Early Predictor of Functional Outcome for Acute Hemorrhagic Stroke. Study on ICH Score and Leucocytes Count

Yafet Ronny Setiawan[a]*, Andi Asadul Islam[b], Ilhamjaya Patellongi[c], Mochammad Hatta[d]

[a]Faculty of Medicine, Universitas Pelita Harapan, Tangerang, Indonesia
[b]Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
[c]Department of Physiology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
[d]Molecular Biology and Immunology Lab, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
[a]Email: ronnysetiawan@yahoo.com

Abstract

Acute spontaneous intracerebral haemorrhage is often fatal, so that an accurate prediction of patient outcome is necessary for the patient's families and physician to make decisions for further handling. Assessment of functional outcome that is often used for stroke cases is Modified Rankin Scale, which can only be done clinically at months 3 , 6 , or 12 after the attack. Several attempts were made to predict functional outcome early. ICH Score was made to predict the outcome that can be done quickly and accurately which can be checked directly when patients came to the hospital . The role of inflammatory reactions in the pathophysiology of acute stroke hemorrhage began rising studied recently. Several clinical studies show a link between biomarkers of inflammatory reactions and the outcome of the acute brain hemorrhage, but the relationship between serum biomarkers and functional outcomes among patients who survive has not been evaluated yet. Functional outcome assessment should be done as early as possible, because it can provide informations for management strategies or further managements of the patient, and in particular these would be useful for the patient's families and physician to predict the prognosis of patients.

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* Corresponding author.

Aim of the study to know the ICH score as clinical indicator and the count of leucocytes as an indicator of immunologic response in predicting 30-days functional outcome in patients with acute haemorrhagic stroke. The results of this study indicate the higher ICH score will worsen 30-days functional outcome. Normal early leukocytes count can be used to predict a good functional outcome in patients with acute hemorrhagic strokes.

Keywords: ICH score; leukocyte; functional outcome; spontaneous intracerebral haemorrhage.

1. Introduction

It is widely known that acute hemorrhagic strokes are often fatal, so the rejection of medical treatment often occurs in the early stages of hospital handling. The situation can eliminate the "fighting chance" of the patient whose prognosis is not as bad as originally thought. Accurate patient outcome predictions are necessary for both patient and physician families to make further decisions [1]. Therefore a method is needed to predict the functional outcome of acute hemorrhagic strokes patients, as this will be of great benefit to both treating physicians and the patient's family. A commonly used outcome functional assessment for a stroke case is to use Modified Rankin Scale (mRS) [2], can be classified as a good outcome when slightly dependent / needs other people's help on the move (MRS score < 3), on the contrary if it has a disability (moderate-weight) so that the need for help of others in carrying out simple activities (MRS score ≥3) is categorized as bad outcome [3,4]. ICH Score (Intra-Cerebral Hemorrhage) is designed to predict outcomes that can be performed quickly and accurately that can be examined immediately at the time of the patient. ICH scores assessed several criteria: the GCS score (Glasgow Coma Scale), the volume of bleeding, the presence of intraventricular hemorrhage, the presence of infratentorial bleeding and the age of the patient [5].

The role of inflammatory reactions in the pathophysiology of acute hemorrhage strokes has recently begun to increase studied [6]. Several clinical studies have shown a link between inflammatory and outcome reactions (biomarkers) of brain hemorrhage, but the relationship between serum biomarkers and functional outcomes among survivors has not been widely evaluated yet [6,7,8]. Activation of inflammatory responses can be measured by observing changes in serum white blood cell counts in patients. White blood cells are a marker responsible for the immune system and show the activation of inflammatory cascades after the occurrence of acute hemorrhagic [6,9].

2. Material and Methods

The data were collected from hemorrhagic stroke patients who admitted at Siloam Hospital Jambi from January to November 2017 which fulfilled inclusion and exclusion criteria. Epidemiologic data such as gender, age, risk factors, medical treatment, ICH Score, Leucocytes count and also Modified Functional Outcome Scale were obtained by researcher..

ICH scores were calculated based on the patient's initial condition on admission after general stabilization and head CT-scan.

Component	ICH Score Points
GCS score	
3–4	2
5–12	1
13–15	0
ICH volume, cm³	
≥30	1
<30	0
IVH	
Yes	1
No	0
Infratentorial origin of ICH	
Yes	1
No	0
Age, y	
≥80	1
<80	0
Total ICH Score	0–6

Figure 1: ICH Score [5]

Blood tests for Leucocytes count was performed as soon as after the patient stabilization process. The 30-days functional outcome assessment is performed in the ward or in the outpatient clinic.

3. Results

3.1 Gender

Table 1: Gender

Sex	Number	%
Male	8	61.5
Female	5	38.5
Total	13	100

3.2 Age range

Table 2: Age range

Age range (yo)	Number	%
30-39	1	7.69
40-49	8	61.55
50-59	1	7.69
60-69	1	7.69
70-79	2	15.38

3.3 Risk Factor

Table 3: Risk factor

Risk Factor	Number	%
Hypertension	9	69.23
Diabetes	2	15.38
Dyslipidemia	1	7.69
Not Known	4	30.77

3.4 Medical treatment

Table 4: Medical Treatment

Medical Treatment	Number	%	Dead	%	Survival	%
Conservative/no-surgery	7	53.85	4	57.14	3	42.86
Surgery	6	46.15	3	50	3	50

3.5 Outcome and ICH Skor

Table 5: Outcome and ICH Score

ICH Skor	Number	%	Survival	%	Dead	%
0	2	15.38	2	100	0	0
1	2	15.38	2	100	0	0
2	5	38.46	2	40	3	60
3	4	30.77	1	25	3	75
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0

3.6 Outcome and Early Leucocytes count

Table 6: Outcome and Early Leucocytes count

Leucocytes count	Number	%	Survival	%	Dead	%
Normal	4	30.77	3	75	1	25
Meningkat	9	69.23	4	44.44	5	55.56

3.7 Functional Outcome Modified Rankin Scale (mRS) and ICH Skor

Table 8: mRS and ICH Score

mRS	Skor 0	%	Skor 1	%	Skor 2	%	Skor 3	%
Good (<3)	2	100	2	100	1	50	0	0
Poor(>=3)	0	0	0	0	1	50	1	100

3.8 Functional Outcome Modified Rankin Scale (mRS) and Early Leucocytes Count

Table 9: mRS and and early leucocytes count

mRS	Normal	%	Increase	%
Good (<3)	3	100	2	50
Poor (>=3)	0	0	2	50

4. Discussion

The subjects distribution based on sex was 8 male (61.5%) and 5 female (38.5%). This is consistent with previous studies suggesting that the stroke incidence is higher in male. The dominant age was range from 40 to 49 years old in 8 patients (61.55%). Hypertension is still a major risk factor in which this study was obtained in 9 patients (69.23%). From table 4 it can be seen that 6 patients (46.5%) performed surgery and 7 patients were not performed surgery.

Of the seven non-surgical patients, 4 patients died (57.4%) and 3 patients survived (42.86%). Whereas in 6 operated patients, 3 patients died (50%), the same as survivors. In accordance with the literature that ICH score can be used to predict outcomes, on table 5 seen that 2 patients (15.38%) ICH score 0 and 2 patients (15.38%) ICH score 1, no one died. Five patients (38.46%) with ICH score 2 found 3 patients who died (60%) and 2 patients alive (40%). While 4 patients (30.77%) with ICH score 3 found 3 patients (75%) died and 1 patient (25%) were alive.

Thus the descriptive look results that the higher ICH score will tend to have poor outcome. Table 6 shows that in patients with acute hemorrhagic stroke observed there were 9 patients (69.23%) with increased leukocytes, while the remaining 4 patients (30.77%) were normal. Of the four patients with normal leukocytes, 3 patients (75%) were alive and 1 patient (25%) died. Of the nine patients with leukocyte increased, it was seen that 4 patients (44.44%) live and 5 patients (55.26%) died.

It can be concluded that there is a trend of increased leukocytes in patients with acute hemorrhagic strokes. The

more survivors in normal leukocytes (3 patients;75%) than in the increased leukocyte group (4 patients;44.44%), whereas only 1 patient (25%) who died with normal leukocytes were fewer than those with increased leukocytes, those were 5 patients (55.56%). Table 8 shows that 2 patients (100%) with ICH score 0 and 2 patients (100%) with ICH score 1 had good functional outcome. In ICH scores 2 shows that 1 patient (50%) had good functional outcome and 1 patient (50%) was poor. Whereas only one patient (100%) survive with ICH score 3 who had a poor 30-day functional outcome.

This showed not only the higher ICH score will be bad outcomes, but survivors also have poor functional outcomes in the first month. It can be seen from Table 9 that in the normal group of early leucocytes count, 100% of patients had good functional outcomes, while in the increasing leucocytes group, it appeared that only 50% of the patients whose functional outcomes were good. The limitations in this study was a few number of samples that taken from the hospital.

5. Conclusion

The results of this study indicate the higher ICH score will worsen 30-days functional outcome. Normal early leukocytes count can be used to predict a good functional outcome in patients with acute hemorrhagic strokes.

6. Recommendations

Further research is needed with larger samples and more stringent inclusion and exclusion criteria.

7. Conficts of Interest Disclosure

The authors report no conflict of interest. The authors have no personal, financial, or institutional interest in any of the drugs, materials or devices used in the article.

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