Analysis of Early Outcome of Surgery in Spontaneous Primary Intracerebral Haemorrahage in Relation to Preoperative Glasgow Coma Scale

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Abstract:

Objectives : To correlate preoperative Glasgow coma scale with early outcome of surgery. **Methods:** This prospective study was done at the department of neurosurgery of Dhaka Medical College (from January 2009 to June 2010) on consecutively selected patients with a suspicion of intracerebral haemorrhage and subsequently confirmed by CT scan of brain. A total of 30 hypertensive patients with their age ranged from 41 to 80 years with Glasgow coma scale 6 to 12 were included in this study. Co-morbid patients like cardiac, respiratory and renal failure requiring artificial maintenance of blood pressure and respiration were excluded in this study. All these patients were evaluated on the basis of detailed history from attendants (as patients were stuporous and semicomatose), clinical examination and subsequently CT scan of brain (at presentation and at 7th postoperative day). All these patients were operated and followed up during hospital stay and at 30-day after operation, by observing Glasgow coma scale and Glasgow outcome scale. **Results:** 20 patients had Glasgow coma scale 6 to 8 on admission, among them Glasgow outcome scale was 5 in 4(20.0%) patients, was 3 in 4(20.0%) patients and was 1 in 12(60.0%) patients. 10 patients had Glasgow coma scale 9 to 12 on admission, among them Glasgow outcome scale was 5 in 6 (60.0%) patients, was 4 in 1(10.0%) patient and was 3 in 3(30.0%) patients. **Conclusion**: Surgery in relation to preoperative Glasgow coma scale (Glasgow coma scale) had a significant correlation with early outcome of surgery. From the current study removal of haematoma when Glasgow coma scale >8 lower the morbidity and mortality, which was statistically significant.

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Introduction:

Spontaneous intracerebral haemorrhage is responsible for 10 to 15% of the acute stroke[1]**.** Stroke is the leading cause of hospitalization in the U.S.A. Combining of all types of stroke it is the 3rd leading cause of death in adult population i.e over 40 years of age after ischemic heart disease and cancer in developed country and the first leading cause of disability[2]. According to WHO, stroke may be defined as rapidly developing clinical signs of focal disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin[3].

There are two main types of stroke: Ischemic stroke 85% and haemorrhagic stroke 15%. Although haemorragic stroke accounts for only 10 to 15% of first ever stroke, with a 30-day morality rate of 35% to 52%; half of deaths occur in the first 2 days[4].

Spontaneous intracerebral haemorrhage, by definition is a haemorrhage that arises without preceding trauma. This condition affects infants, children and adult with a varying rate of clinical progression depending upon, preoperative Glasgow coma scale of the patient, the location and extent of the haemorrhage and volume of haematoma.

Depending upon the underlying cause of bleeding, spontaneous intracerebral haemorrhage is classified as either primary or secondary. Primary intracerebral haemorrhage accounting for 78 to 88% of cases, originates from the spontaneous rupture of small vessels damage by chronic hypertension or amyloid angiopathy. Secondary intracerebral haemorrhage occurs in a minority of patients in association with vascular abnormalities[5] (such as arteriovenous malformation, aneurysms, tumors or impaired coagulation.)

The single most important factor guiding the management of patients with spontaneous primary intracerebral haemorrhage is the pre-operative level of consciousness. The majority of studies during the past 20 years have clearly shown that surgical intervention is superior to conservative treatment in both stuporous and semicomatose patients (Glasgow coma scale 6-12) in both mortality and functional status. Surgery should be considered in all patients who deteriorate neurologically despite aggressive medical treatment. However, surgical intervention is not indicated in deeply comatose (Glasgow coma scale 3-5) nor in alert or somnolent patients (Glasgow coma scale 13-15)[6].

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Neurosurgeons in Bangladesh are providing surgical management in certain cases of primary spontaneous intracerebral haemorrhage. As the controversy over management strategy still remains, this study may reflect the relationship between preoperative Glasgow coma scale of patients and early outcome (early 30-day mortality and morbidity) of surgery.

Methods:

This prospective study was carried out at the department of Neurosurgery of Dhaka Medical College on consecutively selected patients from January 2009 to June 2010 with a suspicion of spontaneous primary intracerebral haemorrhage and subsequently confirmed by CT scan of brain (at presentation and at 7th postoperative day). A total of 30 hypertensive patients between age ranged from 41 to 80 years with Glasgow coma scale score 6 to 12 were included in this study. Co-morbid patients like cardiac, respiratory and renal failure requiring artificial maintenance of blood pressure and respiration were excluded in this study. All these patients were evaluated on the basis of detailed history from attendants on admission, clinical examination and subsequently CT scan of brain. All these patients were operated and followed immediate after surgery, at discharge and at 30-day after operation, by observing Glasgow coma scale and Glasgow outcome scale. Surgical procedures were as follows:

1. Burr-hole aspiration: Simple aspiration through a burr-hole is relatively noninvasive and associated with lower morbidity than craniotomy.
2. Open craniotomy: Craniotomy has been the standard approach for removal of intracerebral haemorrhage. It's major advantage is adequate exposure to remove the clot. More complete clot removal may reduce elevated intracranial pressure and local pressure effects of the blood clot on the surrounding brain.
3. Craniectomy: Haemorrhage in the temporal lobe.
4. External ventricular drainage (EVD): Specially applied for any haemorrhgae with ventricular extension.

A pre-designed data collection sheet was used for each patient and information regarding detailed history, general and neurological examination and findings of CT scan (volume, site and ventricular extension of haematoma), Glasgow coma scale and Glasgow outcome scale were recorded. Collected data was analyzed by using statistical package for social science (SPSS). r test was used to evaluate correlation between pre-operative Glasgow coma scale and early outcome of surgery. $p<0.05$ was considered as a minimum level of significance.

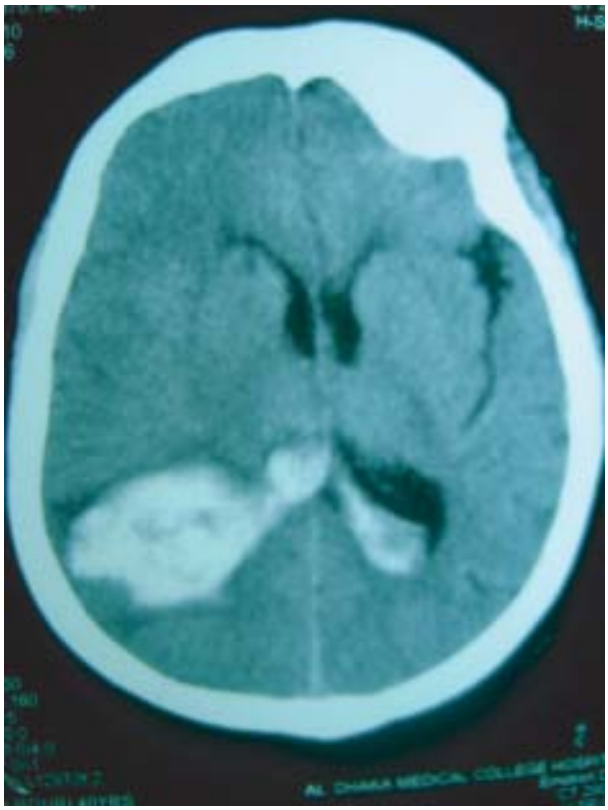

Plate-1 : *Preoperative CT scan of right parietal lobe haemorrhage with midline shift and ventricular extension.*

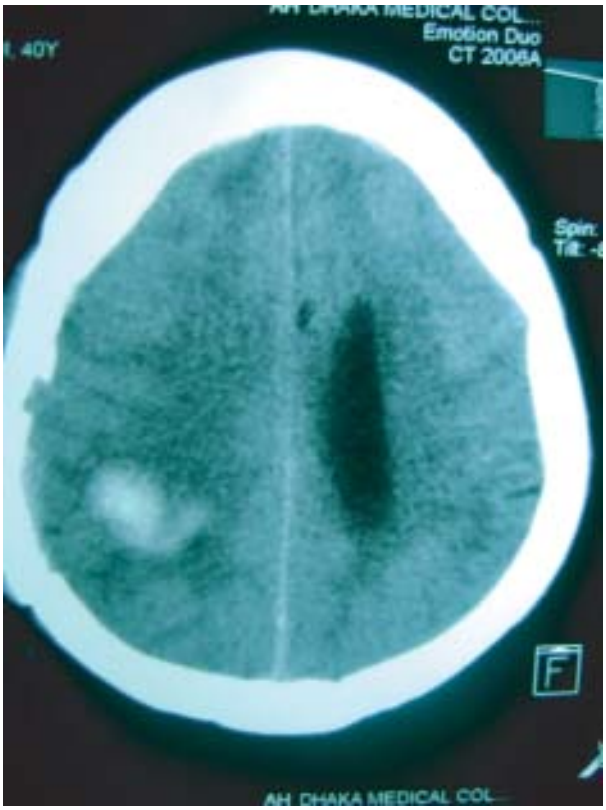

Plate -2 : *Postoperative CT scan after craniotomy and evacuation of haematoma.*

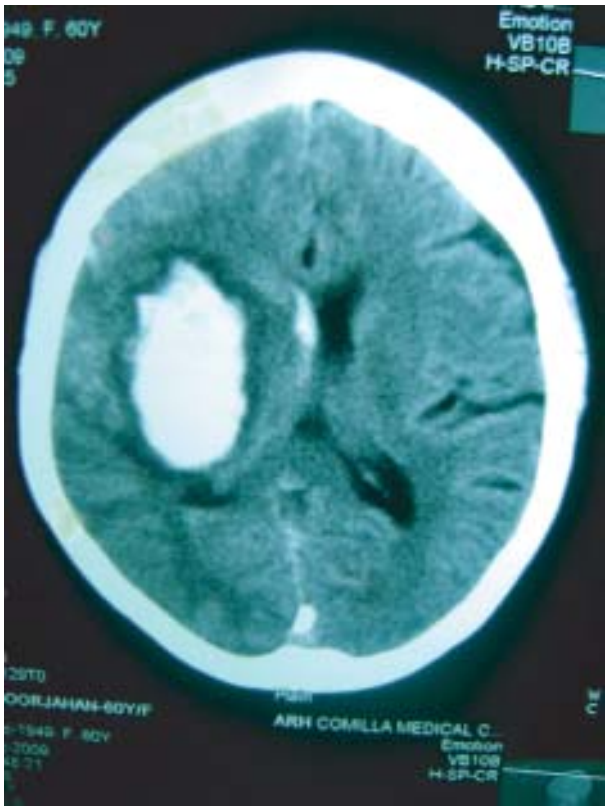

Plate-3 : *Preoperative CT scan of right basal ganglia haemorrhage with midline shift and ventricular extension.*

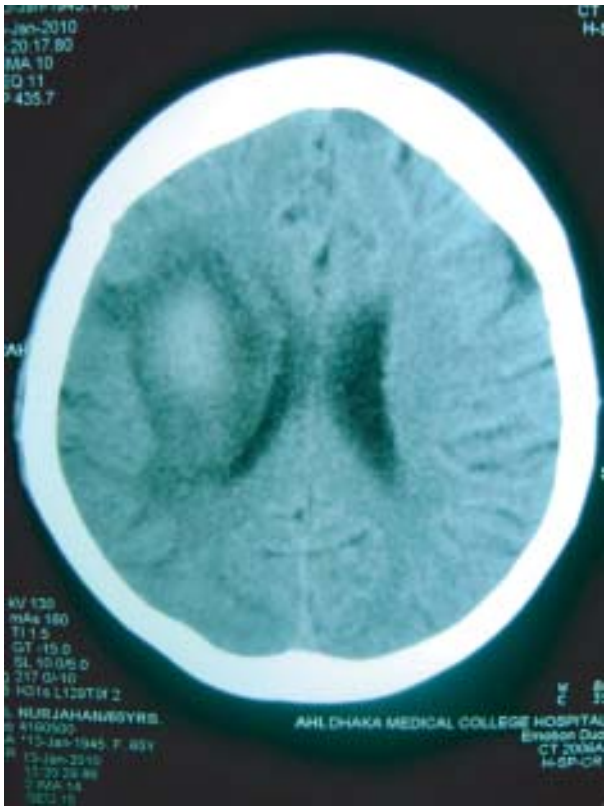

Plate-4: *Postoperative CT scan after craniotomy and evacuation of haematoma.*

Table-I

Glasgow coma scale

Points	Best eye opening	Best verbal	Best motor
6	-	-	obeys
5	-	oriented	localizes pain
4	spontaneous	confused	withdraws to pain
3	to speech	inappropriate	flexor (decorticate)
2	to pain	incomprehensible	extensor (decerebrate)
1	none	none	none

Table-II

Glasgow outcome scale

Score	Meaning
5	Good recovery- resumption of normal life despite minor deficits ("return to work" not reliable)
4	Moderate disability (disabled but independent)- travel by public transportation, can work in sheltered setting (exceeds more ability to perform "activities of daily living")
3	Severe disability (conscious but disabled)- dependent for daily support (may be institutionalized- but this is not a criteria)
2	Persistent vegetative state- unresponsive and speechless; after 2-3 weeks, may open eyes and have sleep / wake cycles.
1	Death

Results:

Among 30 patients 22(73.3%) were male and 8(26.7%) were female and male to female ratio was 2.75:1. Mean (±SD) age of the patients were 55.70 ±10.25, peak age incidence of intracerebral haemorrhage was found in 41 to 50 years age group. 18(60%) patients had the history of irregular antihypertensive medication, 10(33.3%) patients had the history of regular medication and 2(6.7%) patients had no history of medication.

Table-III

Distribution of patients with intracerebral haemorrhage according to Glasgow coma scale (n=30)

Glasgow coma scale on admission	Frequency	Percent
6-8	20	66.67
9-12	10	33.33
Total	30	100.0

Out of 30 patients 20 patients (66.67%) had Glasgow coma scale 6 to 8 and 10 patients (33.33%) had Glasgow coma scale 9 to 12.

Table –IV

Correlation between Glasgow coma scale on admission and Glasgow coma scale immediate after operation of patients with intracerebral haemorrhage.

Glasgow coma scale	Glasgow coma scale immediate after operation				Total
on admission	3-5	6-8	9-12	12-15	
6-8	3(15.0%)	11(55.0%)	6(30.0%)	0 (0%)	20
9-12	0(0%)	0(0%)	7(70.0%)	3(30.0%)	10
Total	3	11	13	3	30

r = 0.673, p = 0.0001

Glasgow coma scale on admission was 6 to 8 in 20 patients and 9 to 12 in 10 patients. Glasgow coma scale immediate after operation was 3 to 5 in 3 patients, 6 to 8 in 11 patients, 9 to 12 in 13 patients and 12 to 15 in 3 patients. It is evident that Glasgow coma scale was improved significantly immediate after operation which is statistically significant (p = 0.0001).

Table-V

Correlation between Glasgow coma scale on admission and follow up Glasgow coma scale of patients with intracerebral haemorrhage after operation (at 30-day after operation)

Glasgow coma scale	Follow up Glasgow coma scale				Total
on admission	3-5	6-8	9-12	12-15	
6-8	4(20.0%)	8(40.0%)	1(5.0%)	7 (35.0%)	20
9-12	0(0%)	0(0%)	0(0%)	10(100.0%)	10
Total	4	8	1	17	30

r = 0.58, p = 0.001

Glasgow coma scale on admission was 6 to 8 in 20 patients and 9 to 12 in 10 patients. Follow up Glasgow coma scale was 3 to 5 in 4 patients, 6 to 8 in 8 patients, 9 to 12 in 1 patient and 12 to 15 in 17 patients. It is evident that follow up Glasgow coma scale after operation improved significantly which is statistically significant (p = 0.001).

Table-VI

Correlation between Glasgow coma scale on admission and Glasgow outcome scale of patients with intracerebral haemorrhage

Glasgow coma scale	Glasgow outcome scale					Total
on admission	1 (Dead)	2 (Vegetative stage)	3 (severe disability)	4 (moderate disability)	5 (Good recovery)	
6-8	12(60.0%)	0(0%)	4(20.0%)	0(0%)	4 (20.0%)	20
9-12	0(0%)	0(0%)	3(30.0%)	1(10.0%)	6(60.0%)	10
Total	12	0	7	1	10	30

r = 0.576, p = 0.0001

20 patients had Glasgow coma scale 6 to 8 on admission. Among them Glasgow outcome scale was 5 in 4 (20.0%) patients, was 3 in 4(20.0%) patients and was 1 in 12 (60.0%) patients. 10 patients had Glasgow coma scale 9 to 12 on admission. Among them Glasgow outcome scale was 5 in 6 (60.0%) patients, was 4 in 1 (10.0%) patient and was 3 in 3 (30.0%) patients. It is evident that surgical outcome was better when Glasgow coma scale was 9 to 12 on admission which is statistically significant (p= 0.0001).

Table-VII

Condition of patients with intracerebral haemorrage at 30-day after operation (n = 30)

Glasgow outcome scale	Frequency	Percent
5 (Good recovery)	10	33.3
4 (moderate disability)	1	3.3
3 (severe disability)	7	23.3
2 (Vegetative stage)	0	0
1 (Dead)	12	40.0
Total	30	100.0

Out of 30 patients, 12 patients (40.0%) had died either in ICU, post operative ward, recovery ward or at home. 10(33.3%) patients had good recovery, 7 (23.3%) patients were severely disable, 1(3.3%) patient was moderately disable but independent and no patients was in vegetative stage.

Discussion:

The surgical treatment of spontaneous primary intracerebral haemorrhage varies throughout the world, mainly because of the factors that may influence patient's outcome such as patient's age, level of consciousness, severity of limb paresis, site, volume and mass effect of the haemorrhage and presence or absence of ventricular extension, clinical status of patients at presentation with time lapse since haemorrhage. Surgery has a high early mortality rate of 38 to 52%, even though it is recommended to have effective surgical treatment in the hazardous acute phase[7].

Clinicians try to determine the likely cause of a haemorrhage by its location in the brain as seen on the CT scan. With the advent of CT scan the appropriate diagnosis of intracerebral haemorrhage has become much easier and timely interventional attitude has been developed in the management of intracerebral haemorrhage but over enthusiasm has not been rewarded.

This study was under taken on 30 patients with spontaneous primary intracerebral haemorrhage. The age ranged between 41 to 80 years and mean age was 55.70. In the previous study[6] the highest incidence of intracerebral haemorrhage is in between 45 to 75 years. This study had a male predominance which is similar to other study[8].

It was observed that habit of irregular intake of antihypertensive drugs caused about 60% of the known hypertensive patients who had intracerebral haemorrhage, this study correlates with the previous study[9] where habit of irregular intake of antihypertensive drugs caused about 55% of the known hypertensive patients who had intracerebral haemorrhage.

The volume of haematoma has been found to correlate with an individual's level of consciousness (Glasgow coma scale). Here it was observed that outcome was good where Glasgow coma scale was 9 to 12 but poor where Glasgow coma scale was 6 to 8 which is comparable to other study[10] where outcome was good when Glasgow coma scale was 9 to 11 but poor when Glasgow coma scale was d" 8.

It was observed that an early (30-day) mortality rate was 60% when admission Glasgow coma scale was 8 or less and no mortality was found when admission Glasgow coma scale was 9 or more which is comparable to other study[11] where 30-day mortality rate was 91% and 19% accordingly.

Out of 30 patients with intracerebral haemorrhage, 1(3.3%) patient had moderate disability i.e disable but independent, 7(23.3%) patients had severe disability i.e. conscious but disable. This study had an early (30-day) mortality rate of 40% which is undoubtedly similar to other study[7] where 30-day mortality rate was 38 to 52% and comparable to other study[12] where mortality rate was 50%.

This study clearly shows that there is a significant positive correlation between the Glasgow coma scale and Glasgow outcome scale that revealed statistically in correlation co-efficient (r- test) test. ($r = 0.576$, $p < 0.001$).

Conclusion:

Surgery in relation to preoperative Glasgow coma scale (Glasgow coma scale) had a significant correlation with early outcome of surgery. From the current study removal of haematoma when Glasgow coma scale >8 lower the morbidity and mortality, which was statistically significant.

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