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Original Research Article

Study of clinical profile and its effect on outcome of spontaneous intracerebral haemorrhage in a medical college, Varanasi

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ABSTRACT

Introduction: Intracerebral haemorrhage (ICH) is associated with increased mortality in cases of stroke. Studies regarding profile of spontaneous ICH and its effect on outcome are limited. The present was aimed at assessing the clinical profile and its effect on outcome of spontaneous intracerebral haemorrhage.
Materials and Methods: The present prospective study was conducted upon 417 patients of SICH admitted in a medical college. Details regarding clinical profile, radiological findings and outcome using mRS score were obtained.
Results: Mean age was found to be 62.4±10.4 years. 65.5% were males. 31.9% of the patients died within three months follow-up period. Hypertension, smoking and history of irregular treatment were significantly associated ($p<0.05$) with mortality. GCS score at admission and ICH score of 4 and above were associated with higher mortality. 24.5% patients had good outcome at discharge as per mRS score which increased to 44.8% at three months.
Conclusion: Vomiting, altered sensorium, lower GCS score and high ICH are associated with increased mortality in cases with spontaneous intracerebral haemorrhage.

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1. Introduction

Spontaneous intracerebral haemorrhage (ICH) has been defined as "a collection of blood in the cerebral parenchyma that is not caused by trauma".[1] It is responsible for 10-15% of all stroke cases.[2] Haemorrhage is due to weakening of the endothelial lining of cerebral vessels caused by hypertension or other illnesses. This results in rupture of the blood vessels inside the brain parenchyma and resultant localized collection of blood. The hematoma leads to increased intracranial pressure and injury to the neurons. It can result in death also.[3]

Mortality associated with haemorrhagic stroke is higher as compared to ischaemic stroke. Size of the hematoma and its location in the brain determine the risk of mortality. Death can occur in up to 50% of patients within the first month. In the survivors, it results in disability and only one-fifth of the cases are independent at 6 months.[4]

Due to its poor outcome, various researchers have tried to find the association of clinical and radiological factors with the outcome in cases of ICH. Ojha et al have commented that large volume of ICH, lower level of consciousness, intraventricular site of the haemorrhage, infratentorial extension and older age are associated with higher risk of death or disability at 30 days. A composite score named Intracerebral haemorrhage (ICH) score has been introduced to predict the risk of death at 30 days. It is based on five indicators: age more than 80 years, GCS score, volume of hematoma, its location and intra-ventricular extension.[4]

Literature regarding outcome of spontaneous ICH and its association with ICH score is limited in this part of the

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country. Hence, the present study was conducted to find the pattern of outcome and associated factors in cases of SICH among patients from eastern part of India.

2. Aims & Objectives

The present hospital-based study was conducted-

1. To assess the clinical profile and its effect on outcome of spontaneous intracerebral haemorrhage and
2. To determine the association between clinical, biochemical and radiological parameters with mortality among these cases

3. Material and Methods

3.1. Study design

The present study was prospective in nature. The patients were followed-up during their stay in the hospital and follow-up was done after three months to assess the outcome.

3.2. Study place

The study was conducted in medicine department of Heritage Institute of Medical Sciences, Varanasi.

3.3. Period of study

The present study was conducted between August 2018 to July 2019. Data was collected between August 2018 to June 2019.

3.4. Study population

The study population included adult patients admitted in the medicine department of the institute and diagnosed to be suffering from spontaneous intracerebral haemorrhage.

3.5. Inclusion criteria

The patients above 18 years of age reporting to medicine emergency of the institute and diagnosed to be suffering from intracerebral haemorrhage by computerised tomography (CT) between October 2018 to December 2018 were included in the present study.

3.6. Exclusion criteria

1. Trauma to head
2. Arteriovenous malformations
3. Aneurysms
4. Space-occupying lesions with bleeding
5. Cases in which consent could not be obtained.

3.7. Sample size

Narayan et al in their study conducted at JIPMER, Puducherry found that 50% of the patients with intracerebral haemorrhage died with one month.[5]

Sample size (n)= $Z^2X\ p\ X\ q\ /\ d^2$

Considering p= 0.5, d= 0.05 and confidence level of 95%, sample size was calculated to be 384. Considering 10% non-response, final sample size was 423.

3.8. Sampling technique

All the cases of spontaneous intracerebral haemorrhage reporting during the study period were included till the desired sample was selected. In 6 patients, study could not be completed due to loss to follow-up. Hence, a total of 417 patients were studied.

3.9. Study tools

Pre-tested proforma was used for data collection. It included questions related to demographic profile of the study subjects, their clinical details, findings of the laboratory and radiological investigations and the outcome at discharge and at three months follow-up period.

3.10. Data collection procedure

The study subjects were recruited form the emergency of the institute. Written consent was obtained in all the cases from the patient or the guardian depending upon the condition of the patient.

Detailed history was taken for current illness as well as for pre-existing diseases. Physical examination was done to note general signs and neurological condition including Glasgow Coma Scale (GCS) score. Investigations like CBC, blood sugar, lipid profile, liver function and renal function tests were done. Electrocardiogram was done to note cardiac condition. Echocardiogram was done in selected cases if there was any suspicion of cardiac abnormality.

Imaging included Computerized tomographic angiogram (CTA) in all the cases at admission which was repeated at one week and one month if required. Magnetic resonance imaging (MRI) was done as per need. Volume of hematoma was calculated by formula of ABC/2. A is the longest diameter of the haematoma (in cm), B the diameter perpendicular to A (in cm) and C is the product of the number of slices of the CT scan in which the hematoma is visible and slice thickness in cm. Location of hematoma, its intraventricular extension, presence of hydrocephalus and any mid line shift were also noted. ICH score was also calculated during the time of admission.

Management was done as per the hospital protocol. Patients were given hypoglycaemic agents, anti-hypertensives, osmotic agents and antiepileptic agents as per need. Surgery was done if needed.

Outcome was measured as mortality and morbidity. Morbidity was measured using the modified Rankin Scale (mRS) at discharge. The patients were asked to visit the hospital again after three months for assessment of outcome using mRS. It is a 6-point disability scale widely used for outcome assessment in cases of stroke. The values range from 0 to 5. A score of 6 means that the patient has died.[6]

3.11. Data analysis

Data was entered in Microsoft Excel version 2013. It was cleaned, coded and analysed using Statistical Package for Social Sciences (SPSS) version 20. Categorical variables were summarized as frequency and percentage while numerical variables were summarized as mean and SD. Appropriate statistical tests were done to find the association between clinical and radiological factors with the outcome among these cases. p-value < 0.05 was considered to be statistically significant.

3.12. Ethical considerations

Permission of institutional ethics committee was obtained. Written consent was obtained from the patient if he was able to give the same or the care-taker if the patient was seriously ill. All the records were kept confidential.

4. Results

Total of 417 cases of spontaneous intracerebral haemorrhage were included in the present study

4.1. Demographic profile

Mean age was found to be 62.4±10.4 years. 65.5% were males. Association between age and mortality was significant while that with sex was not significant. (Table 1)

4.2. Clinical profile

53.4% of the study subjects had history of hypertension. 21.3% had diabetes, 14.6% of them smoked, 19.2% history of irregular treatment and 6.5% had history of previous stroke. 31.9% of the patients died within three months follow-up period. Hypertension, smoking and history of irregular treatment were significantly associated (p<0.05) with mortality. (Table 1)

4.3. Clinical profile

31.4% of the patients presented with headache, 28.1% with vomiting, 18.2% with convulsion, 54.7% with altered sensorium and 63.3% with weakness of limbs. Mean systolic BP was 170.3±23.4 mm of Hg and diastolic BP was 100.7±11.7 mm of Hg. Random blood sugar was 154.9±46.8 mg/dl. In 137 patients, GSC score was <8. (Table 2)

4.4. Radiological findings

Radiological investigations revealed that mean volume of haematoma was 24.9±18.8 ml. Midline shift was seen in 36.2% cases, hydrocephalus in 23.5% and haematoma growth in follow-up CTs was seen in 4.8%. All the above radiological features were significantly associated (p<0.05) with mortality among these cases. (Table 2)

11.2% cases had GCS score of 4 or less at the time of admission and this group had highest mortality (87.2%). (Table 3)

8% of the cases had ICH score of 4 and above. This group had mortality of 91.2%. (Table 4)

11.5% patients died before discharge and 31.9% by the completion of three months. 44.8% had good outcome as per mRS score by the end of three months. (Figure 1)

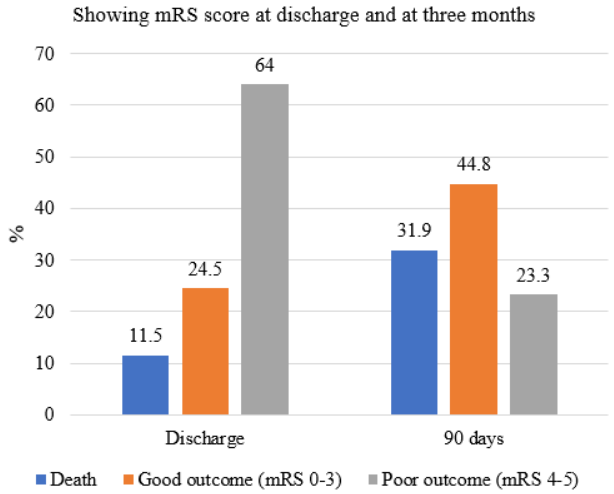

Fig. 1: Showing mRS score at discharge and at three months

5. Discussion

Among various causes of mortality associated with cerebrovascular accidents, spontaneous intracerebral haemorrhage is associated with high mortality and morbidity.[7,8] Despite advances in radiological evaluation techniques and newer treatment modalities, the prognosis of this condition still remains poor.[4,9,10] Various predictive models have been devised to understand the clinical course and outcome of this condition. ICH score is an important indicator for this purpose.[11] Studies regarding outcome in cases of SICH are limited.

The present study was conducted with the objective to assess the clinical profile and outcome of patients with of SICH admitted in a medical college of eastern India. A total of 417 cases were included. 31.9% of the patients died within three months follow-up period. Different authors have reported varying rates. While Narayan et al[5] found mortality rate of 50% for a follow-up period of three

Table 1: Showing background factors in relation to mortality of the cases

Background Factor	Survived (n=284)	Died (n=133)	Significance
Age (yrs)	59.9±10.0	67.7±11.2	t=7.14, p=0.000
Sex (Male)	191 (67.3%)	83 (62.4%)	X2=0.94, p=0.33
Hypertension	137 (48.2%)	86 (64.7%)	X2=9.82, p=0.001
Diabetes	56 (19.7%)	33 (24.8%)	X2=1.39, p=0.24
Smoking	34 (12%)	27 (20.3%)	X2=5.03, p=0.03
History of irregular treatment	46 (16.2%)	34 (25.6%)	X2=5.13, p=0.02
History of stroke	15 (5.3%)	12 (9%)	X2=1.52, p=0.22

Table 2: Showing clinical and radiological findings in relation to mortality of the cases

Clinical and radiological findings	Survived (n=284)	Died (n=133)	Significance
Clinical findings			
Headache	75 (26.4%)	56 (42.1%)	X2=1.98, p=0.16
Vomiting	70 (24.6%)	47 (35.3%)	X2=5.13, p=0.02
Convulsion	49 (17.3%)	27 (20.3%)	X2=0.56, p=0.45
Altered sensorium	140 (49.3%)	88 (66.2%)	X2=10.4, p=0.001
Weakness of limbs	185 (65.1%)	79 (59.4%)	X2=1.29, p=0.26
Systolic BP (mm Hg)	168.9±19.8	173.3±29.6	t=1.79, p=0.07
Diastolic BP (mm Hg)	99.8±11.3	102.6±12.6	t=2.27, p=0.02
ICH Score	1.1±0.4	2.7±0.9	t=25.1, p=0.000
GCS<8	76 (26.8%)	61 (45.9%)	X2=14.9, p=0.0001
Random glucose (mg/ dL)	146.8±43.4	172.3±53.5	t=5.18, p=0.000
Radiological findings			
Volume (ml)	20.4±17.6	34.8±21.1	t=7.29, p=0.000
Midline shift	86 (30.3%)	65 (48.9%)	X2=13.6, p=0.000
Hydrocephalus	49 (17.3%)	49 (36.8%)	X2=19.3, p=0.000
Hematoma growth	9 (3.2%)	11 (8.3%)	X2=5.16, p=0.02

Table 3: Showing GCS score at admission in relation to mortality of the cases

GCS Score	Total cases (n=417)	Died (n=133)	Mortality (%)
<=4	47	41	87.2
5-8	111	54	48.6
09-12	118	20	16.9
>=13	141	18	12.8

Table 4: Showing ICH score in relation to mortality of the cases

ICH Score	Total cases (n=417)	Died (n=133)	Mortality (%)
0	93	8	8.6
1	131	22	16.8
2	89	31	34.8
3	70	41	58.6
4	32	30	93.8
5	2	1	50

months, Bhatia et al[12] found that 32.7% of the patients died during hospital stay. Suthar et al reported that 41% of the patients died within six weeks.[9] Mortality among these cases might be different due to differences in their initial condition or the medical care that was available at the hospital.

Age and sex- Age of the study subjects ranged from 23 to 91 years. 65.7% of them were males. The association between age and mortality among the cases was found to be statistically significant (p=0.000) while that with sex was not significant statistically (p=0.33). Other researchers have also reported similar trend. Hegde et al found that age has highly significant association (p<0.001) while sex was not associated with mortality.[13] However, Ojha et al reported that age and sex both are not associated with mortality (p>0.05).[4]

Hypertension- In the subjects alive at three months, 48.2% were hypertensives while in those who died,

64.7% were suffering from uncontrolled hypertension. The difference was statistically significant (p=0.001). Hypertension is a known risk factor of SICH and has been found to be associated with increased mortality.[14]

Diabetes- 19.7% of the survivors were suffering from diabetes while prevalence of diabetes was 24.8% in those who died. The difference was not significant (p=0.24). Hegde et al and Ojha et al also observed similar findings.[4,13]

Smoking- Among the survivors, 12% had history of smoking while 20.3% smoked among the patients who died. The difference was significant (p=0.03). Smoking is an important risk factor of ICH. It is associated with atherosclerosis and resultant weakening of blood vessels. The present study also observed similar trend.[9,15]

History of stroke- 5.3% survivors had history of stroke while 9% of the patients who died had similar history, the difference not being significant (p=0.22) as also observed by Hegde et al.[13]

History of irregular treatment- 16.2% survivors had poor treatment compliance while 25.6% among the mortality group had history of irregular treatment. Ojha et al commented that proper treatment of hypertension was important and poor treatment compliance resulted in increased chances of SICH, the association being statistically significant as also observed in the present study.[4]

Clinical profile- Among those surviving at three months, clinical findings included headache (26.4%), vomiting (24.6%), convulsion (17.3%), altered sensorium (49.3%) and weakness of limbs (65.1%). Headache was seen in 42.1% among those who died before three months, vomiting in 35.3%, convulsion in 20.3%, altered sensorium in 66.2% and weakness of limbs in 59.4%. Chi-square test showed that vomiting (p=0.02) and altered sensorium (p=0.001) were significantly associated with mortality while association with other clinical findings was not significant. Modi et al observed that limb weakness was the most common symptom followed by altered sensorium. Headache, vomiting and altered sensorium were significantly associated (p<0.05) with mortality among these cases. These features may warn the clinician for poorer prognosis. However, Ojha et al reported that in addition to these symptoms, seizures were also associated with poor prognosis.[4]

Association of systolic BP with mortality was not significant (p=0.07) while that with diastolic BP (p=0.02), random blood glucose level (p=0.000), ICH Score (p=0.000) and GCS Score at admission (p=0.000) were significant. Similar trend was observed by Hegde et al[13], but Ojha et al did not find any association between diastolic BP and mortality.[4] ICH score and GCS score at admission have been significantly associated with mortality in various studies and can be good predictor of clinical outcome in cases with SICH.[4,12,13,16] Ojha et al has commented that ICH Score cane be valid grading scale for predicting favourable functional outcome during follow-up at 1 and 2 months.[4]

Radiological findings- Radiological evaluation indicated that mean volume of haematoma was 24.9±18.8 ml. Independent t-test showed that it was significantly associated with mortality. Other findings like midline shift (p=0.000), hydrocephalus (p=0.000) and haematoma growth (p=0.02) were also significantly associated with mortality. Radiological findings have been considered to be important in assessment of prognosis in intracerebral haemorrhage cases.[2]

Ojha et al found that various radiological features namely, infratentorial haemorrhage, hydrocephalus, midline shift, intraventricular extension and larger hematoma volume were significantly associated with mortality.[4] Narayan et al reported that size of haematoma and intraventricular extension were significantly associated with poor outcome ($p < 0.05$).[5] Similar observations were also made by Hegde et al.[13] It is apparent that visualization of size and location of haematoma by radiological investigations can be helpful for the clinicians in predicting outcome as corroborated by findings of the present study as well as other studies.

GCS & ICH Scores- In the present study, GCS score at admission showed that 11.2% cases had score of 4 or less with highest mortality (87.2%). Mortality rate in those above scores of 12 was 12.8%. With increasing ICH score, mortality rate increased and in those with a score of 4 and above, the mortality rate was 91.2%.

Modi et al found mortality rate of 100% in GCS score of 4 or less.[16] Hegde et al reported that GCS score <8 and higher ICH score were significantly associated with mortality. They have commented that original Hemphill ICH score has been reliable for assessment of outcome. But, Essen ICH score based on clinical criteria only can be convenient option for use in Indian conditions.[13] Ojha et al also found that GCS score <8 was associated with increased mortality. As ICH scores increased, the mortality rates also increased with it being 100% in patients with ICH scores of 5 and 6. They concluded that ICH score should be standard assessment in management of patients with intracerebral haemorrhage.[4]

Outcome on the basis of mRS score- Analysis of mRS score showed that 11.5% patients died before discharge while at three months, it was 31.9%. 24.5% patients had good outcome at discharge as per mRS score which increased to 44.8% at three months. Similar observations have been made by other researchers also.[4,12,13]

6. Limitations

The study was limited to one medical college only. The patients were followed up for three months only to assess the outcome. Larger sample can be taken with longer period

of follow up for better assessment of functional outcomes.

7. Conclusion

It is concluded that intracerebral haemorrhage is associated with high mortality. Major factors associated with increased mortality are hypertension, smoking, presenting symptoms of vomiting and altered sensorium, lower GCS score and high ICH score and poor prognostic radiological features of midline shift, larger haematoma and infratentorial extension. Early identification of these features may be helpful in better assessment of prognosis and adequate intervention.

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10. Conflict of Interest

The authors declare they have no conflict of interest.

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