ORIGINAL ARTICLE

Examine the Frequency and Associated Mortality of Hydrocephalus in Patients with Intracerebral Hemorrhage

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ABSTRACT

Aim: To examine the frequency of chronic hydrocephalus in patients with intracerebral hemorrhage and in-hospital outcomes associated to hydrocephalus with ICH patients.
Study Design: Descriptive/Observational
Place and duration of study: Department of Neurology, Bolan Medical Complex Hospital Quetta from 1st October 2019 to 31st March 2020.
Methodology: Eighty patients of both genders with ages 20 to 70 years presented with spontaneous intracerebral hemorrhage were included. Patient's detailed demographics including age, sex, complete blood picture and comorbidities were recorded. Plain CT was performed at admission. Radiological parameters recorded included the presence of hydrocephalus on CT brain. Every patient was then being observed for outcome within 14 days.
Results: There were 50(62.5%) males and 30(37.5%) were females with mean age 48.15±11.76 years. Hypertension was most common comorbidity found in 56 (70%) patients followed by diabetes mellitus in 18 (22.5%). Hydrocephalus was found in 44 (55%) patients. Overall in-hospital mortality found in 29 (36.25%) patients and 51(63.75%) were survived. Among hydrocephalus patients 21/44 (47.73%) were died and among patients without hydrocephalus 8/36 (22.22%) were died. Mortality was significantly higher in patients with hydrocephalus as compared to without hydrocephalus (p-value <0.05).
Conclusion: The frequency of hydrocephalus in spontaneous intracerebral hemorrhage was high and is highly associated with increased mortality rate.
Keywords: Intracerebral hemorrhage, Hydrocephalus, Mortality, Survived

INTRODUCTION

Intracerebral haemorrhage (ICH) accounts for 10% to 15% of all strokes, but is associated with high morbidity and mortality[1,2]. In Japan, the prevalence of ICH is at least twice that in Western countries[3] and the age- and sex-adjusted incidence rate is about 53/100 000 per year[4]. Intracerebral haemorrhage will continue to be an important problem as the population ages, in both Japan and other developed countries[5]. Recombinant Activated Factor VII[6] has been suggested as a potential treatment for ICH, but optimal management of this condition remains unclear[7].

A first step for reaching a consensus on the management of ICH is the development of prediction rules for risk stratification of ICH patients. Clinical risk prediction tools may be useful in guiding medical decision-making, and provide prognostic information to patients and their family. Moreover, they may help focus attention on potential targets for intervention, and suggest which patient groups are most likely to have their outcome influenced by a particular intervention[2].

It is speculated that upto 50% patients expire in the first 30 days[8,9]. The resultant disability is also immense with only 20% cases reported as functionally independent after 6 months of the event.[10] Worldwide various studies have identified certain clinical and radiological factors which help in predicting mortality in patients with spontaneous ICH[11,12]. One such radiological parameter is the presence of hydrocephalus on CT brain (plain). It is seen in 57% cases of ICH[8]. The frequency is significantly higher in the ICH patients who expire during hospital stay. Very few local studies have been done on this subject. The present study was conducted aimed to examine the frequency of hydrocephalus in patients with intracerebral hemorrhage and to determine the in-hospital mortality and survival associated with hydrocephalus and without hydrocephalus.

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MATERIALS AND METHODS

This descriptive/cross-sectional study was conducted at Department of Neurology, Bolan Medical Complex Hospital Quetta from 1st October 2019 to 31st March 2020. A total of 80 patients of both genders with ages 20 to 70 years presented with spontaneous intracerebral hemorrhage were included. Patient's detailed demographics including age, sex, complete blood picture and co-morbidities were recorded after written consent. Patients with subdural hemorrhage, epidural hemorrhage, traumatic ICH, anticoagulant or coagulopathy-related hemorrhage and subarachnoid hemorrhage on CT brain were excluded. Spontaneous ICH was defined as stroke with hemorrhage into the brain parenchyma (hyperdense area) on CT scan brain (plain) done at the time of admission (without history of trauma or surgery). Hydrocephalus for this study was defined by the presence of the following on CT brain: Size of both temporal horns greater than 2 mm, ratio of the largest width of the frontal horns to maximal biparietal diameter (i.e., Evans ratio) greater than 30% and ballooning of frontal horns of lateral ventricles and/or the third ventricle. In-hospital mortality and survival were examined at 14th day. All the data was analyzed by SPSS

24. Chi-square test was done to compare the outcomes between hydrocephalus and without hydrocephalus patients. P-value <0.05 was taken as significant.

RESULTS

There were 50 (62.5%) males and 30 (37.5%) were females with mean age 48.15±11.76 years. Hypertension was most common comorbidity found in 56 (70%) patients followed by diabetes mellitus in 18 (22.5%), cardiovascular disease found in 8 (10%) patients, chronic liver disease in 6(7.5%) patients, and stroke found in 5(6.25%) patients respectively. Mean ICH volume by CT findings was 32.54±22.48 ml (Table 1). According to the radiological parameters by CT brain, hydrocephalus was found in 44(55%) patients (Fig. 1). Overall in-hospital mortality found in 29(36.25%) patients and 51 (63.75%) were survived (Fig. 2). Among hydrocephalus patients 21/44 (47.73%) were died and among patients without hydrocephalus 8/36 (22.22%) were died. Mortality was significantly higher in patients with hydrocephalus as compared to without hydrocephalus (p-value <0.05) (Table 2)

Table 1: Baseline details of all the patients

Variable	No.	%
Age (years)	48.15±11.76	
ICH volume (ml)	32.54±22.48	
Gender		
Male	50	62.5
Female	30	37.5
Co-morbidities		
Hypertension	56	70.0
DM	18	22.0
CVD	8	10.0
Chronic liver disease	6	7.5
Stroke	5	6.25

Fig. 1: Frequency of hydrocephalus in ICH patients

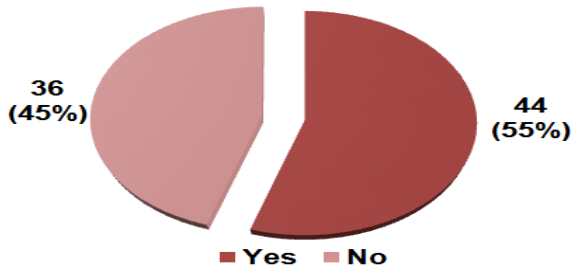

Fig. 2: In-hospital mortality and survival among ICH patients

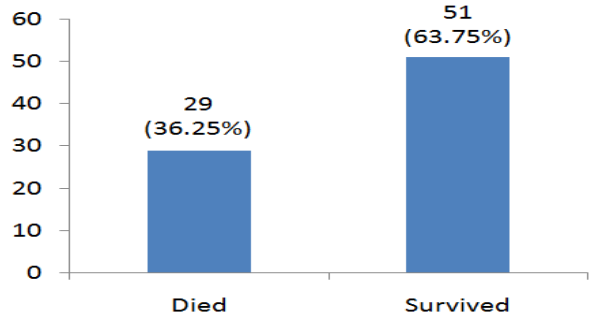

Table 2: Association of mortality between hydrocephalus and without hydrocephalus ICH patients

Variable	Hydrocephalus	Without hydrocephalus	P-value
Mortality	21 (47.73)	8 (22.22)	0.032
Survived	23 (52.27)	28 (77.78)	

DISCUSSION

Intracerebral hemorrhage is commonly found neurological disorders and associated with higher mortality and morbidity. It was seen that presence of hydrocephalus on CT brain is associated with considerably higher in-hospital mortality[13]. In present study we found that majority of ICH patients were male 62.5% as compared to females 37.5% and the mean age of patients was 48.15±11.76 years. These results were comparable to some previous studies in which male patients population was high 55% to 70% and majority of patients were in the age group 40 to 60 years[14,15].

Hypertension in our study was the most common comorbidity found in 56(70%) patients followed by diabetes mellitus in 18(22.5%), cardiovascular disease found in 8(10%) patients, chronic liver disease in 6(7.5%) patients, and stroke found in 5(6.25%) patients respectively. Takahashi, et al[16] reported that hypertension was the most frequent comorbidity found in 57.6% patients followed by diabetes mellitus in 25.6% patients. A study by Ahmad et al[17] reported that in ICH patients, hypertension was the most frequent comorbidity found in 72% patients.

In our study according to the radiological parameters by CT brain, hydrocephalus was found in 44 (55%) patients. Overall in-hospital mortality found in 29 (36.25%) patients and 51 (63.75%) were survived. Among hydrocephalus patients 21/44 (47.73%) were died and among patients without hydrocephalus 8/36 (22.22%) were died. Mortality was significantly higher in patients with hydrocephalus as compared to without hydrocephalus (p-value <0.05).

A study conducted by Zuurbier et al[18] reported that out of 90 cerebral venous thrombosis patients, hydrocephalus was found in 20 (22.22%) patients and is highly associated with poor in-hospital outcomes.

Seng et al[19] conducted study regarding outcomes in patients with spontaneous ICH and they reported that 82.9% patients had basal ganglia hemorrhage and the mortality rate among ICH patients was 40%, statistically significant of higher mortality rate among patients with pre-operative Glasgow Coma Scale (GCS) of 5 and below (OR for death = 9.5; p=0.015) and pre-operative CT scan brain showing acute hydrocephalus (OR for death = 4.3; p=0.046). Ahmad et al[17] reported in their study that hydrocephalus found in 53.12% patients and was highly associated with poor in-hospital outcomes, their study patients with hydrocephalus had high rate of mortality 35.23% as compared to without hydrocephalus patients 22.2%.

A study conducted Suthar et al[20] reported that out of 49 ICH basal ganglia patients 92% patients had hypertension and mortality found in 35% patients. They demonstrated that patients with basal ganglia had significantly poor outcomes.

CONCLUSION

The frequency of hydrocephalus in spontaneous intracerebral hemorrhage was high. Overall mortality rate was 36.25%. Intracerebral hemorrhage patients with hydrocephalus had significantly high rate of mortality as compared to patients without hydrocephalus.

REFERENCES

1. Xi G, Keep RF, Hoff JT. Mechanisms of brain injury after intracerebral haemorrhage. Lancet Neurol 2006; 5: 53-63.
2. Manno EM, Atkinson JL, Fulgham JR, Wijdicks EF. Emerging medical and surgical management strategies in the evaluation and treatment of intracerebral hemorrhage. Mayo Clin Proc 2005; 80: 420-33.
3. Zheng H, Chen C, Zhang J, Hu Z. Mechanism and therapy of brain edema after intracerebral hemorrhage. Cerebrovasc Dis 2016;42:155-69.
4. Krishnamurthi RV, Feigin VL, Forouzanfar MH, Mensah GA, Connor M. Bennett DA. Global and regional burden of first-ever ischaemic and haemorrhagic stroke during 1990–2010: findings from the Global Burden of Disease Study 2010. Lancet Glob Health 2013;1(5):e259–81.
5. Krishnamurthi RV, Moran AE, Forouzanfar MH, Bennett DA, Mensah GA, Lawes CMM, et al. The global burden of hemorrhagic stroke: a summary of findings from the GBD 2010 study. Global Heart 2014;9(1):101-6.
6. Sacco S, Marini C, Toni D, Olivieri L, Carolei A. Incidence and 10-year survival of intracerebral hemorrhage in a population-based registry. Stroke 2009;40(2):394-9.
7. Hemphill JC, Greenberg SM, Anderson CS, Becker K, Bendok BR, Cushman M, et al. Guidelines for the management of spontaneous intracerebral hemorrhage: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association. Stroke 2015;46(7): 2032-60.
8. Mayer SA, Brun NC, Begtrup K, Broderick J, Davis S, Diringer MN, Skolnick BE, Steiner T. Recombinant activated factor VII for acute intracerebral hemorrhage. N Engl J Med 2005; 352: 777-85.
9. Brown DL, Morgenstern LB. Stopping the bleeding in intracerebral hemorrhage. N Engl J Med 2005; 352: 828-30.
10. Zia E, Engström G, Svensson PJ, Norrving B, Pessah-Rasmussen H. Three-year survival and stroke recurrence rates in patients with primary intracerebral haemorrhage. Stroke 2009;40: 3567-73.
11. 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; 61:244-8.
12. Almutawa E, Shahda A, Albalooshi M. Spontaneous intracerebral haemorrhage (SICH): factors associated with in-hospital mortality. Bahrain Med Bulletin 2012; 34(2): 1-6.
13. Cheung RT, Zou LY. Use of the original, modified, or new intracerebral hemorrhage score to predict mortality and morbidity after intracerebral hemorrhage. Stroke 2003; 34(7): 1717-22.
14. Kasanmoentalib ES, Brouwer MC, van der Ende A, van de Beek D. Hydrocephalus in adults with community-acquired bacterial meningitis. Neurology 2010;75:918-23.
15. Morgenstern LB, Hemphill JC 3rd, Anderson C, Becker K, Broderick JP, Connolly ES Jr, *et al*. Guidelines for the management of spontaneous intracerebral hemorrhage: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2010; 41: 2108-29
16. Takahashi O, Cook EF, Nakamura T, Saito J, Ikawa F, Fukui T. Risk stratification for in-hospital mortality in spontaneous intracerebral haemorrhage: a classification and regression tree analysis. *QJM 2006;* 99(11): 743-50,
17. Ahmed F, Badshah M, Nabi S, Ahmed S, Shoro J. In-hospital outcome in patients with spontaneous intracerebral hemorrhage (ICH). PJNS 2016; 11 (3): 13-8.
18. Zuurbier SM, van den Berg R, Troost D, Majoie CB, Stam J, Coutinho JM. Hydrocephalus in cerebral venous thrombosis. J Neurol 2015;262(4): 931-7. doi:10.1007/s00415-015-7652-4
19. Seng LB, Kass RA, Siregar AJ. Outcome in Patients with Spontaneous Primary Intracranial Hemorrhage who underwent Craniotomy Affiliation. J Brain Spinal Cancer 2016; 1(1):19-28.
20. Suthar NN, Patel KL, Saparia C, Parikh AP. Study of clinical and radiological profile and outcome in patients of intracranial hemorrhage. Ann Afr Med 2016;15(2):69-77.