ISSN: 2349-2678

Contents lists available at www.ijpba.in

International Journal of Pharmaceutical and Biological Science Archive

Index Copernicus Value 2015: 43.92

Volume 3 Issue 3; 2015, Page No.28-33

STUDY OF CLINICAL PROFILE AND ITS EFFECT ON THE OUTCOME OF SPONTANEOUS INTRACEREBRAL HEMORRHAGE

Dr. Deepak Varshney

Assistant Professor, Department of Medicine, F.H. Medical College, NH-2, Near Railway Over Bridge, Etmadpur, Agra

ARTICLE INFO

Research Article

Received 19 April. 2015
Accepted 29 May. 2015

Corresponding Author:

Dr. Deepak Varshney

Assistant Professor, Department of Medicine, F.H. Medical College, NH-2, Near Railway Over Bridge, Etmadpur, Agra..

ABSTRACT

BACKGROUND:
Spontaneous Intracerebral Haemorrhage (SICH) is a potentially life-threatening condition associated with high mortality and morbidity. Early assessment of outcomes is important to optimize therapeutic efforts. Spontaneous ICH is defined as intraparenchymal bleeding in the absence of trauma or surgery. ICH accounts for approximately 10–20% of all strokes. The incidence rates of primary ICH vary among countries, age, sex, ethnicity, and seasons. It is the second most common type of stroke and the leading cause of morbidity and mortality worldwide with a case fatality rate of approximately 40% at 30 days and severe disability in most of the survivors. ICH is a medical emergency, as 20% or more of patients experience deterioration in their level of consciousness after their initial assessment. Furthermore, 15–23% of patients have hematoma expansion and neurological deterioration within the first few hours. The complications of intracerebral hemorrhage (ICH) are among the major predictors of early mortality and poor outcomes. Specialized neurocritical centers play a crucial role in providing medical care and improving patients' outcomes. The present study was aimed at assessing the clinical profile and its effect on the outcome of spontaneous intracerebral hemorrhage.

AIM: The aim of the study is to assess the clinical profile and its effect on the outcome of spontaneous intracerebral hemorrhage and to determine the association between clinical, biochemical, and radiological parameters with mortality among these cases.

MATERIAL AND METHOD: This hospital-based, prospective, interventional study was conducted in the Department of General Medicine. The patients were followed-up during their stay in the hospital and follow-up was done after three months to assess the outcome. The study population included adult patients admitted to the medicine department of the institute and diagnosed to be suffering from spontaneous intracerebral hemorrhage. Written informed consent was obtained from participants or their relatives if they were unable to give consent due to their medical condition. All patients had a follow-up CT scan within 24 hours of admission or on clinical deterioration, whichever was earlier.

RESULTS: The mean age was found to be 41.4±8.0 years. 65.5% were males. The association between age and mortality was significant while that with sex was not significant. 17 of the study subjects had a history of hypertension. 19 had diabetes, 14 of them smoked, 16 had histories of irregular treatment, and 15% had a history of previous stroke. 20 of the patients died within three months follow-up period. Hypertension, smoking, and a history of irregular treatment were significantly associated. Hypertension, smoking, and a history of irregular treatment were significantly associated with mortality. GCS score at admission and ICH score of 4 and above were associated with higher mortality.

CONCLUSION: It is concluded that intracerebral hemorrhage 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 hematoma, and infratentorial extension.

KEYWORDS: Clinical, Determinants, Intracerebral hemorrhage score, Prognosis and Radiological.

INTRODUCTION

Spontaneous intracerebral hemorrhage (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. Haemorrhage is due to the weakening of the endothelial lining of cerebral vessels caused by hypertension or other illnesses. This results in the rupture of the blood vessels inside the brain parenchyma and the resultant localized collection of blood. The hematoma leads to increased intracranial pressure and injury to the neurons. It can result in

death also.[2] Spontaneous Intracerebral Haemorrhage (SICH) is the second most common cause of stroke and accounts for 7.5−30% of all strokes.[3,4] Hemorrhagic stroke is generally associated with higher morbidity and mortality rates than ischemic stroke.[5,6] Only one-fourth of the patients regain functional independence after SICH and between one-fourth to half of the patients succumb to the bleeding.[7] Optimal management is controversial, and considerable debate exists primarily on the role of surgery in SICH.[8] In developing countries like India with severe resource constraints, treatment strategies need to be customized given the high morbidity and mortality associated with SICH. Published literature from India on outcomes following SICH is limited.[9]

Approximately, 4-14% of all strokes comprise SICH, with a higher incidence in Asian countries compared to the West.[10,11] Intracerebral Haemorrhage (ICH) is more common as well as more likely to result in death (30-day mortality of 44%) or major disability compared to cerebral infarction or Subarachnoid Haemorrhage (SAH).[12] The American Heart Association/American Stroke Association (AHA/ ASA) guidelines for the management of spontaneous intracerebral bleeding recommended to use of widely accepted severity assessing scores like the Glasgow Coma Scale (GCS) and ICH scores for clear communication among medical professionals and objective assessment.[13] The National Institute of Health Stroke Scale (NIHSS) is the most extensively used deficit rating scale for stroke.[14] The modified Rankin Scale (mRS) is used for the measurement of neurologic disability affecting the daily activities of patients suffering from stroke or any other neurological disease.

The complications of intracerebral hemorrhage (ICH) are among the major predictors of early mortality and poor outcomes. Specialized neurocritical centers play a crucial role in providing medical care and improving patients' outcomes. Non-contrast computed tomography is the gold standard brain imaging study for the initial assessment of patients with acute stroke due to its availability and high sensitivity for detecting ICH. It helps to detect the hematoma location, size and associated IVH and hydrocephalus. These characteristics of a hematoma act as predictors of patients' outcomes.[15]

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 a large volume of ICH, lower level of consciousness, intraventricular site of the hemorrhage, infratentorial extension, and older age are associated with a higher risk of death or disability at 30 days. A composite score named Intracerebral hemorrhage (ICH) score has been introduced to predict the risk of death at 30 days. It is based on five indicators: age of more than 80 years, GCS score, the volume of hematoma, its location, and intra-ventricular extension.[16] Computerized Tomography (CT) scanning is the initial diagnostic modality of choice in SICH, as it clearly differentiates hemorrhagic from ischemic stroke. Magnetic Resonance Imaging (MRI) and angiography may be considered wherever appropriate.[17,18] Hence, the present study was conducted to find the pattern of outcome and associated factors in cases of SICH among patients from the eastern part of India.

MATERIAL AND METHODS

This hospital-based, prospective, interventional study was conducted in the Department of General Medicine. The patients were followed-up during their stay in the hospital and follow-up was done after three months to assess the outcome. The study population included adult patients admitted to the medicine department of the institute and diagnosed to be suffering from spontaneous intracerebral hemorrhage. Written informed consent was obtained from participants or their relatives if they were unable to give consent due to their medical condition. All patients had a follow-up CT scan within 24 hours of admission or on clinical deterioration, whichever was earlier. The surgical evacuation was offered to all patients with supratentorial hematoma volume >30ml or midline shift of >1 cm. Posterior fossa cerebellar hematomas with maximum diameter >3 cm was offered surgical intervention.

Inclusion criteria

- Patients above 18 years of age report to the medical emergency of the institute and are diagnosed to be suffering from intracerebral hemorrhage by computerized tomography (CT).

Exclusion criteria

- Trauma to the head
- Arteriovenous malformations
- Aneurysms
- Space-occupying lesions with bleeding
- Cases in which consent could not be obtained.

Study Tools

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

Data Collection Procedure

The study subjects were recruited from 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. A detailed history was taken for current illness as well as for pre-existing diseases. A physical examination was done to note general signs and neurological conditions 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 a computerized tomographic angiogram (CTA) in all the cases at admission which were repeated at one week and one month if required. Magnetic resonance imaging (MRI) was done as per need. The volume of hematoma was calculated by the formula of ABC/2. A is the longest diameter of the hematoma (in cm), B is 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. The location of the hematoma, its intraventricular extension, the presence of hydrocephalus, and any midline 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.

The 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 an assessment of the outcome using mRS. It is a 6-point disability scale widely used for outcome assessment in cases of stroke. The treatment provided was either medical conservative therapy or early surgical evacuation, which is done within 72 hours of diagnosis of ICH. The primary outcome was either death or survival within the hospital. The observations were made to assess the short-term outcome and short-term mortality.

STATISTICAL ANALYSIS

Data were entered in Microsoft Excel version 2013. It was cleaned, coded, and analyzed 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.

RESULT: -

In total, 100 patients with spontaneous ICH requiring hospitalization were identified within the study period. Based on our inclusion and exclusion criteria, 80 patients were included in the study. Twenty patients were lost to follow-up, and their mRS at 90 days could not be obtained.

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

Background Factor	Survived (n=60)	Died (n=20)
Age (yrs.)	41.4±8.0	47.6±10.2
Sex (Male)	31	13
Hypertension	17	6
Diabetes	19	3
Smoking	14	10
History of irregular treatment	16	14
History of stroke	15	12

The mean age was found to be 41.4±8.0 years. 65.5% were males. The association between age and mortality was significant while that with sex was not significant. 17 of the study subjects had a history of hypertension. 19 had diabetes, 14 of them smoked, 16 histories of irregular treatment, and 15% had a history of previous stroke. 20 of the patients died within three months follow-up period. Hypertension, smoking, and a history of irregular treatment were significantly associated.

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

Clinical and radiological findings	Survived (n=55)	Died (n=25)
Headache	15	6
Vomiting	12	10
Convulsion	29	17
Altered sensorium	44	33
Weakness of limbs	45	30
Systolic BP (mm Hg)	122.3±12.5	173.3±29.6
Diastolic BP (mm Hg)	66.3±9.2	62.3±10.3
ICH Score	0.54±0.2	1.5±0.8
GCS<8	36	21
Random glucose (mg/ dL)	116.5±21.3	132.1±40.3
Volume (ml)	10.2±12.4	21.3±12.1

Midline shift	43	13
Hydrocephalus	39	19
Hematoma growth	*5*	9

15 of the patients presented with headache, 12 with vomiting, 29 with convulsion, 44 with altered sensorium, and 45 with weakness of limbs. Mean systolic BP was 122.3±12.5 mm of Hg and diastolic BP was 66.3±9.2 mm of Hg. Random blood sugar was 116.5±21.3 mg/dl. In 36 patients, the GSC score was <8.

Table 3: Showing ICH score in relation to mortality of the cases.

ICH Score	Total cases (n=60)	Died (n=20)	Mortality (%)
0	13	4	5.6
1	21	5	12.8
2	8	3	23.8
3	10	6	28.6
4	6	1	39.8
5	2	1	25

5% of the cases had an ICH score of 4 and above. 9.5% of patients died before discharge and 21.9% by the completion of three months. 33.4% had good outcomes as per the mRS score by the end of three months.

DISCUSSION

Among various causes of mortality associated with cerebrovascular accidents, spontaneous intracerebral hemorrhage is associated with high mortality and morbidity. Despite advances in radiological evaluation techniques and newer treatment modalities, the prognosis of this condition still remains poor. 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.[19] Studies regarding outcomes in cases of SICH are limited. The SICH is a medical emergency with potentially life-threatening consequences for the patients. Hence, its optimum management is of utmost importance, so that an appropriate treatment option is provided by virtue of the prediction of 30-day mortality.[20]

In a study by **Bhatia R et al., 2013**[21] 30-day mortality was 32.7% (70 out of 214 patients). Consistent with the previous study, age, gender, and co-morbidities like hypertension, diabetes, and alcohol abuse were not significant outcome predictors in the present study. The present study confirmed that the ICH volume was one of the strongest predictors of outcomes in patients with SICH. In the study by **Hegde A et al.2018**[19], a volume of more than 30 mL with intraventricular extension and hydrocephalus was an indicator of poor outcome.

Hypertension is the most common risk factor in all the studies relating to SICH. **Feldmann et al.2005**[22] have reported a relative risk of 3.9 for ICH in patients with hypertension. It is proposed that high blood glucose at admission contributes to poor outcomes, due to exacerbation of cerebral edema and cerebral damage. A recent meta-analysis by **Zheng et al. 2018**[23] concluded that hyperglycemia was associated with poor functional outcomes in patients with ICH. However, the pool of available evidence about blood glucose variability and ICH is still limited, and random blood glucose has not been a predictor of mortality in the Indian ICH studies

The study done by **Safatli DA et al.2016**[24] where the supratentorial bleeding volume of more than 32 mL and infratentorial bleeding volume more than 21 mL correlate with poor outcome. However, the cut-off values for ICH volume significantly differ in various studies. The present study's observation that the infratentorial location of ICH has a higher 30-day mortality, is also consistent with the aforementioned study. This could possibly emphasize the importance of "timely" surgical intervention in reviving the patient. The present study also showed the importance of validated outcome grading scores like ICH score and ICH-GS in the accurate prediction of 30-day mortality in SICH patients.

Modi et al.2017[25] found a mortality rate of 100% in a GCS score of 4 or less. **Hegde et al. 2018**[19] reported that GCS scores <8 and higher ICH scores were significantly associated with mortality. They have commented that the original Hemphill ICH score has been reliable for the assessment of outcome. But Essen ICH score based on clinical criteria only can be a convenient option for use in Indian conditions. **Ojha et al. 2015**[16] also found that a 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 the ICH score should be a standard assessment in the management of patients with intracerebral hemorrhage.

The major limitations of the present study were relatively small sample size, a short follow-up period (3 months), and the outcome assessment being restricted to mRS. Other important parameters, including cognitive disability, have not been assessed. Biomarkers and other novel predictors such as ferritin,

β-amyloid, vascular endothelium growth factor (VEGF), and ApoC-III were not evaluated. This was a short-term outcome study and there is a definite need for more studies evaluating the long-term outcomes in patients with SICH. The decision for surgical or conservative management varies among various physicians/neurosurgeons, based on their subjective knowledge and risk prediction.

CONCLUSION:

It is concluded that intracerebral hemorrhage 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 hematoma, and infratentorial extension. Early identification of these features may be helpful in better assessment of prognosis and adequate intervention. Intraventricular extension and hematoma growth and hydrocephalus remain the most consistent predictors of death and poor outcome following spontaneous intracerebral hematoma. Further studies are needed to assess the risk of SICH among hypertensive patients and to prognosticate outcomes after SICH using novel predictors, including biomarkers.

REFERENCES:

1. Casolla B, Tortuyaux R, Cordonnier C. Management of spontaneous intracerebral hemorrhages. Presse Medicale Paris Fr. 1983;45(12):419–28.
2. Baidya O, Tiwari S, Usman K. Clinical profile of acute hemorrhagic stroke patients: a study in tertiary care hospital in Northern India. Int J Res Med Sci. 2014;2(4):1507–10.
3. A. I. Qureshi, S. Tuhrim, J. P. Broderick, H. H. Batjer, H. Hondo, and D. F. Hanley, "Spontaneous intracerebral hemorrhage," New England Journal of Medicine, 2001;344(19):1450–60.
4. J. Broderick, S. Connolly, E. Feldmann, et al., "Guidelines for the management of spontaneous intracerebral hemorrhage in adults: 2007 update: a guideline from the American heart association/American stroke association stroke council, High Blood Pressure Research Council, and the quality of care and outcomes in research interdisciplinary working group," Circulation, 2007;116(16):391–413.
5. D. A. Cadilhac, H. M. Dewey, T. Vos, R. Carter, and A. G. " health loss from ischemic stroke and intracerebral hemorrhage: evidence from the North East Melbourne Stroke Incidence Study (NEMESIS)," Health and Quality of Life Outcomes, 2010;14(8):49.
6. C. J. J. van Asch, M. J. A. Luitse, G. J. E. Rinkel, I. van der Tweel, A. Algra, and C. J. M. Klijn, "Incidence, case fatality, and functional outcome of intracerebral hemorrhage over time, according to age, sex, and ethnic origin: a systematic review and meta-analysis," Lancet Neurology, 2010;9(2):167–176.
7. K. D. Flemming, E. F. M. Wijdicks, and H. Li, "Can we predict the poor outcome at presentation in patients with lobar hemorrhage?" Cerebrovascular Diseases, 2001;11(3):183–189.
8. A. D. Mendelow, B. A. Gregson, H. M. Fernandes, et al., "Early surgery versus initial conservative treatment in patients with spontaneous supratentorial intracerebral hematomas in the international surgical trial in Intracerebral Haemorrhage (STICH): a randomized trial," e Lancet, 2005;365:387–397.
9. S. K. Das, T. K. Banerjee, A. Biswas, et al., "A prospective community-based study of stroke in Kolkata India," Stroke, 2007;38(3): 906–910.
10. Chuang YC, Chen YM, Peng SK, Peng SY. Risk stratification for predicting 30-day mortality of intracerebral hemorrhage. Int J Qual Health Care. 2009;6:441-47.
11. Schwarz S, Hafner K, Aschoff A, Schwab S. Incidence and prognostic significance of fever following intracerebral hemorrhage. Neurology. 2000;54:354-61.
12. Broderick J, Brott T, Tomsick T, Miller R, Huster G. Intracerebral hemorrhage is more than twice as common as subarachnoid hemorrhage. J Neurosurg. 1993;78:188-91.
13. Rahmani F, Rikhtegar R, Ala A, Farkhad-Rasooli A, Ebrahimi Bakhtavar H. Predicting 30-day mortality in patients with primary intracerebral hemorrhage: Evaluation of the value of intracerebral hemorrhage and modified new intracerebral hemorrhage scores. Iran J Neurol. 2018;17 (1):47-52.
14. Hemphill JC 3rd, Bonovich DC, Besmertis L, Manley GT, Johnston SC. The ICH score: A simple, reliable grading scale for intracerebral hemorrhage. Stroke. 2001;32:891-97.
15. Morgenstern LB, Zahuranec DB, Sánchez BN, Becker KJ, Geraghty M, Hughes R, et al. Full medical support for intracerebral hemorrhage. Neurology. 2015;84:1739–44
16. Ojha P, Sardana V, Maheshwari D, Bhushan B, Kamble S. Clinical Profile of Patients with Acute Intracerebral Hemorrhage and ICH Score as an Outcome Predictor on Discharge, 30 Days and 60 Days Follow-up. JAPI;67:8
17. Dul K, Drayer B. CT and MR imaging of intracerebral hemorrhage. In: Kase CS, Caplan LR, eds. Intracerebral Hemorrhage. Boston, Mass: Butter worth Heinemann; 1994;5:73-93.
18. Al-Mufti F, Thabet AM, Singh T, El-Ghanem M, Amuluru K, Gandhi CD. Clinical and radiographic

predictors of intracerebral hemorrhage outcome. Intervent Neurol. 2018;7:118-36.
19. Hegde A, Menon G. Modifying the Intracerebral Hemorrhage Score to Suit the Needs of the Developing World. Ann Indian Acad Neurol. 2018;21(4):270–4
20. Sahni R, Weinberger J. Management of intracerebral hemorrhage. Vasc Health Risk Manag. 2007;3(5):701-09
21. Bhatia R, Singh H, Singh S, Padma MV, Prasad K, Tripathi M, et al. A prospective study of in-hospital mortality and discharge outcome in spontaneous intracerebral hemorrhage. Neurol India. 2013;61(3):244-48
22. E. Feldmann, J. P. Broderick, W. N. Kernan, et al., "Major risk factors for intracerebral hemorrhage in the young are modifiable," Stroke, 2005;36(9):1881–1885.
23. J. Zheng, Z. Yu, L. Ma et al., "Association between blood glucose and functional outcome in intracerebral hemorrhage: a systematic review and meta-analysis," World Neurosurgery, 2018;114:756– 765.
24. Safatli DA, Günther A, Schlattmann P, Schwarz F, Kalff R, Ewald C. Predictors of 30-day mortality in patients with spontaneous primary intracerebral hemorrhage. Surgical Neurology International. 2016;7(18):510-17.
25. Modi TN, Santosh SA. Clinico-Epidemiological Profile of Intracerebral Hemorrhage. Natl J Community Med. 2017;8(8):512–516.