

Correlation of Clinical and CT Scan diagnosis of Stroke

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ABSTRACT

Objectives: To determine the frequency of correctly diagnosed type of stroke on clinical findings taking Computed Tomography as Gold Standard.

Materials and methods: A total of 80 patients with clinical diagnosis of CVA, attending the accident and emergency department of Ittefaq Hospital Lahore were enrolled in the study. After history taking and physical examination, clinical diagnosis was made and confirmed by C.T. Scan as a gold standard.

Results: The age range was 30-90 years with the most common age group being 51-70 years. Hemorrhagic stroke was found in 30% patients while ischemic stroke was found in 70% patients. Out of 80 patients, clinical diagnosis was accurate in 63(79%) patients and inaccurate in 17(21%) patients. Clinical accuracy was 83% in ischemic stroke and 67% in hemorrhagic stroke.

Conclusion: Though the clinical diagnosis can be made with accuracy in a large number of patients, CT scan is mandatory before initiating treatment.

Key words: Cerebrovascular Accident (CVA), Computed Tomography(C.T), Ischemic stroke,

INTRODUCTION

Stroke is defined as abrupt onset of a focal neurologic deficit that is attributable to a focal vascular cause¹. Stroke is the third commonest cause of death after coronary artery disease.² It causes nearly 200,000 deaths each year in United States and is a major cause of morbidity^{3,4}. Estimated annual incidence of stroke in Pakistan is 250/100000, translating to 350000 new cases every year⁵. The death rate following stroke is 25 %⁶.

Stroke is classified as ischemic stroke (80%) and hemorrhagic stroke (20%). Ischemic stroke is due to atherothrombosis of cranial and extra cranial vessel or embolism from the heart and great vessels in the neck. Hemorrhagic stroke is due to rupture of a vessel within the brain parenchyma (cerebral hemorrhage) or in the subarachnoid space (subarachnoid hemorrhage).

Ischemic and hemorrhagic strokes vary in their clinical presentation. CT scan is a simple, non-invasive and accurate investigation in distinguishing ischemic from hemorrhagic stroke. This study will compare clinical and C.T. scan diagnosis of stroke and determine the reliability of the clinical diagnosis in cases of stroke. In a study carried out in Pakistan, the frequency of correctly diagnosed types of stroke on the basis of clinical findings was found to be 77%⁷. Rationale of the study is, if the frequency of correctly diagnosed types of stroke on clinical findings will be high, then we can institute early treatment on the basis of clinical findings to avoid unnecessary delays some time encountered with CT scan, and in periphery where facility of CT scan is not available.

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MATERIAL AND METHODS

This was a Cross sectional survey carried out at the Department of Medicine, Ittefaq Hospital (Trust), Lahore. This study was carried out over a period of six months from 26th May 2010 to 25th November 2010. Eighty patients admitted through accident and emergency ward with a clinical diagnosis of stroke were enrolled for the study using non probability purposive sampling. Patients of both genders, aged 30-90 years, having clinical features of ischemic or hemorrhagic stroke were selected. Patients with a history of head injury in past six months, taking warfarin (on history), having platelet count less than 100000/ul on CBC, International normalized ratio (INR) more than 1.5, serum creatinine more than 1.5 mg/dl or a history of chronic renal insufficiency and chronic liver disease were excluded from the study.

Detailed history from the patient or from the relatives was taken and complete clinical neurological examination was performed for making a clinical diagnosis regarding type of stroke. Patients presenting with sudden onset of neurological deficit with rapid deterioration, vomiting, and severe headache and neck stiffness were clinically characterized as having hemorrhagic stroke. Ischemic stroke was considered in patients presenting with gradual onset of neurological deficit without vomiting, headache or neck stiffness with risk factors such as a history of Diabetes Mellitus (Fasting plasma glucose ≥ 126 mg/dl or random plasma glucose ≥ 200 mg/dl) or atrial fibrillation (Irregularly irregular pulse with ECG evidence of irregular rhythm and absent p waves) or hypercholesterolemia (Serum cholesterol > 6 mmol/l) or previous history of transient ischemic attack (Focal neurological deficit lasting less than 24 hours)

C.T Scan brain was carried out as a gold standard in all patients and reported by a single radiologist. Ischemic stroke was identified as "hypodense lesion" and hemorrhagic stroke was identified as "hyperdense lesion. The data was recorded on a given Performa and analyzed by SPSS version 10.

RESULTS

A total of 80 patients with clinical diagnosis of stroke were included in this study. Out of these patients 46 (57.5%) patients were male while 34 (42.5%) patients were female.

Out of 80 patients, 22 (27.5%) patients were between 30 and 50 years of age, 38 (47.5%) patients were between 51 and 70 years of age and 20 (25%) patients were between 71 and 90 years of age. Mean age was 61 years. Out of 80 patients with clinical diagnosis of stroke, 49% had diabetes mellitus, 14% had elevated cholesterol levels and 11% had previous history of transient ischemic attack. Atrial fibrillation was found in 9 patients 11%.

Out of 80 patients, clinical diagnosis of ischemic stroke was made in 59 patients (74 %). Out of these, ischemic stroke was confirmed on CT scan in 49 patients reflecting a clinical accuracy of 83 % while remaining 10 patients (17%) had hemorrhagic stroke.

Out of 21(26%) suspected cases of hemorrhagic stroke, CT scan confirmed hemorrhagic stroke in 14 patients reflecting a clinical accuracy of 67% while remaining 7 patients (33%) had cerebral infarction.

Overall, clinical diagnosis was correct in 79% (63/80) whereas clinical judgment was inaccurate in 21% (17/80) cases.

Table 1: Distribution of patients by risk factors for stroke

Risk factor	Yes	no
Diabetes mellitus	49%	51%
Hypercholesterolemia	14%	86%
Atrial fibrillation	11%	89%
Transient ischemic attack	11%	89%

Table 2: Frequency of type of Stroke on clinical findings and CT Scan (n=80)

Type of stroke	Cinical findings	CT scan
Ischemic stroke	59(74%)	56(70%)
Hemorrhagic	21(26%)	24(30%)

Table 3: Frequency of correctly diagnosed type of stroke (n=80)

Type of stroke	Clinical diagnosis	Correct diagnosis	Incorrect diagnosis
Ischemic	59(74%)	49 (83%)	10(17%)
Hemorrhagic	21(26%)	14 (67%)	7(33%)

DISCUSSION

Despite all the advances in medical science, stroke to date remains third leading cause of morbidity and mortality² and utilizes a significant proportion of health care facilities. Differentiation of cerebral infarction and cerebral haemorrhage is the most important first step in the management of acute stroke as clinical management of the two disorders differs substantially. It has been documented that thrombolytic therapy started within three hours of ischemic stroke improves outcome⁸ where as similar therapy can be disastrous in case of hemorrhagic stroke. Also, certain drugs like nimodipine have been found useful to treat vasospasm associated with subarachnoid variety of hemorrhagic stroke^{9,10} highlighting the importance of correct diagnosis prior to initiating treatment.

CT scan is a simple and non-invasive test to correctly diagnose the type of stroke. However, quick access to CT scanning is not available in every part of our country and hospital. We studied 80 patients with stroke and tried to establish the diagnosis on clinical grounds and correlated this with C.T.Scan.

Over two third of patients (70%) had ischemic stroke while 30 % patients had hemorrhagic stroke. This figure is lower for ischemic stroke while higher for hemorrhagic stroke compared with study reported by Qureshi et al¹¹.

Diabetes mellitus was present in 49% of our ischemic stroke patients. This figure is higher than that reported by Khan et al (36.3%)¹². Hypercholesterolemia was present in 14% of ischemic stroke patients. This figure is lower than that reported by Khan et al (25.5%)⁹. Previous history of transient ischemic attack was found in 11% of our ischemic stroke patients. This figures is lower than that reported by Khan et al (24.9%)¹³. In our study, we found atrial fibrillation in 11% of patients. This figure is comparable to that reported by Alam et al (12%)¹⁴.

Overall, clinical diagnosis was accurate in 79% patients which is comparable to the study done by Nisar et al⁷. Clinical accuracy was comparable to the study by Baloch et al in cases of ischemic stroke but was higher than the same study in cases of hemorrhagic stroke¹⁵.

In recent years, a number of scoring systems based on clinical data determining the relative likelihood of infarction or hemorrhage were developed. However, it was concluded that all these stroke scores e.g., Allen score, Greek score and Siriraj score lack accuracy hence can not be applied safely to guide the physician in management of stroke^{16,17,18}.

A study by Besson et al¹⁹ showed that these clinical scoring systems do not exhibit enough accuracy to be applied safely if the use of antithrombotic treatment is to be considered and use of these clinical stroke scores can only be limited to clinically classify strokes for academic purpose where CT scan facility is not available.

Our findings emphasize the need for routine CT scanning in stroke patients as this remains the most accurate method for differentiating between haemorrhage and infarction.

CONCLUSION

The importance of detailed history and clinical examination cannot be denied as evidenced by our study that clinically accurate decision was made in 79% of patients. However, despite certain degree of clinical accuracy, the limitations of clinical diagnosis regarding the type of stroke should be understood. Therefore, Computed Tomography (C.T) is necessary to initiate definite therapy in patients with stroke.

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