COMPARISON OF CLINICAL DIAGNOSIS WITH COMPUTED TOMOGRAPHY IN ASCERTAINING TYPE OF STROKE

Jehangir Khan, Atique ur Rehman
Department of Medicine, Ayub Medical College and Ayub Teaching Hospital, Abbottabad

Background: Cerebrovascular Accident or stroke is a major cause of morbidity and mortality. For any treatment to be contemplated it is important to know whether we are dealing with a bleed or an infarct. 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 ischemic). **Methods:** This study was carried out at Department of Medicine, Ayub Teaching Hospital, Abbottabad from November 2001 to December 2003. One hundred consecutive patients fulfilling the inclusion criteria presenting with stroke were included. Clinical diagnosis was mainly based on presentation with specific emphasis on speed of onset, presence or absence of underlying cardiovascular diseases and past history of stroke. CT scan brain was carried out in all patients to confirm the diagnosis. The results were compared on case to case basis with CT diagnosis. **Results:** The patients included 71 males and 29 females, with an age range of 20-80 years. Clinically, 43% were suspected to have cerebral infarction, 25% intracerebral bleed and 32% indeterminate. CT scan brain showed 60% cerebral infarction, 27% intracerebral hemorrhages, 9% Space Occupying Lesion and 4% hemorrhagic infarct. **Conclusion:** We found that clinical diagnosis in majority of the cases is not as reliable as the CT scan. It can help in diagnosis but cannot confirm it.
Keywords: Cerebrovascular Accident, CT Scan, Ischemic stroke, Hemorrhagic stroke

INTRODUCTION

Cerebrovascular accident (CVA) or stroke is defined as an acute focal neurological deficit resulting from cerebrovascular disease. In majority of cases stroke is due to cerebral infarction (85%).[1] Despite new post-stroke management strategies it remains a serious disease affecting not only the patient but his family as well.[2,3] It is difficult to be sure clinically about the type of stroke (Hemorrhagic or ischemic) in majority of cases as there is no specific differentiating feature.[1] The only confirmatory test is computed tomography (CT) of brain. However, some features like sudden onset of coma or changing state of consciousness with severe headache, vomiting and meningeal irritation suggest intracranial bleed. Similarly in cerebral infarction patient usually presents with sudden onset of stroke with lateralizing neurological deficit (hemiparesis, aphasia, homonymous hemianopia) with or without clinically detectable risk factors(hypertension, atrial fibrillation, rheumatic heart disease, recent myocardial infarction).[4]

We carried out this study to compare clinical diagnosis with CT scan in accurately identifying the type of cerebrovascular accident.

MATERIAL AND METHODS

This study was carried out at Department of Medicine, Ayub Teaching Hospital, Abbottabad from November 2001 to December 2003. One hundred consecutive patients of both genders and age more than 20 years presenting with stroke were included in the study. Patients with history of head injury in the past 6 months, those on anticoagulant drugs 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. Special emphasis was made on risk factors especially hypertension, coronary artery disease, atrial fibrillation, rheumatic heart disease, peripheral vascular disease, smoking and diabetes mellitus etc. The clinical diagnosis of type of stroke was made on the basis of the neurological history and signs. Those patients who presented with sudden onset of coma, rapid deterioration of neurological state, severe headache and vomiting and neck stiffness along with hypertension were considered to be suffering from hemorrhagic stroke. Patients who presented with sudden onset of lateralizing signs especially in the presence of atrial fibrillation, rheumatic heart disease, recent myocardial infarction and carotid bruit were considered to be suffering from cerebral infarction. In addition to routine investigation blood sugar, lipid profile, ECG and in some

selected patient echocardiography was performed. All patients had CT scan brain.

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 100 cases, 71 were males and the rest females. Amongst these 59 patients were above 60 years of age, 25 between 50-60, 15 between 40-50 years and 10 between 20-40 years of age.

We suspected hemorrhagic stroke in 25 patients clinically. Out of these only 13 had hemorrhage on CT scan showing 52 % agreement, while the rest 12 had infarction.

Out of 43 clinically suspected of cerebral infarction, only 25 proved to have infarction on CT scan reflecting a clinical accuracy of 58.6%. Out of the rest 18 patients 10 were diagnosed as hemorrhagic stroke by CT scan while the rest 8 were hemorrhagic infarction.

Out of the 32 patients in whom clinical diagnosis of type of stroke was uncertain CT scan showed infarction in 16, space occupying lesion in 8, hemorrhage in 4 and hemorrhagic infarction in 4 cases. No case was found to be normal on CT scan.

Table 1: Clinical diagnosis of type of cerebrovascular accident (n=100)

Diagnosis	Cases (%)
Hemorrhage	25 (25%)
Infarction	43 (43%)
Indeterminate	32(32%)

Table 2: CT scan findings in patients with cerebrovascular accident patients (n=100)

Diagnosis	Cases (%)
Hemorrhage	27 (27%)
Infarction	53 (53%)
Space Occupying Lesion	8 (8%)
Hemorrhagic Infarct	12 (12%)

Table 3: CT scan diagnosis in clinically classified cases (n-68)

	Clinical Diagnosis	C.T. Scan	Agreement of results (%)
Hemorrhage	25	13	52
Infarction	43	25	58.6

DISCUSSION

It is necessary to make correct identification of the exact pathologic process causing stroke. This can enable us to benefit from new developments in the management of acute stroke.[6] It has been observed that low molecular weight heparin when given in acute ischemic stroke showed better results than placebo.[5] Nimodipine, a new calcium blocker is being used with better outcome in patients with subarachnoid hemorrhage to prevent spasm hence preventing further deterioration.[6] A neurotoxin glutamate is released after ischemic stroke, which activates a number of biochemical cascades resulting in neuronal dysfunction and death. Recent advances are in progress to develop novel compounds which could effectively block the toxic effects of glutamate on brain cells.[7]

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. 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 every country and hospital. It is well known that some clinical data may suggest a hemorrhagic or ischemic stroke even though no data are specific enough to allow a reliable diagnosis. A number of scoring systems based on clinical data determining the relative likelihood of infarction or hemorrhage were developed and tested over the last decade or so. Although the clinical diagnoses made using these scores seem more accurate than those made by physicians, they present several problems.

Since the clinical distinction between haemorrhagic and ischaemic stroke cannot be achieved with a simple clinical evaluation, and it is virtually impossible to submit all stroke patients to CT, a weighted clinical score may offer some advantages to physicians who are involved in stroke management. The Allen score (also referred to as the Guy's Hospital score), a validated clinical score was received with a lot of enthusiasm but it has gradually faded away.[8]

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 the Allen score do not achieve a diagnosis with a positive predictive value of close to 100%.[9]

A study compared the Guy's Hospital and Siriraj stroke diagnostic scores on a group of 1059 patients admitted to the acute stroke unit at

the Western Infirmary, Glasgow, with suspected stroke. The diagnosis was confirmed as stroke by computed tomography scanning or necropsy in 991 patients. The Guy's Hospital score had a sensitivity of 70% for the diagnosis of haemorrhage and specificity of 64%. The corresponding figures for the Siriraj score were 68% sensitivity and 64% specificity. This validation study concluded that neither score is useful for exclusion of haemorrhage before anticoagulant treatment is initiated or as a diagnostic screening procedure for trials of low-risk treatments such as aspirin.[10] Exactly similar were the findings of Hawkins et al in a study conducted in Newzealand to compare the same two scoring systems.[11]

Recently Siriraj stroke score and Guy's hospital score was tested by Badam et al[12] in an Indian setting. It was found that both scores are not sufficiently accurate to identify infarct from hemorrhage.

In a recent study another scoring system "Greek stroke score" was compared to the Allen and Siriraj scores. The overall comparability of Greek stroke score and Allen score was better as compared to Greek stroke score and Siriraj stroke score. Greek Stroke score was more specific in diagnosing hemorrhage as compared to Siriraj score. However, the authors concluded that all these stroke scores lack accuracy hence could not be applied safely to guide the physician in management of stroke.[13]

A study very similar to ours was carried out in the Emergency Ward of a Brazilian University Hospital where patients were examined by emergency physicians and computerised tomography. This study also tested Guy's Hospital and Siriraj scoring system. They reported that both clinical diagnosis (made by emergency physicians) and the available diagnostic tests very unable to confidently discriminate between the stroke subtypes.[14]

A study by Besson et al[9] 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 emphasise the need for routine CT scanning in stroke patients as this remains the most accurate method for differentiating between haemorrhage and infarction. Systematic diagnostic approaches can be used as guide to treating physicians where computed tomography facility is not available.

It is evident from this study that clinical judgment alone is not sufficient and one has to rely on CT scan that is the confirmatory diagnostic tool in establishing the type of stroke. It is however an expensive test and not easily available in most of the District Headquarters Hospitals in Pakistan.

REFERENCES

1. Martin BM. Cerebrovascular Disease: Epidemiology, History, Examination and differential diagnosis. Medicine International 1996:10:35-41.
2. Ali L, Jamil H, MashoorAS. Risk Factor in Stroke. J Coll Physicians Surg Pakistan 1997;9(1):7-10.
3. Lalkalay, Wassermann. Cerebrovascular accident: Care and rehabilitation. The practitioner 1983 227,469-73.
4. Guieis MA, Perez M. Epidemiologic assessment of stroke. MMC proceedings 1988;11:48-52.
5. Kay R, Wong S Ka, Yuk YL. Low Molecular Weight Heparin in the treatment of Acute Ischemic Stroke. N Engl J Med 1995;333:1588-93.
6. Wilkinson IMS. Essential Neurology. 3rd ed. Oxford: Blackwell Science Ltd;1999.
7. Hsu CY. Recent advances in the development of therapeutics to reduce brain damage after stroke. Proceedings of the 7th International conference on health problems related to the Chinese-July 1-3, 1994.
8. Celani MG, Ceravolo MG, Duca E, Minciotti P, Caputo N, Orlandini M, Ricci S, Provinciali L. Was it infarction or haemorrhage? A clinical diagnosis by means of the Allen score. J Neurol 1992;239(7):411-3.
9. Besson G, Robert C, Hommel M, Perret J. Is It clinically possible to distinguish Nonhemorrhagic infarct from hemorrhagic Stroke? *Stroke* 1995;26:1205-9.
10. Weir CJ, Murray GD, Adams FG, Muir KW, Grosset DG, Lees KR. Poor accuracy of stroke scoring systems for differential clinical diagnosis of intracranial haemorrhage and infarction. *Lancet* 1994;344:999-1002.
11. Hawkins GC, Bonita R, Broad JB, Anderson NE. Inadequacy of clinical scoring systems to differentiate stroke subtypes in population-based studies. Stroke. 1995;26(8):1338-42.
12. Badam P, Solao V, Pai M, Kalantri SP. Poor accuracy of the Siriraj and Guy's hospital stroke scores in distinguishing haemorrhagic from ischaemic stroke in a rural, tertiary care hospital. Natl Med J India 2003;16:8-12.
13. Soman A, Joshi SR, Tarvade S, Jayaram S. Greek stroke score, Siriraj score and Allen score in clinical diagnosis of intracerebral hemorrhage and infarct: validation and comparison study. Indian J Med Sci. 2004;58(10):417-22.
14. Gomes Mda M, Costa MF, Andre C, Gomes R, Novis SA. Emergency physician's diagnosis of stroke subtype. An accuracy study. Arq Neuropsiquiatr 1998;56(3B):523-7.

Address For Correspondence:
Dr Jehangir Khan, Department of Medicine, Ayub Medical College, Abbotttabad.
Email: dr_jehangir_khan@yahoo.com