

Spontaneous Intracerebral Haemorrhage(SICH): Factors Associated with in-hospital Mortality

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Objective:The aim of this study is to determine the mortality rate and the factors associated with in-hospital mortality of patient with SICH.

Design: Retrospective.

Setting: Bahrain Defence Force Royal Medical Services (BDF Hospital).

Method: Personal, clinical and neuroimaging characteristics of 54 patients with SICH admitted from January 2009 to December 2011 were included. Age, sex, risk factors (hypertension and diabetes mellitus) and CT findings were documented.

Result: Thirty-five (64.8%) SICH patients were males, 19 (35.2%) were females. Forty-seven(87%) patients had hypertension and 23(42.6%) had diabetes mellitus. The mean age of deceased patients was 66.3 ± 12.9 . Out of the twenty who died in the hospital eleven(55%) deaths occurred in first week, 18(90%) in two weeks after hospitalization.

The overall mortality rate among the patients with SICH was 37%. Significant factors independently associated with in-hospital mortality were the location of the hematoma ($p=0.017$), volume of the hematoma ($p=0.019$) and intraventricular haemorrhage ($p=0.027$).

Conclusion: The majority of mortality occurred during the first two weeks after hospitalization. Location and volume of the hematoma and the presence of intraventricular haemorrhage were important prognostic factors.

Bahrain Med Bull 2012; 34(2):

The cerebrovascular diseases are the most frequent and important among the neurological illnesses in adult life.

Spontaneous Intracerebral hemorrhage (SICH) accounts for 10% to 20% of all strokes, with an incidence of 10-20 per 100 000 and is more common in men^{1,2}.

The mortality rate is high, 27-52%, and the majority dies soon after the onset of bleeding³⁻⁵. In addition, it could cause a major disability².

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METHOD

Fifty-four patients with SICH who were admitted from January 2009 to December 2011 were included in this study.

We excluded patients with bleeding caused by brain tumors, aneurysms, vascular malformations, hematological disorders and malignancies, hemorrhagic transformation of prior cerebral infarction or traumatic brain injury.

Age, sex, hemorrhage location, hemorrhage size, midline shift displacement on CT scan of >5 mm and intraventricular extension of the hemorrhage were selected as the most likely relevant variables to prognosis.

Sex, age, history of hypertension (HTN), diabetes mellitus (DM), intracerebral hemorrhage/hematoma location and volume, ventricular extension, surgery for the hematoma and mortality (death occurred due to any cause during the admission period) were documented.

Hematoma volume was estimated by measuring the greatest diameter "A" and perpendicular diameter "B" of hematoma and the thickness of each CT slices by adding the number of CT slices visualizing the hematoma "C". These values are multiplied and the product is divided by two ($A \times B \times C / 2$ method). The volumes were divided into three categories: <30 ml, 30-60 ml and >60 ml.

Basal ganglia and thalamus (BG&Th), cerebellum, brainstem, lobar and multiple topographic (two or more locations were affected) involvements, primary and secondary intraventricular hematoma extension were included as variable factors.

Surgeries were divided into three groups: evacuation of the hematoma, insertion of external ventricular drainage (EVD) and the third group had both interventions at the same time.

The data were analyzed using SPSS version 20. Continuous variables were described as mean \pm SD or median values. Values of $p \leq 0.05$ were considered statistically significant.

RESULT

Fifty-four patients diagnosed with SICH from January 1, 2009 to December 31, 2011, were included in the study. Twenty patients (37%) died in the hospital, out of whom 4 (20%) died in the first two days, eleven (55%) in the first week and 18 (90%) in two weeks after admission.

Personal and clinical characteristics of patients are summarized in Table 1. Thirty-five (64.8%) patients were males. The median age was 61 years (range 16 to 86 years). Six (11.1%) patients were above 80 years, of whom three expired. Forty-seven (87%) patients had history of hypertension on admission, only 23 (42.6%) had diabetes mellitus.

Table 1: Personal and Clinical Data

Characteristics	Number (%)	Mortality Number (%)
Sex: <i>p</i> -value 0.570*		
Male	35 (64.8)	12 (34.3)
Female	19 (35.2)	8 (42.1)
Age Group: <i>p</i> -value 0.257*		
<60	24 (44.4)	6 (25)
60-80	24 (44.4)	11 (45.8)
≥81	6 (11.1)	3 (50)
Expired:		
Yes	20 (37)	Mean ± SD 66.3 ± 12.9
No	34 (63)	Median = 58.5
HTN: <i>p</i> -value 0.238*		
Yes	47 (87)	16 (34)
No	7 (13)	4 (57.1)
DM: <i>p</i> -value 0.387*		
Yes	23 (42.6)	7 (30.4)
No	31 (57.4)	13 (41.9)

*(Not statistically sign)

Location of hematoma ($p=0.017$), volume of the hematoma ($p=0.019$) and presence of IVH ($p=0.027$) were significantly associated with mortality, see table 2.

Midline shift did not show significant statistical differences regarding in-hospital mortality rate ($p=0.078$).

Table 2: Neuroimaging Features

Characteristics	Number (%)	Mortality Number (%)
Location of ICH: <i>p</i> -value 0.017*		
Lobar	14 (25.9)	2 (14.3)
BG & Th	24(44.4)	8 (33.3)
Brain Stem	6 (11.1)	2 (33.3)
Cerebellum	4 (7.4)	2 (50)
Multiple	4 (7.4)	4 (100)
Isolated IVH	2 (3.7)	2 (100)
ICH Volume (cc): <i>p</i> -value 0.019*		
<30	35 (64.8)	10 (28.6)
30-60	6 (11.1)	1 (16.7)
>60	13 (24.1)	9 (69.2)
Intraventricular extension: <i>p</i> -value 0.027*		
Yes	30 (55.6)	15 (50)
No	24 (44.4)	5 (20.8)
Midline Shift: <i>p</i> -value 0.078**		
Yes	24 (44.4)	12 (50)
No	30 (55.6)	8 (26.7)

*(Statistically sign) ** (Not Statistically sign)

Twenty-two (40.7%) patients had surgery;none of them was had brain stem hematoma. Data regarding surgery are summarized in table 3 and 4.

Table 3: Surgeries in SICH Patients

Characteristics	Number (%)	Mortality Number (%)
Type of Surgery: p-value	0.630*	
Evacuation	10 (45.5)	4 (40)
EVD	7 (31.8)	3 (42.9)
Evacuation& EVD	5 (22.7)	3 (60)

*(Not statistically sign)

Table 4: Type of Surgeries per Location of ICH

Location/Type of Surgery	Evacuation	EVD	Multiple
	Number (mortality)		
Lobar	5 (1)	2 (0)	1 (0)
BG & Th	3 (1)	3 (1)	1 (1)
Cerebellum	-	-	2 (1)
Multiple	2 (2)	-	1 (1)
Isolated IVH	-	2 (2)	-
Total	10 (4)	7 (3)	5 (3)

DISCUSSION

Twenty SICH patients died in the hospital, a mortality rate of 37%, which is similar to other studies; mortality rate of 27-52% have been reported worldwide for SICH^{3,4}.

Twenty percent died in the first two days, 50.5% in one week and 90% in two weeks after admission; previous studies reported a higher mortality rate in the first two to four days following hospital admission (40-50%)^{2,4,5}.

Patients at the age of 80 and ≥ 85 have higher risk of mortality^{6,7}. Similarly, our data suggest a higher mortality in patients aged ≥ 80 (50%). Male predominance over female was also observed in other studies⁸. Gender and age were found to be important factors affecting mortality in some studies⁹. Our study showed no relation between gender, age and mortality rate. Most of the patients in this study suffered from hypertension, which is almost similar to other studies^{4,10}.

Hypertension was often reported as independent factor in mortality rate among SICH patients, we could not support this thesis¹¹. Previous studies showed diabetes mellitus as an independent factor in mortality rate among SICH patients^{12,13}. In this study, no significant relation was found between mortality rate and diabetes mellitus.

Previously reported results confirmed our findings that the volume of hematoma and extension of the hemorrhage to ventricles are independent factors in mortality of SICH patients^{7,12,14,15}.

This study showed that the location of hematoma is an independent factor in mortality, which is similar to other studies, but the frequency of involvement varied from study to another^{15,16}.

Brain midline shift was found to be an independent factor in mortality in previous studies; our study failed to support this factor^{17,18}.

Our study had two limitations. First, our group was small, and may account for some of the discrepant results in comparison to other studies; second, we do not have data on the timing of symptom onset, which might affect the CT findings.

CONCLUSION

The majority of mortality occurred during the first two weeks after hospitalization. Hypertension is the most frequent risk factor in patients with spontaneous intracerebral haemorrhage. Location and volume of the hematoma and presence of intraventricular haemorrhage are independent prognostic factors of mortality.

Author Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential conflicts of interest: No

Competing interest: None **Sponsorship:** None

Submission date: 22 April 2012 **Acceptance date:** 1 May 2012

Ethical approval: Approved by Neurosurgical Department.

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