Loss of Consciousness at Onset of Subarachnoid Hemorrhage as Marker of Short Term Outcome

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Abstract

Background: Studies assessing the impact of loss of consciousness (LOC) on prognosis of subarachnoid hemorrhage (SAH) has been limited. Objective: This scientific assessment was done to determine the effect of LOC on outcome of SAH. Methodology: This hospital based observational study was done in Department of Neurology of Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2018 to December 2018. Patients with the diagnosis of SAH admitted in the in-patient wards of Neurology, Neurosurgery and Internal Medicine were taken as study population. The patients were divided in two groups with either presence (B) or absence of loss of consciousness (A). Group B was further subdivided into 3 subgroup depending admission WFNS scale grades (BI= WFNS II &III, BII=WFNS IV and BIII=WFNS V). Follow up was done in the stroke clinic, outpatient department of Neurology or by telephone interviews of patients, caregivers or family members. Outcome was measured by modified Rankin Scale (mRS). Result: A total of 75 patients were divided into group A and Group B. Six (8.0%) patients died during hospital stay, 6 died after 3 months. All those died during hospital stay were from group B. At 3 months, 16(21.3%) patients were lost during follow up. In group A at discharge 28.6% patients had poor outcome whereas 36% of patients in group B had poor outcome. Within group B most of the patients having poor outcome were in subgroup BIII (75.0%) compared to 33.0% cases in BI (p=0.023). About 16.7% cases in group A had poor outcome at 3 months and 75.0% cases in Group BIII. Furthermore, 8.3% patients died in Group A, however, 25.0% died in Group BIII. WFNS grade (IV or V) had statistically significant influence on poor outcome among patients having LOC (adjusted Odds ratio is 2.20, p=0.04 and 95% CI 1.03–4.71). Conclusion: Loss of consciousness at onset of SAH is an important marker for poor outcome. *[Journal of National Institute of Neurosciences Bangladesh, January 2021;7(1): 20-24]*

Keywords: Loss of Consciousness; Subarachnoid Hemorrhage; Outcome

Introduction

Subarachnoid hemorrhage is often accompanied by a dramatic increase in intracranial pressure and reduction in cerebral perfusion pressure, leading to transient cessation of cerebral blood flow, as documented by angiography and transcranial Doppler ultrasonography[1-4].

Loss of consciousness at ictus also has been linked to global cerebral edema, a marker of early brain injury after SAH demonstrated on computed tomographic (CT) scan[5]. Initial clinical grade assessed with the Hunt and Hess scale or World Federation of Neurosurgeons scale are well established strong prognostic indicators in

SAH[6]. There are data analyzing the long-term effect of symptoms at onset of SAH on survival and recovery.

The most common mechanisms underlying LOC at onset of SAH are likely to be reduced cerebral perfusion pressure in the setting of elevated intracranial pressure, seizures, or neurogenic cardiopulmonary dysfunction, manifesting as hypotension or frank cardiac arrest. It is well established that even with transient LOC, a corresponding episode of brief global hypoxia-ischemia is enough to trigger apoptosis, delayed neuronal death, and other negative downstream effects in selectively vulnerable cell populations[6,7].

With improvements in therapy for vasospasm and safer surgical techniques for aneurysm repair, early brain injury now poses the most important threat to survival with good recovery after SAH[8]. Studies assessing the impact of LOC on prognosis of SAH has been limited. In a resource constrained country such as Bangladesh the condition is predictably worse. A scientific analysis of effect of initial loss of consciousness on outcome of SAH may be helpful to assess the prognosis of patients and planning appropriate counseling in the future.

Methodology

This was a hospital based observational study conducted in the Department of Neurology at Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2015 to June 2017 for a period of two years. Patients with diagnosis of SAH who were admitted in the in-patient wards of Neurology, Neurosurgery and Internal Medicine were taken as study population. They were subsequently followed up in the stroke clinic, outpatient department of Neurology or by telephone interviews of patient, caregivers or family members. Inclusion criteria were patients aged 18 years or more including both sexes, clinical features and radiologic evidence (CT scan of head) suggestive of SAH, follow up after 3 months or patient dies within this time. Exclusion criteria were patients with traumatic SAH, where initial level of consciousness not known, patient undergoing surgical or endovascular intervention. A structured questionnaire was filled up as well as demographic data including age, sex and relevant medical history. History of present illness, including symptoms suggestive of SAH e.g. headache, LOC, nausea, vomiting, change in mental status, seizures etc. Any feature of sentinel headache were obtained by interview of the patient, family members and emergency medical officers who attended the patient if possible. Seizure attacks were recorded based on accounts from eyewitnesses. Co-morbid medical history

of hypertension, diabetes, dyslipidemia, ischemic heart disease and family history of SAH were also recorded. Results from the initial neurologic examination on hospital admission were evaluated by the Glasgow Coma Scale administered by emergency department health care professionals or in house residents who received the patients. Patients were grouped in the following way. World Federation of Neurosurgical societies (WFNS) SAH scoring along with LOC was considered for categorization of the patients. Group A included patients of SAH without initial LOC (WFNS SAH score grade I) and those with initial LOC were designated in Group B. The Group B patients were further sub grouped according to the WFNS grade. BI was labeled for WFNS grade II and III, BII for WFNS grade IV, BIII for WFNS grade V. Patients were treated according to the local protocol with standard conservative management. Patients were followed up first within 24 hours of hospital admission. Second follow up was at the time of discharge. Modified Rankin Scale (mRS) scores were prospectively assessed at 3 months. Poor outcome was defined by mRS 4 or more. Hospital complications after SAH were diagnosed and treated by the treating physician. Multivariable logistic regression analysis was used to adjust factors for poor outcome other than initial LOC, such as age, hypertension (HTN), diabetes mellitus (DM), sex, WFNS grade. Ethical approval was taken from Ethical Review Committee in Dhaka Medical College. After collection of all data these were checked and edited. Then data was entered into the computer with the help of software SPSS for windows programme version 22.0. Results on continuous measurements were presented on mean ± SD- Standard deviation (min-max) and results on categorical measurements was presented in number (%). Association of loss of consciousness with outcome after subarachnoid hemorrhage was evaluated with Chi-square test. Independent sample t test was used to compare between two groups. Multivariate logistic regression analysis was done to measure the effect of loss of consciousness on outcome. Significance was assessed at 5 % level of significance.

Results

A total of 75 patients were enrolled in two groups in this study. Mean age of patients enrolled in this study was 55.67±0.374 ranging from 25–80 years. Mean age of male patients was 56.50±10.707 ranging from 23 to 80 years and that of female was 54.34±19.39 and 25 to 72 years (Table 1).

Table 1: Distribution of Respondents by Age (n=75)

Respondents	Range	Mean±SD	P value
All (n=75)	25-80	55.67±10.34	
Male (n=46)	23 – 80	56.50±10.707	0.374*
Female (n=29)	25-72	54.34±19.39	

There was no statistically significant difference of age and sex between the groups (p>0.05). Risk factors assessed were hypertension, diabetes mellitus, arrhythmia, smoking, family history of subarachnoid hemorrhage (Table 2).

Table 2: Risk factors among two groups (n=75)

Risk factors	Loss of consciousness(LOC)		P Value
	Present(n=61)	Absent(n=14)	
Hypertension	38(62.30%)	5(28.40%)	0.023**
Diabetes mellitus	15(24.60%)	2(14.30%)	0.330*
Smoking	25(41.00%)	5(35.70%)	0.481*
Arrhythmia	6(9.80%)	0 (0%)	0.276*
FHSH	4 (6.60%)	0(0%)	0.429*

FHSH: Family history of subarachnoid hemorrhage; Chi–square test was done to analyze the data.

It was observed that in both the group most frequent risk factor was hypertension (62.30% and 28.40%) followed by smoking and diabetes mellitus respectively. But there was no significant (p>0.05) difference of risk factors between the groups except that of hypertension (p<0.05).

Headache is the most frequent presenting symptoms among two groups (83.6% and 92.9%) followed by vomiting and sentinel headache. No patient in group A (Loss of consciousness absent) had tonic–clonic activity. There is no statistically significant difference of frequency of symptoms among the groups except tonic–clonic activity (p<0.05) (Table 3).

Table 3: Distribution of presenting symptoms among two groups of patients (n=75)

Presenting Symptoms	Loss of consciousness (LOC)		P Value
	Present(n=61)	Absent(n=14)	
Headache	51(83.6%)	13(92.9%)	0.343*
Vomiting	34(55.7%)	9(64.3%)	0.392*
Tonic–clonic activity	14(23.0%)	0(0%)	0.040**
Sentinel headache	15(24.6)	2(14.3%)	0.330*

Chi–square test was done to analyze the data.

The most frequent complication among the hospitalized patients were delayed neurological deficit (34.4% & 7.1%) followed by delayed cerebral ischemia (31.1% &

7.1%) and rebleeding (24.6% & 0%) (Table 4).

Table 4: Distribution of complications among the groups (n=75)

Complication	Loss of consciousness(LOC)		P Value
	Present(n=61)	Absent(n=14)	
Delayed neurological deficit	21(34.4%)	1(7.1%)	0.037**
Delayed cerebral ischemia	19(31.1%)	1(7.1%)	0.060*
Rebleeding	15(24.6%)	0(0%)	0.031**

Chi–square test was done to analyze the data.

Statistically significant difference of complications among the group was observed for delayed neurological deficit and rebleeding (p<0.05) but not for that of delayed cerebral ischemia (p>0.05). Outcome was measured by modified Rankin Scale in two groups. It was observed that 71.4% of patients in group A had good outcome (mRS=1-3) but it was 25.0% in group BIII. No patient in group A died during hospital admission but 6 patients died in group B. There is statistically significant difference of outcome (good) at discharge between the groups (p<0.05) (Table 5).

Table 5: Distribution of outcome of patients at discharge among the groups (n=75)

Group	Outcome at discharge		P Value
	Good	Poor	
Group–A (WFNS-I, n=14)	10(71.4%)	4(28.6%)	
Group–B (WFNS:II-V, n=61)			
BI (WFNS-II&III, n=27)	18(66.7%)	9(33.3%)	0.023**
BII (WFNS–IV, n=18)	8(44.4%)	10(55.6%)	
BIII (WFNS–V, n=16)	4(25%)	8(75%)	

Chi-square test was used to analyze the data; Good outcome=mRS 1-3; Poor Outcome=mRS 4- 5

Analysis of outcome after 3 months showed that 16.7% in group A had poor outcome at 3 months but it was 75.0% in Group BIII. About 8.3% patients died in Group A, but 25% died in Group BIII. There was statistically significant (p<0.05) difference of poor outcome between the groups (Table 6).

Table 7 shows the effect of different admission characteristics of patient on poor outcome (mRS:4–6) compared with good outcome (mRS:1–3) after 3 months of discharge. Comparison was carried out between HTN, DM and sex. For WFNS comparison was between grade 1 with grade IV or V. It was observed that there was no overall statistically

significant effect of admission characteristics on poor outcome except for WFNS–IV or V (p<0.05). AOR for WFNS IV or V was 2.20. It means that if a patient had World Federation of Neurosurgical Societies grading scale grade IV or V, he/she had 2.20 times the risk of having poor outcome than for World Federation of Neurosurgical Societies grading scale grade I.

Table 6: Distribution of Outcome after 3 Months Among Two Groups (n=59)

Group	Outcome at 3 months			P Value
	Good	Poor	Dead	
Group A (WFNS-I, n=12)	9(75.0%)	2(16.7%)	1(8.3%)	
Group B (WFNS-II-V, n=47)				
BI (WFNS-II-III, n=22)	7(31.8%)	14(63.6%)	1(4.5%)	0.007**
BII (WFNS-IV, n=13)	5(38.4%)	7(53.8%)	1(7.6%)	
BIII (WFNS–V, n=12)	0(0%)	9(75.0%)	3(25%)	

Chi–square test was used to analyze the data; Good outcome=mRS 1-3; Poor Outcome=mRS 4- 5

Table 7: Multivariable admission predictor of poor outcome after 3 months.

Variable	p- value	AOR	95% CI Of AOR
Intercept	0.476*		
Age	0.478*	0.978	0.919–1.040
HTN	0.666*	1.319	0.375–4.637
DM	0.588*	1.640	0.274–9.813
Sex	0.690*	1.295	0.364–4.615
WFNS (IV or V)	0.04**	2.20	1.03–4.71

Multinomial logistic regression analysis was done to analyze the data; AOR–adjusted Odds ratio, SE–standard error, CI–confidence interval HTN–hypertension, DM–diabetes mellitus, WFNS-World Federation of Neurosurgical Societies grading scale; WFNS-World Federation of Neurosurgical Societies grading scale; **Statistically significant;*Statistically non-significant

Discussion

In this study the relationship between the loss of consciousness at admission and short term outcome of SAH patients was sought. This study revealed the significance of LOC at presentation with in hospital mortality and short term outcome among these patients. Majority of patients were relatively older (45 to 65 years) which corresponds with similar studies conducted by Suarez et al[9] and Suwatcharangkoon et al[10]. Similar to this study, Hassan et al[11] and Islam et al[12] found higher incidence among male (60.0% & 59.8%). In line with the findings of Hassan et al[11] Islam et al[12] and Linn et al[13] sudden headache and vomiting were the most frequent presenting symptom in this study. But vomiting is not a distinctive feature as almost half the patients with non-hemorrhagic thunderclap headache also report vomiting at onset. The frequency of convulsion was three times higher than those reported by Al-Shahir et al[14] Similar to the report of Leonardo et al[15] sentinel headache was not uncommon in this study. The reported frequency of LOC as a presenting symptoms was much higher in this study than the report of Suwatcharangkoon et al[10], Hassan et al[11] and Al-Shahi et al[14]. This is probably due to the difference in operational definitions among these studies. Delayed neurological deficit, delayed cerebral ischemia and re-bleed were the most frequent in hospital neurological complication observed in this study. Rashid et al[16] reported similar observation from Kashmir, India.

The distribution of risk factors for SAH were also assessed in this study. In comparison to the report of Koshy et al[17], who searched for risk factors of SAH in Indian population; hypertension and smoking were more frequent in this study. But Hassan et al[11] also observed findings similar to this study.

There was no significant difference between group A and group B in terms presenting symptoms, except for seizure activity (p=0.04) which was present only in group B. This was in contrast to the findings of Suwatcharangkoon et al[10] for reasons unexplained.

There was also statistically significant difference of having complication between the groups rebreeding (p=0.031) and delayed neurological deficit (p=0.037). Suwatcharangkoon et al[10] found that all types of neurological complication was significantly (p<0.001) more common in patients of subarachnoid hemorrhage with loss of consciousness.

Subarachnoid hemorrhage is serious disease with high morbidity and mortality. A thirty days case fatality has ranged from 8.0% to 67.0% in different studies[18,19]. In present study 6(8.0%) patient died during hospital stay, another 6 patient died within 3 month. Apparent low mortality might be explained by avoidance of health care service with severely ill patients or they might be dead before reaching hospital. In present study outcome of patients at discharge and after 3 month were measured by using modified Rankin's scale (mRS). Statistically significant difference of poor outcome was observed between group A and B (p=0.023). Moreover, subgroup analysis also revealed that the outcome was worst for group B-III. There was statistically significant (p=0.007) difference of poor outcome between the subgroups. Outcome analysis from different studies yielded similar results.[10,20,21] A

multivariable logistic regression analysis was carried out to determine the magnitude of admission characteristics (age, sex, HTN, DM, WFNS grade) of patients on outcome after 3 months of SAH. Patients having LOC only WFNS grade (IV or V) have statistically significant influence on poor outcome. Suwatcharangkoon et al[10] also reported similar observation.

Conclusion

SAH patients presenting with LOC have higher in hospital mortality and poorer secondary functional outcome at three months. Moreover, the outcome is worse in patients of WFNS grade III and IV and presenting with LOC. So, LOC at onset of subarachnoid hemorrhage may serve as an important marker for poor outcome at discharge and 3 months after the event.

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