IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 11 Ser.11 (November. 2020), PP 36-39
www.iosrjournals.org

Association of Short-Term Outcome and Haematoma Volume in Primary Intracerebral Haemorhage.

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Abstract
Primary Intracerebralhaemorrhage (ICH) is a common neurological disorder, with high mortality. This prospective study was conducted on 144 primary ICH patients to assess the association of the haematomavolume with the short-tern outcome. Majority of the study subjects were >60 years of age. Hypertension was found as a risk factor in 75 percent subjects. Large haematomas (>30 cc) were associated with higher mortality and functional outcome within the first week.

Key Words: *Primary intracerebralhaemorrhage, Haematoma volume, Short-term outcome.*

Date of Submission: 12-11-2020 Date of Acceptance: 28-11-2020

I. Introduction

Primary intracerebralhaemorhage (ICH) is defined as the non-traumatic haemorrhage within the brain parenchyma without a definite cause. ICH may occur following a trauma, which falls under the spectrum of head injuries. Non-traumatic ICH is grouped under the spectrum of stroke, and called spontaneous ICH.[1]Spontaneous ICH comprise approximately 15 percent of total stroke cases worldwide.[2] Spontaneous ICH may occur as a complication of definite disease conditions like vascular malformations, vasculitic disorders, Moyamoya disease, tumourhaemorrhages, haemorrhagic infarcts, haemorrhagic diathesis and those associated with the use of anticoagulant or fibrinolytic drugs.[3] But in majority of the cases, there is no definite direct cause, and this major proportion of spontaneous ICH patients are called primary ICH.[4] However, primary ICH develop on the background of risk factors: hypertension, smoking and advancing age being the most important ones.[5]

PrimaryICH has higher mortality, 30 percent dying within a week.[6]but functional recovery is good among the survivors.[7] Higher haematoma volume was found as a bad prognostic marker in a few studies on primary ICH.[8,9]

II. Methodology

This was a hospital-based follow-up study conducted on 144 primary ICH patients admitted in a tertiary level hospital in Dhaka, Bangladesh, from January to December 2019. Infratentorialhaemorrhages (brainstem and cerebellar) has very grave outcomes, irrespective of haematoma volume, and were excluded from the study. Patients having serious co-morbidities that might have altered the outcome were also excluded.
Haematoma volume was calculated from CT scan using the ABC formula.[10] Patients were followed-up for 1 week. Mortality and neurological deterioration within 1 week and level of consciousness at the end of 1 week among survivors were compared between patients with haematoma volume ≥ 30 cc and those with smaller haematoma. Deterioration of Glasgow coma scale score by ≥ 2, development of new focal neurological deficits or deterioration of the existing neurological deficits was considered as neurological deterioration.[11]

All the patients received the standard medical management of spontaneous ICH according to the guideline of American Heart Association and American Stroke Association, as far as practicable.[12]

Prior to the commencement of this study, the research protocol was approved by the local Ethical Committee. Informed written consent was taken from each patient/attendant.

III. Results

Total 144 patients of primary ICH were included in the study. 81 (56 percent) were males and 63 (44 percent) were females. Majority of cases aged more than 60 years (75 percent), in both sexes (70 and 75 percent

among males and females respectively).Hypertension was found in 108 (75 percent) of patients. Smoking was amajor risk factor in males (85 patients, 59 percent).

Headache is the most frequent complaint (84 percent). Hemiparesis/plegia was the next common presenting feature and most frequent focal neurological deficit (75 percent). Vomiting was common also (62 percent). Impaired level of consciousness, aphasia/dysphasia and seizure were found in 26, 15 and 7 percent patients.

Putamen is the favoured site for hypertensive ICH (70 percent). Lobar ICH was found mainly in non-hypertensive ICH (92 percent). (Table-I)

Location	HTN ICH	Non-HTN ICH	Overall
Putamen	76(70.4)	3(8.3)	79 (54.9)
Lobar	29(26.9)	33 (91.7)	62(43.1)
Frontal	23(21.3)	15(41.7)	38(26.4)
Temporal	3(2.8)	9(25.0)	12(8.3)
Parieto-occipital	3(2.8)	9(25.0)	12(8.3)
Thalamus	3(2.8)	0(0.0)	3(2.1)
Total	108(100)	36(100)	144 (100)

Percentages are mentioned within the parentheses

Table I: Location of haemorrhage among the study subjects

A GCS score< 9 at the end of first week was found in 42 subjects (29 percent) patients. Fourty-three (30 percent) patients deteriorated neurologically during the first week. Overall mortality within that period was thirty-five (24 percent).

Haematoma volume was ≥30 cc in 48 study subjects (33 percent) and <30 cc in 96 (67 percent).

Morta-lity	ICH ≥30 cc (n_1=48)	ICH <30 cc (n_2=96)	Relative risk	95% CI	p-value
Yes	18	16	2.3	1.3–4.0	0.01*
No	30	80			

*Chi-square test

Table II: Association of haematoma volume and 1-week mortality (n=144)

A higher 1-week mortality was observed in ICH volume ≥30 cc group. (Table-II)

ND	ICH ≥30 cc (n_1=48)	ICH <30 cc (n_2=96)	Relative risk	95% CI	p-value
Yes	24	21	2.3	1.4-3.7	<0.01*
No	24	75			

*Chi-square test

Table III: Association of haematoma volume and neurological deterioration (n=144)

Neurological deterioration was also found more in these patients. (Table-III)

Level of consciousness, measured with Glasgow coma scale (GCS) was significantly lower at the end of 1 week among the survivors. (Table-IV)

GCS	ICH ≥30 cc (n_1=30)	ICH <30 cc (n_2=80)	Relative risk	95% CI	p-value
<9	14	18	2.1	1.2-3.6	0.01*
≥ 9	16	62			

*Chi-square test

Table IV: Association of haematoma volume and GCS among survivors at 1 week (n=110)

IV. Discussion

144 patients of primary ICH were included in this study. Most (75 percent) of the patients were of 60 years or more age. Mean age was 67.4 ± 12.8 years. The age distribution was similar to that of most of the previous studies conducted in Bangladesh and India.[13, 14, 15]The youngest and oldest patients were of 26 and 85 years respectively. Number of males (56 percent) was more than that of females (44 percent). Similar sex distribution was found in the study on spontaneous supratentorial ICH patients in Heerlen, Netherlands.[6]

Majority of the cases were hypertensive intracerebralhaemorrhages (75 percent). This finding is consistent with that of Kase[16] and Ropper[7].

Headache was the most frequent presenting feature (80 percent) followed by hemiparesis/plegia (73 percent), vomiting (58 percent) and deteriorated consciousness (26 percent). Convulsion was not a common presenting feature, found in 7 percent patients. Siddique[14] and Al-Dahhan[17]found similar results in spontaneous intracerebralhaemorrhage, though proportion of patients presenting with deteriorated consciousness was lower in this study. Exclusion of infratentorialhaemorrhages might explain this discrepancy.

Putamen was the most favoured site for hypertensive ICH (71 percent), like described by Lindsay[18] and Ropper[7]. On the other hand, most of the non-hypertensive ICH (92 percent) were found to be lobar. This distribution was higher than found in studies in India and United States.[19, 20]

A large haematoma (≥30 cc) was found in 33 percent patients, which is consistent with most other studies.[9]

Regarding outcome, Overall mortality was thirty-four (24 percent). Forty-five (31 percent) patients deteriorated neurologically over the first week. GCS score<9 at the end of the first week was found in 32 percent of 110 survivors. Similar outcome regarding morbidity was observed in studies on primary ICH patients conducted by Mayo Clinic, except the mortality in this study.[21] Exclusion of infratentorial haemorrhages might be the reason behind.

Proportion of mortality and neurological deterioration weresignificantly higher in patients with larger haematoma (≥30 cc). Two different studies in Siriraj Hospital in Thailand and in University of California in USA revealed similar results.[9,22]

Among the patients survived till the end of first week, lower GCS score (<9) was found in higher proportion of with haematomavolume ≥30 cc, which is consistent with the results of studies by Flemming and Hemphill.[11, 22]

LIMITATIONS

A relatively small sample size is the main drawback of this study. This study did not exclude potential confouinders like e hypo/hyperglycaemia or electrolyte imbalance.

V. Conclusion

Larger haematoma volume (≥30 cc) is a poor prognostic marker for short term outcome in primary intracerebralhaemorrhage.

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