Original Article

Prediction of Outcome in Acute Hemorrhagic Stroke from Initial Clinical Presentation and a Single CT Scan on Admission

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Abstract

Background: Intracerebral hemorrhage (ICH) accounts for about 7-15% of all strokes and is the most devastating type of stroke with mortality rate of 34%-51%.

Objective: The study was done to determine the potential predictors for short-term mortality and neurological recovery in ICH patients by clinical and computed tomographic (CT) correlation.

Methods: This study was conducted over 100 admitted patients out of them fifty were diabetic, in the department of Medicine, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh for a duration of one year from 01.07.2010 to 30.06.2011. Data was collected in hospital directly from patient or attendance. Result was calculated using Chi-square test.

Result: In this study mean age of the ICH patients was 60.26 ± 11.22 years. The clinical and CT scan findings were correlated with the outcome. GCS score was significantly higher among survivors. Poor outcome was associated with a hematoma volume of more than 30ml and presence of ventricular extension. Mortality of hemorrhagic stroke patients was 40% in first month. Most of the death occurred in first 7 days.

Conclusion: Though outcome and functional status at discharge were well correlated with the initial CT scan findings, age and GCS score, but larger study with greater matched variables, risk factors and long-term follow-up is needed to make a concrete comment.

Keywords: Hemorrhage, Outcome, Stroke, CT scan, GCS.

Introduction:

Stroke is defined by the World Health Organization (WHO) as a condition characterized by rapidly developing symptoms and signs of a focal brain lesion, with symptoms lasting for more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.[1] Intracerebral hemorrhage(ICH) is characterized by non-traumatic abrupt onset of severe headache, an altered level of consciousness and focal neurological deficit secondary to focal collection of blood within the brain parenchyma. An ICH accounts for approximately 7-15% of all strokes and is the most common devastating type of stroke. It carries a high early mortality rate of 34-51% with half of the fatalities occurring within the first 2 days of ictus.[2-5] Multivariate studies have shown that level of consciousness, hematoma size and ventricular extension are the most important risk factors at presentation in patients of ICH which determine outcome and mortality in first month.[5-8]

A recent study suggests age of patient and amount of alcohol consumed within a week of ICH as independent determinant of outcome after hemorrhagic stroke.[9] Diabetes mellitus is a disease which involves almost all organs of the body and associated with poorer outcome in diseases of other organs in comparison to patients without diabetes mellitus. In all emergency presentations of diabetes mellitus is associated with higher mortality.[10] Cerebrovascular mortality rates have been shown to be raised in patients with diabetes relative to the general population.[11,12] Markedly elevated blood pressure on admission and persistent inadequate blood pressure control adversely affect the prognosis in intracerebral hemorrhage.[13] Brain imaging is the cornerstone for diagnosis of ICH. Although MRI is an excellent tool for considerable information on the process of acute stroke; MRI is not readily available to the most patients. CT scan is the imaging modality of choice in patients presented with acute stroke, which can detect ICH within

few minutes of onset of stroke.[14] It is safe and non-invasive, helps to measure the hemorrhage size and the presence of ventricular extension. All these information are extremely useful in assessing the outcome in acute ICH, which cannot be obtained by clinical examination itself.[15,16] In our country income and resources are limited, CT scan cannot be done repeatedly. Therefore, it is an important task for the physician to predict the functional outcome from a single CT scan of the brain done at the time of the hospital admission.

The purpose of this study is to find out how we can predict a short-term in-hospital mortality and morbidity from clinical presentation specially age, presence of diabetes or not, GCS level and CT scan findings: hemorrhage size with or without ventricular extension, influence the clinical outcome in patients with acute stroke.

Materials and Methods:

This observational study was carried out in the department of Medicine, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh. The duration of the study was from 01.07.2010 to 30.06.2011. The study comprises 100 patients with intracranial hemorrhage (ICH) - all were CT scan proved. Out of 100 patients 50 had diabetes mellitus. ICH patient who were referred for interventional therapy, patients were taking antiplatelet or anticoagulant therapy, patients with blood dyscrasia, subarachnoid hemorrhage and hemorrhagic stroke due to trauma were excluded from the study. Data was collected by using predesigned data collection form from patient or attendance in hospital. Initial presentations of patients were recorded and appropriate investigations were advised.

Consciousness level was assessed by Glasgow comma scale. Systemic complications associated with stroke were searched and recorded. Baseline characteristics includes age, sex, living conditions, medication before stroke (antihypertensive, anti-platelet, and anticoagulant therapy), vascular risk factors and co-morbid conditions included hypertension (previous diagnosis, current treatment), diabetes mellitus, previous myocardial infarct or ischemic heart diseases, valvular heart diseases, transient ischemic attack (TIA) or stroke, smoking (current or former habit). Acute stress induced hyperglycemia were differentiated by using HbA1C and standard method of diagnosis of diabetes. A CT scan was done within few hours of the hospital admission. Volume and site of hemorrhage and presence of ventricular

extension were obtained from CT scan. Volume of hematoma was calculated using the formula ABC/2, site of hemorrhage & ventricular extension were recorded. From day 2 to day 7 all patients were followed up twice daily and any change in status were recorded. As shortage of bed in hospital did not allow long duration stay, these patients were discharged on seventh day and followed up on 15th and 30th day. Patients who could not attend this follow up, their information were collected over telephone. Result was calculated using Chi-square test.

Results:

A total of 100 patients of hemorrhagic stroke were incorporated in this study. Majority of patients belonged to age group above 60 years 38(38%), most of the patients were male 74(74%) and 62(62%) patients were smoker. 50(50%) patients were diabetic, 70(70%) hypertensive and maximum patient's lipid profile were found normal in this study. In this study, majority of patients 58(58%) presents with loss of consciousness and vomiting, followed by motor weakness 56(56%). Glasgow Comma Scale (GCS) level was ≤ 8 in 52(52%) patients who presents with loss of consciousness on admission; (Table-I).

Table-I

Socio-demographic and Clinical Profile of patients (*n=100*)

Parameter	Number of patients	
Age (year) mean± SD	60.26 ± 11.22	
Sex : Male/Female	74(74%)/26(26%)	
Smoker	62(62%)	
Hypertension	70(70%)	
Diabetes mellitus	50(50%)	
Hyperlipidaemia	10(10%)	
Clinical presentations:	::	
Loss of consciousness	58(58%)	
Vomiting	58(58%)	
Hemiparesis/Hemiplegia	56(56%)	
Aphasia	20(20%)	
Headache	12(12%)	
GCS level: ≤8 / >8	52(52%) / 48(48%)	P-Value = 1.00

Result was calculated using Chi-square test.

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CT scan evaluation of all patients revealed Intracerebral hemorrhage (ICH) size > 3o ml in 50(50%) patients and ventricular extension in 34(34%) cases.

Total 40(40%) patients died in 1st month and remaining patients improved gradually in this study. Most of death in this study 38(95%) occurred within first 5 days of admission;(Table-II).

Table-II
Outcome of patients (n=100)

Death in days	No of death	Total death	
< 5 days	38	40 (40%)	P-Value < 0.05
6 – 10 days	02		

Result was calculated using Chi-square test.

Out of 38(38%) patients ages more than 60 years, 30(84.2%) died in this study. 22(44%) and 32(45.7%) patients of diabetic (50) and hypertensive (70) respectively died in this study. 38(73%) died out of 52 patients who had GCS level < 8. 40(80%) patients out of 50 died whose hematoma volume was > 30 ml and 30(88.2%) out of 34 died who had ventricular extension found on initial CT Scan of brain; (Table – III).

Table-III
Prognostic factors and outcome of patients (n=100)

Factors	Total no of patients	Death (Total death=40)	
Age > 60 years	38(38%)	30(84.2%)	P-Value = 0.01
Diabetes mellitus	50(50%)	22(44%)	P-Value = 0.50
Hypertension	70(70%)	32(45.7%)	P-Value = 0.01
GCS < 8	52(52%)	38(73%)	P-Value < 0.05
Hematoma size > 30 ml	50(50%)	40(80%)	P-Value < 0.05
Ventricular extension	34(34%)	30(88.2%)	P-Value < 0.05

Result was calculated using Chi-square test.

Discussion:
Hemorrhagic stroke is the most common devastating type of stroke. It carries a high early mortality and half of the fatalities occur within the first 2 days of attack. This study comprised assessment of outcome of acute hemorrhagic stroke from presenting clinical features and a single CT scan study on admission in one tertiary level medical institute in Bangladesh.

In this study, most of the patient's 72(72%) age were

above 50 years. This co-relates with two studies abroad and explained by the fact that atheroma of cerebral vessels induced by diabetes occurs at the same rate as other vascular risk factors[17,18] and > 60 years group shows worst outcome, 30(84.2%) out of 38 died in this group. This also co-relates with studies abroad.[19]

Some studies have reported diabetes mellitus as an independent risk factor of early mortality.[20,21] But only 22(44%) out of 50 patients died in this study. This is might be due to, those studies included both ICH and Infarcts, so likely to biased by overestimation or underestimation.

Hypertension has been reported as the most common significant and independent risk factor for ICH.[22,23] Out of 70 hypertensive patients treatment and follow-up were regular only in 28 patients and 32(45.7%) hypertensive patients died in this study. This is similar to other studies abroad.[23,24]

According to some studies, level of consciousness on hospital admission and hematoma volume are the most robust outcome predictors.[25,26] This is also found in this study, patients who presented with loss of consciousness had worst outcome 38(65.5%) died out of 58, specially those whose GCS level < 8,(73%), (P-value = <0.05).

A number of studies showed a direct relationship of hematoma volume with a clinical outcome in ICH.[27,28] A study by Molshatzki et al. demonstrated that patients with moderate to severe stroke had 2.3-fold higher hematoma volume as compared to mild stroke patients.[29] This is also supported by this study, as all died patients(n=40) in this study had hematoma volume > 30ml.

Intraventricular extension of blood from other anatomical location of hemorrhage is an independent poor prognostic factor.[30] This study also found that outcome of ICH stroke patients with ventricular extension is very poor, 30(88.2%) out of 34 died(P-value = <0.05).

Conclusion:
Initial clinical presentations and a CT scan of brain give a lot of information from which we can predict the functional outcome in stroke (ICH) patients. Low GCS score and older age are related to high mortality rate. Though it is thought that diabetes mellitus is an independent risk factor of early mortality but it is not statistically significant in this study. Hematoma volume

>30ml and presence of ventricular blood on the initial CT scan have been consistently shown to predict high mortality rate. Short-term outcome was well correlated with the initial CT scan findings and GCS score. But long-term impact of the hematoma and other CT scan parameters on long duration remains to be determined.

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