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# Outcomes of Surgical and Non-Surgical Management of Primary Intracerebral Haemorrhage: A Non-Randomized Clinical Trial

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**Abstract**

**Background:** Management of primary intracerebral haemorrhage is very important in the context of outcomes. **Objective:** The purpose of the present study was to compare the outcomes of surgical and non-surgical management of primary intracerebral haemorrhage. **Methodology:** This non-randomized clinical trial study was conducted in the Department of Neurosurgery at Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2006 to December 2007 for a period of two (02) years. All patients with primary intracerebral haematoma admitted in the Department of Neurosurgery in study period managed conservatively or surgically is the study population. Selected patients were divided into two group of which patients in group A were treated surgically and the group B patients were treated conservatively. Best medical treatment was given for nonsurgical group and operation were done for surgical group and followed up after surgery till discharge by observing GCS, neurological improvement and GOS at discharge. **Results:** Of the total 60 subjects selected for study, 30 cases were in group A and the rest of 30 cases were in group B. The both groups were almost identical in terms of age. Distribution of patients in relation to age had no significant difference (P-=0.7). In group A 13(43.3%) patients were died and the survival rate was in 17(56.6%) cases. On the other hand, in group B mortality rate were 15(50.0%) patients and survival rate were 15(50%) patients (P=0.605). Considering the Glasgow outcome scale, in group A 13(43.3%) patients died and 7(23.3%) patients had severe and moderate disability and 3(10.0%) patients had good outcome. In group B 15(50%) patients died and 8(26.7%) patients had severe disability as well as 7(23.3%) patients had moderate disability (p=0.360). **Conclusion:** In conclusion there is no significant difference of outcomes of surgical and non-surgical management of primary intracerebral haemorrhage. *[Journal of National Institute of Neurosciences Bangladesh, January 2024;10(1):12-16]*

**Keywords:** Outcomes; surgical; non-surgical management; primary intracerebral haemorrhage

## Introduction

Primary intracerebral haemorrhage (PICH) accounts for approximately 70.0 to 80.0% cases[1]. It is due to spontaneous rupture of small vessels damaged by hypertension or amyloid angiopathy[2]. Secondary intracerebral haemorrhage (ICH) is associated with a number of congenital or acquired condition such as vascular anomalies, coagulopathies, tumours and various drug therapies[3]. Most frequent site for spontaneous intracerebral haemorrhage are the basal ganglia, thalamus, sub-cortical white matter of cerebral lobes, cerebellum and brainstem[4].

Treatment of haemorrhagic stroke is based on underlying cause of the haemorhage and extent of damage to brain[5]. The initial management of all patient with spontaneous ICH consists of medical intervention and stabilization, followed by either surgical intervention or conservative treatment. The goals of medical treatment include control

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of hypertension, reduction of intracranial pressure and prevention of seizures[6]. 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 the important consideration are the patients level of consciousness site and size of haematoma, involvement of dominant hemisphere, deterioration of neurological status, midline shift and ventricular extension, proper timing of surgery[7].

Although it is not possible to predict individual patient outcome with complete accuracy, some knowledge of the relevant prognostic indicators is desirable, as the probability for a meaningful recovery invariably dictates further management[8]. The most significant predictors of mortality are haematoma volume and level of consciousness at admission. Increasing patient age, infratentorial location of the intracerebral haemorrhage, midline shift and presence of intraventricular blood have all been associated with poor outcome[9]. In addition, intubation has been shown to be an independent predictor of mortality in intracerebral haemorrhage. The purpose of the present study was to compare the outcomes of surgical and non-surgical management of primary intracerebral haemorrhage.

## Methodology

**Study Settings and Population:** This non-randomized clinical trial study was conducted in the Department of Neurosurgery at Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2006 to December 2007 for a period of two (02) years. All patients with primary intracerebral haematoma admitted in the Department of Neurosurgery in study period managed conservatively or surgically were the study population. Patients of PICH treated with GCS less than 5 and patients with secondary intracerebral hemorrhage like aneurysm, arterio-venous malformation (AVM), trauma or tumour were excluded from this study.

**Study Procedure:** Conservatively managed patients regarded as control group. Selected patients were divided into two group by purposive sampling. The PICH patients in group A were treated surgically and the group B patients were treated conservatively. Patients or attendants refused to operate were included in, the conservative group. CT-scan evidence of PICH and patients with the GCS (5-15) in admission. Haematoma volume 30 cc or above were included in this study.

**Surgical Procedure:** All the selected patients were evaluated on the basis of detailed history, clinical examination and CT-scan findings. Best medical treatment was given for nonsurgical group and operation were done for surgical group and followed up after surgery till discharge by observing GCS, neurological improvement and GOS at discharge. A data collection sheet was prepared including the variable of age and sex of the patients, clinical presentations, GCS at admission and discharge, Glasgow outcome score at discharge, volume and site of hematoma on CT-scan, history of hypertension. The data were collected by the researcher himself.

**Statistical Analysis:** Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). Continuous data were expressed as mean, standard deviation, minimum and maximum. Categorical data were summarized in terms of frequency counts and percentages. Chi-square test was used for comparison of categorical variables and Student t test was applied for continuous variables. Every effort was made to obtain missing data. A two-sided P value of less than 0.05 was considered to indicate statistical significance. Differences between case and control were tested.

**Ethical Clearance:** Ethical permission was taken from Dhaka Medical College Hospital ethical committee. All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration 2013) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and were analyzed using the coding system.

## Results

The present study was prospective control study conducted in the Department of Neurosurgery at Dhaka Medical College and Hospital, Dhaka, Bangladesh from January 2006 to October 2007. Of the total 60 subjects selected for study, 30 were in group A and the rest 30 were in group B. The group A was PICH treated surgically while the group B were PICH treated conservatively. The mean age of group-A and group-B were 55.2 years and 57.1 years respectively. The both groups were almost identical in terms of age.

Distribution of patients in relation to age had no significant difference (P¬ value=0.7). Highest number of patients were in 40 to 60 years' age group (31 cases) (Table 1)

Table 1: Comparison of Age Distribution of Patients between Two Groups (n=60)

| Age Group | Group A | Group B | Total | P value |
|---|---|---|---|---|
| Less Than 40 Years | 7 | 5 | 12 | |
| 40 to 60 Years | 15 | 16 | 31 | |
| 60 to 80 Years | 8 | 8 | 16 | 0.761 |
| **Total** | **30** | **30** | **60** | |

In group A 13 (43.3%) patients were died and the survival rate was in 17 (56.6%) cases. On the other hand, in group B mortality rate were 15(50%) patients and survival rate were 15(50%) patients. The outcome of mortality was non-significant (P value 0.605) (Table 2).

Table 2: Number of Mortality during Discharge (n=60)

| Mortality | Group A | Group B | Total | P value |
|---|---|---|---|---|
| Alive | 17 | 15 | 32 | |
| Death | 13 | 15 | 28 | 0.605 |
| **Total** | **30** | **30** | **60** | |

In group A 13(43.3%) patients died 7(23.3%) patients had severe and moderate disability and 3(10%) patients had good outcome. In group B 15(50%) patients died and 8(26.7%) patients had severe disability as well as 7(23.3%) patients had moderate disability. Statistically the result was non-significant as because p value was 0.360 (Table 3).

Table 3: Comparison of outcome in Glasgow Outcome Scale (n=60)

| GOS | Group A | Group B | Total | P value |
|---|---|---|---|---|
| Good | 3 | 0 | 3 | |
| Moderate | 7 | 7 | 14 | |
| Disability | 7 | 8 | 15 | 0.360 |
| Vegetative state | 0 | 0 | 0 | |
| Death | 13 | 15 | 28 | |
| **Total** | **30** | **30** | **60** | |

GCS in group A >9 had 9 patients and < 9 had 21 patients, in group B >9 had 16 patients and less than 9 had 14 patients. GCS is the important predictor in the outcome of PICH. In our study GCS is worse in group A but it was not significant (P value 0.546) (Table 4).

Table 4: GCS Comparison among Study Population (n=60)

| GCS level | Group A | Group B | Total | P value |
|---|---|---|---|---|
| >9 | 9 | 16 | 25 | |
| <9 | 21 | 14 | 35 | 0.605 |
| **Total** | **30** | **30** | **60** | |

## Discussion

There is a long controversy which exists for last few decades and still continues in this modem CT-scan era regarding surgical versus nonsurgical management of the PICH. Important considerations are patients initial level of consciousness, size and location of hematoma, involvement of dominant hemisphere, deterioration of neurologic status and development of hydrocephalus[9]. Therefore, decision should be individualized.

In this study number of death were 13(43.0%) patients in, group A and 15(50.0%) patients in group B. There was no significant difference in mortality rate between two groups but outcome was relatively better in group A. The mortally rate had similarity with other study[4,10]. Therefore, this study almost similar to the study of Morioka et al[7], Broderick et al11 where surgical management had better outcome but statistically non-significant. On the other hand, Hemphill et al[12] and Togha et al[13] support conservative treatment of PICH. However, Hemphill et al[12] trial was done without CT-scan findings and diagnosed by clinical examination, angiography and CSF examination. Thus we think this was the reason behind the poor outcome of their study.

There are many studies related to management of spontaneous intracerebral haemorrhage. Some literatures related to our study are mentioned below. The probability of lethal outcome can be calculated on admission in all patient with supratentorial bleeding area and level of consciousness[12]. Intraventricular expansion of blood is a better prognostic factor in thalamic bleeding and a worse one in lobar haematoma. Functional outcome is also related with size of the bleeding area and level of consciousness on admission in putaminal and lobar haemorrhages but has no correlation to thalamic haemorrhage[13].

Poor outcome in patients with lobar haemorrhage is associated with a haemorrhage size of more than 40cc, GCS less than or equal to 13, however, also dependent on time interval between ictus and presentation[7]. This is consistent with prior studies demonstrating deterioration from enlargement may occur when patient

present early on stupor and septum pellucidum shift greater than 6mm on CT scan at presentation predict a hopeless outcome in conservatively treated patients[11]. This signs may influence triage and management decisions[14].

The GCS is commonly used by clinicians to determine the aggressiveness of care for ICH patients. Determining potentially reversible causes of low GCS scores is important before withdrawal of care orders are considered[11]. ICH has a wide range of severity at presentation. Hydrocephalus is a potentially reversible cause of a lower GCS score. Since early withdrawal of care decisions are often based on initial GCS, recognition of the important influence of hydrocephalus on GCS is warranted before withdrawal of care decisions are made[15].

Zahuranec et al[10] reported the surgical removal of 100 putaminal haemorrhages within 7 hours of symptom onset and 60 haemorrhages within 3 hours of onset. Patient had a baseline GCS score of 6 to 13 with obvious hemiplegia. Most of the patients had a haematoma volume more than 20 to 30 cc, with a midline shift more than 5mm. Patient with mild symptoms or GCS less than 5 were treated conservatively. At 6 months 7.0% of the patient had died, 15.0% full recovery and 35.0% living independently at home[13]. An admission Glasgow Coma Scale of 8 or less and intracerebral haemorrhage haematoma volume of 60 m1 or more predicted a mortality of a 91.0% at 30 days. Some investigations have reported that a haematoma volume of more than 50 ml was associated with a mortality rate 90.0% cases. A rating system known as the ICH score has been developed. It is based on GCS, age, haematoma volume location and presence of intraventricular blood[11].

While early mortality is higher, survivors of intracerebral haemorrhage appear more likely than ischaemic stroke patients to be functionally independent at one year. In Oxfordshire stroke project, although 62.0% of intracerebral haemorrhage patients were dead after one year. 68.0% of the survivors were independent[13]. Although it is not possible to predict individual outcome with complete accuracy, some knowledge of the relevant prognostic indicator is desirable, as the probability for meaningful recovery invariably dictates future management. The two most significant predictors of mortality are haematoma volume and level of consciousness at admission. It is important that clinicians not become overly didactic in their approach to patients with large haemorrhage volumes and low Glasgow coma scale scores, but this information can be very helpful in assisting families and health care providers in management decisions[10]. It has been pointed out that therapeutic nihilism can affect the outcome of the patients who might otherwise do well. Becker determined in a retrospective analysis that the decision to withdraw treatment was the biggest predictor of mortality[14].

The mortality rate six months after spontaneous intracerebral hemorrhage ranges from 23 to 58 percent. A low score on the Glasgow Coma Scale, a large volume of the hematoma, and the presence of ventricular blood on the initial CT-scan are factors that have been consistently identified as predictive of a high mortality rate. Broderick et at[10] found that the mortality rate at one month was best predicted by determining the initial score on the Glasgow Coma Scale and the initial volume of the hematoma. In their study, patients who initially had a score of less than 9 on the Glasgow Coma Scale and a hematoma volume of more than 60 ml had a mortality rate of 90 percent at one month, whereas patients with a score of 9 or greater and a hematoma volume of less than 30 ml had a mortality rate of 17 percent[11].

## Conclusion

In conclusion there is no significant difference of outcomes of surgical and non-surgical management of primary intracerebral haemorrhage. The number of death and survival in the surgical and non-surgical groups are almost equal and is not statistically significant. Furthermore, the disability is also almost similar to each group. A large scale study should be carried out to the real scenario.

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authors read and approved the final version of the manuscript.

**Data Availability**
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

**Ethics Approval and Consent to Participate**
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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