Section: Radiology

Original Research Article

STUDY ON ROLE OF COMPUTED TOMOGRAPHY IN EVALUATION OF CEREBROVASCULAR ACCIDENTS: A TEACHING HOSPITAL BASED STUDY

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ABSTRACT

Background: One of the main causes of death and disability worldwide is cerebrovascular accidents. To assess cerebrovascular strokes with CT tomography.

Materials and Methods: For the study, 40 patients with a clinical diagnosis of stroke who were admitted to the World College of Medical Sciences Research and Hospital in Jhajjar were selected. A comprehensive clinical evaluation, including a radiological examination, was performed on the patients. Both plain and contrast studies were used for computed tomography.

Results: Thirteen (32.5%) of the 40 cases that were part of the study were female, and 27 (67.5%) were male. The age range of 51 to 70 years was shown to have the highest rates of both infarction and hemorrhage. Two cases (20.0% each) had thalamic and cerebellar involvement, whereas five cases (50.0%) implicated the putamen or external capsule. In one case (10.0%), hemorrhagic infarction was also observed.

Conclusion: The most common method for diagnosing acute stroke is CT scanning, which should ideally be performed in every instance. Management of stroke is dependent on a precise diagnosis.

Keywords: CT, infarction, stroke, hemorrhage and cerebrovascular accidents.

INTRODUCTION

Acute loss of focal and occasionally global brain function, with symptoms lasting more than 24 hours or resulting in death with no apparent cause other than vascular origin, is referred to as a cerebrovascular accident (CVA) or stroke (WHO).[1] Acute loss of focal and often global (applied to patients in deep coma and those with subarachnoid hemorrhage) cerebral function, with symptoms lasting longer than 24 hours or resulting in death with no apparent cause other than vascular origin, is referred to as a cerebrovascular accident or stroke. After heart disease and cancer, cerebrovascular accidents rank among the top causes of death in developed nations. In India, they rank among the top causes of death as well. As people age, the incidence and fatality rates from stroke rise rapidly. For every brain hemorrhage, 16 to 80% of patients die, and for every cerebral infarction, 15 to 30% of patients die. Most people who survive end up permanently disabled. Numerous research have been conducted globally to illustrate the use of computed tomography in the treatment of cerebrovascular accidents.[2] CT scans are performed on individuals who have had cerebrovascular accidents in order to make a fair diagnosis, determine which stroke types are surgically treatable, rule out cerebral hemorrhage, diagnose spontaneous subarachnoid hemorrhage, and find any alterations in the bone. Moreover, various brain lesions, such as primary or metastatic brain tumors or subdural hemorrhages, which are typically easily distinguished by CT scan, might occasionally manifest clinically as stroke-like syndromes.[3] Gathering hemorrhages or infracts, estimating their size and accurately evaluating the area of blood vessels involved, and identifying the frequency of negative cases of clinically suspected stroke were the objectives of the current study.

MATERIALS AND METHODS

This present study was carried in the department of Radiology, World College of Medical Sciences Research and Hospital during the period from March, 2022 to December, 2023. For the study, 40 patients with a clinical diagnosis of stroke who were admitted to the World College of Medical Sciences Research and Hospital in Jhajjar were selected. A comprehensive clinical evaluation, including a radiological examination, was performed on the patients. Both plain and contrast studies were used for computed tomography. Computed tomography was not compared to other imaging modalities such as Doppler, Angiography, or M.R.I. For two months, follow-up was conducted. The patient was followed up with additional CT scans, and the remaining CT images were connected with either a positive clinical outcome or, if required, surgical findings. Before and after treatment, the lesion's size, peri-lesionaledema, and attenuation values were compared.

Inclusion Criteria: The study was open to patients admitted to the College of Medical Sciences Research and Hospital who had a clinical diagnosis of acute stroke and were older than ten years.

Exclusion Criteria: This study did not include patients with CNS abnormalities resulting from causes other than vascular disease, such as hypoglycemia, diabetic keto acidosis, or trauma.

RESULTS

Forty patients with a clinical diagnosis of stroke who were admitted to the World College of Medical Sciences Research and Hospital in Jhajjar were included in the study. Of the 40 patients who were clinically suspected of having a cerebrovascular accident and had their brains scanned with CT, 21 had infarction, 10 had hemorrhage, 2 had SAH, 5 had normal scans, 1 had tumorous pathology, and 1 had cerebral venous thrombosis. [Figure 1]

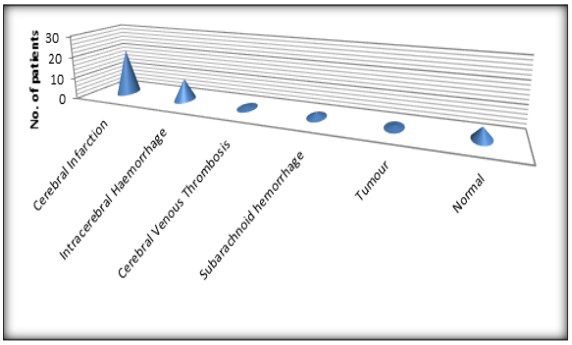

Figure 1: Shows the distribution of patients according to CT Findings.

The patients in this study ranged in age from the second to the seventh decade. Table 2 shows that the patients' ages ranged from 21 to 74 years old. Thirteen (32.5%) of the 40 cases that were part of the study were female, and 27 (67.5%) were male. Figure 2 showed that the age group between 51 and 70 years old had the highest rates of both infarction and hemorrhage.

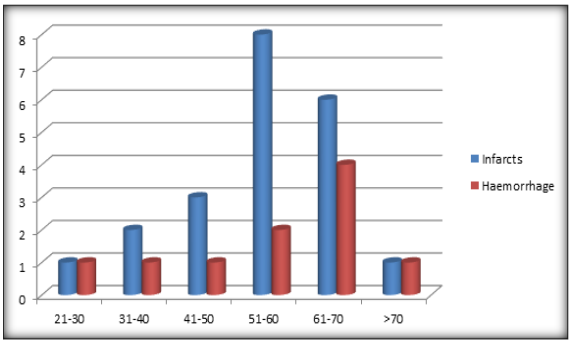

Figure 2: Shows the distribution of patients a/c to Infarcts and Haemorrhage

Table 1: Shows the Involvement of vascular territory in cerebral infarction

Vascular Territory	No. of patients (%)
Right MCA	06 (28.6%)
Left MCA	04 (19.04%)
Right PCA	02 (9.52%)
Left PCA	01 (4.76%)
Right ACA	01 (4.76%)
Left ACA	01 (4.76%)
Right MCA and PCA	01 (4.76%)
Left MCA and PCA	01 (4.76%)
Right and Left MCA	01 (4.76%)
Vertebro basilar artery territory except PCA branch	01 (4.76%)
Lacunar	02 (9.52%)

There were 21 cases of cerebral infarction in this investigation. Four patients (19.04%) experienced an infarction in the left middle cerebral artery (MCA) territory, while six patients (28.6%) experienced an infarction in the right MCA territory. Infarction occurred in the right posterior cerebral artery (PCA) area in 02 patients (9.52%), and in the left PCA in 01 patients (4.76%). An infarction occurred in the right anterior cerebral artery (ACA) territory in one patient (4.76%) and the left ACA territory in another. Infractions were found in the right MCA and PCA, left MCA and PCA, and right and left MCA region in one patient (4.76%). Table 1 shows that 02 patients (9.52%) had lacunar infarction and 01 patients (4.76%) had infarction in

the vertebro-basilar artery area, excluding the PCA branch.

Table 2: Shows the distribution of patients a/c to Infarcts and Haemorrhage

Vascular Territory	No. of patients (%)
Right MCA	01 (10.0%)
Left MCA	02 (20.0%)
Right PCA	01 (10.0%)
Left PCA	01 (10.0%)
Left ACA	01 (10.0%)
Right MCA and PCA	01 (10.0%)
Left MCA and PCA	01 (10.0%)
Right and Left MCA	01 (10.0%)
Haemorrhagic	01 (10.0%)

Ten cases of intracerebral hemorrhage were included in this investigation. Infarction occurred in the right Middle Cerebral Artery (MCA) area in 01 patients (10.0%), and in the left MCA territory in 02 patients (20.0%). The right posterior cerebral artery (PCA), left PCA, left anterior cerebral artery (ACA), right MCA and PCA, left MCA and PCA, and right and left MCA region were all affected by infarction in 01 patients (10.0% each). Table 2 shows that 01 patients (10.0%) experienced hemorrhagic infarction.

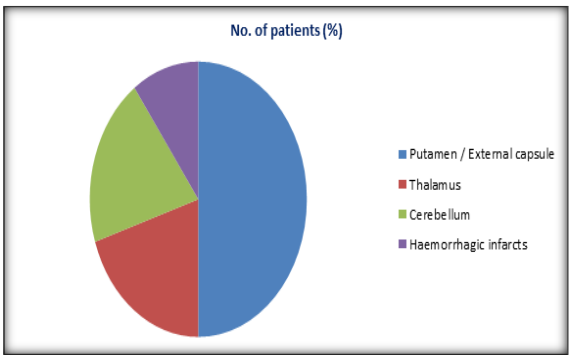

Figure 3: Shows the ICH frequency in various brain regions in 10 episodes of intracerebral hemorrhage.

Two cases (20.0% each) had thalamic and cerebellar involvement, whereas five cases (50.0%) implicated the putamen or external capsule. In fig. 3, hemorrhagic infarction was also observed in 01 cases (10.0%).

DISCUSSIONS

The goal of the current study is to determine how well a CT scan can distinguish between hemorrhage, infarct, and other stroke etiology in individuals who present with acute CAV. Prior to the advent of CT scans, particularly in areas where they are not yet accessible, doctors mostly relied on physical examination results, history, and Allen's grading system to distinguish between hemorrhage and infarct. In 90% of the 174 acute stroke cases that Allen studied, a correct diagnosis was made.[4] However, the scoring method has some issues because it relies on the patient's family members' history, and frequently they are unable to provide a clear picture of the symptoms and indicators that are connected to the scoring system. Based on clinical data, it was unable to distinguish between hemorrhage and ischemic stroke with 100% accuracy. The Oxfordshire Community Stroke project evaluates 325 consecutive acute stroke patients, highlighting the value of CT scans. CT scans were once thought to be insignificant when evaluating individuals who had suffered an acute ischemic stroke, but more recently, early CT findings have been found to have prognostic significance. It has been demonstrated that using CT in conjunction with early acute phase stroke treatments, such as thrombolytic therapy, improves outcomes for acute stroke patients. Within a few hours of the ictus, a cerebral CT scan provides crucial information and is a standard diagnostic procedure for acute stroke patients. In a recent series of patients with MCA territory infarctions, Hans Peter Harring et al. found that the incidence of positive findings in cerebral CT scans conducted within two hours of the stroke onset was 68%, rising to 89% within three hours. This highlights the importance of emergency cerebral CT scanning in acute stroke management, which is superior to MRI.[5] Forty stroke patients were evaluated in this study; of these, twenty-one (52.5%) had infarct, ten (25.0%) had hemorrhage, two (5.0%) had SAH, five (12.5%) had normal scans, one (2.5%) had tumorous pathology, and one (2.5%) had cerebral venous thrombosis. In a case study of 50 patients, Nubiola and Kubota reported an incidence of 60% infarcts, 30% hemorrhage, and 8% subarachnoid hemorrhage. In a study of 30 stroke patients, Ghosh SK and Row Chowhary found that infarct occurred in 33.3% of cases while intracerebral hemorrhage occurred in 60% of cases. The incidence of hemorrhage is found to be higher than that of infarction in this study, which had a contrasting experience in terms of severity.[6,7] A study by Rosenwasser RH and Ogun SA found that subarachnoid hemorrhage occurred in 7.2% of patients. England's Carlisle Sub-arachnoid hemorrhage occurred in 7.0% of patients. New Zealand's Auckland Sub-arachnoid hemorrhage occurred in 6.8% of patients. Australia's Perth Subarachnoid hemorrhage occurred in 4.5% of patients.[8,9] Two instances, or 5.0% of the 40 CVA cases in our study, exhibited subarchnoidhemorrhage. SAH resulting from

aneurysmal rupture, rupture of A-V malformations, and SAH of unclear source are all included in these studies of primary subarchnoidhemorrhage. Five cases, or 12.5% of the 40 clinically diagnosed CVA cases that underwent CT examination, were found to be normal. They are considered negative cases. Although there are technical issues in detecting infarction, bleeding is always ruled out. Out of 197 patients who had arrived with acute stroke, Moha Briton reported 3 patients with mass. In the Oxfordshire Community Stroke Project, 325 patients with a clinically confirmed stroke diagnosis had five non-stroke abnormalities identified by CT scan. One incidence of glioma, one case of CVT, and three cases of subarachnoid hemorrhage were found in the 50 patients in the current investigation. The patients also presented with symptoms similar to an acute stroke.[10] The brain and intracranial and extracranial vasculature can now be evaluated in great detail and with more sophistication thanks to recent developments in medical imaging. These resources keep adding to our knowledge of the complex processes that take place in the aging brain. Further research will help clarify the pathophysiologic basis of age-related changes in the brain, particularly with the use of more advanced functional and physiologic imaging techniques. CT scanners are now able to identify and describe stroke and its cause (atherosclerotic disease of supra aortic arteries) with a fine degree of detail thanks to rapid advancements in technology and software. CTP improves the performance of stroke diagnosis by providing useful information about brain vascular physiology.

CONCLUSION

In conclusion, since accurate diagnosis is essential to the sensible therapy of stroke and should ideally be performed in every instance, computed tomography scanning is the standard method for diagnosing acute stroke. The development of cerebrovascular accidents is influenced by a number of risk factors, including hypertension, diabetes, heart disease, and prior stroke episodes. It is advised that patients should be closely examined, that sudden neurological deficits or unexplained headaches should be further investigated for the possibility of cerebro-vascular accidents, and that early treatment could prevent some CVA cases from developing into life-threatening issues.

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