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# The role of magnetic resonance imaging in diagnosing brain stroke

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**Abstract**
Brain stroke diagnosis heavily relies on the magnetic resonance imaging (MRI) that provides detailed view of brain structure and function. MRI though imperfect still stands unbeaten as a key player in detecting stroke early and correctly, a procedure later found to improve clinical outcomes even without its ineffectiveness. The future is promising as AI keeps integrating into the already evolving technology of MRI which is aimed at producing innovative images for stroke diagnosis through this new approach, treating stroke like a treatable disease has led other groups towards studying different possibilities such as intra-arterial clots using thrombolytic drugs like urokinase or even more recent mechanical clot extraction. Patients who suffered from an acute ischemic stroke were admitted to AL-Najaf in the province of Najaf, Iraq. The study specifically focused on patients with ischemic stroke in the anterior circulation area and recommended that the evaluation of such patients should be based on two criteria: collateral circulation and CTP parameters. This approach helps identify patients with good collaterals and certain aspects and group characteristic thresholds, which can lead to more targeted treatment strategies. Notably, most of the patients were found to have small vessel ischemia with a baseline ASPECTS CTP threshold, indicating high incidence among this specific population subgroup.

**Keywords:** MRI, stroke, brain, CTP, hypo

## Introduction
The field of medicine has forever changed with the advent of MRI it produces detailed images that allow us to see deep within the body's structures and organs. Among all areas impacted by MRI [1], diagnosis of brain stroke stands at the top spot in importance. Stroke ranks first among global disabilities an early and accurate diagnosis is paramount for effective clinical outcomes. This paper delves into the basic tenets of MRI: value in early detection of brain stroke, merits and demerits that come with using MRI for stroke diagnosis, as well as what lies ahead for this revolutionary technology [2].

MRI works by creating high resolution pictures using magnets plus radio waveslet's discuss why being able to use this technology should be seen both as a blessing and a curse. Besides its detection capabilities [3], MRI is able to provide three-dimensional images of the brain which can let health practitioners see how extensive damage from a stroke is. On top of this, MRI can also provide other important details that could help with specific clinical applications like using parallel imaging or studying water diffusion as these can highlight changes related to stroke. Detecting brain strokes early is crucial given their significant impact on patient outcomes; stroke ranks as the leading cause of long-term disability so it is important to intervene promptly in order to prevent irreparable damage [4]. Time is indeed of essence: for instance, identifying acute ischemic stroke and its potential management based on findings from different MRI sequences calls for quick decision-making since those results not only affect prognosis but also guide treatment strategies. Magnetic Resonance Imaging, known as MRI, is an advanced technology that blends both structural and functional aspects in imaging. It is high resolution which allows the visualization of detailed structures within the brain including how these regions functionally behave. In what concerns stroke particularly during its acute phase multimodal [5]. MRI plays a pivotal role towards identifying ischemic stroke diagnosis, hence allowing clinicians to tailor specific treatment plans based on brain injury volume. Moreover post-acute as well as chronic phases introduce functional MRI, an innovation which uncovers changes in brain activation post-stroke; it guides efforts in cognitive rehabilitation down the line [6].

Despite its advantages though MRIs struggle to offer comprehensive details around strokes: while MRIs can identify location and size of stroke-induced tissue damage CT still stands out as the fastest means through which cerebral blood loss can be detected overshadowing MRI for its precision in this regard. In the absence of contrast, a CT scan is more likely to detect ischemic strokes which are particularly true in such situations; one limitation of MRI [7] is tissue heating because of RF-circuits that occurs especially [8]. Among patients with implants. However promising the future advancements of MRI technology might be for stroke diagnosis [9], there are already two other advanced neuroimaging techniques emerging fMRI and EEG can help identify post stroke changes in brain activity [10]. AI application in acute stroke imaging an evolving technology along with these advanced neuroimaging modalities has a potential use for recognizing different types of strokes, including ischemic and hemorrhagic strokes [11]. Furthermore, stroke management and diagnosis still heavily rely on [12] contrast-enhanced MRI (CE-MRI) as this technology has made great strides in this field specifically over recent years [13].

## Materials and Methods

### Subjects

From January 1, 2021, to February 1, 2022, individuals suffering from acute ischemic stroke were, which operates under the Ministry of Health in Iraq. The occurrence of acute ischemic stroke is a significant factor contributing to hospitalization rates and global mortality. However, in Al-Najaf, Iraq, there exists a dearth of information regarding the demographics, clinical manifestation, diagnostic assessment, and treatment strategies employed for patients admitted to hospitals with acute ischemic stroke.

### Statistical Analysis

The well-known statistical system (Graph Pad prism ver. 5) was adopted, and the analysis of variance table one-way anova (by Tukey´s multiple comparisons test) was used for the comparison among subdivided groups in the measured parameters. The results were expressed as (Mean ± Stander Error). Correlation coefficients were calculated to estimate the correlation between markers and parameters, the descriptive statistics and correlation coefficients were performed by using mega stat (Version v 10.12) for Excel 2010 (Motulsky, 2003).

## Results

The distribution of patients, their ages, and causes of the disease stroke is considered one of the main causes of death and long-term disability in the world, and it has a major social impact. The study included many patients and the results were as in Table (1), where the researcher found that there were (10) patients and the patients were under treatment for multiple reasons.

**Table 1:** Shows the disease, its causes and its types

| N. Name | Age | $T_1$ | $T_2$ | Diagnosis |
|---|---|---|---|---|
| 1 | 52 | Hypo | Hyper | Chronicsmallvessel ischemia |
| 2 | 27 | Hypo | Hyper | Chronicsmallvessel ischemia |
| 3 | 36 | Hypo | Hyper | Old small vessel ischemia |
| 4 | 53 | Hypo | Hyper | small vessel ischemia |
| 5 | 73 | Hypo | Hyper | small vessel ischemia |
| 6 | 70 | Hypo | Hyper | Ischemia |
| 7 | 58 | Hypo | Hyper | small vessel ischemia |
| 8 | 68 | Hypo | Hyper | small vessel ischemia |
| 9 | 65 | Hypo | Hyper | small vessel ischemia |
| 10 | 61 | Hypo | Hyper | small vessel ischemia |

Figure 1 shows the distribution of patients according to the incidence, as it was as follows (0.15557% for chronic small vessel ischemia, and the highest incidence was (0.66667%) for small vessel ischemia, while the incidence was (0.0332) Ischemia. The causes of clots may be due to several important things, including surgical intervention and its effects, smoking, obesity, and advanced age.

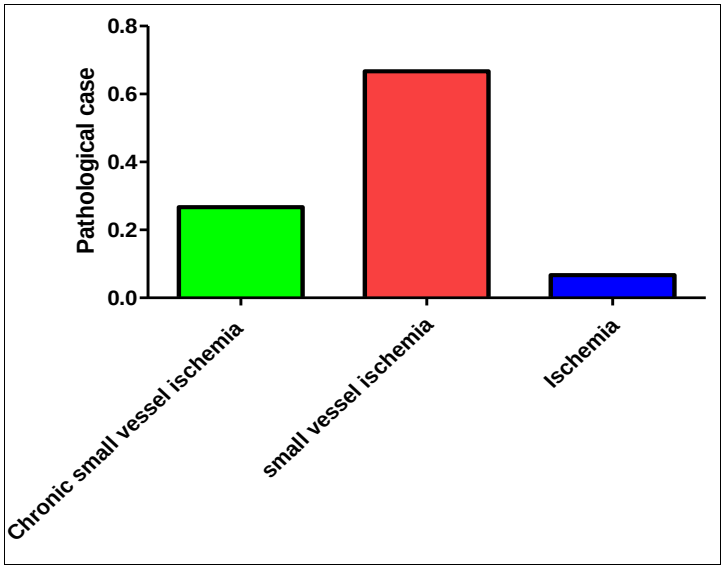


**Fig 1:** Distribution of disease cases according to cause

Figure 2 shows the distribution of patients according to gender, where the infection rate of males was higher than that of females, as the number of males was (9) while the number of females was (6) and their average ages did not differ significantly as the females were (55.17 ± 8.845) while the ages of males were (56.11). ±6.624). The difference in causes between them may be due to the difference in physiological nature between females and males, and since the infection rate in males is higher, it may be due to smoking, hormonal differences, and aging**.**

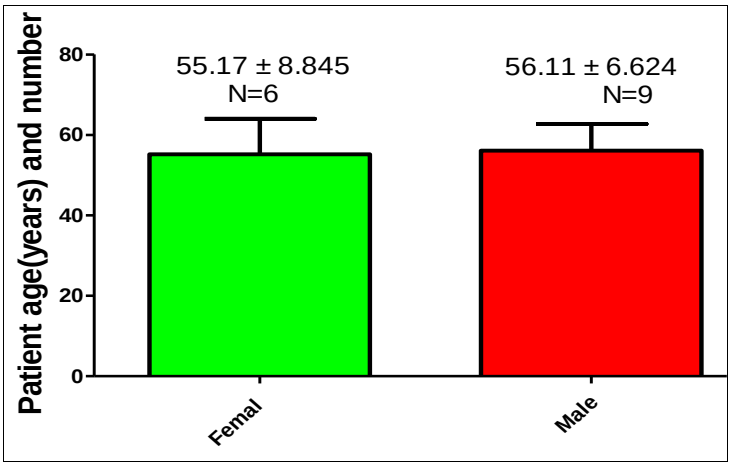


**Fig 2:** Distribution of medical cases by sex

## Discussion

The global prevalence of stroke is depicted in Table 1, showing its grim societal implications as a major contributor to mortality and long-term impairments[14]. This study delved into a considerable sample size of patients (10individuals) whose treatment was influenced by multiple factors. The distribution of patients based on incidence sees chronic small vessel ischemia at 0.26667% while the most common is small vessel ischemia at 0.66667%; factors like surgical intervention and smoking play roles depicted in Figure 1. Male infection rates far exceed those of females as illustrated in Figure 2 another consideration shown when studying clot formation within blood vessels (indicated by specific incidences) [15]. There were 9 male patients and 16 female patients [sic]. What is curious is that the average age of the two groups did not significantly differ: females had an average age of 55.17 ± 8.845 while males had an average age of 53.10 ± 6.624. Such differing infection rates between males and females may stem from physiological disparities among which smoking, hormonal variations, and aging play prominent roles for men to have higher infection rate than women due to those factors [16].

## Conclusions

1. The study showed that it is best to examine the revascularized patient using two criteria simultaneously - aspects ctp basic value characterization and collectives. Patients with good collaterals and with baseline ASPECTS CTP threshold were found

3. The highest incidence of small vessel ischemia

## Recommendations

1. Patients with large cerebral artery occlusion should not wait for the results of intravenous thrombolysis treatment, but should proceed to endovascular thrombectomy without undue delay.
2. Intravenous thrombolysis before endovascular therapy is recommended for all patients, unless there is a contraindication, especially when endovascular therapy is not immediately available or if the patient is transferred from an inpatient setting where endovascular therapy is not available.

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