

Role of Clinical Diagnosis to Ascertain the Type of Stroke

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Background: Cerebrovascular Accident or stroke is a major cause of morbidity and mortality all over the world, including Pakistan. Determination of type of stroke either hemorrhagic or infarct is important for start of any treatment. This study was carried out to compare clinical diagnosis of stroke with Computed tomography (CT) scan findings in ascertaining the type of stroke (hemorrhagic or infarct).

Methods: This study was carried out at Medical unit 3, Services Hospital, Lahore from July 2003 to December 2003 and December 2004 to April 2005. Sixty patients admitted to our ward for stroke lasting more than 24 hours, with at least unilateral motor weakness affecting face and/or arm and/or leg were included in the study. Clinical diagnoses of type of stroke i.e. hemorrhage or infarct was made using a clinical parameter, with specific emphasis on speed of onset, presence or absence of vomiting, headache and altered state of consciousness. CT scan brain was used as a gold standard in all patients to confirm the diagnosis. The results were compared on case to case basis with CT diagnosis.

Results: The study included 60 patients, 44 with ischemic stroke and 16 with hemorrhagic CVA. Out of these 60 patients; clinical diagnosis correlated with CT findings in 46 patients (76.66%) whereas in 14 patients (23.33%), CT findings contradicted our clinical suspicion. Clinical accuracy was 84% (37/44) in case of ischemic stroke and 56% (9/16) in hemorrhagic stroke.

Conclusion: The study has shown that although clinical evaluation of acute stroke can be made in most cases but CT scan is mandatory for excluding hemorrhage before start of treatment.

Keywords: Cerebrovascular Accident, CT scan, Ischemic stroke, Hemorrhagic stroke.

Introduction

Stroke is characterized by the sudden loss of circulation to an area of the brain, resulting in a corresponding loss of neurologic function. Cerebrovascular accident or stroke syndrome, is a nonspecific term encompassing a heterogeneous group of pathophysiologic causes, including thrombosis, embolism and hemorrhage.¹

It causes both physical and mental crippling, resulting in coma, hemiplegia, paraplegia, monoplegia, speech disturbances, nerve paralysis and sensory impairment etc.¹

It is a worldwide health problem making an important contribution to morbidity and mortality in developed as well as developing countries. It is the 3rd commonest cause of death in USA despite the fact that the incidence of stroke has decreased over the past 3 decades owing to better control of B.P, diabetes mellitus and other known risk factors.

Cerebral infarction is usually the most frequent form of stroke encountered in clinical studies, followed by hemorrhage. Sub-arachnoid hemorrhage comes next as regards both mortality and morbidity.²

The management of a patient with acute stroke is based on the knowledge of stroke type: hemorrhagic or ischemic.³ In most developed countries, diagnosis is easily obtained by CT scanning, which allows the

accurate distinction of hemorrhagic and ischemic types. However, quick access to CT scanning is not available in all hospitals of our country. It is well known that some clinical data may suggest a hemorrhagic or ischemic stroke but no data is specific enough to allow a reliable diagnosis.

Early diagnosis and treatment are imperative to prevent and decrease permanent neurological sequelae and to decrease mortality and morbidity. For this purpose, CT scan brain is employed to make an accurate diagnosis. We carried out this study to compare clinical diagnosis with CT scan in accurately identifying the type of CVA.

Materials and Methods

This study was carried out at Medical unit 3, Services Hospital, Lahore from July 2003 to December 2003 and December 2004 to April 2005. Sixty consecutive patients of both genders and age between 18-75 years, presenting with stroke were included in the study.

Stroke was considered in patients presenting with an acute neurological deficit (focal or global) or altered level of consciousness. Patients with history of head injury in the past 6 months, those on anticoagulant drugs, those with history of space occupying lesion, migraine, epilepsy or those who

refused CT scan or consent were excluded. In addition minor stroke and transient ischemic strokes were also excluded.

On admission detailed history and thorough clinical examination including neurological assessment was carried out. Patient presenting with sudden onset of neurological deficit with rapid deterioration, nausea, vomiting, severe headache and neck stiffness along with deteriorating level of consciousness were classified as having hemorrhagic strokes clinically. Those with gradual onset of weakness without nausea, vomiting and disturbed conscious level were classified as having cerebral infarction.

All patients had CT scan brain. Routine image parameters included axial sections from base of brain to vertex with 10 mm slice thickness.

We evaluated CT scan findings by looking for any area of abnormal attenuation, ventricular system, subarachnoid cisternae, mid line shift, cerebral sulci and gyri, deep nuclei, evidence of mass effect and surrounding edema.

The results of CT scan were compared with clinical diagnosis on case to case basis and precision of clinical diagnosis was ascertained.

Results

Out of 60 patients, 28 were males and the 32 females. Amongst these 47 patients were above 40 years of age, 12 between 20-40, and 1 below 20 years of age.

Out of these 60 patients, 36 had cerebral infarction, 16 had hemorrhage and 8 had normal CT scan (Fig. 1).

We suspected hemorrhagic stroke in 16 patients clinically. Out of these only 9 had hemorrhage on CT scan showing 56.25% agreement, while the rest 7 had infarction.

Out of 44 clinically suspected of cerebral infarction, only 37 proved to have infarction on CT scan reflecting a clinical accuracy of 84%. Rest 7 patients were diagnosed as hemorrhagic stroke by CT scan.

Overall our diagnosis was correct in 77% (46/60) of cases whereas clinical judgment failed in 23% (14/60) of cases (Table 1).

According to this study 82.14% (23/28) of male patients had cerebral infarction, whereas 65.62% (21/32) of females presented infarction. Overall percentage of hemorrhagic stroke was more in females (Table 2).

We also noted the time of occurrence of stroke in our patients which revealed that most of the patients were awake at the time of stroke i.e. 49 (81.66%) were awake whereas 11 (18.33%) had stroke during sleep. All those who had stroke during sleep had infarction on CT (100%) whereas 67.34% (33/49) of awake patient had infarction on CT. None of the patients had hemorrhagic stroke while asleep (Table 3).

Patient with stroke while awake, were further evaluated for its occurrence at rest or on exertion, which showed that one half of the patients with hemorrhagic stroke were engaged in some activity at the time of stroke whereas 50% (8/16) of stroke occurred at rest. Among patients who had ischemic stroke while awake 69.69% (23/33) occurred at rest whereas 30.3% (10/33) occurred on exertion. (Table 4).

Table 1: Correlation between clinical and CT scan findings.

Clinical Stroke		CT Scan Correlating	CT Scan not Correlating
Infarction	44	37 (84%)	7 (16%)
Haemorrhage	16	9 (56.25%)	7 (43.75%)
Total	60	46 (77%)	14 (23%)

Table 2: Frequency of infarction and hemorrhage, according to sex distribution.

Gender	Infarct	Haemorrhage	Total
Male	23 (82.14%)	5 (17.86%)	28
Female	21 (65.62%)	11 (34.37%)	32
Total	44 (73.33%)	16 (26.66%)	60

Discussion

Cerebrovascular accidents are a major cause of mortality and morbidity through out the world. Although control of some risk factors like hypertension, diabetes mellitus, atherosclerosis, cardiac diseases and bleeding diathesis has led to decrease prevalence seen in past three decades, it still continues to be the third leading cause of death in

USA.⁴

Identification of type of stroke i.e. hemorrhage or ischemic is important. This can enable us to benefit from new developments in the management of acute stroke. Like Nimodipine, a new calcium blocker which is being used with better outcome in patients with subarachnoid hemorrhage to prevent spasm hence preventing further deterioration.⁵ Thrombolytic therapy with rt-PA (recombinant tissue-plasminogen activator) has been shown to be of benefit in ischemic stroke if offered within 4 hours of onset of stroke.⁶ A recent study suggests that Lubeluzole (an inhibitor of glutamate release) may benefit patients with acute Ischemic stroke if given within 6 hours.⁷ Aptiganel (noncompetitive inhibitor of the NMDA receptor) also appears promising when given early in the course of ischemic stroke (infarct).⁷

Research analyses until now have suggested that clinical diagnosis of stroke type at the bedside is inaccurate. However, using our clinical criteria, we were able to affirm diagnosis in 84% of patients with a cerebral infarct and in 56% of the patients with hemorrhagic CVA in our population. We understand that a positive predictive value of 100% cannot be proved, but none of scoring system or study until now has given 100% accuracy. The advantage of our clinical criteria is that it is very simple and can be applied to patients at the time of admission to hospital.

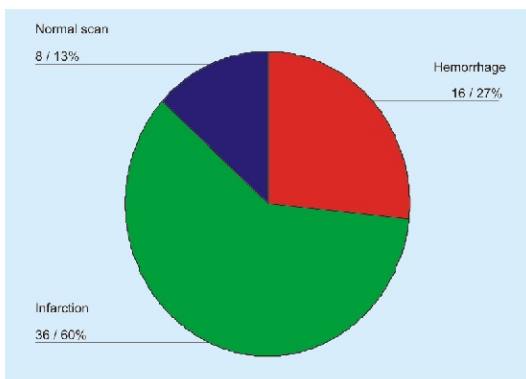


Fig. 1: Frequency of infarction, hemorrhage and normal CT scan.

Various scoring systems based on clinical data determining the relative likelihood of infarction or hemorrhage have been formulated and tested.^{8,9} They

Table 3: Relationship of type of stroke with awake / sleep pattern.

At The Time of Stroke	Infarction	Haemorrhage
Awake	49 (81.66%)	33 (75%)
Sleep	11 (18.33%)	11 (25%)
Total	60	44

Table 4: Relationship of stroke occurrence with level of activity.

	Infarction	Haemorrhage
At rest	31 (63.26%)	23 (69.69%)
Exertion	18 (36.73%)	10 (30.3%)
Total	49	33

use multivariate discriminant analysis to generate a linear equation that predicts the occurrence of infarct or hemorrhagic stroke. Although the clinical diagnoses made using these scores seem more accurate than those made by physicians,⁸ they present several problems.¹⁰ The Allen score requires data collected 24 hours after admission, such as level of consciousness and diastolic blood pressure, and must be calculated with a handheld calculator. Furthermore, the Siriraj score, which also includes the level of consciousness and the diastolic blood pressure, and they both do not achieve a diagnosis with a positive predictive value of close to 100%.

In our clinical criteria, predictor of diagnosis of hemorrhagic CVA were:

1. Sudden onset of altered state of consciousness with rapid deterioration.
2. Presence of severe headache with nausea and vomiting.
3. Neck stiffness.

Diagnosis of CVA due to cerebral infarction was favored by:

1. Gradual onset of altered state of consciousness.
2. Absence of headache with nausea, vomiting and neck stiffness.
3. History of transient neurological deficit, peripheral arterial disease, history of hyperlipidemia.

Our criteria are simple and can be calculated from information available to all physicians at the patient's bedside. It seems to give a reliable diagnosis in about more than 80% of selected stroke patients. While it cannot replace CT in the management of all strokes, this score may be very useful for patients who do not

undergo CT, as is the case in many hospitals of our country where this facility is not available.

To sum up we emphasize the need for routine CT scanning in stroke patients as this remains the gold standard for differentiating between hemorrhage and infarction. Systematic diagnostic approaches can be used as guide to treating physicians where computed

tomography facility is not available.

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