

Original Article

Assessment of Importance of CT scans in evaluation of Cerebrovascular Accidents

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ABSTRACT:

Background: Cerebral CT has shown that the prognosis of intracerebral hemorrhage (ICH) is not as poor as was supposed when small hemorrhages were often undiagnosed or misdiagnosed as ischemic events, and it has changed the order of diagnostic procedures for stroke. **Aim:** To assess importance of CT scans in evaluation of cerebrovascular accidents. **Materials and methods:** The present study was conducted in the Department of Radiology of medical institution. All patients with clinical diagnosis of acute stroke were referred to the radiology department for CT scan of the brain. After fulfilling the guidelines of the study, a total of 42 patients were included in the study. CT scans of the referred patients were conducted with standardized specifications. Follow up scans of the patient were conducted for 3 months post 1st scan. Scans were correlated clinically and surgically. **Results:** A total of 42 patients were included in the study. The age of the patients ranged from 12-68 years with mean age to be 39.81 years. Number of male patients in the study group is 28 and number of female patients in the group is 14. Infarcts were seen in 28 patients, hemorrhage in 8 patients, CVT in 4 patients, SAH in 1 patient and normal CT scan was seen in 1 patient. **Conclusion:** From the results, we conclude that for accurate diagnosis of the cases of acute stroke CT scanning is the gold standard technique and should be done in all the cases.

Keywords: CT scan, Cerebral Hemorrhage, Cerebrovascular accident, Stroke.

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INTRODUCTION:

Cerebral CT has shown that the prognosis of intracerebral hemorrhage (ICH) is not as poor as was supposed when small hemorrhages were often undiagnosed or misdiagnosed as ischemic events,¹⁻³ and it has changed the order of diagnostic procedures for stroke. Furthermore, in differentiating ischemic infarcts from hemorrhagic lesions, cerebral CT has proved to be of crucial importance for therapeutic considerations, particularly anticoagulant treatment. Several authors consider CT the best imaging modality for quantification of carotid artery stenosis and for the detection of some elements of plaque's vulnerability (such as ulcers).^{4, 5} The main limitation of the CT study is the radiation dose [usually it ranges from 5 to 7 milli-Sievert (mSv)] delivered to the patients even if some methods can be used to reduce the radiation dose and multi-spectral scanner can perform a CTA of carotid arteries with 2 mSv.⁶ Hence, the present study is planned to assess importance of CT scans in evaluation of cerebrovascular accidents.

MATERIALS AND METHODS:

The present study was conducted in the Department of Radiology of medical institution. All patients with clinical diagnosis of acute stroke were referred to the radiology department for CT scan of the brain. Exclusion criteria of the study were: Patients having neurological defects due to cause other than vascular for example hypoglycemia, diabetic ketoacidosis and trauma.

After fulfilling the guidelines of the study, a total of 42 patients were included in the study. CT scans of the referred patients were conducted with standardized specifications. Contrast agent (76% iodinated contrast agent) was used for routine IV contrast in all cases of stroke except intracerebral haemorrhage of non-traumatic origin. Follow up scans of the patient were conducted for 3 months post 1st scan. Scans were correlated clinically and surgically.

The statistical analysis of the data was done using SPSS program. Student's t-test and Chi- square test were used for

checking the significance of the data. A p-value less than 0.05 was predefined as statistically significant.

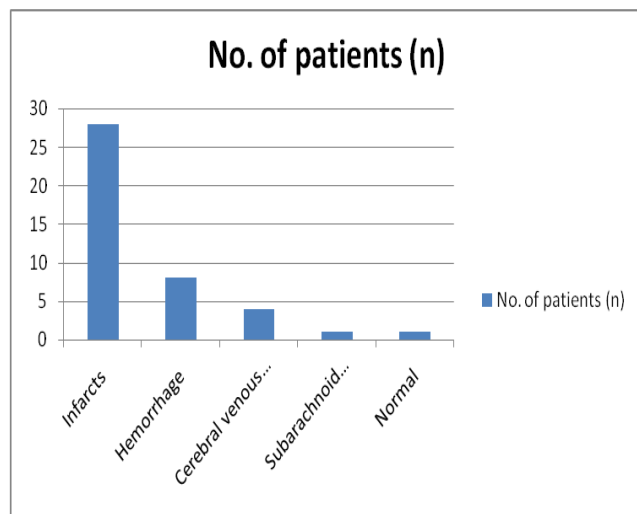
RESULTS:

A total of 42 patients were included in the study. The age of the patients ranged from 12-68 years with mean age to be 39.81 years. Number of male patients in the study group is 28 and number of female patients in the group is 14. **Table 1** shows the frequency of different findings on CT scan. We observed that Infarcts were seen in 28 patients, hemorrhage in 8 patients, CVT in 4 patients, SAH in 1 patient and normal CT scan was seen in 1 patient [Fig 1].

Table 1: Frequency of different findings on CT scan

Findings on CT scan	No. of patients (n)
Infarcts	28
Hemorrhage	8
Cerebral venous thrombosis (CVT)	4
Subarachnoid hemorrhage (SAH)	1
Normal	1

Figure 1: Showing frequency of different findings on CT scan



DISCUSSION:

The present study was conducted to assess the importance of CT scan in cerebrovascular accidents. We included 42 patients for the study. After conducting CT scans on all the patients, we observed that majority of cases were cerebral infarcts followed by hemorrhage. The results were statistically non-significant. Yunusa GH et al retrospectively reviewed CT findings in 128 patients who presented in the Radiology Department of Usmanu Danfodiyo University Teaching Hospital with clinical diagnosis of stroke was undertaken over a period of 1 year (from December 2008 to November 2009). The following data were recorded; age, sex, clinical diagnosis, and CT findings. All the CT examinations were performed on a

Neusoft C3000 multidetector spiral CT. Evaluation was done by consultant radiologists in the department. Of the 128 patients seen within the period under review, 84 (65.6%) were males while 44 (34.4%) were females. Age range was 4-85 years (mean 49.52, standard deviation (SD) 15.11), while 61 (47.7%) of the patients were in the age group of 41-60 years. Eighty-six patients (67.1%) had cerebral infarction, 38 (29.7%) had intracerebral hemorrhage, while one (0.01%) had subarachnoid hemorrhage. Three patients (0.02%) had normal brain CT findings. It was concluded that cerebral infarction is the most common form of stroke in this study. CT is essential in establishing the type of stroke, which subsequently determines the type of intervention as well as follow-up evaluation the patient may require. Salawu F et al compared two available clinical scores with brain CT for the differential diagnosis of cerebral ischemia and hemorrhage among adult Nigerians with first-ever acute stroke. The study was conducted at the State Specialist Hospital Maiduguri. Ninety-five adult Nigerians presenting with first-ever acute stroke onset within 48 hours were evaluated with the Siriraj Hospital Stroke (SHS) score on presentation and the Guy's Hospital Stroke (GHS) score 24 hours after admission. CT brain scan was considered as gold standard. These two stroke scores were compared with the results of CT brain and sensitivity, specificity; positive predictive and negative values were calculated. Applying the recommended optimum cut-off points for the 2 scores, diagnoses were classified by the Guy's Hospital Stroke and Siriraj Hospital Stroke score as probable hemorrhagic strokes (49% and 25% respectively) and probable ischemic (40% and 65% respectively). The remainder were classified as "uncertain." The prevalence of hemorrhage diagnosed by gold standard (CT) was 29.5% while the prevalence of ischemic stroke diagnosed by CT was 54.7%. The CT brain was normal in 15.8%. Sensitivity, specificity, positive predictive value and negative predictive value for cerebral hemorrhage was 0.64, 0.48, 0.4 and 0.71 for Guy's Hospital Stroke score and 0.35, 0.73, 0.4 and 0.68 for Siriraj Hospital Stroke score. It is evident from the study that these clinical scoring systems alone are not sufficient and one has to employ the use of computerized tomography scan in establishing stroke type in Nigerians with stroke.^{7,8}

Inoue S et al reviewed characteristic diagnostic findings of vascular diseases in the central nervous system with 3-dimensional computed tomographic angiography (3D-CTA) using multi-detector row computed tomography (MDCT) and a novel 320-row area detector CT (320-ADCT). With coverage of 160 mm in a single rotation, 320-ADCT enables acquisition of both 4-dimensional CT angiography (dynamic 4D-CTA) and whole-brain CT perfusion imaging. They describe their experience of investigating cerebrovascular diseases with MDCT and 320-ADCT, as well as several postprocessing techniques to acquire images useful for diagnosis, therapy planning, and simulation of neurosurgical and endovascular intervention.

3D-CTA demonstrates has high accuracy in detecting and evaluating cerebral aneurysms and steno-occlusive diseases. Angiographic analysis, including information of surrounding tissues on 3D-CTA, allows assessment of the feasibility of neurosurgical or endovascular approaches and the technique to accomplish the therapy. However, 3D-CTA using MDCT is limited in its detection of aneurysms less than 3 mm in size and aneurysms embedded in the skull base region. In addition, discrimination between intradural paraclinoid aneurysms and extradural intracavernous aneurysms remains an unresolved problem in imaging of cerebral aneurysms. 320-ADCT may solve this problem with its high accuracy in discriminating arteries from the venous system. 3D-CTA could be used as an alternative to DSA for detection of severe carotid artery disease. 3D-CTA enables measurement of the lesions, plaque imaging, prediction of anatomical variants, screening for asymptomatic vascular lesions, and exclusion of patients with risk factors from carotid endoarterectomy (CEA) or carotid artery stenting (CAS). The diagnosis of intracranial dural arteriovenous fistula (DAVF) with CTA is challenging. Recently, several authors proposed diagnostic findings of ADVF by CTA and reported high sensitivity and specificity. 320-ADCT may offer comprehensive information for diagnosis and therapy planning of intracranial DAVF. Although DSA is a standard modality to detect spinal vascular malformations, selective catheterization requires considerable time and a certain amount of contrast medium, and is associated with a risk of neurological complications. Spinal 3D-CTA prior to DSA is useful in selective catheterization to arteries at certain spinal levels as well as when considering treatment options and therapy planning. Ogunseyinde AO et al present the findings in 14 paediatrics patients with SCA who had CT examination at the University College Hospital Ibadan on account of stroke between 1993 and 2000. There were 8 female and 6 male with a mean age of 11.25 years and SD of 3.66. Cerebral infarction was the most common finding occurring in 57% of the patients while intracerebral bleed was seen in 21%. Two patients had a mixed lesion and atrophy was seen in one patient. Five patients (36%) had their lesion on the right hemisphere while eight (57%) had their lesions on the left side. The frontal and parietal lobes were mainly affected. Prompt CT screening of the brain in a child with sickle cell anaemia who presents with symptoms and signs suggestive of stroke can help identify the particular type of lesion and this may influence mode of therapy given as well as prognosis.^{9, 10}

CONCLUSION:

From the results, we conclude that for accurate diagnosis of the cases of acute stroke CT scanning is the gold standard technique and should be done in all the cases.

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