Does Surgery give Better Outcome than Conservative Treatment in Management of Supretentorial Spontaneous Intracerebral Haemorrhage (SICH)

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Abstract:

Introduction: *Management of supratentorial spontaneous intracerebral haematoma (SICH) has been one of the biggest controversies in neurosurgery from the time of beginning of modern neurosurgery. Here we have tried to put some light on that controversial dilemma whether to not to operate on patients of SICH to give the patients the maximum benefit.*

Objective: *To compare the outcomes between surgical and conservative management of patients of supratentorial spontaneous intracerebral haematoma (SICH).*

Methodology: *This was a cross sectional study conducted among the patients with a clinical diagnosis of SICH admitted in the Department of Neurosurgery, Chittagong Medical College and Hospital (CMCH). Patients having surgical indications and fulfilling inclusion criteria were included in the study during the period of November 2006 to November 2007. A total of 65 consecutive patients were enrolled in the study out of which 29 patients were enrolled in surgical group (Group I) and 36 patients in non surgical group (Group II). Informed written consent were taken from patient or attending relatives before enrollment The patients of both the groups were followed up on the 7th day, 14th day and 30th post ictus day and were assessed for improvement or deterioration by Glasgow Coma Scale (GCS), Glasgow Outcome Scale (GOS), Modified Rankin Scale (MRS) and mortality.*

Result: *In the surgical group (group I) mean age of the patients was 54. 9±10.38 years and in the non surgical group (group II) mean age of the patients was 61.5±10.57 years. In Glasgow Outcome Scale (GOS) on 30th day follow up moderate recovery was higher (75.0%) in group I whereas severe disability was higher (57.1%) in group II ($p < 0.05$). Modified Rankin Scale (MRS) was almost similar between two groups at 7th and 14th days follow ups whereas during 30th day follow up severe disability was not observed in group I but 32.1% was found in group II ($p < 0.05$). Mortality was 17.2% (5 patients) and 22.2% (8 patients) in surgical group and non surgical group respectively. The study found statistically significant better outcome of surgical management over conservative management in terms of both GOS and MRS at 30th day ($p < 0.05$). In relative terms of overall outcome between two groups surgical group did better in regards of both mortality and dependency.*

Conclusions: *Patients managed surgically for supratentorial spontaneous intracerebral haematoma had significantly better outcome than the patients managed conservatively.*

Key Words: *Spontaneous Intracerebral haemorrhage, stroke, supratentorial, craniotomy*

Bang. J Neurosurgery 2013; 3(1) : 3-9

Introduction:

Spontaneous Intracerebral Haemorrhage (SICH) is a blood clot that arises in the brain parenchyma in the absence of trauma or surgery. This entity accounts for 4 to 15% of all strokes and is associated with a higher morbidity and mortality rate than either ischaemic stroke or subarachnoid haemorrhage. Between 32% and 50% of patients die within the first month, and only 20% are independent six months after intracerebral bleeding. Despite the seriousness of the condition, the best therapeutic option for patients suffering from supratentorial spontaneous intracerebral haematoma (SICH) remains to be established[1,2,3].

With a high mortality rate in SICH, identification of modifiable risk factors might help lower its incidence. Common causes include hypertension, amyloid angiopathy, coagulopathy, vascular anomalies, tumors, and various drugs. Hypertension continues

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to be the single greatest modifiable risk factor for SICH. The incidence of SICH has, in fact, declined coincident with improvements in hypertension control. Authors of the Systolic Hypertension in the Elderly Program reported that treatment of isolated systolic hypertension in the elderly decreased the risk of SICH by 50%[2,4,5].

Mass effect, ischaemia and toxicity of blood components are responsible for brain tissue damage. Initially occurring disturbances of cerebral blood flow have a temporary character and do not play a key role in the pathology of intracerebral haemorrhage. Oedema formatting in the 24–48 hours after intracerebral bleeding is the result of multidirectional processes. The pathological mechanism that underlines it is the function of activation of systemic complement and cascade of coagulation[6].

Intracerebral haemorrhages commonly occur in the cerebral lobes, basal ganglia, thalamus, brain stem (predominantly the pons), and cerebellum. Extension into the ventricles occur in association with deep, large haematomas[7].

Many patients of SICH are best managed in the neuro ICU. The condition of the patient and the size and location of the haematoma are the primary factors in the decision to have surgery. Several criteria can be used to select patients for surgery. Among the important considerations for surgery and good outcome are level of consciousness, site and size of haematoma, deterioration of neurological status, midline shift, ventricular extension and proper timing of surgery[4].

Kanno et al[8] reported no beneficial effect of surgery for mild and severe SICH (defined by the location and size of the haematoma) but showed benefit for moderate SICH. The long controversy of whether to go for surgery or not is still going on, though there is much inclination towards doing surgery for selected cases to give a better life to the patient in comparison to treating the patient non surgically.

In Asian population the frequency of SICH may be as high as 30%[4]. In Bangladesh with population of more than 143 million, increasing life expectancy, betterment of socio-economic condition and improvement of diagnostic facilities including cheaper and easy availability of CT scanners in many peripheral district levels have contributed to the increased number of detections of SICH patients more than before. Many modalities of treatment for SICH are in hand at present. From different studies world wide the role of surgery for SICH has not been established yet. Even with the controversy whether surgery has a better role in outcome than conservative management, consensus is leaning towards surgical management for SICH for patients having fitting selection criteria for surgical intervention.

With the advent of modern facilities and techniques, available in our context, this study compared the outcomes between surgical and conservative management of patients of supratentorial spontaneous intracerebral haematoma, in an effort to overcome the controversy.

Objective of the Study:

The objective of this study was to compare the outcomes between surgical and conservative management of patients of supratentorial spontaneous intracerebral haematoma (SICH) regarding disability and other sequels or death and to ascertain the better management approach to give the patients the best possible benefits.

Methods and Materials:

This cross sectional comparative study was conducted in the department of Neurosurgery, Chittagong Medical College and Hospital during the period of November 2006 to November 2007. A total of 79 patients of supratentorial spontaneous intracerebral haematoma (SICH) with volume of 30 ml to 100 ml, with or without intraventricular extension, within the age group of 30 to 65 years, having GCS of 6 to 15, were selected for the study. The aim and objective of the study along with its procedures, diagnostic methods, risks and benefits were well explained to the patients and/or their attending relatives in an easy understandable local language. It was assured that all information and records would be kept confidential. Patients not meeting the inclusion criteria or refusing to take part in the study or who had incomplete follow up were excluded from the study. Informed written consents were taken from all the participating patients and/or the attending relatives. Of the 79 patients selected . Patients who consented for surgery and underwent surgery were included / enrolled in the surgical group (Group I) and patients who refused surgery but consented to take part in the study were enrolled in the non surgical group (Group II). The patients

of both the groups were followed up at 7th day, 14th day and 30th post ictus day and were assessed for improvement or deterioration in terms of Glasgow Coma Scale (GCS), Glasgow Outcome Scale (GOS), Modified Rankin Scale (MRS) and mortality.

Data were collected and edited manually. A master data sheet was prepared and data were analyzed by SPSS program. The level of significance was considered to be p value <0.05. The summarized data were then presented in a tabulated form.

Results:

Of the total 79 patients 14 patients were excluded as some refused to take part in the study or and some did not have a complete follow up. Of the rest of 65 patients, 29 was in Group I and 36 was in Group II

The mean (±SD) age was 54.9±10.38 years ranging from 35 – 73 years and in 61.5±10.57 years ranging from 35 – 75 years in group I and group II respectively. Maximum number was found in the age group of 51 – 60 years in group I and >60 years in group II. This finding was statistically significant (p<0.05). (Table I)

Male was predominant in both groups and male female ratio was 3.6: 1 in the whole study population, which was not significant. Among the presenting complaints and symptoms, no statistically significant difference was found between the two groups. Statistically significant (p>0.05) difference was also not found between two groups in terms of site of haematoma, though putaminal hamorrhages were the commonest followed by thalamic haemorrhages in both the groups. (Table II)

Volume of haematoma, as calculated by the formula ð/6 x abc, was <50 ml in 19 patients and was >50 ml in 10 patients in group I. In group II volume of haematoma was <50 ml in 31 patients and was >50 ml in 5 patients. (Table III)

A total of 29 patients underwent different surgical procedures, out of which 14 patients underwent craniotomy, 07 patients had craniectomy while 08 patients were given External Ventricular Drainage (EVD). (Table IV)

In surgical group GCS on admission was >8 in 15 patients and <8 was in 14 patients. In non surgical group GCS on admission was >8 in 22 patients and <8 was in 14 patients.

Table-I

Age distribution of the patients (N=65)

Age in year	Group I (n=29)		Group II (n=36)		p value
	n	%	n	%	
31-40	4	13.8	3	8.3	
41-50	5	17.2	3	8.3	
51-60	12	41.4	8	22.2	
>60	8	27.6	22	61.1	
Mean ± SD	54.9±10.38		61.5±10.57		0.013 S
Range (min- max)	(35-73)		(35-75)		

Table-II

Location of haematoma evaluated by CT scan (n=65).

Location	Group I (n=29)		Group II (n=36)		p value
	n	%	n	%	
Lobar	3	10.3	2	5.6	
Putaminal	19	65.5	19	52.8	0.421 NS
Thalamic	7	24.1	14	38.9	
Pontine	0	0.0	1	2.8	

Table-III

Volume of haematoma evaluated by CT scan (n=65).

Volume of Haematoma (ml)	Group I (n=29) n	%	Group II (n=36) n	%	p value
30-39	11	37.9	27	75.0	
40-49	8	27.6	4	11.1	
50-59	3	10.3	1	2.8	
>59	7	24.1	4	11.1	
Mean ±SD	46.5±10.99		39.9±12.7		0.029[S]
Range (min-max)	(32-66)		(31-84)		

Table-IV

Different Surgical approaches for evacuation of SICH (n=29)

Name of Surgery	Number of patients
Craniectomy	07
Craniotomy	14
External Ventricular Drainage(EVD)	08
Total number of procedures	29

The mean GCS score at different follow-ups increased in both groups with time from the level of score on admission but the differences were not statistically significant. (Figure 1).

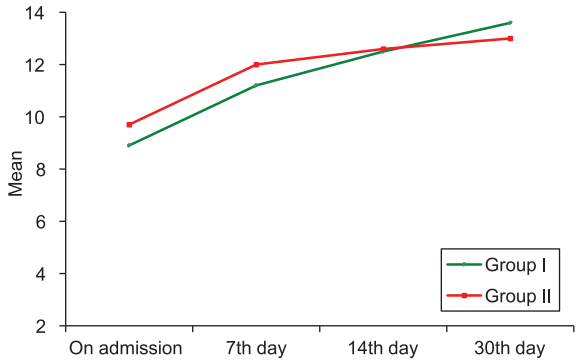

Fig.-1: *Line diagram showing mean GCS score at different stages*

In Glasgow Outcome Scale (GOS) on 7th and 14th day follow ups severe disability was predominant in both groups. But at 30th day follow up, moderate recovery was higher (75.0%) in group I whereas severe disability was higher (57.1%) in group II which was statistically significant ($p < 0.05$). (Figure 2)

Modified Rankin Scale (MRS) score was almost similar between two groups at 7th and 14th days follow up whereas during 30th day follow up severe disability was not observed in group I but 32.1% was found in group II and the difference was statistically significant ($p < 0.05$). (Figure 3)

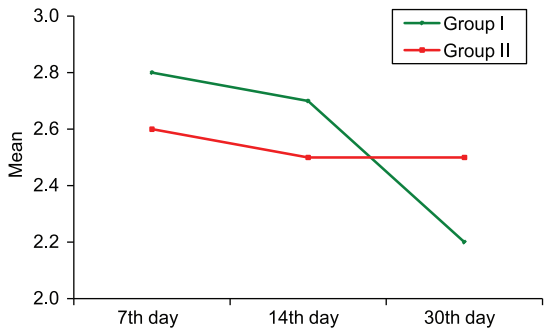

Fig.-2: *Line diagram showing mean GOS score at different follow-ups*

Mortality was 17.2% (5 patients) in group I and was 22.2% (8 patients) in group II. (Table V)

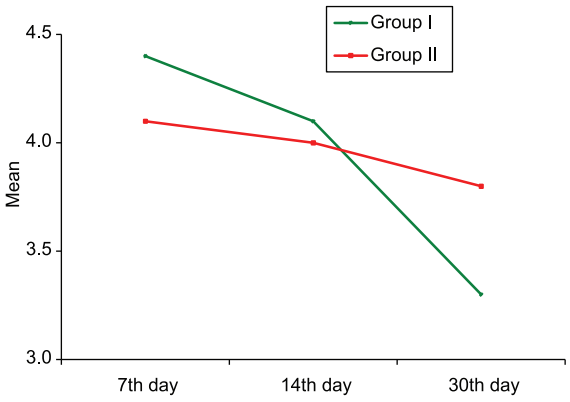

Fig.-3: *Line diagram showing mean MRS score at different follow-ups*

Table-V

Comparison of mortality between two groups (N=65)

Mortality	Group I (n=29)		Group II (n=36)		p value
	n	%	n	%	
Alive	24	82.8	28	77.8	0.618^{NS}
Death	5	17.2	8	22.2	

We found statistically significant better outcome of surgical management over conservative management in terms of both GOS and MRS at 30th day. In relative terms of overall outcome between two groups surgical group did better in regards of both dependency and mortality.

Discussion::

The objective of the present study was to compare the outcomes between surgical and medical treatment of supratentorial spontaneous intracerebal haemorrahge (SICH) in terms of Glasgow Coma Scale (GCS), Glasgow Outcome Scale (GOS), Modified Rankin Scale (MRS) and mortality between two groups and to see whether surgery gives better outcome than conservative management.

In the present study maximum number was found in the age group of 51 – 60 years and >60 years in group I and group II respectively. The male and female ratio was 3.6:1. These findings are in resemblance to the WHO's estimates for stroke incidence and prevalence in both men and women that has shown that stroke rates increase exponentially with age, and in most countries rates are higher for men than for women.[9]

The classic presentation of SICH is sudden onset of focal neurological deficit progressing over hours with accompanying headache, nausea, vomiting, altered consciousness, and elevated blood pressure. Supratentorial haemorrhage is commonly accompanied by headache and vomiting and altered consciousness that is rarely seen in ischaemic stroke. The type of focal neurological deficit, of course, depends on haematoma location.[2,5,7,10] Presenting complaints like headache, vomiting, loss of consciousness or hemiparesis were not statistically significant (p>0.05) in this study.

Putaminal and thalamic sites were predominant in both groups but no significant (p>0.05) difference in the site of haematoma was observed between two groups in our study.

The volume of haematoma was evaluated by CT scan in our study and the mean volume of haematoma, which was 46.5±10.99 ml in group I was significantly (p<0.05) higher than the volume of group II which was 39.9±12.7 ml. In one study patients quality of life was not affected by surgery, but the mortality rate was significantly lower than other studies.[10]

In our present study, in surgical group GCS on admission was >8 in 15 patients and was <8 was in 14 patients, volume of haematoma was <50 ml in 19 patients and >50 ml in 10 patients. Mortality was 17.2% (5 patients). In non surgical group GCS on admission was >8 in 22 patients and was <8 in 14 patients, volume of haematoma was <50 ml in 31 patients and was >50 ml in 5 patients. Mortality was 22.2% (8 patients). GCS score on admission in our study was slightly higher in group II but not significant (p>0.05). The mean (±SD) GCS score was 8.9±1.69 ranging from 6 – 12 in group I and 9.7±2.69 ranging from 6 – 15 in group II. Preoperative GCS influenced the outcome. GCS score of group I patients had relatively low GCS score as because deterioration of GCS level was one of the indications of SICH operations in some cases. In the current study the mean (±SD) GCS score on different follow ups observed quick rise of GCS in group I whereas in group II GCS score raised slowly, which indicates that the group I was better than group II in relation to GCS score on different follow ups. This findings match with other studies. [1,12,13,14]

Initial management should first be directed toward the basics of airway, breathing, and circulation, and detection of focal neurological deficits. Critical care is aimed at seizure prophylaxis, blood pressure management, management of intracranial hypertension by intracranial pressure monitoring whenever possible and by elevation of head by 30º and/or infusion of mannitol and/or steroids, maintenance of fluid and glucose balance, management of body temperature and coagulopathy and later depending on the patient's clinical state,

physical therapy, speech therapy, and occupational therapy should be initiated as soon as possible.[1, 2, 10, 15] Different methods of surgical management for SICH have been advocated. Amongst the different methods - craniotomy and evacuation of haematoma, decompressive craniotomy, craniectomy and evacuation, burr hole aspiration, external ventricular drainage (EVD), endoscopic aspiration, fibrinolysis with stereotactic clot aspiration are the common ones.[10, 11, 16] Surgical evacuation of ICH is recommended in supratentorial haematomas exceeding 20 ml except in patients older than 60 or already unconscious. Smaller haematomas with intraventricular extension may benefit from ventricular drainage.[18] In our study most of the patients (48.27%) underwent craniotomy and evacuation of haematoma. Some patients (27.59%) with large intraventricular haematoma or extension into the ventricle from the surroundings were treated with external ventricular drainage (EVD).

In this study Glasgow outcome scale (GOS) observed on 7th day and 14th day severe disability was predominant in both groups and no significant difference was found between two groups. During 30th day follow-up moderate recovery was higher (75.0%) in group I whereas severe disability was higher (57.1%) in group II and the difference was statistically significant ($p<0.05$). The magnitude of disability in both the groups according to GOS were higher than the other studies, which is most likely to be because of a very short follow up period.[1,11,14]

During 7th day and 14th day follow-ups, scores of both groups were almost similar according to Modified Rankin Scale but significant ($p<0.05$) change was found during 30th day of follow-up. During 30th day follow-up according to Modified Rankin Scale moderate disability and moderately severe disability were the majority in group I whereas severe disability and moderately severe disability were predominant in group II. Severe disability was significantly ($p<0.05$) higher in group II whereas no severe disability was observed in group I. The percentage of disability in terms of MRS was higher in both the groups as a whole in this study as we feel that the period of follow up was shorter than the other studies.[10,11,14]

Between 32% and 50% of patients die within the first month, and only 20% are independent six months after intracerebral bleeding. Despite the seriousness of the condition, the best therapeutic option for patients suffering from spontaneous supratentorial SICH remains to be established[1, 2, 3] The mortality rate is approximately 50% and two thirds of the patients who survive become disabled to various extent[14]. Mortality after SICH approaches 50% at 1 year. Half of all deaths happen in the first 2 days after symptom onset, whereas most deaths that take place after the first month are a result of secondary medical complications[19]. Survival rate was 82.8% and 77.8% in group I and group II respectively. mortality was higher in group II though it was not significant statistically. The percentages of mortality of both groups were much less than other studies which range from 23% to 58%.[2,3,5,7,14,19] This is probably because; the follow up period of this study was too short.

Conclusion:

Whether to go for surgery or not in case of spontaneous intracerebral haematoma remains a dilemma. Several factors should be kept in mind in selecting patients for surgery of SICH and as well as prediction of outcome in terms of benefit of surgery. The age of the patient, site and size of the haematoma, ventricular extension, and co-morbid diseases especially uncontrolled hypertension are the major factors regarding good or bad outcome of surgery in patients of SICH. In our study we found statistically significant difference between outcomes in two groups, though the co-morbid conditions were not considered here.

Acknowledgement:

I am indebted and grateful to Professor M Afzal Hossain, Professor Kanak Kanti Barua, Professor A T M Mosharef Hossain, Professor Khokon Kanti Das, Professor Lutfor Rahman and Dr. M Kamaluddin for their help and inspiration in preparing this paper.

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