria

Patients who fit any of the following requirements were not allowed to participate in the trial:

1. Contraindications to MRI, including cardiac pacemakers, cochlear implants, metallic intracranial clips, ferromagnetic implants, or severe claustrophobia.
2. Previously diagnosed intracranial pathology such as brain tumors, chronic subdural hematoma, intracranial infections, or old major infarcts with significant residual imaging abnormalities.
3. Severe renal impairment contraindicating administration of contrast agents for angiographic studies where required.
4. Hemodynamically unstable patients who were unable to tolerate MRI examination.
5. Pregnant women due to concerns regarding prolonged imaging exposure and contrast administration where applicable.
6. Patients declining participation or unable to provide consent.

Clinical Evaluation

All patients underwent detailed clinical and neurological examination at admission by the attending neurologist. Clinical history included onset and duration of symptoms, associated neurological deficits, previous cerebrovascular events, medication history, and cardiovascular risk factors.

Age and gender were among the baseline demographic characteristics that were noted. Documented vascular risk factors included atrial fibrillation, diabetes mellitus, dyslipidemia, smoking, hypertension, and coronary artery disease.

At presentation, vital indicators such as blood pressure, pulse rate, respiration rate, oxygen saturation, and temperature were noted. Prior to imaging examination, the National Institutes of Health Stroke Scale (NIHSS) was used to measure the severity of the stroke. For every patient, time intervals between the beginning of symptoms and arrival to the hospital as well as between the onset of symptoms and imaging were recorded.

Imaging Protocol

CT Imaging Protocol

All patients underwent immediate non-contrast computed tomography (NCCT) brain imaging upon admission as part of the institutional acute stroke protocol. A multidetector CT scanner was used for CT imaging, and 5-mm slice thickness axial sections were taken from the base of the skull to the vertex.

NCCT was primarily performed to exclude intracranial hemorrhage and detect early ischemic changes. Hemorrhage, loss of gray-white distinction, sulcal effacement, hyperdense vascular sign, cerebral edema, infarct location, and mass impact were among the imaging findings that were assessed.

The Alberta Stroke Program Early CT Score (ASPECTS) was used when applicable for assessment of anterior circulation stroke. CT angiography and CT perfusion imaging were performed selectively in patients considered for reperfusion therapy or suspected large vessel occlusion.

MRI Imaging Protocol

MRI examination was performed after CT evaluation whenever clinically feasible and in patients without contraindications. MRI studies were conducted using a 1.5 Tesla MRI scanner.

The MRI protocol included:

- Diffusion-weighted imaging (DWI)
- Apparent diffusion coefficient (ADC) mapping
- Fluid-attenuated inversion recovery (FLAIR)
- T1-weighted imaging
- T2-weighted imaging
- Gradient echo (GRE)/susceptibility-weighted imaging (SWI)
- Magnetic resonance angiography (MRA)

DWI and ADC sequences were used for detection of acute ischemic lesions based on restricted diffusion. FLAIR imaging was utilized for lesion characterization and edema assessment, while GRE/SWI sequences were used for identification of hemorrhage or microbleeds.

MR angiography was performed to evaluate intracranial vascular occlusion and stenosis. MRI findings assessed included infarct size, lesion localization, vascular territory involvement, posterior circulation infarcts, lacunar infarcts, hemorrhagic transformation, and stroke mimics.

Image Interpretation

Two skilled radiologists with expertise in neuroimaging independently examined CT and MRI pictures. The radiologists were blinded to patient outcomes and treatment decisions during image interpretation.

Imaging findings were documented using standardized reporting formats. Discrepancies between observers were resolved through consensus discussion. Interobserver agreement for major imaging findings was assessed using Cohen's kappa statistics.

Data Collection

A standardized case record form was used to prospectively gather imaging and clinical data. Collected variables included demographic details, vascular risk factors, NIHSS score, imaging findings, stroke subtype, lesion characteristics, and vascular territory involvement.

Time metrics including door-to-imaging time, imaging acquisition duration, and time to diagnosis were recorded. Treatment decisions including thrombolysis, thrombectomy, antiplatelet therapy, anticoagulation, or conservative management were documented.

Hospital stay duration, in-hospital complications, hemorrhagic transformation, recurrent stroke, seizures, aspiration pneumonia, and mortality were also recorded. Functional outcome at 90 days was assessed using the modified Rankin Scale (mRS).

Outcome Measures

Primary Outcome

Using follow-up imaging and final clinical diagnosis as reference standards, the main end measure was the diagnostic accuracy of MRI and CT in identifying acute ischemic stroke.

Secondary Outcomes

Secondary outcomes included:

- Sensitivity and specificity of MRI and CT
- Positive predictive value and negative predictive value
- Accuracy of lesion localization
- Detection of intracranial hemorrhage
- Time to diagnosis
- Impact on therapeutic decision-making
- Functional outcome at 90 days assessed using mRS
- In-hospital and follow-up mortality

Follow-up

All patients were followed for 90 days after hospital admission. Functional outcome assessment was performed during outpatient visits or through structured telephonic interviews when direct follow-up was not possible. Neurological disability was assessed using the modified Rankin Scale. Scores of 0–2 were considered favorable outcomes, while scores of 3–6 indicated poor functional outcome or death.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Continuous variables were expressed as mean \pm standard deviation (SD) or median (IQR), while categorical variables were presented as frequencies and percentages. Chi-square test or Fisher's exact test was used for categorical variables, and independent t-test or Mann-Whitney U test was used for continuous variables. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy were calculated for CT and MRI. Interobserver agreement was assessed using Cohen's kappa coefficient. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The Institutional Ethics Committee approved the study, and all participants or their legally designated representatives provided written informed consent. The study was carried out in accordance with the Declaration of Helsinki's guiding principles and patient anonymity was upheld throughout.

RESULTS

A total of 200 patients presenting with suspected acute stroke were included in the study during the study period from December 2024 to November 2025. All patients underwent initial CT brain imaging, and MRI evaluation was subsequently performed whenever feasible according to the study protocol.

Baseline Demographic and Clinical Characteristics

The mean age of the study population was 63.4 ± 11.2 years (range: 32–89 years). Majority of the patients were males (59%). Hypertension was the most common vascular risk factor followed by diabetes mellitus and smoking history.

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population (n=200)

Variable	Frequency (%) / Mean \pm SD
Age (years)	63.4 \pm 11.2
Male	118 (59.0%)
Female	82 (41.0%)
Hypertension	132 (66.0%)
Diabetes mellitus	88 (44.0%)
Dyslipidemia	74 (37.0%)
Smoking history	74 (37.0%)
Alcohol consumption	58 (29.0%)
Atrial fibrillation	24 (12.0%)
Coronary artery disease	31 (15.5%)
Previous stroke/TIA	27 (13.5%)
Mean NIHSS score at admission	11.8 \pm 4.6
Symptom onset to hospital arrival (hours)	6.2 \pm 3.8

Stroke Type and Distribution

Among the 200 patients evaluated, ischemic stroke constituted the majority of cases. Hemorrhagic stroke and stroke mimics were observed in a smaller proportion. Among ischemic strokes, anterior circulation infarcts were more common than posterior circulation infarcts.

Table 2: Distribution of Stroke Types and Lesion Localization (n=200)

Variable	Number (%)
Stroke Type	
Acute ischemic stroke	162 (81.0%)
Hemorrhagic stroke	24 (12.0%)
Stroke mimics	14 (7.0%)
Localization of Ischemic Stroke (n=162)	
Anterior circulation infarct	108 (66.7%)
Posterior circulation infarct	38 (23.5%)
Lacunar infarct	16 (9.8%)
Lacunar infarct	16 (9.8%)

Diagnostic Performance of CT and MRI

MRI demonstrated significantly superior diagnostic performance compared with CT in the detection of acute ischemic stroke. The sensitivity of MRI was 96.3%, which was significantly higher than the sensitivity of CT (78.4%) ($p < 0.001$). MRI also showed slightly higher specificity compared with CT (95.8% vs 91.7%), although this difference was not statistically significant ($p = 0.182$).

The positive predictive value (PPV) of MRI was 97.5%, compared with 94.1% for CT, without statistically significant difference ($p = 0.091$). However, MRI demonstrated a significantly higher negative predictive value (NPV) than CT (92.0% vs 68.3%, $p < 0.001$), indicating better ability to exclude acute ischemic stroke in negative cases.

Overall diagnostic accuracy was significantly greater with MRI (95.0%) compared with CT (81.5%) ($p < 0.001$), confirming the superior effectiveness of MRI in acute stroke evaluation.

sensitivity of 96.3%, which was markedly higher than the sensitivity of CT (78.4%), and this difference was statistically significant ($p < 0.001$). The specificity of MRI was also higher than CT (95.8% vs 91.7%); however, the difference was not statistically significant ($p = 0.182$).

Similarly, MRI demonstrated a higher positive predictive value (PPV) of 97.5% compared with 94.1% for CT, although this difference did not reach statistical significance ($p = 0.091$). In contrast, the negative predictive value (NPV) of MRI was significantly greater than that of CT (92.0% vs 68.3%, $p < 0.001$), indicating superior reliability of MRI in ruling out acute ischemic stroke when imaging findings were negative.

Overall diagnostic accuracy was significantly higher with MRI (95.0%) than CT (81.5%) ($p < 0.001$), highlighting the superior effectiveness of MRI in the diagnosis of acute ischemic stroke.

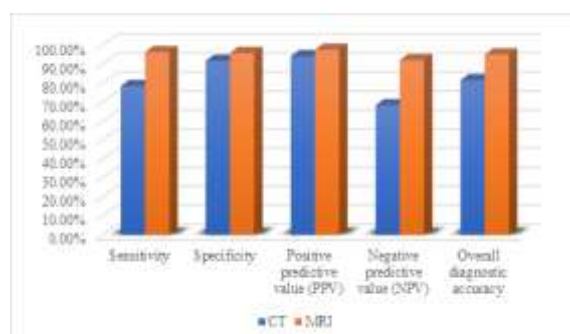


Figure 1: Diagnostic Performance of CT and MRI in Acute Ischemic Stroke Detection

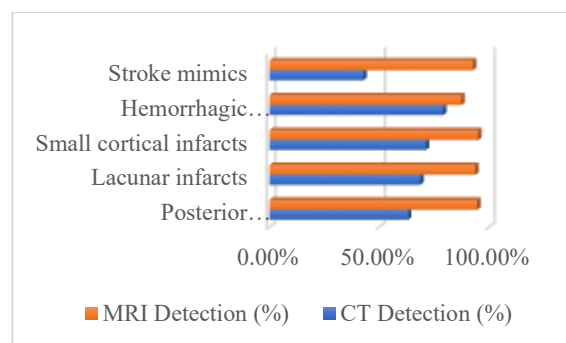


Figure 2: Comparison of Lesion Detection Between CT and MRI

Detection of Specific Lesion Types

The diagnostic performance analysis demonstrated that MRI was significantly superior to CT in the evaluation of acute ischemic stroke. MRI showed a

Time Metrics and Workflow Analysis

CT imaging demonstrated significantly shorter acquisition and reporting times compared with MRI.

Table 3: Comparison of Imaging Time Metrics

Time Metric	CT	MRI	p-value
Door-to-imaging time (minutes)	15.4 ± 5.8	37.6 ± 9.4	<0.001
Imaging acquisition time (minutes)	7.8 ± 2.3	25.8 ± 5.7	<0.001
Door-to-diagnosis time (minutes)	28.6 ± 8.1	49.7 ± 11.3	<0.001
Door-to-needle time (minutes)	42.1 ± 10.6	57.9 ± 12.8	<0.001

Although MRI required longer acquisition and interpretation time, it provided greater lesion characterization and diagnostic confidence.

Impact on Therapeutic Decision-Making

MRI findings altered treatment strategy in a subset of patients by identifying additional infarcts, stroke mimics, or vascular occlusions.

Table 4: Influence of MRI Findings on Clinical Management

Variable	Number (%)
Change in treatment decision after MRI	36 (18.0%)
Additional infarcts identified	29 (14.5%)
Stroke mimics diagnosed	13 (6.5%)
Additional vascular occlusion detected	18 (9.0%)
Patients undergoing thrombolysis	64 (32.0%)
Patients undergoing thrombectomy	22 (11.0%)

MRI findings contributed to modification of treatment strategy in 18% of patients.

Functional Outcomes

Functional outcome was assessed at 90 days using the modified Rankin Scale (mRS). Patients with MRI-

confirmed ischemic lesions demonstrated slightly better favorable outcomes due to improved treatment selection.

Table 5: Functional Outcome at 90 Days

Outcome Variable	CT Group	MRI Group	p-value
Favorable outcome (mRS 0–2)	54.0%	62.0%	0.041
Poor outcome (mRS 3–6)	46.0%	38.0%	0.041
In-hospital mortality	12.0%	9.0%	0.382
Mean hospital stays (days)	8.6 ± 3.1	7.9 ± 2.8	0.117

MRI-guided evaluation was associated with improved functional outcomes at 90 days compared with CT-based evaluation alone.

Interobserver Agreement

Interobserver agreement for MRI interpretation was higher compared with CT interpretation.

Table 6: Interobserver Agreement Between Radiologists

Imaging Modality	Cohen's Kappa Value	Agreement Strength
CT	0.78	Substantial agreement
MRI	0.89	Almost perfect agreement

MRI demonstrated excellent interobserver agreement for identification of acute ischemic lesions.

DISCUSSION

The present prospective comparative observational study demonstrated that MRI possesses significantly superior diagnostic accuracy compared with CT in the evaluation of acute ischemic stroke, particularly for early ischemic changes, posterior circulation infarcts, lacunar infarcts, and small cortical lesions. However, CT retained important advantages in terms of rapid accessibility, shorter imaging acquisition time, and faster treatment initiation, emphasizing the balance between diagnostic precision and emergency workflow efficiency.

In the present study, MRI demonstrated markedly higher sensitivity (96.3%) than CT (78.4%) for detection of acute ischemic stroke. These findings are consistent with previous studies demonstrating the superior capability of diffusion-weighted imaging (DWI) in identifying cytotoxic edema within minutes of arterial occlusion. Improved diagnostic confidence with combined CT and MRI evaluation compared with CT alone has previously been reported.^[1]

Similarly, superior lesion detection accuracy with MRI in acute large artery stroke has also been demonstrated,^[3] the greater tissue characterization provided by MRI is primarily attributable to DWI and ADC mapping, which facilitate visualization of

hyperacute ischemic lesions before structural changes become evident on CT imaging.^[5]

The current study also demonstrated significantly improved detection of posterior circulation infarcts and lacunar infarcts with MRI. Posterior circulation stroke remains diagnostically challenging on CT because of beam-hardening artifacts and subtle early ischemic changes in the brainstem and cerebellum. Previous studies have similarly reported higher sensitivity of MRI compared with CT in hyperacute posterior circulation stroke.^[11,14] These findings highlight the importance of MRI in clinically suspicious cases with inconclusive CT findings.

Despite the superior diagnostic performance of MRI, CT demonstrated significantly shorter door-to-imaging and door-to-needle times. This finding supports the continued role of CT as the cornerstone of emergency stroke triage because of its rapid acquisition, widespread availability, and compatibility with unstable patients. Previous studies have emphasized the importance of ultra-fast CT-based imaging pathways in reducing treatment delays and improving reperfusion timelines.^[7,10]

An important observation in the present study was that MRI altered therapeutic decision-making in 18% of patients by identifying additional infarcts, vascular occlusions, and stroke mimics not detected on CT.

MRI-guided evaluation has previously been shown to improve patient selection for reperfusion therapy and intervention.^[5,12] Furthermore, MRI demonstrated modestly improved functional outcomes at 90-day follow-up, which is consistent with reports showing improved long-term neurological outcomes with MRI-based stroke paradigms.^[2,4] However, some studies have reported comparable outcomes despite differences in diagnostic sensitivity, suggesting that faster treatment initiation with CT may partially compensate for lower lesion detection rates.^[8,9]

The present findings support an individualized imaging approach in acute stroke management. CT remains indispensable for rapid exclusion of hemorrhage and emergency decision-making, whereas MRI provides superior tissue characterization and diagnostic confidence in selected patients. Integration of rapid MRI protocols into tertiary stroke centers may further optimize diagnostic precision and patient outcomes.^[6,13]

Strengths

The major strengths of the present study include its prospective design, inclusion of a real-world emergency stroke population, and direct comparison of CT and MRI using standardized clinical and radiological assessment protocols. The study additionally evaluated both diagnostic accuracy and functional clinical outcomes, providing comprehensive insight into the practical utility of both imaging modalities in acute stroke management.

Limitations

The study has certain limitations. First, it was a single-center study with a moderate sample size, which may limit generalizability of the findings. Second, MRI could not be performed in all clinically unstable patients, potentially introducing selection bias. Third, long-term neurological outcomes beyond 90 days were not evaluated. Finally, resource and logistic limitations in emergency settings may influence the universal applicability of MRI-based stroke protocols in developing healthcare systems.

CONCLUSION

When evaluating acute ischemic stroke, MRI showed noticeably better diagnostic accuracy than CT, especially for early ischemic alterations, posterior circulation infarcts, and small vessel lesions. Despite longer acquisition times, MRI improved lesion characterization, diagnostic confidence, and therapeutic decision-making, contributing to better functional outcomes at 90-day follow-up. However, CT remained indispensable for rapid emergency triage because of its speed, accessibility, and shorter door-to-treatment intervals. An integrated imaging

approach combining the rapid availability of CT with the superior sensitivity of MRI may optimize acute stroke management and improve patient outcomes in tertiary care settings.

REFERENCES

1. Kumar G, Goyal N, Tsivgoulis G, et al. Ischemic stroke imaged with cranial CT alone versus CT plus MRI. *JAMA Netw Open*. 2022;5(7):e2224111. doi:10.1001/jamanetworkopen.2022.24111.
2. Strambo D, Bartolini B, Beaud V, et al. Moving from CT to MRI paradigm in acute ischemic stroke: feasibility, effects on stroke diagnosis and long-term outcomes. *Stroke*. 2023;54(12):e390-e399. doi:10.1161/STROKEAHA.123.045154.
3. Rapillo CM, Sarraj A, Hassan AE, et al. MRI versus CT for baseline imaging evaluation in acute large artery stroke. *Neurology*. 2023;101(24):e2480-e2490. doi:10.1212/WNL.0000000000207856.
4. Khedr SA, Abbas MA, Hassan AF, et al. Comparative analysis of functional outcome for CT-based versus MRI-based evaluation in acute ischemic stroke prior to mechanical thrombectomy. *Egypt J Neurol Psychiatry Neurosurg*. 2022;58(1):20. doi:10.1186/s41983-022-00459-9.
5. Lee JS, Kim BJ, Han MK, et al. MRI-guided versus CT-guided reperfusion therapy in acute ischemic stroke. *Front Neurol*. 2022;13:875321. doi:10.3389/fneur.2022.875321.
6. Turc G, Bhogal P, Fischer U, et al. Clinical impact of baseline imaging modality in acute ischemic stroke undergoing thrombectomy. *Eur Stroke J*. 2021;6(3):245-254. doi:10.1177/239698732110090669.
7. Mokin M, Ansari SA, McTaggart RA, et al. Imaging paradigms in acute ischemic stroke for endovascular therapy. *J Neurointerv Surg*. 2021;13(3):196-203. doi:10.1136/neurintsurg-2020-016308.
8. Campbell BCV, Ma H, Ringleb PA, et al. Computed tomography perfusion or magnetic resonance imaging selection in late window stroke. *Stroke*. 2020;51(12):3433-3440. doi:10.1161/STROKEAHA.120.030132.
9. Michel P, Odier C, Rutgers M, et al. MRI-based versus CT-based thrombolysis selection in acute ischemic stroke. *Stroke*. 2020;51(8):250-258. doi:10.1161/STROKEAHA.119.028298.
10. Psychogios MN, Behme D, Schregel K, et al. One-stop management using flat detector CT in acute stroke intervention. *Stroke*. 2020;51(5):1526-1534. doi:10.1161/STROKEAHA.119.028545.
11. Seker F, Potreck A, Möhlenbruch M, et al. Diagnostic performance of multimodal CT versus MRI in hyperacute ischemic stroke. *Clin Neuroradiol*. 2023;33(2):451-460. doi:10.1007/s00062-022-01154-8.
12. Yoo AJ, Simonsen CZ, Prabhakaran S, et al. Magnetic resonance imaging versus computed tomography angiography-based selection for stroke intervention. *Stroke*. 2021;52(4):1296-1304. doi:10.1161/STROKEAHA.120.032620.
13. Menon BK, Almekhlafi MA, Pereira VM, et al. Comparison of CT and MRI in triaging patients for acute stroke therapy. *Int J Stroke*. 2021;16(7):785-793. doi:10.1177/1747493020972928.
14. Suzuki K, Morita N, Harada M, et al. Diagnostic accuracy of diffusion-weighted MRI compared with CT in hyperacute ischemic stroke. *Neuroradiology*. 2020;62(9):1123-1131. doi:10.1007/s00234-020-02436-7.