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Profile of Clinical and Radiological Factors of Intracerebral Hemorrhage Stroke Patients in Dr. Soetomo General Hospital Surabaya

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A B S T R A C T

Introduction: Intracerebral hemorrhage (ICH) is a medical emergency with high mortality and morbidity that occurs in 15-20% of stroke cases. However, in the Multicenter Surgical Trial in Lobar ICH (STICH) study no benefit was found from the initial operative handler in Lobar ICH patients. Many clinical and radiological factors affect the outcomes of patients. This study aims to find variables that have significance in the mortality rate of ICH stroke patients

Methods: The design of this study was a cross-sectional study. Clinical and radiological factors were analyzed by chi-square test and Kruskal-Wallis test. Then significant results were sought Relative Risk. This research was conducted from January 2017 to September 2018 starting from sampling to processing data. Sampling was carried out at the medical record center of Dr. Soetomo General Hospital Surabaya. Data collection is done by using secondary data in the form of patient medical records

Results: Age (p=0.0014), Glasgow Comma Scale (p=0.000), Tentorial location (p=0.034), Intraventricular hemorrhage (p=0.000), Hemorrhage volume (p=0.024), ICH Score (p=000) had significant role that predict outcome of patient with ICH. But Sex (p=0.937) and Treatment (p=0.796) didn't have significant role.

Conclusion: There are several factors that influence the outcome of ICH patients namely: Age, Glasgow Coma Scale, Hemorrhage Location, Intraventricular Hemorrhage, Volume of Hemorrhage, and ICH Score. Radiological factors and clinical factors both have an impact on outcomes.

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Introduction

Intracerebral hemorrhage (ICH) can be treated with medical conservative treatment, surgical operative, and minimally invasive surgery. At present, there is no adequate treatment for ICH. Several studies have tried to compare outcomes from the operative and conservative methods. One of the most famous studies is the study of Surgical Treatment in Lobar Intracranial Haemorrhage (STICH). The STICH study was conducted by the Multicenter in 1995. The STICH study found no benefit from early operative handlers in Lobar ICH patients[1-3].

In the STICH study, there are a number of issues that are criticized by clinicians where the time of handling is not divided, the depth or volume of uncharged ICH makes it biased towards the treatment of patients with operative surgery. With more advanced CT-Scan and better evaluation of Radiodiagnosis factors, STICH II is currently being carried out in response to the criterion of STICH 1[4, 5].

Based on the STICH research data, it can be concluded that operative measures provide benefits for ICH with Infratentorial locations. But for the Supratentorial location, there is still debate and controversy for handling operatives[6]. Here the author wants to try to examine more specifically which subgroups benefit from operative Treatments by comparing clinical factors, namely the level of consciousness (Glasgow Coma Scale) and age[7]. As well as radiological factors, namely the volume of bleeding[8], the location of bleeding[2], and intraventricular expansion[9].

This study aims to find variables that have signed on the mortality rate of ICH stroke patients. So that in the future there will be a more appropriate treatment for certain characteristics. which is expected to reduce mortality.

Methods

The design of this study was a cross-sectional study with a retrospective observational approach to determine the outcome based on the relationship of the radiological and clinical characteristics of stroke patients with the criteria for inclusion of patients in neurology and neurosurgery at the Dr. Soetomo General Hospital Surabaya. The patient has a primary ICH. And the exclusion of patients with: Status of medical records is incomplete, in this case, the clinical and radiological characteristics studied are not recorded. The patient has not received therapy or has received therapy for less than 3 months. Patients experience other vascular disorders, such as aneurysms. The minimum required sample is calculated using the formula Charan and Biswas[10], included p-value according to the lowest mortality in the previous study, namely 20% Z = 1.96 and d = 0.05 the minimum sampling was 240. Then clinical and radiological factors were analyzed by test chi-square and Kruskal-Wallis test. Then significant results are sought for Relative Risk

Results

This research was conducted from January 2017 to September 2018 starting from sampling to processing data. Sampling was carried out at the medical record center of Dr. Soetomo General Hospital Surabaya. Data collection is done by using secondary data in the form of patient medical records. All of the collected intracerebral hemorrhage patients were 302 and the total patients who met the inclusion and exclusion criteria were included in the study as the study subjects. Patients who met the criteria obtained 247 research subjects. In the output, variables are divided into two categories, life, and death categories. It can be seen that the percentage of respondents in the living category was 53.8% with a frequency of 133 respondents. Meanwhile, the death category is 46.2% with the frequency of respondents being 114 people.

Age

Age variables are divided into five categories, namely categories of children, young adults, adults, the elderly, and very elderly. It can be seen that the percentage of respondents in the child category is 2.0% with a frequency of 5 respondents. Young adult category is 20.2% with a frequency of 50 people. Adult category is 62.3% with a frequency of 154 respondents. The elderly category is 14.2% with a frequency of 35. Meanwhile, the percentage of the category is very elderly at 1.2% with a frequency of 3 respondents.Then performed a statistical test and obtained p = 0.014 and t = -2.47 were obtained. then the conclusion of the age ratio is inversely proportional to the outcome of the patient's life. The older the patient the higher the death rate (See at table 1).

Sex

In gender, variables are divided into two categories, namely categories of men and women. It can be seen that the percentage of male patients is 54.7% (135 respondents) and the percentage of female patients is 45.3% (112 respondents).Then performed a statistical test and obtained p-value= 0.937. Which means there is no significant difference in the outcome of patients in different Genders.

Glasgow Coma Scale (GCS)

GCS variables were divided into three categories, namely the conscious category (> 13), unconscious (5-13) and unconscious (<5). It can be seen that the percentage of GCS respondents in the conscious category (0-4) is 28.3% with a frequency of 70 respondents. The unconscious category is 58.7% with a frequency of 145 respondents. Meanwhile, the percentage of unconscious categories (13-15) is 13% with a frequency of 32 respondents.Then performed a statistical test and obtained p-value= 0.000. Which means there are significant differences in the outcome of patients in different GCs. In

the trend, there was a decrease in GCS followed by an increase in mortality.

Tentorial location

In Tentorial Location variables are divided into two categories, namely the Supratentorial and Infratentorial categories. It can be seen that the percentage of respondents in the Tentorial location in the supratentorial category was 90.3% with a frequency of 223 respondents. Meanwhile, the infratentorial category was 9.7% with a frequency of 24 respondents.Then a statistical test is performed and p-value= 0.034 is obtained. Which means there are significant differences in the outcome of patients on different Tentorial Locations. In the trend seen Supratentorial had a lower mortality rate compared to infratentorial patients (41% vs 33%).

Intraventricular Hemorrhage (IVH)

The IVH variables are divided into two categories, namely the categories IVH and Non-IVH. It can be seen that the percentage of IVH respondents in the Non-IVH category was 48.2% with a frequency of 119 respondents. Meanwhile, the IVH category was 51.8% with a frequency of 128 respondents.Then a statistical test is performed and p-value = 0.000 is obtained. Which means there are significant differences in patient outcomes in patients with IVH. In the trend seen IVH patients had higher mortality rates compared to no-IVH patients (71% vs 38%).

Hemorrhage Volume

Volume variables are divided into three categories, namely low, medium, and high categories. It can be seen that the percentage of respondents in the low category is 55.1% with a frequency of 136 respondents. Meanwhile, the Medium category was 31.6% with a frequency of 78 respondents. In the high category, the percentage of respondents was 13.4% with a frequency of 33 respondentsThen performed a statistical test and obtained p-value = 0.024. Which means there are significant differences in the outcome of patients in different volumes. The trend seen as higher volume will be followed by an increase in mortality.

ICH Score

In ICH Score variables are divided into seven categories, namely categories zero to six. It can be seen that the percentage of respondents to the ICH Score in the zero categories is 12.6% with a frequency of 31 respondents. The first category is 20.6% with a frequency of 51 respondents. Category two is 31.2% with the frequency of respondents 77 people. Category three is 23.5% with the frequency of respondents 58 people. The fourth category is 9.7% with a frequency of 24 people. Category five is 2.0% with a frequency of 5 people. Meanwhile, category six is 4% with a frequency of respondents of 4 people.Then performed a statistical test and obtained p-value α = 0,000. Which means there are significant differences in patient outcomes on different ICH scores. In the trend seen an increase in ICH Score is directly proportional to the increase in mortality.

Table 1. Descriptive and Significance Test

Hemorrhage Location

The location variables are divided into seven categories, namely the basal ganglia, lobar, thalamus, cerebellum, multiple, brainstem, and other categories. It can be seen that the percentage of location respondents in other categories is 2.0% with a frequency of 5 respondents. The basal ganglia category was 33.2% with a frequency of 82 respondents. The lobar category is 32.8% with a frequency of 81 respondents. The thalamus category is 12.6% with the frequency of respondents 31 people. The cerebellum category was 4.9% with a frequency of 12 respondents. Multiple categories of 9.3% with a frequency of 23 respondents. Meanwhile, the brainstem category was 5.3% with a frequency of respondents of 13 people.Then performed a statistical test and obtained p-value α = 0.009. Which there are significant differences in the outcome of the patient in patients with different bleeding sites.

Treatments

The Treatment variables are divided into two categories, namely conservative and operative categories. It can be seen that the percentage of respondent Treatments in the conservative category amounted to 57.9% with a frequency of 143 respondents. Meanwhile, the operative category was 42.1% with a frequency of 104 respondents. Then performed a statistical test and obtained p-value = 0.796. Which means there is no significant difference in the outcome of the patient in operative and conservative treatment. Both conservative and operative Treatments which are not subgroups have a different mortality rate.

Discussion

After analyzing each variable on the outcome of ICH patients. then the writer analyzes statistical tests to answer how each factor influences outcomes. the results of our study found that the age ratio is inversely proportional to the outcome of the patient's life (P=0.0014). The older the patient the higher the death rate. This is in line with the study of Rendevski et al, Independently, age affects the outcome of patients significantly at a young age with a higher percentage of life[6]. This is because in young adult patients the entire physiology of the body is still running well and the regeneration power is still high. So that the healing power of major surgery is better[7, 11].

The results of our study which showed that GCS obtained p-value= 0.000. Which means there are significant differences in the outcome of patients in

No	Variable	Category	Life	Death	Total	Mortality Percentage	P-Value
1	Age	Child (0-20)	3	2	5	40%	0.014
		Young Adult (20-40)	33	17	50	34%	
		Adult (40-60)	79	75	154	49%	
		Elderly (60-80)	17	18	35	51%	
		Very Elderly (>80)	1	2	3	67%	
		Total	133	114	247	46%	
2	Sex	Male	73	62	135	46%	0.937
		Female	60	52	112	46%	
		Total	133	114	247	46%	
3	GCS	>13	56	14	70	20%	0.000
		5-13	70	75	145	52%	
		<5	7	25	32	78%	
		Total	133	114	247	46%	
4	Tentorial Location	Supratentorial	125	98	223	44%	0.034
		Infratentorial	8	16	24	67%	
		Total	133	114	247	46%	
5	IVH	Non-IVH	85	34	119	29%	0.000
		IVH	48	80	128	63%	
		Total	133	114	247	46%	
6	Volume	<30cc	81	55	136	40%	0.024
		30-60cc	41	37	78	47%	
		>60cc	11	22	33	67%	
		Total	133	114	247	46%	
7	ICH Score	0	28	3	31	10%	0.000
		1	37	14	51	27%	
		2	40	37	77	48%	
		3	21	37	58	64%	
		4	6	18	24	75%	
		5	1	4	5	80%	
		6	0	1	1	100%	
		Total	133	114	247	46%	
8	Locations	Others	3	2	5	40%	0.009
		Basal Ganglia	50	32	82	39%	
		Lobar	49	32	81	40%	
		Thalamus	9	22	31	71%	
		Cerebellum	5	7	12	58%	
		Multiple	14	9	23	39%	
		Brainstem	3	10	13	77%	
		Total	133	114	247	46%	
9	Treatment	Conservative	78	65	143	45%	0.796
		Operative	55	49	104	47%	
		Total	133	114	247	46%	

different GCs. In the trend, there was a decrease in GCS followed by an increase in mortality. This is in line with a previous study of GCS by Castellanos et al 2005 and Davis et al 2006 [12, 13].

The results of our study that showed an increase in volume increasing the mortality rate of ICH patients with significant results (P = 0.024). This is in line with a previous study of radiological factors by Castellanos et al 2005 and Davis et al 2006[12, 13], which showed that bleeding volume> 30cc and hematoma expansion would significantly increase patient mortality. This is due to the high volume of bleeding increasing the ICP which causes herniation of Cerebri[12-14]. Radiological factors Tentorial sites also show Infratentorial locations have higher mortality rates with significant results (P = 0.034).

Whereas, on radiological factors, IVH showed ventricular extension increasing intraventricular mortality with significant results (P = 0.00).

All points assessed in the ICH Score show the significance of the outcome of the death rate. This is in accordance with the research of Hemphill, et al., 2001[15] regarding the ICH Score which showed an increase in the ICH score significantly increasing patient mortality (P = 0.000)[15].

The statistical tests on each location specifically which showed significant results (P = 0.009) with the highest mortality rates in the highest order were Brainstem, multiple, Thalamus, Cerebellum, Lobar and Basal Ganglia. The results of this study are not much different from the results of previous studies which showed that based on the location of bleeding, the hospital mortality rate in ICH stroke patients was 16.3% in the basal ganglia / internal capsule,

20% in the cerebellum, 25% in lobar, 25, 8% in the thalamus, 40% in the brain stem, and 44.4% in intraventricular [14, 16]

Further research is needed to find out which factors can be a diagnosis for choosing treatments that provide better outcomes. Further analysis is needed to look for indications of the use of Operative or Conservative actions.

Conclusion

There are several factors that influence the outcome of ICH patients namely: Age, Glasgow Coma Scale, Hemorrhage Location, Intraventricular Hemorrhage, Volume of Hemorrhage, and ICH Score. Radiological factors and clinical factors both have an impact on outcomes. Statistically, more than 1 variable is needed to determine an action that results in a more significant outcome of living patients. This shows that the choice of treatment for patients with different characteristics requires different treatments.

CONFLICT OF INTEREST

The author stated there is no conflict of interest.

REFERENCES

1. Kim H-T, Lee J-M, Koh E-J and Choi H-Y. Surgery versus Conservative Treatment for Spontaneous Supratentorial Intracerebral Hemorrhage in Spot Sign Positive Patients. *Journal of Korean Neurosurgical Society*. 2015; 58: 309-15.
2. Aguilar MI and Brott TG. Update in Intracerebral Hemorrhage. *The Neurohospitalist*. 2011; 1: 148-59.
3. de Oliveira Manoel AL, Goffi A, Zampieri FG, et al. The Critical Care Management of Spontaneous Intracranial Hemorrhage: A Contemporary Review. *Critical Care (London, England)*. 2016; 20: 272-.
4. Mendelow AD, Gregson BA, Mitchell PM, et al. Surgical Trial in Lobar Intracerebral Haemorrhage (STICH II) Protocol. *Trials*. 2011; 12: 124-.
5. Ikram MA, Wieberdink RG and Koudstaal PJ. International Epidemiology of Intracerebral Hemorrhage. *Current Atherosclerosis Reports*. 2012; 14: 300-6.
6. Rendevski V, Stojanov D, Aleksovski B, et al. *Surgical Outcome in Patients with Spontaneous Supratentorial Intracerebral Hemorrhage*. 2017.
7. Chung J-Y, Chang W-Y, Lin T-W, et al. An Analysis of Surgical Outcomes in Patients Aged 80 years and Older. *Acta Anaesthesiologica Taiwanica*. 2014; 52: 153-8.
8. Broderick JP, Brott TG, Duldner JE, Tomsick T and Huster G. Volume of Intracerebral Hemorrhage. A Powerful and Easy-to-Use Predictor of 30-day Mortality. *Stroke*. 1993; 24: 987-93.
9. Hanley DF. Intraventricular Hemorrhage: Severity Factor and Treatment Target in Spontaneous Intracerebral Hemorrhage. *Stroke*. 2009; 40: 1533-8.
10. Charan J and Biswas T. How to Calculate Sample Size for Different Study Designs in Medical Research? *Indian Journal of Psychological Medicine*. 2013; 35: 121-6.
11. A AK and Valson JS. Surgery in Spontaneous Intracerebral Hemorrhage– A Series Analysis. *Journal of Neurology and Stroke*. 2015; 2.
12. Rodríguez-Yáñez M, Castellanos M, Freijo MM, et al. Clinical Practice Guidelines in Intracerebral Haemorrhage. *Neurología (English Edition)*. 2013; 28: 236-49.
13. Davis SM, Broderick J, Hennerici M, et al. Hematoma Growth is A Determinant of Mortality and Poor Outcome After Intracerebral Hemorrhage. *Neurology*. 2006; 66: 1175-81.
14. Salihović D, Smajlović D and Ibrahimagić OĆ. Does the Volume and Localization of Intracerebral Hematoma Affect Short-Term Prognosis of Patients with Intracerebral Hemorrhage? *ISRN Neuroscience*. 2013; 2013: 327968-.
15. Hemphill JC, Greenberg Steven M, Anderson Craig S, et al. Guidelines for the Management of Spontaneous Intracerebral Hemorrhage. *Stroke*. 2015; 46: 2032-60.
16. Arboix A, Comes E, García-Eroles L, et al. Site of Bleeding and Early Outcome in Primary Intracerebral Hemorrhage. *Acta Neurologica Scandinavica*. 2002; 105: 282-8.