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ORIGINAL RESEARCH

Role of computed tomography in assessment of clinically suspected cases of cerebrovascular accident: A Hospital based study

Manish Shaw

Assistant Professor, Department of Cardiovascular Radiology and Endovascular Interventions, AIIMS, New Delhi, India

Correspondence:
Manish Shaw
Assistant Professor, Department of Cardiovascular Radiology and Endovascular Interventions, AIIMS, New Delhi, India

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ABSTRACT

Introduction: Computed tomography is in clinical practice of utmost important for differentiating stroke from other diseases, which may mimic stroke, it also distinguishes one type of stroke from other.The purpose of this study is to document the presence or absence of hemorrhage or infarcts, to find the location and reasonably assess the blood vessels involved and to spot the incidence of negative cases of clinically suspected stroke.

Materials and Methods: Detailed clinical history was taken in patients admittedinourhospital as per the Proforma. All patients referred for CT evaluation were scanned by using GE Hi speed dual slice spiral CT scanner and Toshiba helical CT scanner machine with the following specifications: 80 milliamperage, 120 kilovoltage, tilting angle ±22^{o}, matrix size of 512×512. Scans are taken parallel to the floor of the anterior fossa, the lowest section through the external auditory meatus and continuing to the top of the head. The gantry is angled towards the feet. Slice thickness of 4mm was used for scanning posterior fossa, 7mm for remainder of the head and wherever necessary still thinner sections weretaken.

Results: 75 cases were turned out to be intracerebral haemorrhage, which accounts for 26.7%.10 cases of CVT and the percentage calculation was 3.5%. Tumors deterred in 10 cases out of 280 cases of suspected CVA, which accounts for 3.5% of the total study and SDH cases were also 3.5%. 7.1 % cases were found normal in evaluation.

Conclusion: CT scanning is very useful and life caring technique for diagnosis of acute stroke as the rational management of stroke.

Keywords: Computed Tomography, technique, haemorrhage, cerebrovascular

INTRODUCTION

Despite many improvements in MR technology, CT is still the method of choice for more of the patients being evaluated for cerebrovascular accidents because of its fast acquisition. CT is a good diagnostic instrument even in early phase of acute ischemic stroke. In combination with new helical CT technique (CT angiography) all important decisions regardingearlytherapeuticscanbeanswered. Clinical approach to stroke has undergone many changes in the past few years. CT scan has become an essential and integral part of the assessment and has given a more objective basis to management and use of the IV contrast material. After non- contrast CT and the availability of follow-up studies inmany instancesignificantlyaidsinthedeterminationofthe correct vascular etiology of the stroke, as

does correlation of CT changes with patient's age, sex, history and neurologicaldeficit.[1,2] . CT can be used to distinguish between hemorrhagic strokes and stroke due to infarction.1CT scan is a dramatically new non-invasive technique that provides direct visualization of the intracranial contents without discomfort or risk to the patient (Radiation).CT helps to compare patterns of abnormalities with clinical profiles and pathologic anatomic findings at necropsy.3,4CT has proven to be of significant potential prognostic value in the evaluation of the acute stoke patient.[3]

CT Findings in Infarction CT changes in acute infarction evolve with time. Recent studies show that positive CT findings within the first 6 hours after onset vary from 56-92%. Positive CT findings have also been described inthe first 2 hours after cerebral infarction (68%), the incidence increases to 89% in the third hours and to 100%thereafter.[4]

There is a potential for prominent impact for radiologic imaging on care for patient with acute stroke.[5] Computed tomography (CT) is very important in diagnosis of CVA as it shows if it is hemorrhagic or ischaemic.[6] CT helps to compare patterns of abnormalities viewed with clinical profiles and pathologic anatomic findings at necropsy.[7] It has proven to be of significant potential prognostic value in the evaluation of the acute stroke patient.[8] However, it is a relatively new and scarcely available facility in a yet developing country like India. Its use is further restricted by patient's economic status. CT is still the method of choice for most of acute stroke patients despite of many improvements in MR technology. Contrary to a long existing opinion CT is a good diagnostic instrument even in early phase of acute ischemic stroke.[9] In combination with new helical CT techniques (CT angiography) all important decision regarding early therapeutic decisions can be answered.[10]

Cerebrovascular accidents are one of the leading causes of death after heart disease and cancer in the developed countries and one of the leading causes of death in India. The exact prevalence rate of this disease in the Indian population is not known, although it accounts for about one percent of admissions to general hospital. The incidence rate and the death rate from stroke increases dramatically with age. About 15 to 30% of patients die with each episode of cerebral infarction and 16 to 80% with cerebral haemorrhage. Those who survive are usually left with permanent disability. Thus, stroke becomes a great medical and social problem. Accurate and early diagnosis may improve the morbidity and mortality rates in the future as newer and more effective therapies are currently being instituted.[11]

MATERIALS & METHODS

The study subject would be considered as a case of cerebrovascular accident if he/she has an acute stroke which is defined as a focal or global deficiency of brain function lasting for more than24 hours which had occurred within 2 weeks of the patient's presentation and which was considered on admission to have a vascular cause. Detailed clinical history was taken in patients admitted in our hospital as per the Proforma. All patients referred for CT evaluation were scanned by using GE Hi speed dual slice spiral CT scanner and Toshiba helical CT scanner machine with the following specifications: 80 milliamperage, 120 kilovoltage, tilting angle $\pm 22^{o}$, matrix size of 512×512. Scans are taken parallel to the floor of the anterior fossa, the lowest section through the external auditory meatus and continuing to the top of the head. The gantry is angled towards the feet. Slice thickness of 4mm was used for scanning posterior fossa, 7mm for remainder of the head and wherever necessary still thinner sections weretaken. . Patients with clinical history of stroke were subjected to computed tomography scan of the head using GE REVOLUTION ACTs 16 slice MDCT SCANNER. The imaging protocol consisted of acquisition of sequential 5x5 mm axial sections with image reconstruction (coronal and sagittal) and viewing MPR images without intravenous contrast material administration. Images were evaluated with brain

window settings. Definition of study subject: The study subject was considered as a case of cerebrovascular accident if he/she has an acute stroke which is defined as a focal or global deficiency of brain function lasting for more than 24 hours which had occurred within 2 weeks of the patient's presentation and which was considered on admission to haveavascularcause.

RESULTS

Total 280 Patient

Out of 280 cases of CT evaluation of CVA, 155 cases of infarcts were diagnosed that accounts for 53.3%. 75 cases were turned out to be intracerebral haemorrhage, which accounts for 26.7%.10 cases of CVT and the percentage calculation was 3.5%. Tumors deterred in 10 cases out of 280 cases of suspected CVA, which accounts for 3.5% of the total study and SDH cases were also 3.5%. 7.1 % cases were found normal in evaluation. CT findings of patients were shown in table 1. Infarct and hemorrhage patients according to age were shown in figure 2 and 3.

Table No.1: CT findings in Patients

CT Findings	No. of cases	culation for 50 cases
Infarcts	155	55.3%
Haemorrhage	75	26.7%
SDH	10	3.5%
Tumor	10	3.5%
CVT	10	3.5%
Normal	20	7.1%

Table 2: Infarcts: Number of cases 155

AGE	CASES
20-29 Years	6
30-39 Years	16
40-49 Years	16
50-59 Years	25
60-69 Years	36
70-79 Years	36
80-89 Years	20

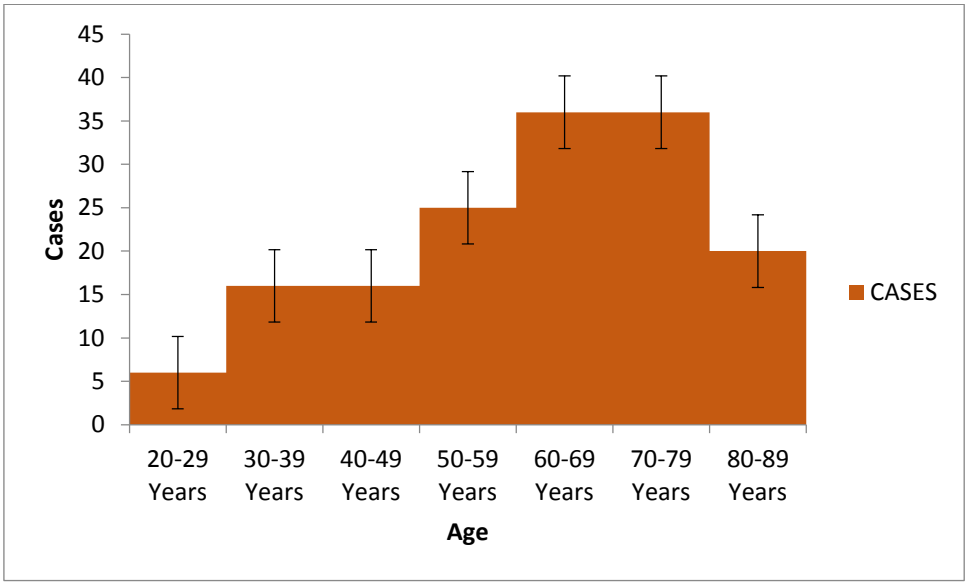
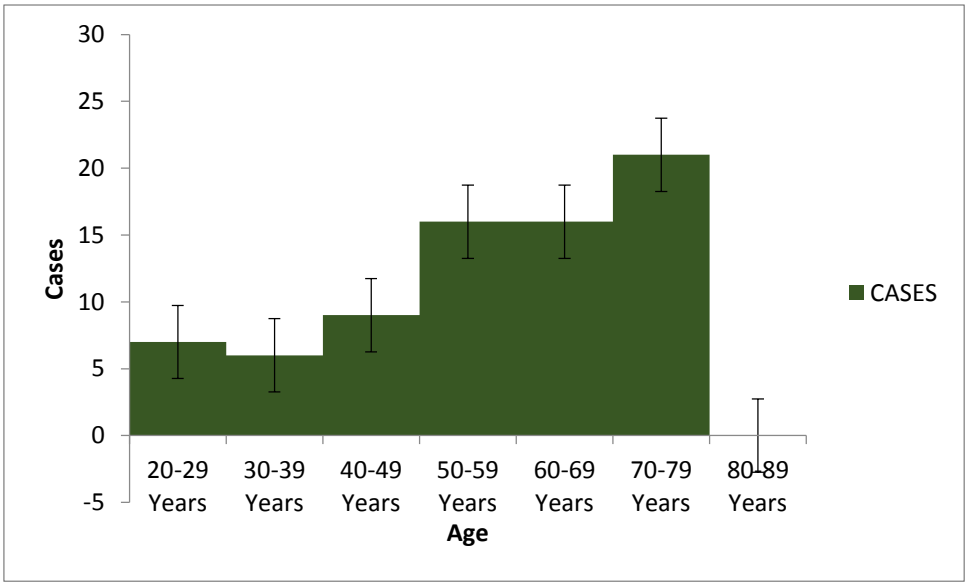


Table 3: Haemorrhage: Number of cases 75

AGE	CASES
20-29 Years	7
30-39 Years	6
40-49 Years	9
50-59 Years	16
60-69 Years	16
70-79 Years	21
80-89 Years	0



DISCUSSION

However, the scoring system had few limitations as it is reliant on the history given by the bystandersof patients and many times they may not able to give a clear account of signs and symptoms due to poor literacy level which directly correlates with the scoring system. 100% accuracy in differentiating hemorrhage from ischemic stroke based on history and clinical findings was not possible.[13]

Previous studies have stated the usefulness of CT scan in patients suffering from stroke by its ability to differentiate between hemorrhage and infarct and also other causes of stroke and hence aiding in the clinical management. Oxfords hire Community Stroke project which assessed 325 consecutive patients of acute CVA focusing on the role of usefulness of CTscan.[12,14]

Before the advent of CT scan and in places where CT scan is not yet available, physicians were mainly dependent on the history, physical findings and the Allen's method of scoring to differentiate between hemorrhage and infarct using this scoring system. Allen studies 174 cases of acute stroke and was able to make an accurate diagnosis in 90% of cases.[15] However, the scoringsystemhadcertainlimitationsasitisdependent on the history given by the relatives of patients and sometimes they are not able to give a clear description of signs and symptoms which correlated with the scoring system. 100% accuracy in distinguishing hemorrhage from ischemic stroke based on clinical findings was not possible. Previous studies have reported the usefulness of CT scan in patients suffering from stroke by ability to differentiate between hemorrhage and infarct and other causes of stroke and thus aiding in the clinical management. Oxford shire community stroke project that assesses 325 consecutive patients

of acute stroke highlighting the role of usefulness of CTscan.[16]
Also, a retrospective study of medical admissions at the University of Nigeria Teaching Hospital, Enugu reported a male genderpreponderance.[17] This male preponderance in CVA suggests that men have more risk factors for CVA such as hypertension and diabetes mellitus than women. Although, we did not review the lifestyle and habits of the patients, we think that men are more involved in high-risk habits such as smoking and alcoholism, and probably work harder under stressful conditions. These factors are closely associated with hypertension and other cardiac diseases which may elicit CVA. Over 75% of all infarcts occur in MCA territory. Detection of MCA territory hypodensity on hyper acute CT is a sensitive, prognostic and reliable indicator of the amount of MCA territory undergoing infarction.[18]
Mukherjee N, et al. (1998) studied on 80 patients suffering from stroke. On the settings of clinical and CT scan findings and with follow up to 6 months. He found that even though some of the clinical and CT scan findings are found to be important in prediction of outcome of stroke patients,clinical assessment appears to be more important.[19]
Previously, CT was considered insensitive in the evaluation of acute ischemic stroke patient; however, more recently detection of early CT findings has proved to be of prognostic value in the evaluation of these patients. The use of CT coupledwith early acute phase therapy of stroke such as thrombolytic therapy has shown to improve outcome in the acute stroke patients. Cerebral CT is a mainstay in emergency diagnostic work up of acute stroke patients and conveys important information within a few hours after the ictus. Hans Peter Harring et al., found that in a recent series of patients with MCA territory infarctions the incidence of positive findings was 68% in cerebral CT scans performed within 2 hours of stroke onset increasing to 89% within 3 hours, thus emphasizing the great value of emergency cerebral CT scanning in acute stroke management, which is superior to MRI.[20] Razzaq AA, et al. (1999) performed a CT study to investigate the role of CT in diagnosis and management of young stroke patients. CT scan findings of 108 stroke patients between 15 and 45 years of age were reviewed retrospectively. About 80% of the patients had infarcts of carotid territory and 20% of the vertebro basilar distribution. More than half of the infarcts were cortical (56%).[21] In the present study 60 patients of stroke were analyzed and of them 38 patients had infarct i.e., 63.33%, 15 patients had haemorrhage i.e., 25%, 2 patients had CVT i.e., 3.33%, 1 patient had tumor i.e., 1.6%, 3 patients had SAH i.e., 5% and 1 patient had normal scan i.e., 1.6 %. Gaskill et al. (1999) emphasized that although new imaging techniques have emerged in the diagnosis of cerebrovascular accidents, CT remains the primary imaging test for evaluation of acute stroke. It is fast reliable, readily available and an accurate method of screening patients prior to thrombolytic therapy.[22]

CONCLUSION

CT scanning is very useful and life caring technique for diagnosis of acute stroke as the rational management of stroke depends on “Accurate diagnosis” and should be ideally being done in all cases.

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