

Surgery for primary intracerebral haemorrhage: is it safe and effective?

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Abstract

This prospective study was conducted to compare the outcome between medical and surgical treatment of primary intracerebral haemorrhage at the department of Neurosurgery, Dhaka Medical College Hospital from January 2006 to October 2007. All patients with primary intracerebral haematoma with Glasgow Coma Scale (GCS) 5-15 (on admission) and haematoma volume 30 cc or above admitted at Neurosurgery department managed conservatively or surgically were included in this study. Total 60 patients were selected, of them 30 patients managed conservatively and 30 patients managed surgically. Conservatively managed patients regarded as control group (Group-A) and surgically managed patients regarded as experimental group (Group-B). Patients or attendants refused to operate were included in the conservative group. All the selected patients were evaluated on the basis of detailed history, clinical examination (general and neurological examination) and CT scan findings. Outcome was evaluated in term of Glasgow Outcome Scale (GOS). Best medical treatment was given for conservative group and operations were done for surgical group and followed up after surgery till discharge by observing GCS and GOS at discharge. Number of death were 15 (50%) patients in group-A and 13 (43%) patients in group-B. There was no significant difference in mortality rate between two groups but outcome was relatively better in group-B. According to Glasgow Outcome Scale, dependency in group-A and group-B was 26.6% and 23.4% respectively. So dependency were more in group-A. But there was no significant difference statistically. Seven (23.4%) patients were independent in group-A but 10(43.3%) patients were independent in group-B. However in relative terms of outcome of group-B was better than that of group-A. In our study we found no statistically significant difference in outcome between medical and surgical management of primary intracerebral haemorrhage.

Introduction

Spontaneous intracerebral haemorrhage leads to blood clot in brain parenchyma in the absence of trauma or surgery. Spontaneous intracerebral haemorrhage (SICH) can be classified as either primary or secondary depending on underlying cause of haemorrhage. Primary intracerebral haemorrhage (PICH) accounts for approximately 70-80% of cases and is due to spontaneous rupture of small vessels damaged by hypertension or amyloid angiopathy. Secondary ICH is associated with a number of congenital or acquired condition such as vascular anomalies, coagulopathies, tumors and various drug therapies. Most frequent site for spontaneous intracerebral haemorrhage are the basal ganglia, thalamus, subcortical whitematter of cerebral lobes, cerebellum and brainstem¹.

Spontaneous intracerebral haemorrhage accounts for approximately 4-14% of all strokes and is

associated with a high mortality and morbidity. Between 32% and 50% of patients die within the first month, and only 20% are independent after six months of intracerebral bleeding².

The incidence of ICH increases significantly after age 55 and doubles each decade of age till 80, at which point the incidence increases 25 fold during each decade³.

Many other factors can contribute to bleeding like acute increase in blood pressure and flow may also be important particularly where auto regulation may be compromised (as in trauma) or where pressure may be above the limit of auto regulation, as in toxemia. SICH generally occurs during the morning or early afternoon when a patient is active. Therefore it has been postulated that the trigger for bleeding may be a diurnal rise or an acute increase in blood pressure from whatever cause⁴.

Cerebral amyloid angiopathy (CAA) is the other major cause of primary ICH and an important cause of lobar ICH in elderly population.

Hypertension has been clearly identified as the major risk factor for ICH, but the presence of this pre morbid hypertension has ranged in various studies from 26% to 89% of the patients. The true figure is probably about 50%⁵.

Diabetes is an important risk factor for mortality after intracerebral haemorrhage (ICH). ICH in diabetic patients present some different clinical features from ICH in non diabetic patients; accordingly this subgroup of patients should be very closely monitored⁶.

Most spontaneous haematomas are attributed to chronic arterial hypertension. Other potential risk factors for ICH include alcohol consumption, anticoagulant treatment and to a lesser extent, aspirin use, thrombolytic therapy and the use of amphetamines or cocaine⁷.

In one fourth of patients with intracerebral hemorrhage who are initially alert, deterioration in the level of consciousness occurs within the first 24 hours after onset of the hemorrhage. The presence of a large hematoma and ventricular blood increases the risk of subsequent deterioration and death. Expansion of the hematoma is the most common cause of underlying neurologic deterioration within the first three hours after the onset of hemorrhage. Worsening cerebral edema is also implicated in neurologic deterioration that occurs within 24 to 48 hours after the onset of hemorrhage. Infrequently, late deterioration is associated with progression of oedema during the second and third week after the onset⁸.

Treatment of haemorrhagic stroke is based on underlying cause of the haemorrhage and extent of damage to brain. The initial management of all patient with spontaneous ICH consists of medical management and stabilization, followed by either surgical intervention or conservative treatment. The goals of medical treatment includes control of hypertension, reduction of intracranial pressure and prevention of seizures. Controversy exists concerning the indications for operative treatment of spontaneous ICH and decisions should be individualized. Several criteria may be used to select appropriate patient for surgical treatment. Among them the important consideration are the patient's level of consciousness, site and size of haematoma, involvement of dominant hemisphere, deterioration of neurological status, midline shift and ventricular extension, proper timing of surgery⁹.

The most significant predictors of mortality are haematoma volume and level of consciousness at admission. Increasing patient's age, infratentorial location of the ICH, midline shift and presence of intraventricular blood have all been associated with poor outcome. In addition, intubation has been shown to be an independent predictor of mortality in ICH. On admission Glasgow Coma Scale of 8 or less and ICH haematoma volume of 60ml or more predicted a mortality of 91% at 30 days. Some investigations have reported that a haematoma volume of 50ml was associated with a mortality rate of 90%. A rating system known as the ICH score has been developed. It is based on GCS, age, haematoma volume, location and presence of intraventricular blood¹⁰.

With Population of more than 143 million, increasing life expectancy and improvement of diagnostic facilities including availability of CT scan in many district centers contributes in increase in the number of detection of intracerebral haemorrhage patients. The place of surgery in the treatment of intracerebral haematoma is still controversial. Controversy exists about medical and surgical management which is better still in the modern CT era & in minimally invasive surgery period. So it is our small effort to overcome the controversy.

Materials and Methods

This prospective study was carried out at the department of Neurosurgery, Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2006 to October 2007. All patients with primary intracerebral haematoma with GCS 5-15 (on admission) and haematoma volume 30 cc or above admitted at Neurosurgery department managed conservatively or surgically were included in this study. Total 60 patients were selected, of them 30 patients managed conservatively and 30 patients managed surgically. Conservatively managed patients regarded as control group (Group-A) and surgically managed patients regarded as experimental group (Group-B). Patients or attendants refused to operate were included in the conservative group. All the selected patients were evaluated on the basis of detailed history, clinical examination (general and neurological examination) and CT scan findings. Outcome was evaluated in term of Glasgow Outcome Scale (GOS). Best medical treatment was given for conservative group and operations were done for surgical group and followed up after surgery till discharge by observing Glasgow Coma Scale (GCS) and Glasgow Outcome Scale (GOS) at discharge.



Plate I: Preoperative CT scan of right basal ganglia haemorrhage with midline shift and ventricular extension.

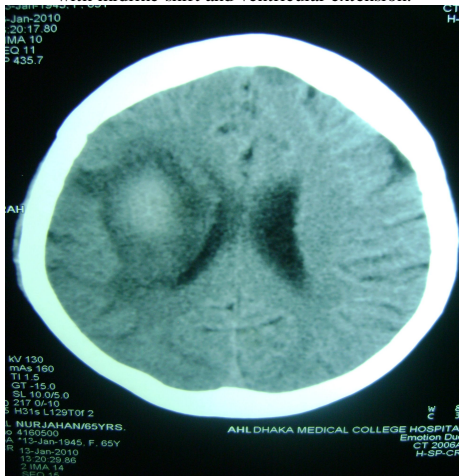


Plate II: Postoperative CT scan after craniotomy & evacuation of haematoma.

A pre-designed data collection sheet was prepared including the variable of age and sex of the patients, clinical presentations, GCS at admission and discharge, Glasgow outcome scale at discharge, volume & site of hematoma on CT and history of hypertension. The data was collected by the researcher himself.

Data was collected and edited manually. A master sheet was prepared and data was analyzed by using Statistical Package for Social Science (SPSS) program. χ^2 test was used to compare the outcome between medical and surgical treatment of primary intracerebral haemorrhage. p value <0.05 was considered as a minimum level of significance.

Results

The age of total 60 patients ranged from 30 to 85 years. Means age of group-A and group-B were 57 years and 55 years respectively. Highest number of patients were in 51 to 60 age group (33%). There were 18 male and 12 female patients in group-A and 15 male and 15 female patients in group-B.

Table I: GCS score on admission

GCS on admission	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
5	4	7	11	7.885	0.546
6	3	5	8		
7	5	3	8		
8	2	6	8		
9	3	3	6		
10	3	2	5		
11	4	2	6		
12	2	0	2		
13	1	0	1		
14	1	2	3		
15	2	0	2		
Total	30	30	60		

Maximum patients' GCS score was low on admission. GCS of group-B patients were relatively low because deterioration of GCS level were the indication of ICH operation in some instant. P-value indicate that there were no significant difference.

Table II: Location of haematoma on CT scan

Site haematoma	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
Frontal	3	1	4	9.0	0.436
Parietal	5	5	10		
Temporal	1	3	4		
Basal ganglia	9	4	13		
Temporoparietal	8	6	14		
Parietooccipital	0	1	1		
Posterior fossa	1	4	5		
Frontoparietal	1	3	4		
Occipital	2	2	4		
Temporobasal		1	1		
Total	30	30	60		

Basal ganglia and temperoparietal site were predominant. Distribution of site in both group were more or less similar (P=0.436). So they did not influence the outcome.

Table III: Volume of haematoma

Volume of haematoma	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
30to39	2	6	8	2.848	0.416
40to49	9	6	15		
50 to 59	7	8	15		
>60	12	10	22		
Total	30	30	60		

Volume distribution in two groups almost equal so they did not modify the outcome significantly (P=0.416).

Table IV: Ventricular extension of haematoma

Ventricular extension	Group-A	Group-B	Total	χ^2 with Yates correction	P-value
Yes	4	2	6	0.185	0.667
No	26	28	54		

No difference (p-value with Yates correction=0.667) of ventricular extension between two groups, so ventricular extension had no influence on outcome.

Table V: Mortality at discharge

Mortality	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
Alive	15	17	32	0.268	0.605
Death	15	13	28		
Total	30	30	60		

Mortality is one of our outcome determinant. In group-A mortality rate was 50% (15 patients) and survival rate was 50% (15 patients). On the other hand in group-B 13(43.3%) patients died, survival rate was 56.6% (17 patients). The outcome of mortality was nonsignificant (P=0.605).

Table VI: GCS (Pre-Operative) comparison

GCS Level	Group-A	Group-B	Total
≥ 9	16	9	25 (40%)
< 9	14	21	35 (60%)

In Group-A 16 patients had GCS ≥ 9 and 14 patients had GCS > 9 , in group-B 9 patients had GCS ≥ 9 and 21 patients had GCS > 9 . GCS is the important predictor in the outcome of PICH. In our study GCS is more worse in group-A but it was not significant (P=0.546).

Table VII: GCS score at discharge

GCS at Discharging	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
10	1	1	2	3.743	0.587
12	4	1	5		
13	0	1	1		
14	2	2	4		
15	8	12	20		
Total	15	17	32		

GCS at discharge in both groups were more or less similar indicated by statistical result (P=0.587).

Table VIII: Comparison of outcome in Glasgow Outcome Scale

GOS	Groups		Total	χ^2	P-value
	Conservative group-A	Surgical group-B			
Good	0	3	3	3.210	0.360
Moderate disability	7	7	14		
Severe disability	8	7	15		
Vegetative state	0	0	0		
Death	15	13	28		
Total	30	30	60		

In group-A 15(50%) patients died, 8(26.7%) patients had severe disability and 7(23.3%) patients had moderate disability.

In group-B 13(43.3%) patients died 7(23.3%) patients had severe and 7(23.3%) patients had

moderate disability and 3(10%) patients had good outcome. Statistically the result was nonsignificant as because p-value was 0.360(>0.05).

Table IX: GOS comparison in terms of death and dependent and independent.

Glasgow outcome scale	Group-A		Group-B	
	Death or Dependant	Independent	Death or Dependant	Independent
Good		0		3
Moderate disability		7		7
Severe disability	8		7	
Vegetative state	0		0	
Death	15		13	
Total	23(76.6%)	7(23.4%)	20(66.6%)	10 (43.3%)

Number of death were 15 (50%) patients in group-A and 13 (43%) patients in group-B.

Discussion

A long controversy exists for last few decades and still continues in this modern CT era regarding conservative versus surgical management of the primary intracerebral haemorrhage (PICH), important considerations are patient's initial level of consciousness, size and location of hematoma, involvement of dominant hemisphere, deterioration of neurologic status and development of hydrocephalus. So decision should be individualized. In our study we tried to find out which group, conservative or surgical had better outcome by Glasgow outcome scale.

Regarding the age of the patients of our study groups they had no significant difference in the mean age of 55 years and 57.86 years & it correlate with other study¹¹ where mean age is 58.8 years.

Regarding the sex, male: female ratio was 1:1 in group-A and 3:2 in group-B. So there were no significant variation in two groups.

Regarding hypertension in group-A, 24(80%) patients had history of hypertension and in group-B, 21(70%) patients had history of hypertension. Forty five (70%) patients had history of hypertension which correlates with other study¹² where 70-90% of patients had history of hypertension¹.

Regarding GCS in Group-A 16 patients had GCS ≥ 9 and 14 patients had GCS > 9 , in group-B 9 patients had GCS ≥ 9 and 21 patients had GCS > 9 . GCS is the important predictor in the outcome of PICH. In our study GCS is more worse in group-A but it was not significant (P=0.546).

In both groups, volume of hematoma distribution were all most similar. So had no significant difference between two groups (P=0.416).

In our study number of death were 15 (50%) patients in group-A and 13 (43%) patients in group-B. There was no significant difference in mortality rate between two groups but outcome was relatively better in group-B. Our mortality rate had similarity with other study^{2,12}.

According to Glasgow Outcome Scale, dependency in group-A and group-B was 26.6% and 23.4% respectively. So dependency were more in group-A. But there was no significant difference statistically. Seven (23.4%) patients were independent in group-A but 10 (43.3%) patients were independent in group-B. However in relative terms of outcome of group-B was better than that of group-A.

Our study almost similar to other study^{13,14}. Where surgical management had better outcome but statistically non significant. On the other hand McKissock et al.¹⁵ and Juvela et al.¹⁶ support conservative treatment of PICH. But McKissock et al.¹⁵ trial was done without CT scan findings and diagnosed by clinical examination, angiography and CSF examination. So we think this was the reason behind the poor outcome of their study.

Conclusion: In our study we found no statistically significant difference in outcome between surgical and medical management of primary intracerebral haemorrhage.

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