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Original Research Article

Computed Tomography Findings in Acute Stroke Patients: A Hospital-Based Cross-Sectional Study

Dr. Rosy Perveen[1*], Dr. Habibur Rahman[2], AFMS Islam[3], Dr. Ruksana P. Khan[4]

[1]Department of Radiology & Imaging, Medical College for Women & Hospital, Uttara, Bangladesh
[2]Department of Surgery, Nightingle Medical College & Hospital, Savar, Bangladesh
[3]Department of Radiology & Imaging, Medical College for Women & Hospital, Uttara, Bangladesh
[4]Sonologist, Medical College for Women & Hospital, Uttara, Bangladesh

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Abstract: ***Introduction:*** Stroke, or "cerebrovascular accident," is a medical disorder in which the brain's cells die due to insufficient blood flow. Successful stroke treatment varies according to the type of stroke, whether an infarct or a bleed, and it can be lethal without brain damage. ***Objective*:** The study aim was to compare clinical stroke diagnosis with computed tomography (CT) scan findings to determine stroke type (hemorrhagic or Ischemic). ***Method:*** This was a cross-sectional type of observational study conducted at the Department of Radiology & Imaging in Medical College for Women and Hospital (MCWH), Uttara and Catharsis Hospital, Pubail, Dhaka from January 2018 to December 2020. A total of 120 patients from the inclusion criteria were taken for the study purpose. Data of clinical diagnosis were compared individually with CT findings. ***Result:*** Out of 120 patients, 84 were males and 36 were females and they were in the age range of 20-80 years. Clinically 52 patients were suspected to have cerebral infarction, 38 intracerebral bleeds and 30 indeterminate. CT scan of the brain showed 58 cerebral infarcts, 42 intracerebral hemorrhages, 06 space-occupying lesions and 14 hemorrhagic infarcts. ***Conclusion*:** The study found that CT should be the first thing to do when a person has a stroke because it's easy, quick, and accurate at figuring out what happened.

Key words: Stroke, Clinical, Computed, Tomography, Diagnosis.

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INTRODUCTION

When blood flow to a portion of the brain is interrupted, a stroke occurs. The brain cells are unable to obtain the necessary oxygen and nutrients from the blood, and they begin to die within a few minutes. This can result in long-term brain damage, incapacity, or death [1]. Mainly in two types of stroke ischemic stroke is the most frequent kind of stroke, accounting for 87% of incidents. A blood clot blocks the flow of blood and oxygen to an area of the brain. The other type of stroke is hemorrhagic stroke which happens as a result of a blood vessel rupture. They are frequently caused by aneurysms or arteriovenous malformations (AVMs) [2]. In light of the therapeutic implications, it is critical to distinguish between hemorrhagic and ischemic strokes [3]. In practice, however, the clinical distinction has proven challenging, as minor hematomas can produce symptoms and signs that are comparable to those generated by infarcts [4]. Brain CT scans have become the most widely utilized primary radiologic examination for stroke since their introduction into clinical practice [5]. A head CT scan employs x-rays and computers to make numerous images inside of the head. It can immediately show the location and size of brain anomalies like blood clots or tumors. It also can reveal infections or areas of the brain where tissue is withering or dead due to a lack of blood flow. A CT scan can determine if a stroke is ischemic or hemorrhagic. A stroke CT scan helps to detect blood in the skull from a hemorrhage, ensuring proper treatment [6]. An ischemic stroke occurs when there is a lack of blood flow; a hemorrhagic stroke occurs when there is bleeding, and a thrombotic stroke occurs when fatty deposits accumulate in blood vessels and cause them to become blocked [7]. One-sided inability to move or feel on one side of the body, difficulty understanding or speaking, a sensation of the world spinning, loss of vision on one side of the body, and complaints of headache are all possible clinical manifestations of this condition. Whether or not a patient will be treated with

***Corresponding Author:** Dr. Rosy Perveen
Department of Radiology & Imaging, Medical College for Women & Hospital, Uttara, Bangladesh

thrombolytics or with other therapies will be determined by how accurately the diagnostic was performed. An incorrect diagnosis, on the other hand, may result in patients being denied appropriate treatment or being exposed to potentially dangerous treatments without their knowledge [8]. The present study compared the clinical diagnosis with computed tomography to determine the specific type of acute stroke.

OBJECTIVE

The main objective of this study was to compare clinical stroke diagnosis with computed tomography (CT) scan findings to determine stroke type (hemorrhagic or Ischemic).

MATERIALS AND METHODS

From January 2018 to December 2020, 120 patients referred to Radiology departments at Medical College for Women and Hospital (MCWH), Uttara and Catharsis Hospital in Pubail, Dhaka were included in this cross-sectional and observational study. CT scans of the brain were performed on all individuals with a clinical diagnosis of the acute stroke where indicated, clinical diagnosis, age, sex, the onset of symptoms, and time of hospitalization are included. Patients who presented with a fast onset of coma, rapid deterioration of neurological status, severe headache, severe vomiting, neck stiffness, and hypertension were diagnosed with hemorrhagic stroke. Patients presenting with a sudden start of lateralizing size, particularly those with atrial fibrillation, rheumatic heart disease, recent myocardial infarction, and carotid bruit, were deemed to have a cerebral infarction. Blood sugar, lipid profile, ECG, and echocardiography were all performed in addition to the standard investigation. Every patient underwent a cerebral CT scan. Finally, the CT scan findings and clinical diagnosis were compared separately in order to ascertain the specific clinical diagnosis.

RESULTS

Table-1 has shown that, eighty-four patients (70%) of acute stroke among one hundred and twenty were male and thirty-six patients (30%) were female. Most of the patients (fifty-three, 44.16%) were from the age group 61-70. Thirty-seven patients (30.83%) were from the age group 51-60. Twelve patients (10%) from 41-50, ten (8.33%) from 71-80, five (4.16%) from 31-40 and three (2.5%) were from age group 21-30 years.

Table-1: Sex and Age distribution in Patients of Acute Stroke (n=120)

Characteristics of Patients	
Gender of Patients	**Cases (N, %)**
Male	84 (70%)
Female	36 (30%)
Age Group (In Year)	**Cases (N, %)**
21-30	03 (2.5%)
31-40	05 (4.16%)
41-50	12 (10%)
51-60	37 (30.83%)
61-70	53 (44.16%)
71-80	10 (8.33%)
Total	**120 (100%)**

The below table has shown that, most of the patients (fifty-two, 43.33%) with acute stroke were clinically diagnosed with infarction whereas thirty-eight patients (31.66%) were diagnosed with haemorrhage. Thirty patients (25%) were diagnosed with indeterminate.

Table-2: Clinical diagnosis of the type of acute stroke (n=120)

Diagnosis	**Cases (N, %)**
Haemorrhage	38 (31.66%)
Infarction	52 (43.33%)
Indeterminate	30 (25%)

Table-3 has indicated that fifty-eight patients (48.33%) had infarction behind the acute stroke. Forty-two patients (35%) had a haemorrhage and fourteen patients (11.66%) had space-occupying lesions behind the acute stroke. Only six patients (5%) had haemorrhage infarct. All of the patients with acute stroke in this table were diagnosed through a CT scan.

Table-3: CT Scan findings in patients with acute stroke (n=120)

Diagnosis	**Cases (N, %)**
Hemorrhage	42 (35%)
Infarction	58 (48.33%)
Space Occupying Lesion	14 (11.66%)
Hemorrhage Infarct	06 (5%)

The below table has indicated that among ninety patients thirty-eight had been clinically diagnosed with haemorrhage and among them, twenty-one patients were diagnosed through CT scan where fifty-two patients had been diagnosed with infarction and among them, thirty patients were diagnosed with CT scan.

Table-4: CT Scan findings in clinically diagnosed cases (n=90)

Specific Type of Acute Stroke	**Clinical Diagnosis**	**CT Scan Confirmation**	**Agreement of Results**
Haemorrhage	38	21	55.26%
Infarction	52	30	57.69%

DISCUSSION

Stroke is a serious life-threatening medical condition that occurs because of poor blood flow to the brain which causes cell death. As clinical examination alone is not enough to differentiate ischemic stroke from hemorrhagic, a CT scan or magnetic resonance imaging (MRI) is needed. Brain imaging helps clinicians make management decisions and decide whether to employ antiplatelet or thrombolytic medications for acute stroke.

The burden of stroke is substantial, which is due not only to its high mortality but also to its associated morbidity. A clinical diagnosis that is incorrect has a significant impact on the patient's outcome. Without a doubt, computed tomography scans significantly improve stroke diagnosis. Reliance on clinical diagnosis alone for acute stroke is unjustifiable, much more so now that CT is widely available.

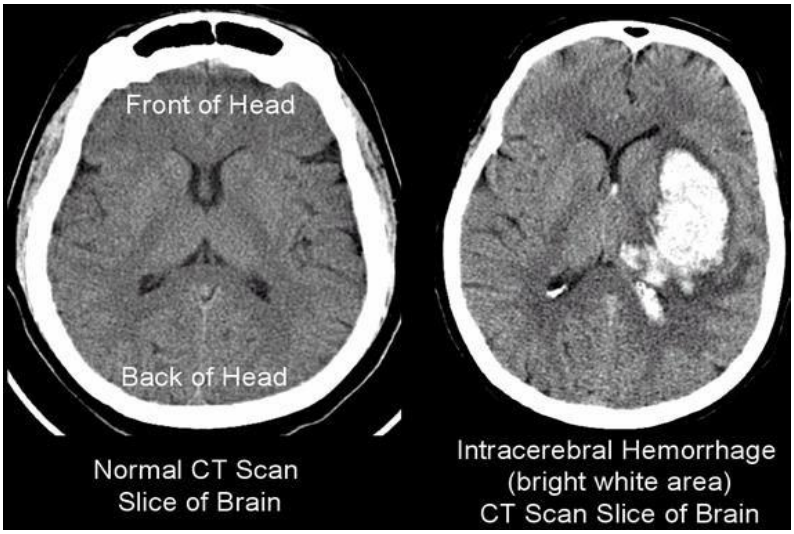

Figure-1: CT scan showing intracerebral haemorrhage Infarct

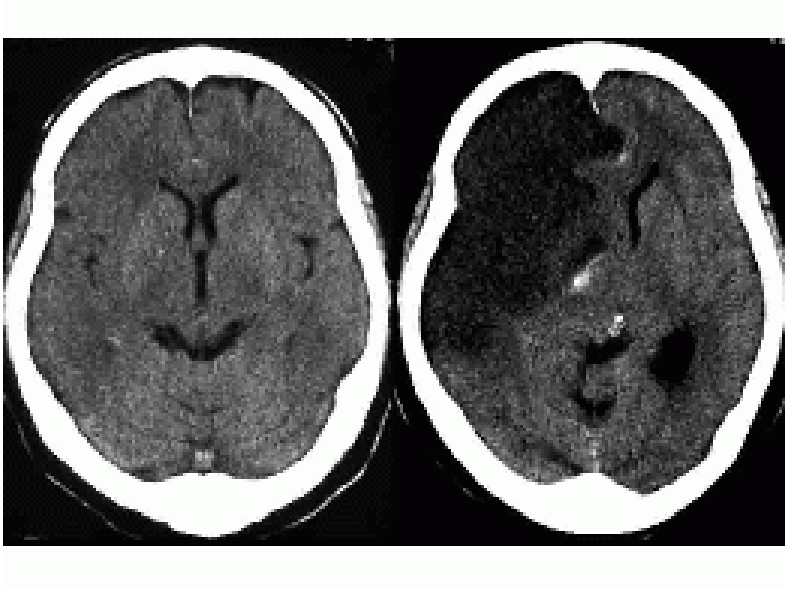

Figure-2: CT scan showing acute (Black area) with mass effect

The clinical diagnosis of the patients in this study was only 75% accurate when compared with the findings of the CT scan, which revealed a misdiagnosis rate of 25%. This finding of the inadequacy of the clinical diagnosis is consistent with the findings of Salawu *et al*., (2009), who noted a misdiagnosis rate of 15% when comparing clinical diagnosis with CT scans in Maiduguri [9]. In a similar study conducted in Ethiopia, Asefa *et al*., (2010) reported a misinterpretation rate of 30% in relation to clinical diagnosis [10]. In a study of 156 Nigerian patients, Ogun *et al*., (2001) found 44% misinterpretation rate when comparing CT findings with clinical diagnosis [11].

To assist physicians in making clinical diagnoses, several scoring systems such as the "Allen score" and the "Siriraj score" have been invented to assess the relative chance of infarction or haemorrhage. While clinical diagnoses made with these scores appear to be more accurate than those made with a physician's clinical eye, they also introduced some complications. Thus, throughout the last decade, the "Allen score" (also known as the Guy's Hospital score), a verified clinical measure, acquired widespread support but has since waned. In a study of 1059 patients in Glasgow, it was determined that the Guy's Hospital score had a sensitivity of 70% for diagnosing haemorrhage and a specificity of 64% whereas the siriraj score had a sensitivity of 68% and a specificity of 64%. This study indicated that neither score is beneficial for excluding bleeding prior to initiating anticoagulant therapy [12]. Badam *et al*., examined the Siriraj stroke score and Guy's Hospital score in an Indian environment [13]. Both of the above-mentioned ratings were found to be insufficient for conclusively identifying bleeding or infarct in this investigation.

The outcomes of this study underscored the critical nature of routine CT scans in acute stroke patients, as they are widely available at all hours of the day and night at large hospitals and produce images fast. Additionally, CT scans offer distinct diagnostic benefits since they rapidly rule out haemorrhages and can reveal even a small tumour that may mimic a stroke.

CONCLUSION

While significant advances in stroke imaging have been made, including CT perfusion imaging, Xenon CT, CT angiography, MR diffusion imaging, MR perfusion imaging, and MR angiography, the study discovered that clinical diagnosis of acute stroke alone is frequently insufficient, resulting in a high risk of poor patient morbidity. As a result, it is critical that CT be used whenever possible in acute stroke therapy.

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