


CLINICAL STUDY

The Functional Outcome of Spontaneous Hypertensive Supratentorial Intracerebral Haemorrhage after Surgery

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ABSTRACT

This study was to determine various factors that affect the postoperative prognosis regarding outcome and the functional recovery after surgical evacuation of spontaneous hypertensive supratentorial intracerebral haemorrhage. This cross-sectional analytic study was done in the Department of Neurosurgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh during a period of 4 years from January 2016 to December 2019 and total 96 patients were selected for this research. Patients with post-head injury hematomas, intracranial space-occupying lesions with bleedings, ischemic strokes with haemorrhagic transformation, arteriovenous malformations, aneurysms, and infratentorial haemorrhages were excluded from the research. The most frequently performed surgical procedure was decompressive craniotomy and evacuation of hematoma. The outcome of the patients was classified according to the Glasgow Outcome Scale (GOS). If the GOS score was more than 3 it was termed as “favorable”. GOS score 3 or less was classified as “unfavorable”. The mean age of the patients was 57.99±12.74 years with male and female ratio was 1.66. The mean blood volume was 28±19.99 cc and all patients were hypertensive. In relation to age and volume of blood, a significant difference ($p < 0.001$) in outcome was found. Age > 70 years, GCS < 8 on admission, hematoma above 40 cc, and intraventricular extension were the most reliable predictors of mortality and poor outcome following surgical evacuation of spontaneous supratentorial intracerebral hematoma. The current research could exclusively assess the mortality and the functional outcome. Further related studies are needed with a focus to measures improving the quality of life to decrease the adverse outcome in postoperative survivors.

KEYWORDS : Spontaneous intracerebral haematoma, Supratentorial, Hypertensive, Craniotomy, Glasgow Outcome Scale.

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INTRODUCTION

Intracerebral hemorrhages (ICH) constitute about 10% to 20% of all strokes. In comparison to the ischemic strokes, ICHs are associated with greater morbidity and mortality [1]. More than half of the patients pass away and half of the survivors are left severely handicapped, with significant personal, social and health service penalties [2]. The issues and drawbacks of stroke have an immense impact within Asia, a densely populated region of the world, where the stroke is often the predominant vascular disease. The conventional approach to prevent stroke calls attention to the significance of identification and treatment of risk factors,

such as hypertension. The world health organization (WHO) defined stroke as “rapidly developing clinical signs of focal or global disturbances of cerebral functions, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin” [Spontaneous intracerebral hemorrhage (ICH) derives from rupture of an intracerebral artery or, less frequently, vein, which results in the formation of an intraparenchymal haematoma. The haematoma increases in size following the path of least resistance, usually along the tracts of white matter, and at times dissects all the way into the

ventricular system. Eventually the bleeding slows and stops as increasing tissue pressure results in tamponade of the ruptured vascular site [4].

Risk factors for ICH include hypertension, diabetes mellitus, alcoholism, dyslipidemia, smoking, and drug abuse [5]. Hypertension is one of the most major modifiable risk factors as the rough prevalence among adults in the US has been estimated to be 45.6%; this is an increase from 31.9% based on previous denotations of hypertension [5,6]. Several prescription medications, such as cyclooxygenase (COX) inhibitors, P2Y12 inhibitors, OACs, selective serotonin reuptake inhibitors (SSRIs), and statins, have also been related with an increased risk of developing spontaneous ICH [6].

Computed tomography (CT) is the most frequently used imaging modality for the diagnosis of acute ICH. Various CT parameters may forecast hematoma expansion and poor neurologic outcome. Hematoma enlargement is a notable risk factor for adverse outcome in patients with ICH. Consequently, imaging predictors of hematoma expansion remain a key area of research. A study described a CT finding called the “blend sign” to predict hematoma expansion. The “blend sign”, defined by a study as blending of a hypo-attenuating area within the hyper-attenuated ICH with a well-defined margin, can be used as independent predictors of hematoma growth, along with the time to baseline CT scan and the initial hematoma volume as suggested by that study [7].

Several studies on surgery, in comparison to conservative management, in cases of primary intracranial haemorrhage (ICH) have given contradictory results. The presenting GCS, size and site of the ICH are thought to affect the postoperative outcome of the ICH patients. In spite of ongoing endeavors to develop effective medical treatments and optimize surgeries, indications for surgical treatment have not been distinctly defined and remain disputed. In spite of best medical management and/or surgery, functional outcome remains below par, as at 6 months only less than one fifth of all ICH patients have regained functional independence [8]. Spontaneous supratentorial ICHs represent the majority of all ICHs where deep-seated ones such as those in basal ganglia or thalamus differ clinically from the superficial ones such as lobar ICHs [8, 9].

The aim of the study : The aim of the study was to determine the different parameters that affect the outcome and the functional outcome after surgical evacuation of supratentorial ICH.

METHODOLOGY

The cross-sectional analytic study was conducted in the Department of Neuro- surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh during a period of 4 years from January 2016 to December 2019. Surgical evacuation was done to all patients with supratentorial ICH with a volume of more than 30 ml or midline shift of more than 1 cm. Total 96 patients were incorporated in this study. Patients with post-traumatic ICH, intracranial space-occupying lesions with hematomas, ischemic strokes with haemorrhagic transformation, arteriovenous malformations, aneurysms, and infratentorial

haemorrhages were excluded from the study. Decompressive craniotomy and evacuation of hematoma was the predominant surgical procedure in these cases. External Ventricular Drain (EVD) was given in cases with Thalamic or Basal Ganglia ICHs with intraventricular extension and significant hydrocephalus with a GCS < 8. In most of the patients, postoperative monitoring was done in intensive care unit (ICU) till the time of extubation. The preoperative and postoperative consciousness level in terms of GCS was noted. A follow-up CT scan was done at 24 hours of surgery or on clinical worsening, whichever was earlier. The outcome of the patients was scored according to the Glasgow Outcome Scale (GOS) at 1-month postoperatively. If the GOS score was more than 3 it was termed as “favorable”. GOS score 3 or less was classified as “unfavorable”. Statistical analyses were conducted with SPSS 24.0. Descriptive statistics including mean, median and standard deviation were calculated for baseline characteristics. Chi-Square test and Student t-test were used to compare categorical variables, and to calculate the *p*-value for continuous variables respectively. Variables with a *p*-value < 0.05 at univariate level were considered significant.

RESULT

Total 96 patients of supratentorial ICH after surgical evacuation were evaluated in this study where all the patients were hypertensive. Male and female ratio was 1.66. The mean age of the patients was 57.99±12.74 years and the mean blood volume was 28±19.99 cc.

The Table 1 shows the characteristics of patients regarding demography, etiology, clinical features and radiological findings along with outcome and mortality.

DISCUSSION

Though ICH accounts for only about one tenth of all strokes, it remains most lethal subtype with 40 % mortality [1]. In our series, the mortality was 29.16%.

Primary Spontaneous ICH is considered to be a disease of ageing. The mean age was 66 years in the study group in Hemphill et al.’s landmark paper [6]. The mean age of patients in the current study was 57.99±12.74 years. This comparatively younger age of incidence has been reported evenly across Bangladesh and appears to be a characteristic attribute of the Spontaneous ICH in the Indian subcontinent [3]. ICH appears to be less lethal in younger individuals particularly in those surgically treated [4]. In a recent study, surgical treatment results in a lower 3-month mortality (9.9% vs. 23.0%) in younger ICH patients (16 to 49 years old) compared to ICH patients older than 49 years of age [5, 9]. Ageing is also associated with increased morbidity and elderly population above 70 years had a high fatality rate in our series. Several studies have shown that older adults with acute ICH suffered worse results compared with their younger equivalents, including death, dependency, and overall quality of life [9].

The clinical features mostly depend on localization and volume of the ICH often requiring emergency treatment. Lobar ICHs are associated with clinical features localized to the affected lobe of the brain, like monoplegia, homonymous hemianopia, or dysphasia; similar findings

were found in our cases. Smaller basal ganglia ICHs could be asymptomatic and larger ones in this region could lead to contralateral neurological deficits, sometimes in

combination with aphasic disorders or homonymous hemianopia [1].

Table 1 : Characteristics of patients.

Variables	Survived	Mortality	P Value	Favorable Outcome (GOS- 4,5)	Poor Outcome (GOS <3)	P Value
Age	55.35 ± 12.36	60.64 ± 13.12	<0.001	55.45 ± 12.25	57.94 ± 12.42	0.06
Sex						
Male	42 (70.5%)	18 (29.5%)	0.687	39 (65.3%)	21 (34.7%)	0.351
Female	26 (71.5%)	10 (28.5%)		25 (69.6%)	11 (30.4%)	
HTN	66 (68.7%)	30 (31.3%)	0.207	62 (64.6%)	34 (35.4%)	0.264
DM	39 (71.7%)	16 (28.3%)	0.139	36 (66.5%)	19 (33.5%)	1
Smoking	33 (66.8%)	17(33.6%)	0.122	27 (54%)	23 (46%)	0.001
H/O Previous Stroke	07 (62.7%)	04 (37.3%)	0.128	06 (60.8%)	05 (39.2%)	0.355
On anti-platelet drugs	05 (56.8%)	03 (43.2%)	0.007	05 (56.8%)	03 (43.2%)	0.007
Blood volume (cc)	21.55 ± 15.59	34.45 ± 24.39	<0.001	25.72 ± 17.96	40.23 ± 10.31	0.001
IVE	04 (33.33%)	08 (66.67%)	0.122	2 (16.66%)	10 (83.33%)	0.001
Side						
Right	36 (72.7%)	14 (27.3%)	<0.001	34 (67.4%)	16 (32.6%)	0.531
Left	32 (69.3%)	14(30.7%)	<0.001	30 (65.7%)	16 (34.3%)	0.633

GOS—Glasgow outcome Score, **IVE**—intraventricular haemorrhage

In most of the studies, hypertension is the commonest risk factor for Spontaneous ICH. It was shown by Feldmann et al. that a relative risk of 3.9 was present for ICH in patients with hypertension [5]. All of our patients had a definite history of hypertension, and nearly two-third of these patients was hypertensive with a history of taking medications irregularly. This observation is in contradiction to the higher rates of preexisting hypertension (70–80%) found in other studies done in India [1, 5].

It is proposed that hyperglycemia on admission contributes to unsatisfactory outcome, due to aggravation of cerebral oedema and injury. In 2018, Zheng et al. suggested that hyperglycemia was associated with poor functional outcome in ICH patients [11]. However, in the Indian ICH studies, random blood glucose has not been a predictor of fatality. [10, 11] In our study, multivariate logistic regression analysis failed to show an association between the blood glucose level and adverse outcome.

The sensitivity of CT brain has been described to be greater than 95% [7]. In our cases, we used CT scan as the only modality of imaging. Volume of the clot is another important predictor of outcome. A large ICH volume has frequently been considered a bad prognostic factor and a strong predictor of mortality in previous studies. Additionally, intraventricular extension and patient age have also been recognized as key prognostic factors [7,10]. Some studies showed that in up to 25% of ICH patients clinically significant hematoma growth occurred and for each 10% increase in hematoma volume, the mortality increased by 5% [7, 12]. The mean volume of the ICH in the mortality group and amongst the survivors were 34.45 ± 24.39 ml, and 21.55 ± 15.59 ml respectively.

Management of the patient who presents with a spontaneous intracerebral haematoma primarily depends on some factors such as level of consciousness, neurologic course over time, size of the haematoma and presence of the blood in the ventricular system. In cases of deeply comatose patients, mortality is high and surgery proved controversy [13, 14]. One of the most unvarying predictors of bad outcome, in

most of the previous studies, has been a Glasgow Coma Score (GCS) of less than 8 on admission. Indian studies also showed comparable findings in ICH patients with poor GCS on admission [5].

Intraventricular extension (IVE) is found in around half of the patients with SICH and is recognized as a major predictor of 30-day mortality and long-term outcome [15]. But in this study, 12.5% patients had IVE. Subgroup analysis from the STICH 1 Trial data showed that the absence of IVH resulted in superior outcomes (31.4% vs. 15.1%;) which was equivalent to the results in our study [15, 16].

Role of surgery in Spontaneous ICH remains disputed. In Troberg's study, 31% of all operated ICH patients were dead after 1 year and only one fourth of patients available for assessment of long-term functional outcome were independent in terms of daily life activities [12].

For over 100 years, despite large randomized trials, the role of surgical treatment in the management of SICH is an unresolved issue. Different protocols used by researchers may pave the way for a uniform protocol in primary ICH management which is lacking now. [17]. Ghani et al. remarked that surgery was beneficiary in patients with hematoma volume between 20-80ml [18]. Nonetheless, Siddique et al. asserted that certain meta-analysis of randomized controlled trials (RCT) went against the effectiveness of surgical treatment taking into account the volume as a parameter [19]. In contrast, in patients with GCS 7 with isolated lobar ICH of 40-100ml, surgical treatment has a preferable prognosis (94.2%). Reichart R et al. stated that patients suffering from medium-sized lobar hemorrhage should undergo surgery, especially if GCS was less than 7 [20]. In STICH II trial the fatality at 6 months follow-up was 18% in the early surgery group when set side by side with 24% observed in early conservative group and deduced that early surgery in patients with superficial spontaneous ICH had better chance of survival [21, 22]. The STICH Trial done in 2005 showed that 26% of the patients randomised to early surgery had a better prognosis

compared with 24% of the patients randomised to initial conservative treatment having a better prognosis. Additionally the trial stated that “patients with hematomas extending to within 1 cm of the cortical surface had a trend towards more favorable outcome with surgery. Patients with lobar hemorrhages and a GCS score of 9 to 12 also had a trend towards better outcome”. However, surgical outcome was worse than medical management if ICH was situated more than 1 cm from the cortical surface or patients had a GCS score of less than 8. The 1-month case mortality after ICH did not change for several decades and remained at around 40%. Nevertheless, the long term prognosis is still less obvious [22].

Our study could only evaluate the fatality and the functional outcome. As some of the surviving cases had an adverse outcome, measures to improve quality of life are of immense importance and should be considered in future studies.

CONCLUSION

Spontaneous ICH mainly affects the comparatively younger population in Bangladesh in contrast to the people in Western countries. Age more than 70 years, GCS less than 8 on admission, ICH volume above 40 cubic cm, and intraventricular extension remain the most persistent predictors of mortality and inferior outcome following

surgical treatment of spontaneous supratentorial ICH. Therefore, prognostic studies in large scale are required to effectively explain the predictors and the indications for surgical treatment in the management of ICH.

AUTHORS’ DISCLOSURE STATEMENT

The authors do not possess any conflict of interest regarding this article.

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AUTHORS’ CONTRIBUTIONS

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