Role of CHA2DS2-VASc-HS Score as Predictor for Failed Reperfusion After Fibrinolytic in St-Elevation Myocardial Infarction

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Abstract : Background: Recent studies showed that CHA2DS2-VASc-HS score can effectively predict longterm outcome, hospitalization and severity in CAD. However, the role of this score in predicting failed reperfusion after fibrinolytic in STEMI patients has not been studied extensively. The main objective of this study was to determine whether CHA2DS2-VASc-HS score can predict failed reperfusion after fibrinolytic in STEMI patients.

Methods: A total of 62 patients with STEMI who undergo fibrinolytic at Haji Adam Malik Hospital since October 2017 until November 2018 were recruited in this cross sectional study. We also performed complete blood count and chest x-ray. CHA2DS2-VASc-HS score was counted before the fibrinolytic started. After the fibrinolytic was done, we assessed the successfullness with the decrease of chest pain, resolution of ST segments > 50% and aritmia reperfusion criterias.

Results: The cut-off value of CHA2DS2-VASc-HS score was 4 (AUC 0.928, 95% CI 0.861-0.995, p<0.05). The CHA2DS2-VASc-HS score ≥ 4 group had higher incidence of failed reperfusion. CHA2DS2-VASc-HS score ≥ 4 is considered to predict the incidence of failed reperfusion with a sensitivity of 91.7%, a specificity of 69.2%, NPV of 85.7% and PPV of 80.4%. Multivariate analysis also showed that CHA2DS2-VASc-HS score ≥ 4 was an independent factor that could predict the occurrence of failed reperfusion (OR 23.769, p<0.001).

Conclusion: CHA2DS2-VASc-HS score is a simple, very useful and easy-to remember bedside score and an inexpensive indicator which can be used as a prognostic marker for failed reperfusion after fibrinolytic in STEMI.

Keyword : CHA2DS2-VASc-HS, fibrinolytic, STEMI.

Introduction

Acute ST Segment Elevation Myocardial Infarction (STEMI) is a part of acute coronary syndrome that occurs due to a total blockage of coronary arteries by thrombus formed or released as the body's response to...
arteriosclerotic plaque rupture. STEMI patients require revascularization to restore blood flow and myocardial reperfusion, which can be done by pharmacological therapy (fibrinolytic agent) or mechanically, namely Percutaneous Coronary Intervention (PCI) primary. Fibrinolytic is an important reperfusion strategy, especially in places that cannot perform PCI. Fibrinolytic therapy is recommended given within 12 hours of symptom onset in patients without a counter indication if the primary PCI cannot be performed by a team experienced in 120 minutes since the first medical contact. Criterias for successful fibrinolytic can be assessed by reduce chest pain, decrease elevation ST segment more than 50% and find arrhythmias reperfusion such as accelerated idioventricular rhythms.

The CHA$_2$DS$_2$-VASc score is a score developed for emboli risk stratification in atrial fibrillation patients. The components of the CHA$_2$DS$_2$-VASc score for each letter are the beginning of a certain word, Congestive heart failure, Hypertension, Age ≥75 years, Diabetes mellitus, Stroke history, Vascular disease, Age between 65 to 74 years , and Sex category (female). Some recent studies have developed the use of the CHA$_2$DS$_2$-VASc score in the non-AF population. The study by Kim found that a high CHA$_2$DS$_2$-VASc score could provide worse cardiovascular outcomes in patients with acute myocardial infarction. The study conducted by Cetin found the CHA$_2$DS$_2$-VASc-HS score with additional "H" (Hyperlipidemia) and "S" (Smoker) components as well as the Sex category component that prioritized male gender as predictors of CAD severity. Some components of this scores, namely hypertension, age, diabetes mellitus, male gender, hyperlipidemia and smoking are traditional risk factors for CAD, very important and a prognostic factor in cardiovascular outcome. Clinicians need simple, reliable, easy to use and quantitative tools to identify patient risks and and recommend prevention strategies. Furthermore, most CAD patients have at least one risk factor, and if they have more than one risk factor it will increase the risk of CAD and will give a worse outcome.

Seeing the role of the CHA$_2$DS$_2$-VASc-HS score in CAD, the aim of this study is to assess the role of the CHA$_2$DS$_2$-VASc-HS score in predicting failed reperfusion after fibrinolytic in patients with STEMI.

Method

Population and Study Design

This study is a cross-sectional study conducted at Haji Adam Malik General Hospital in Medan, Indonesia, with permission from the Research Ethics Committee of the Medicine Faculty of University of North Sumatra. The study subjects were patients with acute STEMI admitted to the emergency department (ED) from October 2017 until November 2018. Diagnosis of STEMI based on the diagnostic criterias of ESC. The inclusion criterias were patients with a diagnosis of STEMI with onset of less than 12 hours and received fibrinolytic therapy with tissue plasminogen activator (t-PA;alteplase). ECG records that cannot be read perfectly and patients with contraindications of fibrinolytic therapy were excluded from this study. Leads ECG examination was performed at the beginning of admission in emergency unit and 90 minutes from the start of fibrinolytic therapy with a recording speed of 25 mm/s and a scale of 10 mm/mv. In this study, 62 peoples have met the inclusion and exclusion criterias and provided with written informed consent and recruited as subjects.

Study Procedure

Baseline clinical and demographic characteristics including age, sex category, previous history of illness such as diabetes mellitus, hypertension, heart failure, stroke, vascular disease and hyperlipidemia, smoking history, family history of CHD, family history of drug use and also vital sign were completely recorded. The initial important data evaluated were 12 lead ECG at the time of admission in the emergency room of Adam Malik General Hospital and 90 minutes from the start of fibrinolytic therapy. The patient also undergo blood test and chest x-ray. The CHA$_2$DS$_2$-VASc-HS score was calculated before the fibrinolytic therapy started. Then based on fibrinolytic results, subjects were divided into two groups, the first group who experienced fibrinolytic failure and the second group who experienced fibrinolytic successful.

Statistic Analysis

All statistical analyses were carried out using the SPSS statistical software. Categoric variables are presented by number or frequency (n) and percentage (%). Numeric variables are presented with mean values
with standard deviations for normally distributed data. The normality test of numeric variables in all study subjects using the Kolmogorov-Smirnov test (n>50). In numeric variables compared with two free samples T test (Two Samples Independent Student's t-test) on normal distributed data or Mann Whitney U Test test if the data is not normally distributed. In categorical variables, an analytical test is performed using chi squared or fisher tests. For variables that were found to be significant in the bivariate analysis test, were included in the multivariate test. Variables found to have significance values with p <0.05 in multivariate analysis are displayed in the form of Odds Ratio (RO) with 95% confidence intervals.

Results

Baseline Characteristics

The study subjects were divided into two groups, which were the group that experienced fibrinolytic failure (36 people, 58.1%) and the group that experienced fibrinolytic successful (26 people, 41.9%). Of the 36 people who experienced failure consisted of 33 men (91.7%) and 3 women (8.3%). The average age was 52 years old in successful group and 54 years in the failure group, but did not reach statistical significance (p> 0.05). The average systolic blood pressure at admission in the two groups was not much different and the average heart rate at admission was slightly higher in the failed fibrinolytic group which was 79 times/minute and 70 times/minutes in the successful fibrinolytic.

From the laboratory examination, it was found that there were statistically significant differences between the failed fibrinolytic group and the successful fibrinolytic group in the number of leukocytes, blood glucose and fasting blood glucose. Likewise in the risk factors of coronary heart disease, there was a statistically significant difference in hypertension and diabetes mellitus in both groups. In addition, other risk factors such as smoking, hyperlipidemia and a family history of CAD are more common in the failed fibrinolytic group.

The results of this study also showed that there were statistically significant differences between the failed fibrinolytic group and the successful fibrinolytic group in terms of the location of the infarction, the presence of pathological Q waves on the ECG, chest X-ray and congestive heart failure. In the failed group, 27 people (75.0%) were found to have an anterior infarction location, the results of cardiomegaly chest X-ray were 28 people (77.8%), more pathological Q waves in 24 people (66.7%) and heart failure in 19 people (52.8%) compared to the group that experienced successful fibrinolytic with all values of p <0.05. The basic characteristics of the subjects can be seen in table 1.

Table 1. Baseline Characteristics of The Subjects Study

|                  | Reperfusion   |               |               |   |
|------------------|---------------|---------------|---------------|---|
|                  | Failed n = 36 | Successful n = 26 | p   |   |
| Age (years)      | 54.5±8.84     | 52.0±8.98     | 0.28         |   |
| Sex category     |               |               | 0.439        |   |
| - Male           | 33 (91.7%)    | 22 (84.6%)    | 0.028*       |   |
| - Female         | 3 (8.3%)      | 4 (15.4%)     | 0.023*       |   |
| Systolic blood pressure | 129.17 ± 23.345 | 121.92 ± 17.893 | 0.190 |   |
| Heart rate       | 79.39 ± 14.58 | 70.88 ± 14.68 | 0.003*       |   |
| Body mass index  |               |               | <0.001*      |   |
| - Normoweight    | 15 (41.7%)    | 20 (76.9%)    | 0.2          |   |
| - Overweight     | 12 (33.3%)    | 4 (15.4%)     | 0.2          |   |
| - Obesitas       | 9 (25%)       | 2 (7.7%)      | 0.2          |   |
| Hypertension     | 22 (61.1%)    | 4 (15.4%)     | 0.003*       |   |
| Diabetes Mellitus| 25 (69.4%)    | 8 (30.8%)     | 0.2          |   |
| Smoker           | 31 (86.1%)    | 19 (73.1%)    | 0.2          |   |
| Hyperlipidemia   | 36 (100%)     | 24 (92.3%)    | 0.172        |   |
| Family history   | 9 (25.0%)     | 2 (7.7%)      | 0.101        |   |
Leucocyte & 15521.39 ± 3015.10 & 13793.08 ± 3280.72 & 0.036* \\ 
Ureum & 35.69 ± 42.57 & 26.38 ± 11.19 & 0.28 \\ 
Creatinine & 1.23 ± 1.17 & 1.04 ± 0.44 & 0.433 \\ 
Blood glucose & 223.0 ± 113.14 & 163.35 ± 88.42 & 0.023* \\ 
Fasting blood glucose & 150.64 ± 66.15 & 111.81 ± 40.85 & 0.01* \\ 
Post prandial blood glucose & 164.03 ± 65.76 & 139.0 ± 60.42 & 0.127 \\ 
Total cholesterol & 200.56 ± 37.45 & 202.35 ± 39.11 & 0.856 \\ 
LDL & 134.31 ± 35.10 & 148.73 ± 43.80 & 0.155 \\ 
HDL & 38.03 ± 9.23 & 39.81 ± 9.34 & 0.459 \\ 
Triglycerida & 156.56 ± 47.82 & 182.19 ± 119.79 & 0.249 \\ 
Ckmb & 175.83 ± 189.72 & 110.08 ± 118.42 & 0.124 \\ 
Troponin & 8.14 ± 10.95 & 5.18 ± 10.17 & 0.238 \\ 
Onset & 5.47 ± 2.52 & 4.42 ± 2.63 & 0.118 \\ 
TIMI Risk & 3.72 ± 1.32 & 3.08 ± 1.38 & 0.068 \\ 
KILLIP & 0.387 & \\ 
- I & 33 (91.7%) & 22 (84.6%) & \\ 
- II & 2 (5.6%) & 4 (15.4%) & \\ 
- III & 0 (0%) & 0 (0%) & \\ 
- IV & 1 (2.8%) & 0 (0%) & \\ 
Infark location & 0.02* & \\ 
- Anterior & 27 (75.0%) & 12 (46.2%) & \\ 
- Non anterior & 9 (25.0%) & 14 (53.8%) & \\ 
ECG & 0.101 & \\ 
- Sinus bradycardia & 3 (8.3%) & 4 (15.4%) & \\ 
- Sinus rhytm & 27 (75.0%) & 18 (69.2%) & \\ 
- Sinus tachycardia & 6 (16.7%) & 1 (3.8%) & \\ 
- AV block & 0 (0%) & 2 (7.7%) & \\ 
- Atrial fibrillation & 0 (0%) & 1 (3.8%) & \\ 
Pathological Q wave & 24 (66.7%) & 6 (23.1%) & 0.001* \\ 
Chest X-ray & 0.01* & \\ 
- Cardiomegaly & 28 (77.8%) & 12 (46.2%) & \\ 
- Non cardiomegaly & 8 (22.2%) & 14 (53.8%) & \\ 
CHF & 19 (52.8%) & 4 (15.4%) & 0.003* \\ 
Stroke & - & - & \\ 
Vascular disease & 3 (8.3%) & 0 (0.0%) & 0.258 \\ 

| Table 2. Bivariate of CHA$_2$DS$_2$VASC-HS score in reperfusion failure |
|---------------------------------|----------------|----------------|----------------|
| **CHA$_2$DS$_2$VASC-HS score** | **Failed Reperfusion** | **Successful Reperfusion** | **p value** |
| 4.81 ± 0.82 | 3.08 ± 0.74 | < 0.001 |

**CHA$_2$DS$_2$VASC-HS Score as Predictor of Failed Reperfusion After Fibrinolytic**

The mean CHA$_2$DS$_2$VASC-HS score in the failed group was 4.81 ± 0.82 and in the group that experienced successful fibrinolytic was 3.08 ± 0.74. The CHA$_2$DS$_2$VASC-HS score in the two groups was found to be significantly different with p < 0.001. The relationship of CHA$_2$DS$_2$VASC-HS score in reperfusion failure after fibrinolytic can be seen in table 2.
Cutoff of CHA<sub>2</sub>DS<sub>2</sub>VASc-HS Score in Reperfusion Failure after Fibrinolytic

Using the ROC curve, Area Under the Curve (AUC) can be assessed from the CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score parameter, which will show the ability of the CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score as a predictor of failed reperfusion after fibrinolytic in STEMI. In this study, we found AUC 0.928 with p value <0.05. This showed that CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score were clinically significant as predictors of failed reperfusion after fibrinolityc in STEMI. The cutoff values were found ≥ 4 which were considered can predict failed reperfusion with a sensitivity of 91.7% and specificity of 69.2% (Figure 1) (Table 3).

![Figure 1. ROC curve of CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score](image)

| Cutoff | Sens | Spes | AUC  | p value | 95% CI       |
|--------|------|------|------|---------|--------------|
| ≥ 4    | 91.7%| 69.2%| 0.928| 0.05    | 0.861-0.995  |

In these 62 subjects, we found 41 people had CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score ≥ 4 and 21 people had a CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score < 4. The subjects in the group with CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score ≥ 4 had a higher rate of reperfusion failure which was 33 people (80.5%) compared to 8 people (8.3%) who experienced successful fibrinolytic. Whereas there were 18 people (85.7%) in the group with CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score < 4 experienced successful fibrinolytic compared to 3 people (14.3%) who experienced failed fibrinolytic. CHA<sub>2</sub>DS<sub>2</sub>VASc-HS score ≥ 4 can predict failed reperfusion after fibrinolytic in STEMI patients with a sensitivity of 91.7%, specificity of 69.2%, negative predictive value (NPV) of 85.7% and positive predictive value (PPV) of 80.4%.

After adjusting admission variables by univariate analysis, we performed multivariate analysis in this study. It was useful to find out which independent variables could be the most dominant and affect the occurrence of reperfusion failure. It showed that there were 2 independent factors that could predict reperfusion failure after fibrinolytic, which were pathological Q wave [OR 6.28 (1.45-27.027), p = 0.014] and CHA2DS2VASc-HS ≥ 4 score [OR 23. 759 (4,904-115.19), p = <0.001] (Table 4).

Table 4. Multivariate analysis of independent factors as predictor of failed reperfusion

| Parameter                     | P value | OR  | Lower | Upper  |
|-------------------------------|---------|-----|-------|--------|
| Pathological Q wave           | 0.014   | 6.28| 1.45  | 27.027 |
| CHA<sub>2</sub>DS<sub>2</sub>VASc-HS ≥ 4 | <0.001  | 23.769| 4.904 | 115.19 |
Relationship between the Criteria for Reperfusion and Fibrinolytic

In this study, we used 3 criteria to determine the success of fibrinolytic treatment, with a reduction in chest pain, ST segment resolution, and the presence of arrhythmia reperfusion. Fibrinolytic success was determined if any of these criteria were met. In the 36 people who experienced fibrinolytic failure, 1 person (2.8%) had ST segment resolution, 35 persons (97.2%) did not experience ST segment resolution, and 18 persons (69.2%) did not experience arrhythmia reperfusion. Furthermore, many studies showed that older age, family history, diabetes mellitus, hyperlipidemia, smoking, and male sex were risk factors for more than 75% of patients using streptokinase with a sensitivity value of 53% and specificity 94%.11,12 Kocas et al (2015) also found that admission hyperglycemia was an independent predictive factor for failed reperfusion, along with time from symptom onset to fibrinolytic and anterior wall myocardial infarction.13

Then we wanted to know the correlation between the reperfusion criteria and fibrinolytic. The criteria for chest pain reduction, ST segment resolution, and arrhythmia reperfusion could not be analyzed because all the samples had a reduction in pain so we could not compare the two groups. In Table 5 showed correlation between the criteria for reperfusion and fibrinolytic. There was a positive correlation of ST segment resolution more than 50% and fibrinolytic with a correlation coefficient (r) 1.00 and p value < 0.001. Furthermore, there was also a significant positive correlation between arrhythmia reperfusion and fibrinolytic with weak correlation strength (r = 0.392) and p value 0.003.

We also wanted to analyze the correlation of the success or failure of the fibrinolytic with the TIMI flow value from the coronary angiography result. There was a significant correlation between TIMI flow and fibrinolytic with strong correlation strength (r = -0.875), significant (p = <0.001) and inverse. It showed that the TIMI flow was higher in the successful fibrinolytic group.

Table 5. Correlation of Reperfusion Criteria and Fibrinolytic

| Reperfusion Criteria                  | Correlation Coefficient | P value |
|--------------------------------------|-------------------------|---------|
| ST segment resolution > 50%          | 1.00                    | < 0.001 |
| Arrhythmia reperfusion               | 0.392                   | 0.003   |
| TIMI flow                            | -0.875                  | < 0.001 |

Discussion

Immediate reperfusion therapy with primary PCI or pharmacology with fibrinolytic agents is indicated for all patients with symptoms occurring within 12 hours with new permanent ST segment elevation or LBBB. If there is no local hospital that has PCI facility, the fibrinolytic therapy is directly selected. After fibrinolytics are given and if possible, the patient can be sent to the hospital with PCI facility.12

The basic characteristics of the subjects in this study between the two groups showed no significant differences for the sex category and age of the patients, but significant differences were found in the heart rate. And in the group that experienced failed reperfusion were found to have more risk factors for hypertension, diabetes mellitus, hyperlipidemia, smoking and family history of CAD than those who experienced successful fibrinolytic. As it is known that the risk factors for CAD are hypertension, smoking, hyperlipidemia, diabetes mellitus and older age. Furthermore, many studies showed that older age, hyperlipidemia, hypertension, diabetes, smoking and male sex category will increase cardiovascular risk and can produce worse outcome.12,13,14

Laboratory parameters showed significant differences in blood glucose and fasting blood glucose values, and the location of the anterior infarction was found to experience failed reperfusion as much as 75%. In addition, the longer onset of STEMI were found in the group that experienced failed reperfusion which was 5.47 ± 2.52 hours. Mahendra et al (2016) found that the onset of ≥ 6 hours, hyperglycemia on admission and the location of anterior wall myocardial infarction could be used as predictors of failed fibrinolytic in STEMI patients using streptokinase with a sensitivity value of 53% and specificity 94%.15 Kocas et al (2015) also found that admission hyperglycemia was an independent predictive factor for failed reperfusion, along with time from symptom onset to fibrinolytic and anterior wall myocardial infarction.16
The mean CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score in the group that experienced failed reperfusion was found to be higher at 4.81 ± 0.82 compared to the successful group of 3.08 ± 0.74, this difference was statistically significant with p <0.001. This shows that the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score can be used as a predictor of failed reperfusion after fibrinolytic. Many studies have used the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score on coronary heart disease, as the study by Cetin et al (2014) found that the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score > 2 was a predictor of coronary heart disease severity.\textsuperscript{9} The same study was developed by Tasolar et al (2016) also mentioned that the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score > 5 could be a predictor of severity and complexity of coronary artery disease and predictors of major cardiovascular events in NSTEMI patients.\textsuperscript{17} Both of these studies were important and significant because the components in the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score which were hypertension, older age, diabetes mellitus, male gender, hyperlipidemia and smoking are very important traditional risk factors for coronary heart disease and are prognostic factors in cardiovascular outcome. Other study also showed that patients with stroke which was one of CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS components, have a pre clinic of CAD condition and a relationship between coronary and cerebral atherosclerosis.\textsuperscript{18} Korkmaz et al (2012) also demonstrated that there was strong relationship between peripheral artery disease (PAD) which also known in CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS components with CAD.\textsuperscript{19} A high CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score is estimated to be able to describe increased thrombogenicity and the number of thrombus in STEMI patients and can produce worse outcome.\textsuperscript{20,21}

CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score ≥ 4 is considered to be the optimal value in predicting reperfusion failure based on the ROC curve with a sensitivity of 91.7% and specificity of 69.2%. The study subjects in the group with CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score ≥ 4 had a higher rate of reperfusion failure compared to the group with CHA2DS2-VASc-HS < 4 which was 33 people (91.7%) compared to 3 people (8.3%). This is in line with study conducted by Killic et al. (2018) who obtained CHA\textsubscript{2}-DS\textsubscript{2}-VASc score ≥ 2 and CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score ≥3 as predictors of failed reperfusion after fibrinolytic with lower sensitivity and specificity compared to this study of 76.1% and 67.6% (AUC 0.764, p <0.001, 95% CI 0.725-0.799. The cutoff value of the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score that is different from the previous study can be caused by the different population and race of the subjects in the study.

Furthermore, after adjusting for other factors affecting failed reperfusion after fibrinolytic, it was obviously found that the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score ≥ 4 remained the dominant factor affecting failed reperfusion after fibrinolytic with OR 23.759 (4.904-115.19), p = <0.001. So it can be concluded that the CHA\textsubscript{2}-DS\textsubscript{2}-VASc-HS score can be used as a predictor of failed reperfusion after fibrinolytic in STEMI patients.

In this study a strong positive correlation was found between ST segment resolution > 50% and fibrinolytic with correlation coefficient r = 1.00 (p = <0.001). Most studies used ST segment resolution criteria > 50% as a determinant of fibrinolytic successful. Many studies using intracoronary thrombolysis showed a decrease in ST segment elevation after successful myocardial reperfusion with a sensitivity of 73-88% and a specificity of 63-80%. The result of this study was consistent with data from the Gruppo Italiano per Studio della Soprawivenza nell’Infarto Miocardico (GISSI-2) trial, which showed patients with a > 50% reduction in ST segment elevation 4 hours after given thrombolytic had a better outcome.\textsuperscript{22} Furthermore, there was also a positive but weak correlation between reperfusion arrhythmias and fibrinolytic action with a correlation coefficient r = 0.392 (p = 0.003). Arrhythmias is a specific marker of myocardial reperfusion in many experimental studies where arrhythmias that often appear are idioventricular rhythm or slow ventricular tachycardia. Reperfusion arrhythmias appears more frequently in patients who experience successful than those who failed in fibrinolytic.\textsuperscript{22} This is consistent with this study where reperfusion arrhythmias were found more in the successful group as many as 8 people (30.8%) compared to 1 person (2.8%) in the failed group.

Limitations

The sample in this study was STEMI patients who undergo fibrinolytic therapy, where nowadays the prevalence rate was lower with the development of hospital facility in conducting the primary PCI so that there were difficulties in collecting the minimum number of samples. In addition, the number of samples in this study is smaller than the previous studies and only carried out in one place so that further study is needed with a larger sample size and collaboration with several referral hospitals that have intensive cardiovascular inpatient facility in order to provide more representative results.
Conclusion

CHA2DS2-VASc-HS score is a simple, very useful and easy-to remember bedside score and an inexpensive indicator which may be used as a prognostic marker for failed reperfusion after fibrinolytic in patients with STEMI, where the cutoff value obtained from this study was ≥ 4.

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