

ICH Score and Basal Plasma D-Dimer in Patients with Intracerebral Haemorrhage

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ABSTRACT

BACK GROUND

Intracerebral haemorrhage constitutes 10-20 % of all strokes & remains without treatment of proven benefit & has higher risk of morbidity & mortality than cerebral infarction or subarachnoid bleed. Thus, these models may accurately predict outcome, and hence the purpose of this study is to define a clinical grading scale for patients with ICH which uses criteria that are predictive of outcome & that can be rapidly & accurately assessed at the time of presentation in emergency/casualty. Estimation of basal plasma D-dimer levels an indicator of systemic activation of coagulative & fibrinolytic system has shown to a powerful predictor of both early neurological worsening & mortality outcome & hence the present study is undertaken.

METHODS

The study was carried out in the IPD of Department of General Medicine, Basaveshwara Teaching and General Hospital, Kalaburagi, attached to Mahadevappa Rampure Medical College. It is a cross sectional study conducted among 100 intracerebral bleed patients between November 2018 to November 2019 with simple random sampling procedure. Patients were followed up at the end of 1 month with telephone/letter/email.

RESULTS

The mortality among patients who scored 0 of ICH scale was 0%, ICH score of 1 was 13.6 %, ICH score of 5 was 100 %. No patient scored 6. Higher the ICH score, higher is the mortality. Mortality among patients with D-Dimer value between 1500 – 5000 ng/ml is 55.2 %, and > 5000 ng/ml is 92.3 %. Above table indicates that higher the basal level of D-Dimer value higher is the mortality. Mortality among patients of either sex was equal i.e., 50 % between 8 - 15 days, and no deaths were noted between 15 - 30 days.

CONCLUSIONS

Intracerebral haemorrhage (ICH) has remained a serious disease despite recent improvements in management. So, efforts must be directed towards better understanding and modification of risk factors. The major risk factor in our study was hypertension. The other common risk factors were alcohol consumption and smoking. Thus, measures to ensure adequate control of hypertension/compliance of treatment among hypertensive, abstinence from alcohol and smoking may reduce the incidence of ICH. High initial plasma D-Dimer levels would indicate bad prognosis in ICH. In addition to diagnosis of ICH, CT Scan can also be used as a useful tool in assessing prognostic outcome of ICH, by using radiological parameters like larger volume of haematoma, presence of midline shift, intraventricular extension of haemorrhage and hydrocephalus which indicated bad prognosis i.e., using ICH score, higher the ICH score higher is the mortality.

KEY WORDS

Intracerebral Haemorrhage, ICH Score, Basal Plasma D-Dimer, Risk Stratification, GCS Score

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BACKGROUND

Intracerebral haemorrhage is defined as the non-traumatic, abrupt onset of severe headache, altered level of consciousness, or focal neurological deficit associated with a focal collection of blood within the brain parenchyma on neuroimaging or at autopsy which is not due to trauma or haemorrhagic conversion of a cerebral infarction. CVA is the second commonest cause of death in the west after heart disease. It ranks first in all neurological disease of adults, with more than 50 percent of all hospital admissions being of stroke. Not only is the mortality associated with stroke, but also the morbidity puts a heavy emotional, psychological and financial burden both on the patient, as well as on the family and the state.

Spontaneous intracerebral haemorrhages account for approximately 10 - 20 percent of all stroke cases and is associated with the highest mortality rate (30%-40%). Its clinical importance derives from its frequency, high morbidity and high mortality. It has still remained as a serious problem despite attempts at improving the outcome by medical and neuro-surgical treatment. The causes of intracerebral haemorrhages are multiple. Hypertension is the most important risk factor for spontaneous intracerebral haemorrhage. Other potential risk factors for spontaneous intracerebral haemorrhage includes excessive alcohol consumption, smoking, diabetes mellitus, anticoagulant therapy, genetic factors, cerebral amyloid angiopathy, bleeding from vascular abnormalities (arterio-venous malformations, aneurysms), drugs like cocaine/amphetamine abuse, bleeding into the tumor and others. Majority of the risk factors are modifiable. Hence identification of modifiable risk factors for ICH is important to decrease the incidence of spontaneous ICH at primary intervention level¹.

Spontaneous ICH has still remained a serious disease despite attempts at improving outcome by medical and neurosurgical treatment^{2,3}. There are many clinical/neuro-radiological parameters like Glasgow Coma Scale, severity of neurological deficit, site, size, volume of haemorrhage, presence of intra ventricular extension, hydrocephalous and others that would predict the outcome of ICH. hence this study accurately predict outcome, they vary in their ease of use, especially by personnel not specifically trained in neuroimaging & statistical analysis and hence the purpose of this study is to define a clinical grading scale for patients with ICH which uses criteria that are predictive of outcome & that can be rapidly & accurately assessed at time of presentation in emergency/casualty especially by a person not specifically trained in stroke neurology.⁽⁴⁾ Estimation of basal plasma D-dimer levels a indicator of systemic activation of coagulative & fibrinolytic system has shown to a powerful predictor of both early neurological worsening & mortality outcome & hence the present study is undertaken.^(5,6,7)

METHODS

This is a cross-sectional study carried out in the in-patient department of general medicine, Basaveshwara Teaching and

General Hospital, Kalaburagi attached to Mahadevappa Rampure Medical College, Kalaburagi. It is a cross sectional study, with 100 intracerebral bleed patients was sample. The sample size was taken based on the convenience of the study. The study was conducted between November 2018 to November 2019 under purposive sampling procedure. And Patient were followed up at 1 month end with telephone/ letter / email. Study subjects were selected after applying inclusion-exclusion criteria. Information is collected through prepared proforma from each patient. All CT proven Patients with intracerebral haemorrhage within 24 hrs of symptoms onset of any age > 18 years and of either sex were taken as Inclusion criteria. Patients with intracerebral bleed secondary to trauma, tumour, haemorrhagic transformation of infarct, Patients presenting after more than 24 hrs of symptoms of ICH onset, Patients on anticoagulants, Patients with bleeding diathesis and Patients with subarachnoid haemorrhage were taken as exclusion criteria. The study was approved by Ethics committee and informed consent was obtained.

Statistical Analysis

Data was entered into Microsoft Excel (windows 7; Version 2007) and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 22.0; SPSS Inc, Chicago). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical Variables were determined. Association between Variables was analyzed by using Chi-Square test for categorical Variables. Bar charts and Pie charts were used for visual representation of the analyzed data. Level of significance was set at 0.05.

RESULTS

During the study period 100 cases of C.T. Scan proven spontaneous intracerebral haemorrhage cases were taken by Simple Random Sampling and studied for Grade intracerebral haemorrhage using the ICH score. Estimation of basal D-DIMER levels as prognostic outcome in intracerebral haemorrhage. Risk stratification of ICH using the ICH score.

Table 1: The mortality among patients who scored 0 of ICH scale was 0 %, ICH score of 1 was 13.6 %, ICH score of 2 was 66.7 %, ICH score of 3 was 88.9 %, ICH score of 4 was 90% and ICH score of 5 was 100 %. No patient scored 6. This table shows higher the ICH score, higher is the mortality. $p < 0.01$. Mortality among patients with D-Dimer value between 500-1500 ng/ml is 0 %, between 1500 - 5000 ng/ml is 55.2 %, and > 5000 ng/ml is 92.3 %. Above table indicates that higher the basal level of D-Dimer value higher is the mortality. $p < 0.001$. Mortality among patients > 80 years was 100 % in our study.

Out of 30 patients who died < 7 days, males were 20 (83.3 %) and females were 10 (58.8%), mortality among patients of either sex was equal i.e., 50 % between 8-15 days, and no deaths were noted between 15 - 30 days. Higher the basal plasma d-dimer higher the mortality, 55.2 % with d-dimer > 1500 ng/ml and 92.3 % with d-dimer > 5000 ng/ml. 100 %

mortality was seen in patients with GCS 3 - 4 in our study. Present study mortality > 30 (cm³) was 79.5 % and < 30 (cm³) 12.5 % and Qureshi et al. 83.3 % and 22.3 % Table 5. Comparison of Intraventricular Extension and Mortality, Tentorial Location and Mortality (30 day). Present study had higher (74.5%) mortality with IVE when compared to Hemphill (66 %) and Agustin (47.9%). Present study has higher mortality (76.5%) than Hemphill (53%) in relation to infratentorial location of ICH.

Association between ICH Score and Outcome			
ICH Score	Number	Outcome	
		Alive (n = 59) n (%)	Death (n = 41) n (%)
0	30	30 (100.0)	0
1	22	19 (86.4)	3 (13.6)
2	15	5 (33.3)	10 (66.7)
3	9	1 (11.1)	8 (88.9)
4	20	2 (10.0)	18 (90.0)
5	7	0	7 (100.0)
6	-	-	-

Chi-Square Test, p Value < 0.001, Significant

Association between D-Dimer and Outcome (N=100)			
D-Dimer	Number	Outcome	
		Alive (n = 59) n (%)	Death (n = 41) n (%)
500 - 1500	45	45 (100.0)	0
1500 - 5000	29	13 (44.8)	16 (55.2)
>5000	26	2 (7.7)	24 (92.3)

Chi-Square Test, p Value < 0.001, Significant

Association between Age and Outcome (N=100)			
Age > 80	Number	Outcome	
		Alive (n=59) n (%)	Death (n=41) n (%)
Yes	8	0	8 (100.0)
No	92	59 (64.1)	33 (35.9)

Chi-Square Test, p Value < 0.001, Significant

Table 1

Death in Days	Number	Gender	
		Male	Female
< 7	30	20 (83.3)	10 (58.8)
8 - 14	11	4 (16.7)	7 (41.2)
15 - 30	0	0	0
Total	41	24	17

Chi-Square Test, p Value = 0.081, Not Significant

Table 2. 30 Day Mortality in Relation to Gender (N=100)

Age >80	Present Study (%)	Hemphill	Present Study (%)	Hemphill
Yes	8	22	100	67
No	92	78	33.33	39

Table 3. Comparison of Age and Mortality

Mortality among patients > 80 yrs was 100 % in our study, where as it was 67 % in Hemphill study.

Comparison of D-Dimer Levels with Mortality		
D-dimer ng/ml	Present Study	P Delgado
< 1500	0 %	10 %
> 1500	55.2 %	50 %
> 5000	92.3 %	-

Comparison of GCS and Outcome		
GCS	Present study (%)	Hemphill (%)
3 - 4	100	97.14
5 - 12	75	50.87
13 - 15	22.2	8

Comparison of Volume of ICH and Outcome		
Volume (CM ³)	Present Study Mortality (%)	Qureshi et al (%)
> 30	79.5	83.3
< 30	12.5	22.4

Table 4

Comparison of Intraventricular Extension and Mortality (30 Day)			
Intraventricular Extension of Hemorrhage	Present Study	Hemphill (%)	Danial Agustin (%)
Present	74.5 %	66	47.95
Absent	6.1 %	19	22.5

Comparison of Tentorial Location and Mortality (30 Day)		
Location	Present Study	Hemphill
Supratentorial	33.7	43
Infratentorial	76.5	53

Table 5

ICH score	Present Study (%)	Hemphill et al
0	0 %	0 %
1	13.6 %	13 %
2	66.7%	26 %
3	88.9 %	72 %
4	90 %	97 %
5	100 %	100 %
6	0	0

Table 6. Comparison of ICH Score and Outcome

p<0.001 Present study has higher mortality with higher the ICH Score, comparable to original Hemphill et al^{8,9}.

DISCUSSION

Mortality among patients > 80 yrs. was 100 % in our study, where as it was 67 % in Hemphill study. Higher the basal plasma d-dimer higher the mortality, 55.2 % with d-dimer >1500 ng/ml and 92.3 % with d-dimer > 5000 ng/ml. in this study compare to Plegdo study <1500 is 10 % and >5000 was 50%, 100 % mortality was seen in patients with GCS 3-4 in our study^(10,11). Compared Hemphill study 97.14% mortality^(12,9). Comparison of Volume of ICH and outcome in this study mortality >30 (cm³) was 79.5 % and < 30 (cm³) 12.5 % and Qureshi et al. 83.3 % and 22.3 %.^(13,14) This study had higher (74.5%) mortality with IVE when compared to Hemphill (66 %) and Agustin (47.9%)^(8,15). This study has higher mortality (76.5%) than Hemphill (53%) in relation to infratentorial location of ICH⁽¹⁶⁾. This study has higher mortality with higher the ICH Score, comparable to original Hemphill et al^{8,9}.

CONCLUSIONS

Intracerebral haemorrhage (ICH) has remained a serious disease despite recent improvements in management. So efforts must be directed towards better understanding and modification of risk factors. The major risk factor in our study was hypertension. The other common risk factors were alcohol consumption and smoking. Thus, measures to ensure adequate control of hypertension/compliance of treatment among hypertensives, abstinence from alcohol and smoking may reduce the incidence of ICH. Old age, low GCS score, high SBP, high DBP, high MAP, presence of gaze palsy, pupillary abnormality, bilateral extensor plantar response, ataxic respiration, and high initial plasma D-Dimer levels would indicate bad prognosis in ICH. In addition to diagnosis of ICH, CT Scan can also be used as a useful tool in assessing prognostic outcome of ICH, by using radiological parameters like larger volume of haematoma, presence of midline shift, intraventricular extension of haemorrhage and hydrocephalus which indicated bad prognosis, i.e. using ICH score, higher the ICH score higher is the mortality.

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