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Research Article

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Outcome of External Ventricular Drainage in Spontaneous Intracerebral Haemorrhage with Ventricular Extension in different GCS Score

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Abstract

Background: *Intracerebral Haemorrhage (ICH) is a medical emergency of the highest degree with frequent early neurological deterioration or death. External ventricular drainage (EVD) is the procedure of choice for the treatment of spontaneous intracerebral haemorrhage with ventricular extension or blood within the ventricles, acute hydrocephalus and increased intracranial pressure in patients of intracerebral haemorrhage and subarachnoid haemorrhage (SAH) with hydrocephalus and its sequelae.*

Objective: *The aim and objective of this study was to predict the outcome of pre operative GCS following external ventricular drainage in spontaneous intracerebral haemorrhage with ventricular extension.*

Method: *In this was prospective observational studies, a total number of 60 cases were taken purposively for a period of July, 2015- March, 2017 diagnosed by CT scan of brain at Department of Neurosurgery, Dhaka Medical College Hospital. All the patients, fulfilling the inclusion and exclusion criteria, were enrolled for the study. For assessing outcome of EVD in post operative patients and evaluating the efficacy of EVD surgery in follow ups. Glasgow Coma Scale and Glasgow Outcome Scale scoring method for patient assessment were used for outcome of EVD surgery.*

Result: *A total of 60 patients were included in this study, age range was 45 to 86 years. Majority patients, 24 (40.0%) were from 61-70 years of age. The mean age was found 62.0±20. It was observed that 24 (40.00%) patients had GCS 5. GCS 6 was observed in 14(23.33%) patients. GCS 5 and 6 were not found post operatively in any cases. GCS 7 was observed in 14 (23.33%) cases. Whereas, GCS 8, 9, 10 were found in 11 (18.33%), 13 (21.66%), 10(16.66%) cases respectively and 4 cases were died on first post operative day. In most cases GCS level rose to 2 points. GOS at 7th POD died total 12 (20.00%) cases. It was observed that 48 (80.00%) patients were alive Moderate disability existed in 12(25.00%) cases. Again, severe disability and persistent vegetative cases observed in 14(29.16%), 9(18.75%) cases. Glasgow Outcome Scale at 3 months follow up of my study patients, it was observed that total died patients 16 (26.66%).*

Conclusion: *According to my study, majority of the study patients survived following EVD in spontaneous ICH with ventricular extension but most cases was unfavorable outcome which was statistically*

Abbreviation: ICH = Intracerebral Haemorrhage, VE = Ventricular Extension, EVD = External Ventricular Drainage, GCS = Glasgow Coma Scale, GOS = Glasgow Outcome Scale

Introduction

Intracerebral Haemorrhage (ICH) is a medical emergency of the highest degree with frequent early neurological deterioration or death. In another study of 156 consecutive patients with SICH, potential risk factors for death and impaired outcome were studied prospectively. Risk of poor outcome is predicted by GCS score, volume of hematoma, age, amount of alcohol consumed within 1 week before hemorrhage, and presence of cerebellar hematoma [1].

Rationale of the research

Spontaneous intracerebral hemorrhage accounts for 20% of all strokes and carries up to 40% mortality. Several trials had proven that the GCS score & size of hematoma affects the surgical benefits. Despite such a huge disease burden, there is relatively lack of such studies regarding EVD in Bangladesh. So my study was tried to focus an outcome of External Ventricular Drainage in spontaneous intracerebral haemorrhage with ventricular extension in relation with the different GCS score.

Research question

What are the outcomes of External Ventricular Drainage in different GCS scores among patients with spontaneous intracerebral

haemorrhage with ventricular extension?

Objectives

General Objectives: The overall objective of the study is to determine outcome of external ventricular drainage in spontaneous intracerebral haemorrhage with ventricular extension diagnosed by CT scan of brain.

Specific Objectives: To measure the GCS scores among intracerebral haemorrhage with ventricular extension cases pre operatively, diagnosed by CT scan of brain. To observe the outcome by Glasgow Outcome Scale patients following EVD.

Literature Review

Intracerebral hemorrhage (ICH) is a type of intracranial bleeding that occurs within the brain tissue as well as in ventricles [2]. ICH occurs due to brain trauma, aneuyrsms, arteriovenous malformations and brain tumors. Uncontrolled blood pressure (high blood pressure) and amyloidosis are the largest risk factors for the spontaneous bleeding. Others include hypertension, diabetes, menopause, current cigarette smoking, alcoholic drinks≥2/day, caffeinated drinks≥5/day), and caffeine in drugs. In other study risk factors for ICH include: Hypertension (high blood pressure), Diabetes mellitus, Menopause , Cigarette smoking , Excessive alcohol consumption, Severe migraine [3].

In case of traumatic intracerebral hematomas, they are divided into acute and delayed types. Patients with intraparenchymal bleeds have symptoms that correspond to the functions controlled by the area of the brain that is damaged by the bleeding [4]. Examination began with resuscitation and a primary survey. Very important assessments were as follows: GCS scoring, pupillary findings, Focal neurological signs.

Pupil Examination: Pupil size is recorded in millimeters. Light response is recorded as present, sluggish or absent. Anisocoria or an asymmetrical sluggish response may suggest partial third nerve dysfunction on the side with the larger or sluggish pupil. This indicates uncal herniation as a result of a mass on the ipsilateral side. As the third nerve becomes increasingly compromised the ipsilateral pupil was come fixed and dilated.

Focal Neurological Signs: Eyes were examined for movements: gaze paresis, dysconjugate gaze or roving eye movements suggest midbrain or brainstem dysfunction. Peripheral nerve examination was recorded for limb tone, evidence of motor weakness or change in jerks. A change in neurological status that is picked up early was result in timely investigation and treatment of emergent problem.

Diagnosis of ICH: Diagnosis of ICH can be done through following imaging system. They are: Computed tomography (CT scan), Computed tomography angiography (CTA), Magnetic resonance angiography (MRA)

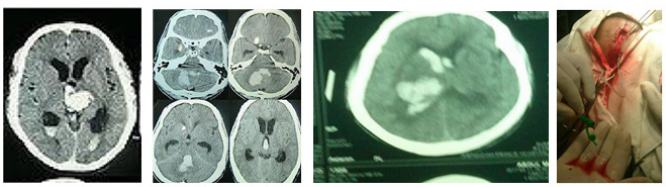

Figure: Spontaneous ICH on Axial CT scan and EVD surgery

When ICH occurs due to high blood pressure, they typically occur in the putamen or thalamus (60%), cerebrum (20%), cerebellum (13) or pons (7%) which is easily visualized in imaging techniques [2].

Prognosis of ICH: For spontaneous ICH seen on CT scan, the death rate (mortality) is 34–50% by 30 days after the occurrence and half of the deaths occur in the first 2 days [5]. GOS is an important factor for outcome of the patents GOS Scale.

Management of ICH: Treatment depends substantially of the type of ICH. Rapid CT scan and other diagnostic measures are used to determine proper treatment, which may include both medication and surgery. We follow Standard Guideline for ICH Management.

Surgical Management: Surgery is required if the hematoma is greater than 3 cm, if there is a structural vascular lesion or lobar hemorrhage in a young patient. Hemorrhagic stroke accounts for only 10% to 15% of all strokes; however, it is associated with devastating outcomes. In most circumstances the increased intracranial pressure and acute hydrocephalus caused by ICH is managed by placement of an external ventricular drain (EVD).

External ventricular drain (EVD): An external ventricular drain (EVD), also known as an extra ventricular drain or ventriculostomy, is a device/plastic tube used to relieves elevated intracranial pressure and hydrocephalus when the normal flow of cerebrospinal fluid around the brain is obstructed. Various forms of acute brain injury benefit from the continuous intracranial pressure (ICP) monitoring and cerebrospinal fluid (CSF) diversion provided by an EVD [6].

EVD insertion: The tube is most frequently placed in Kocher's point with the goal of having the catheter tip in the frontal horn of a lateral ventricle. In draining the ventricle it can also remove blood from the ventricular spaces can reduce complications such as vasospasm. Complication- Bleeding at EVD site, Obstruction, Infection [7-34].

Materials and methods: This study was a prospective interventional study in Department of Neurosurgery, Dhaka Medical College & Hospital, and Dhaka from July, 2015- March, 2017 Purposive sampling.

Sample size: Sample size was calculated purposively according to the inclusion and exclusion criteria.

Sample Selection

Inclusion Criteria: Patients presenting with Spontaneous intracerebral haemorrhage with ventricular extension diagnosed by CT scan of brain. Patients who give the consent to the study.

Exclusion Criteria: GCS - 3, Patents with history of trauma, Patents who is hemodynamically unstable, Patients who cannot communicate properly with the interviewer, and Patients who treated conservatively.

Variables: Main study variables were studied which are as follows: Age, Sex, GCS Score on 1st POD, GOS On- 4th POD and 7th POD. Same outcome check on 1 month and 3 month.

Procedures of Preparing and Organizing Materials

A questionnaire and a written informed consent form were prepared,

sample was selected on the basis of inclusion & exclusion criteria, Data were entered in SPSS 17.0 software after cross checking. Data analysis 'P' value < 0.05 was considered statistically significant.

Ethical implication

Protocol was ethically reviewed and approved by The Ethical Review of Dhaka Medical College & Hospital. Informed written Consent was taken from the participants before enrolling them into the study.

Result

A total of 60 patients were included in this study, they were divided into 5 groups. Age range was 45 to 86 years. Highest number patients age range from 51-70 years. It was 65.0%. Other age related distributions are shown in the table.

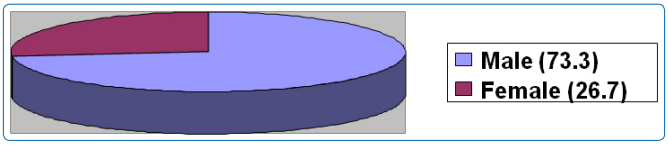

Figure 1: Shows sex distribution of the study patients. Among the 60 patients in the study it was observed that majority, 44 (73.3 %) patients were male and 16 (26.7 %) patients were female. A male predominance was observed

Table I: Distribution of the study patients by past history of illness (n=60)

Past history of illness	Frequency of study subjects (n=60)	
	N	%
DM	12	20%
HTN	42	70%
Both	6	10%

Table I: shown past history of illness of the study patients. It was observed that, 12 (20%) patients' were suffering from DM. Other 42(70%) patients' had HTN. Both observed in 6 (10%) cases.

Table II: Distribution of the study patients by clinical presentation (n=60)

Clinical presentation	Frequency in study subject (n=60)	
	N	%
Loss of consciousness	54	90.0
Hemiparesis	32	53.3
Headache	10	16.66
Vomiting	48	80.0
Convulsion	4	6.7
Respiratory distress	30	50.0
Motor deficit	34	73.3
Restlessness	18	30.0
All of the above	4	6.7

Table II: Shown distribution of clinical presentation in the study patients. It was also observed that 30 (50.0%) patients presented with respiratory distress. Other results are shown in the table.

Table III: Distribution of the study patients by admission GCS (n=60)

Admission GCS	Frequency of GCS score (n=60)	
	N	%
5	24	40.00
6	14	23.33
7	9	15.00
8	7	11.66
9	6	10.00
Total	60	100.00

Table III: Shown distribution of admission GCS in the study patients. GCS is an important predictor of outcome. It was observed that 24 (40.0%) patients had GCS 5. Other results are also shown in the table.

Table IV: Distribution of the study patients by CT scan finding (n=60)

CT scan finding	Frequency among patents (n=60)	
	n	%
ventricular extension	60	100.0
midline shifting	28	46.7

Table IV: Shown CT scan finding of the study patients. It was observed that100% patients ha ventricular extension of ICH. Also, 28 cases also had midline shifting.

Table V: Distribution of the study patients by 1st post operative GCS (n=60)

Post operative GCS	Frequency of GCS score (n=60)	
	N	%
5	0	0.0
6	0	0.0
7	14	23.33
8	11	18.33
9	13	21.66
10	11	18.33
11	7	11.66
Dead	4	6.66
Total	60	100.00

Table V: Shown distribution of post operative GCS score in the study patients. GCS 9 was observed in 13 (21.66%) cases. Whereas, GCS 10, 11 were found in 11 (18.33%), 7 (11.66%), dead was observed 4 (6.66%) cases respectively.

Table VI: Distribution of the study patients by GOS at 4th POD (n=60)

GOS at 4th POD discharge	(n=60)	
	n	%
Dead (Total)	7	11.66
Alive	53	88.33
Persiste vegetative	6	11.32

Severe Disability	8	15.09
Moderate disbility	18	33.96
Good recovery	21	39.62

Table VI: Shows GOS at 4th POD of the study patients, it was observed that more than three forth, 53 (88.33%) patients were alive and 7 (11.66%) cases died. Good recovery observed in 21 (39.62%) cases. Moderate disability existed in 18 (33.96%) cases. Again, severe disability and persistent vegetative cases observed in 8 (15.09%), 6 (11.32%) cases.

Table VII: Distribution of the study patients by GOS at 7th POD (n=60)

GOS at 4th POD discharge	(n=60)	
	n	%
Dead (Total)	12	20.00
Alive	48	80.00
Persiste vegetative	9	18.75
Severe Disability	14	29.16
Moderate disbility	12	25.00
Good recovery	13	27.08

Table VII: Shows GOS at 7th POD of the study patients, it was observed that 5 patients were dead so total 12 cases were dead, 48 (80.00%) patients were alive. Moderate disability existed in 12 (25.00%) cases. Again, severe disability and persistent vegetative cases observed in 14 (29.16%), 9 (18.75%) cases.

Table VIII: Distribution of the study patients by GOS at 1 month (n=60)

GOS at 1st month discharge	(n=60)	
	n	%
Dead (Total)	12	20.00
Alive	48	80.00
Persiste vegetative	13	27.08
Severe Disability	15	31.25
Moderate disbility	11	22.91
Good recovery	9	18.75

Table VIII: Shows GOS at 1 month of the study patients, it was observed that 12 patients were dead 48 (80.00%) patients were alive Again, severe disability and persistent vegetative cases observed in 15 (31.25%), 13 (27.08%) cases.

Table IX: Distribution of the study patients by GOS at 3 months (n=60)

GOS at 3 months	(n=60)	
	n	%
Dead (4)	16	26.66
Alive	44	73.33
Persistent vegetative	11	25.00
Severe disability	13	29.54
Moderate disability	9	20.45
Good recovery	11	25.00

Table IX: Shown GOS at 3 months of follow up of the study patients. It was observed that total 16 cases were dead and 44 cases were alive. Again, severe disability and persistent vegetative cases observed in 13 (29.45%), 11 (25.00%) cases respectively.

Table X: Distribution of the study patients by overall functional outcome (n=60) at 3 Months

Overall functional outcome	(n=60)	
	n	%
Favourable GOS: 4 and 5	20	33.33
Unfavourable (poor outcome) GOS: 1, 2 and 3	40	66.66

Table X: Shown overall functional outcome of the study patients at 3 months, it was observed that 20 (33.33%) patients had favorable outcome (GOS 4 and 5) and 40 (66.66%) patients had Unfavorable outcome (GOS 1, 2 and 3).

Table XI: Comparison between pre operative with post operative outcome of the patients of underwent EVD in different GCS

Per operative with post operative outcome	Pretreatment (n=60)	Post treatment (n=60)	*P* value
	Mean GCS	Mean GCS	
GCS Minimum	5	7	0.854
GCS Maximum	9	11	

P value was reached from chi square test.

Table XI: Shown comparison of pre operative with post operative GCS of the study patients. It was observed that the mean GCS was found 5 in pre-treatment and 9 in post treatment.

Discussion

Although external ventricular drainage (EVD) is a lifesaving procedure, controversy exists about patient selection and timing of the procedure Insertion of an EVD in this scenario would aide in the reduction of intracranial hypertension by diverting CSF and intraventricular blood, allow instillation of medications, and allow continuous intracranial pressure monitoring to help guide brain targeted resuscitation in these critically ill patients.

This prospective observational study was carried out with an aim to determine the post operative outcome of EVD in patients of ICH by Glasgow outcome scale and also to assess the factors that affects outcome in this particular group of patients with Glasgow outcome scale (GOS). Current study also observed that two third, 20 (33.3%) patients' were suffering from DM. Other 28(46.7%) patients' had HTN. Both observed in 20 (33.33%) cases.

It was observed that 54 patients (90%) were unconscious at the time of presentation. It was also observed that majority, 48 (80.0%) patients presented with vomiting and 30 (50.0%) patients presented with respiratory distress.

GOS at 4th POD of the study patients observed that more than three forth, 53 (88.33%) patients were alive and 7 (11.66%) cases

died. The alive patients were again divided into 4 sub groups, persistent vegetative, severe disability, moderate disability, good recovery. Good recovery observed in 21(39.62%) cases. Moderate disability existed in 18(39.96%) cases. Again, severe disability and persistent vegetative cases observed in 8(15.09%), 6(11.32%) cases. Overall Favorable outcome number of patients 20 (33.33%) and Unfavourable (Poor outcome) number of patients 40 (66.66%), that is statistically not significant according to Glasgow Coma Scale score, ($p>0.05$).

Conclusion

According to my study, majority of the study patients survived following EVD in spontaneous ICH with ventricular extension but most cases was unfavorable outcome which was statistically not significant (as p value > 0.05) and GCS score raised 2 in majority cases in the study subjects.

Recommendation

- Further study including large number of study population involving several investigators at multiple centers should be done for precise result.
- Longer duration of follow up is needed to bring more accurate results.
- Resuscitation facilities should be dynamic.
- Monitoring facilities should be made available.
- More surgical facilities with availability of anesthesia must be ensured.
- Referral system along with transport facilities should be improved so that patients are timely transported to neurosurgery unit with all monitoring, imaging and intervention facilities with round the clock availability of a neurosurgeon.
- Number of ICU beds should be increased.
- Neuro ICU should be established.

Limitation of the study: Sample size was small. For all critical patients we could not provide ICU support. It was a single centre study. Follow up after discharge was short, a longer follow up might bring a better result.

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