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Intracerebral Hemorrhage Score as a Prognosis Prediction of Spontaneous Intracerebral Hemorrhage at RSI Surabaya Jemursari

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ABSTRACT

Introduction: Spontaneous intracerebral hemorrhage, or hemorrhagic stroke, is one of the leading causes of mortality and disability in Indonesia. **Objective**: The intracerebral hemorrhage (ICH) score is a widely used predictive tool for the prognosis of death 30 days after spontaneous intracerebral hemorrhage, but the intracerebral hemorrhage-grading scale (ICH-GS) score has a more specific interval to assess prognosis prediction after intracerebral hemorrhage. **Methods:** The type of research used was observational-retrospective research. The population included all patients with spontaneous intracerebral hemorrhage hospitalized at RSI Jemursari Surabaya in 2017–2019. **Results**: The results revealed that there were 110 spontaneous intracerebral hemorrhage patients with complete data in medical e-records during 2017–2019; 65.5% (72 patients) were male and 34.5% (38 patients) were female. The data showed that 20% (22 patients) had an ICH-GS score of 8 and 0.9% (1 patient) had an ICH-GS score of 12. **Conclusion**: The higher the total score, the more likely it is to have a poor outcome. The results of this study indicate that patients with a high total score did not always die.

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INTRODUCTION

Stroke is considered a catastrophic disease because of its widespread impact on the economy and society. According to the 2018 Basic Health Research (Riskesdas), the prevalence of stroke was 10.9 per mile, with East Kalimantan Province having the highest prevalence (14.7 per mile) and Papua Province having the lowest (4.1 per mile). Data from the Healthcare and Social Security Agency (BPJS) in 2016 showed that stroke cost health care costs of 1.43 trillion rupiahs. The same source reported an increase to 2.18 trillion rupiahs in 2017, and it reached 2.56 trillion rupiahs in 2018.[1]

Stroke is a disease that affects the arteries leading to and within the brain. A stroke occurs when a blood vessel carrying oxygen and nutrients to the brain is either ruptured or blocked by a clot, resulting in the brain not receiving the oxygen and nutrients it needs and causing brain cells to die.[2] Data from the Indonesia Stroke Registry in 2012–2013 showed 20.3% of deaths in the first 48 hours after stroke.[3] Stroke is the number-one cause of death in Indonesia.[4] In the United States, stroke is the fifth-leading cause of death and the most common cause of disability.[5]

At least 1 in 5 cases of stroke is related to obesity; 1 in 10 cases is related to smoking; 1 in 4 cases is due to insufficient consumption of fruits and vegetables; and 1 million cases are related to excessive alcohol consumption. There are >50% of stroke cases related to high blood pressure; 1 in 4 cases is related to high LDL levels; and 9% of cases occur due to irregular heart rhythms.[4]

A stroke can be caused by a clot that blocks the blood flow to the brain (ischemic stroke) or by a ruptured blood vessel that blocks the blood flow to the brain (hemorrhagic stroke). Intracerebral hemorrhage and subarachnoid hemorrhage are the two types of hemorrhagic stroke.[5] Hemorrhagic stroke occurs in 10–15% of stroke cases, with an annual incidence rate of 24.6 per 100,000 people.[6]

Although the data indicate that stroke has an economic burden and a high mortality rate, intracerebral hemorrhage still lacks specific therapy. The financial impact of intracerebral hemorrhage that has been highlighted is that, although patients have a long stay in the intensive care unit, intracerebral hemorrhage still has a high mortality rate after 30 days of bleeding. If the patient survives, severe disability can occur.[6]

Accurate prediction of intracerebral hemorrhage outcome is important in distinguishing patients who need special care or who might benefit from a particular therapeutic strategy. Several scales for predicting mortality due to intracerebral hemorrhage have been developed. The intracerebral hemorrhage (ICH) score seems to be the most reliable scoring system for predicting 30-day mortality in different populations and clinical settings; however, mortality during hospitalization is also required. Therefore, the intracerebral hemorrhage-grading scale score (ICH-GS score) is calculated for the prediction of outcome after intracerebral hemorrhage based on evaluations performed at the time the patient came to the hospital.[7] The initial determination of the ICH score may misestimate the severity and expected outcome after ICH. Calculation of the ICH score 24 hours after admission would better predict the initial outcome.[8]

Rumah Sakit Islam (RSI) Jemursari Surabaya is the only type B hospital in Wonocolo District, Surabaya. Before conducting this study, the researcher conducted research on the profile of patients with hemorrhagic stroke and found that there were no records of ICH score or ICH-GS score in the patient's medical records, and there were problems with telephone numbers that could no longer be contacted when the researcher contacted the numbers listed in the medical records. The observation of the ICH-GS score was only based on the data obtained when the patients were hospitalized due to the researcher's inability to visit the addresses listed in the medical records because of the 2019 Corona virus (COVID-19) pandemic.

In the management of intracerebral hemorrhage, the existence of research on the ICH-GS score as a predictor of the prognosis can help health workers be alert and bridge communication between health workers or between health workers and patients' families. ICH scores tend to occur in young adults. ICH volume and GCS score were the most relevant items in predicting death at 30 days in young adults.[9]

OBJECTIVE

1. To identify the number of ICH-GS scores in patients with spontaneous intracerebralhemorrhage as a predictor of prognosis at Rumah Sakit Islam (RSI) Jemursari Surabaya.
2. To identify the characteristics of patients with spontaneous intracerebral hemorrhage at Rumah Sakit Islam (RSI) Jemursari Surabaya based on the Glasgow Coma Scale, age, bleeding volume via head computed tomography (CT), location (infratentorial or supratentorial), and the presence or absence of intraventricular hemorrhage.

METHODS

This research was a retrospective study. The population comprised all patients with spontaneous intracerebral hemorrhage hospitalized at RSI Jemursari Surabaya in 2017–2019, with an affordable population of all patients with spontaneous intracerebral

hemorrhage diagnosed by a neurologist. The collected data were input into the Statistical Package for the Social Sciences (SPSS) data format version 20.0 (SPSS, Inc., Chicago, Illinois).

RESULTS

The results revealed that there were 110 patients with spontaneous intracerebral hemorrhage who had complete data in their medical e-record during 2017–2019; 65.5% (72 patients) were male and 34.5% (38 patients) were female (Table 1). According to the data, 20% (22 patients) had an ICH-GS score of 8, while 0.9% (1 patient) had an ICH-GS score of 12 (Table 2).

DISCUSSION

Distribution of samples by gender

The data showed that 110 patients with spontaneous intracerebral hemorrhage had complete data in medical e-records from 2017 to 2019; 65.5% (72 patients) were male and 34.5% (38 patients) were female (Table 1).

The incidence of ICH is high in low- and middle-income countries and Asian people. Incidence is more common in males and increases with age. Global incidence is increasing, especially in African and Asian countries.[10] A risk factor for both non-lobar and lobar intracerebral hemorrhage is hypertension. Men have a higher prevalence of hypertension, diabetes, and excessive alcohol consumption.[11]

Distribution of samples by ICH-GS score

The data showed that 5.5% (6 patients) had an ICH-GS score of 5; 38.2% (42 patients) had an ICG-GS score of 6; 21.8% (24 patients) had an ICH-GS score of 7; 20% (22 patients) had an ICH-GS score of 8; 5.5% (6 patients) had an ICH-GS score of 9; 4.5% (5 patients) had an ICH-GS score of 10; 3.6% (4 patients) had an ICH-GS score of 11; and 0.9% (1 patient) had an ICH-GS score of 12 (Table 2).

Spontaneous intracranial hemorrhage may present in the emergency department with non- specific symptoms and no lateralizing neurological signs. This indicates a potential risk of misdiagnosis and could be excluded from further investigation. Accessibility to health services may be limited in some parts of the world, including Indonesia.[12]

Distribution of samples by ICH-GS score and outcomes

The data based on the ICH-GS score and patient outcomes showed that among patients with an ICH- GS score of 5, 5 had a survival outcome, and 1 had a death outcome. Of patients with an ICH-GS score of 6, 40 had a survival outcome, while 2 died. Among patients with an ICH-GS score of 7, 24 patients were identified with a survival outcome and no patients died. Among patients with an ICH-GS score of 8, 16 patients were identified with a survival outcome and 6 patients died. Among patients with an ICH-GS score of 9, 3 patients were identified with a survival outcome and 3 patients died. Patients with an ICH- GS score of 10, 2 patients were identified with a survival outcome and 3 patients died. Among patients with an ICH-GS score of 11, 2 patients were identified with a survival outcome and 2 patients died. Then, a patient with an ICH-GS score of 12 died (Table 3).

Regarding the accuracy of the ICH score and the outcomes, it revealed a prediction whereby patients with higher scores are more likely to die due to a lack of aggressive treatment or treatment withdrawal.[13]

Distribution of samples by age and outcomes

The data based on age and outcomes showed that among patients under the age of 45, 8 patients had a survival outcome, while among patients over the age of 45, 3 patients had a death outcome. Of patients aged 45 to 64 years, 79 had a survival outcome, and 11 had a death outcome. Among patients aged 65 years, 7 patients had a survival outcome, and 2 patients died (Table 4).

Spontaneous intracerebral hemorrhage (SICH) is the second most common stroke subtype, and its incidence is known to rise with age.[14] Age itself can't predict short-term survival in the elderly. As is the case for younger patients, the primary predictor has the potential to be better managed. Reinforcing therapeutic attitudes and offering the best acute treatment can improve clinical outcomes for elderly SICH patients.[15]

According to the Charlson Comorbidity Index (CCI), comorbid medical conditions in elderly ICH patients independently have an impact on short-term outcomes. The hematoma's characteristics, such as ICH volume and the presence of IVH, appear to reduce its effect.[16]

Distribution of samples by GCS and outcomes

The data based on the Glasgow Coma Scale (GCS) at the emergency department and the outcomes found that among patients with GCS ≥ 13, 67 patients were identified with a survival outcome, and 3 patients died. Of patients with GCS 9–12, 14 had a survival outcome, while 7 died. Then, among patients with GCS ≤ 8, 10 patients were identified with a survival outcome, and 9 patients died (Table 5).

Therefore, the most widely used predictors for correcting poor outcomes after ICH are a lower level of consciousness, advanced age, a lower initial Glasgow Coma Scale (GCS), greater peri- hemorrhagic edema, the presence of hydrocephalus and

intraventricular hemorrhage (IVH), a larger volume, and the expansion of ICH.[17]

Distribution of samples by volume and outcomes

The data based on the volume of spontaneous intracerebral hemorrhage and outcomes showed 77 patients with a survival outcome in supratentorial hemorrhage with a volume <40 mL, whereas 6 patients died. In supratentorial hemorrhage with a volume of 40–70 mL, 8 patients were identified with a survival outcome and 1 patient died. In supratentorial hemorrhage with a volume > 70 mL, 5 patients had a survival outcome, while 6 died.

In the data regarding infratentorial bleeding with a volume < 10 mL, it was found that 1 patient had a survival outcome and 4 patients died. In the data regarding infratentorial bleeding volume > 20 mL, 1 patient had a survival outcome and 1 patient died (Table 6).

Stroke related factors, such as severity and neurological impairment, are the main predictors of immediate unfavourable outcome. Additionally, the strongest short-term predictor of poor SICH outcomes in the elderly population is hematoma volume, which is also the strongest predictor of long-term SICH outcomes.[18]

Unfavorable outcomes can be caused by many factors, including higher ages, a lower GCS score, the use of an anticoagulant, IVH, and a higher volume of bleeding.

In fact, a different study showed that death was associated with factors such as higher ages, a lower GCS score, the anticoagulant agent used, CHF (as a variable in mFI), and a higher bleeding volume. Previous studies have found that chronological age is a good predictor of postoperative outcome because it distinguishes the essence of the individual patient from the bleeding incident. However, chronological age itself is insufficient to assess physiological reserve or increased surgical susceptibility among elderly patients.[19]

Distribution of samples by IVH and outcomes

In the data regarding the presence or absence of IVH and outcomes, there were 74 patients who did not experience IVH with a survival outcome and 8 patients with a death outcome. A total of 18 patients experienced IVH with a survival outcome and 10 patients with a death outcome (Table 7).

The ICH score predicts death based on age, Glasgow Coma Scale, hematoma volume, location, and presence of intraventricular hemorrhage (IVH). ICH patients over the age of 80 have a good outcome with discharge home or rehabilitation. While a patient population's poor outcomes are predicted by an ICH score > 2 at admission. This provides new insights on the prognosis of ICH in the elderly population. The ICH score can be used to predict a good or poor outcome at discharge rather than estimating 30-day mortality and may be useful in discussions of care goals during the early days of hospitalization.[20]

Distribution of samples by location and outcomes

In the data concerning bleeding location and outcomes, 89 patients with supratentorial hemorrhage were found with a survival outcome, and 13 patients died, while in infratentorial bleeding, 3 patients were alive and 5 patients died (Table 8). Of note, a similar study discovered that ICH locations included the deep (48.2%), lobar (40%), and cerebellum (9.5%). Forty percent of all patients had concurrent IVH. The etiology of ICH included hypertension (51.8%), cerebral amyloid angiopathy (26.8%), coagulopathy (5.9%), and other or unknown causes.[20]

In another study, very old patients had a lobar bleeding rate of 31% compared to 15% in a younger population. ICH patients 80 years of age or older have a higher prevalence of lobar hematoma and a larger volume of hematoma at the emergency visit than do younger patients.[21]

CONCLUSION

Stroke is still an issue that needs attention, bothglobally and in Indonesia. Stroke is a condition that must be avoided due to the risk of permanent disability. In this study, there were 110 ICH stroke patients treated at RSI Jemursari Surabaya, with a higher proportion of male patients. The number of ICH-GS scores varies in this study, ranging from 5 to 11, with a score of 7 having the highest frequency. Although a higher total score is predicted to have a poor outcome, the results of this study indicated that patients with a high total score did not always die. Aside from scores, this study compared each age range, GCS score, bleeding volume, presence of IVH, and site of bleeding against patient outcomes.

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Conflict of Interest
The authors have no conflicts of interest.

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Author Contribution
The first author was the leader of this research; the second author was the writer and data collector; the third author was a data analyzer; and the last author was

an administrator.

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TABLES AND FIGURES

Table 1. Distribution of samples by gender

Gender	Amount	Percentage
Male	72	65.5
Female	38	34.5
Total	110	100.0

Table 2. Distribution of samples by ICH-GS score

ICH-GS Score	Amount	Percentage
Score 5	6	5.5
Score 6	42	38.2
Score 7	24	21.8
Score 8	22	20.0
Score 9	6	5.5
Score 10	5	4.5
Score 11	4	3.6
Score 12	1	0.9
Total	110	100.0

Table 3. Distribution of samples by ICH-GS score and outcome

ICH-GS Score and Outcome	Amount	Percentage
Score 5 with survival outcome	5	4.5
Score 5 with death outcome	1	0.9
Score 6 with survival outcome	40	36.4
Score 6 with death outcome	2	1.8
Score 7 with survival outcome	24	21.8
Score 8 with survival outcome	16	14.5
Score 8 with death outcome	6	5.5
Score 9 with survival outcome	3	2.7
Score 9 with death outcome	3	2.7
Score 10 with survival outcome	2	1.8
Score 10 with death outcome	3	2.7
Score 11 with survival outcome	2	1.8
Score 11 with death outcome	2	1.8
Score 12 with death outcome	1	0.9
Total	110	100.0

Table 4. Distribution of samples by age and outcomes

Age and Outcomes	Amount	Percentage
< 45 years old with survival outcome	8	7.3
< 45 years old with death outcome	3	2.7
45-64 years old with survival outcome	79	71.8
45-64 years old with death outcome	11	10.0
≥ 65 years old with survival outcome	7	6.4
≥ 65 years old with death outcome	2	1.8
Total	110	100.0

Table 5. Distribution of samples by GCS and outcomes

GCS and Outcomes	Amount	Percentage
GCS ≥ 13 with survival outcome	67	60.9
GCS ≥ 13with death outcome	3	2.7
GCS 9-12 with survival outcome	14	12.7
GCS 9-12 with death outcome	7	6.4
GCS ≤ 8 with survival outcome	10	9.1
GCS ≤ 8 with death outcome	9	8.2
Total	110	100.0

Table 6. Distribution of samples by volume and outcomes

ICH-GS Score	Amount	Percentage
Supratentorial vol < 40 mL with survival outcome	77	70.0
Supratentorial vol < 40 mL with death outcome	6	5.5
Supratentorial vol 40-70 mL with survival outcome	8	7.3
Supratentorial vol 40-70 mL with death outcome	1	0.9
Supratentorial vol >70 mL with survival outcome	5	4.5
Supratentorial vol >70 mL with death outcome	6	5.5
Infratentorial vol < 10 mL with survival outcome	1	0.9
Infratentorial vol < 10 mL with death outcome	4	3.6
Infratentorial vol > 20 mL with survival outcome	1	0.9
Infratentorial vol > 20 mL with death outcome	1	0.9
Total	110	100.0

Table 7. Distribution of samples by IVH and outcomes

ICH-GS Score	Amount	Percentage
Absence of IVH with survival outcome	74	67.3
Absence of IVH with death outcome	8	7.3
Presence of IVH with survival outcome	18	16.4
Presence of IVH with death outcome	10	9.1
Total	110	100.0

Table 8. Distribution of samples by location and outcomes

ICH-GS Score	Amount	Percentage
Supratentorial with survival outcome	89	80.9
Supratentorial with death outcome	13	11.8
Infratentorial with survival outcome	3	2.7
Infratentorial with death outcome	5	4.5
Total	110	100.0