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Original Article

Importance of Computed Tomography scan in patients with Cerebrovascular Accidents

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***ABSTRACT*:**

Background: A neurologic symptom or symptom complex caused by cerebral ischemia or hemorrhage is commonly called a cerebrovascular accident (CVA), or stroke. The cardinal clinical features are sudden or subacute onset and (except for subarachnoid hemorrhage) focal neurologic deficit. Three main stages are used to describe the CT manifestations of stroke: acute (less than 24 hours), subacute (24 hours to 5 days) and chronic (weeks). **Aim of the study:** To study the importance of CT scan in patients with cerebrovascular accidents. **Materials and methods:** The present study was conducted in the Department of Radiology of the Medical institution. For the study, we selected patients who were referred to the Department of Radiology for CT scan of brain post suspected cerebrovascular accident for confirmation of the diagnosis. We excluded patients who had neurological defects because of other etiological factors. A total of 80 patients were included. CT scan of the brain was done as per the standardized guidelines. **Results:** In the present study, a total of 80 patients were included. The number of male patients in study group was 44 and number of female patients in study group was 36. The age range of the patients was 18-65 years and the mean age of the patients was 44.39 years. . We observed that 31 patients had cerebral infarcts, 27 patients had hemorrhage, 8 patients gad cerebral venous thrombosis, 6 patients had subarachnoid hemorrhage and 8 patients had normal CT scan. **Conclusion**: Within the limitations of present study, this can be concluded that CT scan should be routinely done in patients who are suspected for cerebrovascular accident to avoid misdiagnosis.

Keywords: CT scan, stroke, cerebrovascular accident.

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INTRODUCTION:

A neurologic symptom or symptom complex caused by cerebral ischemia or hemorrhage is commonly called a cerebrovascular accident (CVA), or stroke. The cardinal clinical features are sudden or subacute onset and (except for subarachnoid hemorrhage) focal neurologic deficit. Three main stages are used to describe the CT manifestations of stroke: acute (less than 24 hours), subacute (24 hours to 5 days) and chronic (weeks).[1, 2] Acute stroke represents cytotoxic edema, and the changes can be subtle but are, significant. They are also termed "early ischemic changes "and were formerly termed "hyper-acute". It is intracellular edema and causes loss of the normal gray matter/white matter interface (differentiation) and effacement of the cortical sulci. A thrombus in the proximal middle cerebral artery (MCA) is sometimes seen in the acute phase and appears as hyper attenuation. A subacute stroke represents vasogenic edema, with greater mass effect, hypoattenuation and well-defined margins. Mass effect and risk of herniation is greatest at this stage.[3, 4] Chronic strokes have loss of brain tissue and are hypoattenuating. A non-contrast head CT may identify the early signs of stroke, but most importantly will exclude intracerebral hemorrhage and lesions that might mimic acute ischemic stroke such as tumor or intracerebral hemorrhage. Non-contrast CT is also used in the evaluation of acute intracranial hemorrhage as it produces good contrast between the high attenuating ("bright") clot and the low attenuating ("dark") cerebrospinal fluid (CSF). This tool's availability and speed make it very useful in the initial evaluation of suspected stroke patients.[5, 6] Hence, the

present study was conductedto study the importance of CT scan in patients with cerebrovascular accidents.

MATERIALS AND METHODS:

The present study was conducted in the Department of Radiology of the Medical institution. For the study, we selected patients who were referred to the Department of Radiology for CT scan of brain post suspected cerebrovascular accident for confirmation of the diagnosis. We excluded patients who had neurological defects because of other etiological factors. A total of 80 patients were included. CT scan of the brain was done as per the standardized guidelines. Contrast agent (76% iodinated contrast agent) was used for routine IV contrast in all cases of stroke except intracerebral haemorrhage of non-traumatic origin. For follow up scans, patients were recalled after 3 months. Clinical and surgical correlation was done between baseline CT and post 3 months CT scan. The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

In the present study, a total of 80 patients were included. The number of male patients in study group was 44 and number of female patients in study group was 36. The age range of the patients was 18-65 years and the mean age of the patients was 44.39 years. **[Table 1]Table 2** shows the frequency of anomalies on CT scan indicative of cerebrovascular accident. We observed that 31 patients had cerebral infarcts, 27 patients had hemorrhage, 8 patients gad cerebral venous thrombosis, 6 patients had subarachnoid hemorrhage and 8 patients had normal CT scan. **[Fig 1]**

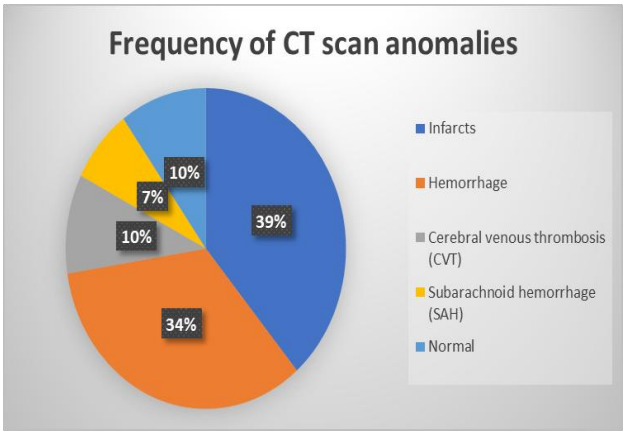
Table 1: Demographic characteristics in study group

Demographic variables	Number
Number of male patients	44
Number of female patients	36
Age range (years)	18-65
Mean age of the patients (years)	44.39

Table 2: Frequency of anomlies on CT scan indicative of cerebrovascular accident

Findings on CT scan	No. of patients (n)
Infarcts	31
Hemorrhage	27
Cerebral venous thrombosis (CVT)	8
Subarachnoid hemorrhage (SAH)	6
Normal	8

Figure 1: Frequency of CT scan anomalies



DISCUSSION:

The present study was conducted to evaluate the significance of CT scan in cerebrovascular accidents. We included 80 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. The results were compared with previous studies and was found to be consistent. Hedberg M et al studied hemispheric side differences of CVA. Cardiac-surgery patients with CVA and with computer tomography (CT) performed (n = 77) were analyzed within a total group of 2641 consecutive cases. CT data were reviewed for hemispheric and vascular distribution and compared with CVA-symptom data of immediate and delayed type. Of the included patients, 66% had positive CT. In the group of 'cardiac-type' operations (e.g., routine clamping and cannulation) and having immediate CVA, right-hemispheric lesions were more frequent than of the contra-lateral side. Patients with aortic dissections had strong dominance of bilateral findings, which was different from the unilateral pattern of 'cardiac-type' operations. The middle-cerebral artery territory dominated, and when involved showed a significant right-sided distribution. Both CT and clinical symptoms confirmed that CVA after cardiac surgery has a right-hemispheric predominance. These observations may imply that aortic manipulation directs embolic material towards the brachiocephalic trunk. Bisdas S et al compared perfusion CT and diffusion-weighted magnetic resonance imaging (DWI) as means of assessing the ischemic brain in hyperacute stroke. Twenty patients with ischemic stroke underwent perfusion computed tomography (CT) and magnetic resonance imaging (MRI) studies <3 hours after stroke onset. Cerebral blood flow thresholds were used to delineate the ischemic lesion, penumbra, and infarct. The volume of the ischemic (core and penumbra) lesion on admission perfusion CT was correlated with the volume of admission DWI abnormalities. The infarcted core tissue volume (on admission CT) correlated more strongly than the admission DWI abnormality volume with the follow-up

infarct volume on fluid-attenuated inversion recovery images. A correlation was demonstrated between infarct volume in perfusion CT and follow-up DWI abnormality volume. Significant correlations were found between ischemic and infarct region volumes in perfusion CT and NIHSS admission and follow-up scores. This was concluded that both imaging modalities provide a sufficient assessment of the hyperacute brain infarct, with significant correlation between them and the clinical condition at admission. [7, 8]

Na DG et al compared multiphasic perfusion computed tomography (CT) with diffusion and perfusion magnetic resonance imaging (MRI) in predicting final infarct volume, infarct growth, and clinical severity in patients with hyperacute ischemia untreated by thrombolytic therapy. Multiphasic perfusion CT was performed in 19 patients with ischemic stroke within 6 hours of symptom onset. Two CT maps of peak and total perfusion were generated from CT data. Diffusion-weighted imaging (DWI) and perfusion MRI were obtained within 150 minutes after CT. Lesion volumes on CT and MRI were compared with final infarct volume and clinical scores, and mismatch on CT or MRI was compared with infarct growth. The lesion volume on the CT total perfusion map strongly correlated with MRI relative cerebral blood volume (rCBV), and that on the CT peak perfusion map strongly correlated with MRI relative cerebral blood flow (rCBF) and rCBV. The lesion volume on unenhanced CT or DWI moderately correlated with final infarct volume, but only lesion volume on unenhanced CT weakly correlated with baseline clinical scores (P = 0.024). The lesion volumes on the CT peak perfusion map and MRI rCBF similarly correlated with final infarct volume and clinical scores and more strongly than those on mean transit time (MTT) or time to peak (TTP). DWI-rCBF or CT mismatch was more predictive of infarct growth than DWI-MTT or DWI-TTP mismatch. They concluded that multiphasic perfusion CT is useful and of comparable utility to diffusion and perfusion MRI for predicting final infarct volume, infarct growth, and clinical severity in acute ischemic stroke. Jaillard A et al studied the pathophysiology of early CT signs. In patients with acute ischemic stroke in the middle cerebral artery territory, the areas of early CT signs and diffusion weighted imaging (DWI) hypersignal were independently assessed and drawn on a standardized atlas. Then, patients were classified into three groups (early CT signs larger than, similar to or smaller than DWI hypersignal) and compared with perfusion weighted imaging (PWI). Of 16 patients, CT scanning was performed with a median time of 3 h after onset and early CT scan signs were recorded in 10/16 patients (62.5%). DWI signal hyperintensity was present in 15/16 (94%) patients. In 7/16 (43%) patients, the area with early CT scan signs was larger than the DWI lesion ('CT-larger group'). Only in 2/16 (12%) patients were the areas matching ('matching group'). In 7/16 (43%) the DWI lesion was larger than the early CT scan signs area ('DWI-larger group'). When compared with PWI, the areas of early CT signs were larger than DWI hypersignal and were matching with PWI abnormalities (rMTT) in 2 cases, suggesting that they may represent a reversible process. They concluded that early CT signs might have a potential dual fate: infarction or reversibility. Other techniques of recognizing reversible ischemic damage, such as DWI-PWI, are needed to improve acute stroke diagnosis and management.[9, 10]

CONCLUSION:

Within the limitations of present study, this can be concluded that CT scan should be routinely done in patients who are suspected for cerebrovascular accident to avoid misdiagnosis.

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