

Case Report

Cardioembolic stroke in patients with atrial fibrillation

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ABSTRACT

Stroke is a neurological emergency in the form of disturbances in brain function that occur suddenly, it can be focal or global, which lasts for 24 hours or more and even causes death, with no other obvious cause other than vascular disorders. Strokes are generally divided into two main categories: ischemic stroke and hemorrhagic stroke. Atrial fibrillation (AF) is a cardiac arrhythmia and is often associated with stroke, dementia, and death. In our case, an 81-year-old woman came to the ED complaining of sudden loss of consciousness with GCS E2V1M5. A non-contrast CT scan of the head revealed cerebral atrophy and senile cerebellum accompanied by suspicion of infarction in the left globus pallidus. The ECG results showed an irregular rhythm (irregular P-P) leading to AF. AF is a high-risk factor for stroke because of impaired blood pumping, so the risk of clots forming which can then escape and flow to the brain causes blockage of blood flow to the brain and stroke occurs. It is therefore important for routine treatment and control of high-risk patients with heart rhythm disorders such as AF to prevent embolic strokes.

Keywords: Cardioembolic stroke, AF, Stroke ischemic

INTRODUCTION

Stroke is an acute neurological emergency and is one of the leading causes of disability and death worldwide. Stroke is a disorder of brain function that occurs suddenly, is focal or global, which lasts for 24 hours or more and even causes death, with no other obvious cause other than vascular disorders.¹

Strokes are generally divided into two main categories: ischemic stroke and hemorrhagic stroke. Hemorrhagic stroke is caused by the rupture of a blood vessel or abnormal blood vessel structure, and ischemic stroke is caused by an interruption of blood flow to a part of the brain causing a sudden loss of function. The etiology of acute ischemic stroke is dominated by the development of macrovascular atherosclerosis and cardiac embolism.²

AF is the most common clinically relevant cardiac arrhythmia affecting 1% to 4% of the adult population and >13% of people 80 years of age. AF is frequently associated with stroke, dementia, and death, but the

mechanism behind this association in the absence of cardiac embolism is unclear. Possible mechanisms include systemic inflammation and cerebral hypoperfusion due to decreased cardiac output. In addition, AF is also a risk factor with stroke and dementia.³

AF is the most important cause of cardioembolic cerebral infarction. AF is the most common cardiac arrhythmia. The prevalence of AF increases with age, reaching a peak of 5% in people over 65 years of age, and its incidence and prevalence are increasing.⁴

In this case report, the patient was at risk for AF and had a stroke.

CASE REPORT

An 81-year-old woman presents to the ED complaining of sudden loss of consciousness. Headache and vomiting denied (-). Previous history of DM, HT and heart disease was denied. Blood pressure 184/84 mmHg, pulse 60

x/minute irregular, body temperature 36.7 C. Neurological examination found GCS E2V1M5, negative meningeal signs, motor strength: right lateralization impression, sensory within normal limits, physiological reflexes within normal limits, negative pathology reflexes. The ECG showed an irregular rhythm with suspicion of AF. The CT scan results revealed cerebral atrophy and senile cerebellum accompanied by suspicion of infarction in the left globus pallidus. The treatment given to this patient was oxygen 2 liters per minute, NGT insertion, 30 degrees head up, infusion of 0.9% NaCl 20 drops per minute, mannitol infusion 4x100 cc with tapering off every day, injection of piracetam 3x3 gm, injection of ranitidine 2x1 ampoules, amlodipine 1x10 mg, aspirin 1x80 mg, bisoprolol 1x2.5 mg (delay if pulse <60), HCT 1x25 mg, simvastatin 1x20 mg, vitamin B complex 2x1 tablet, tube feeding 6x200cc.

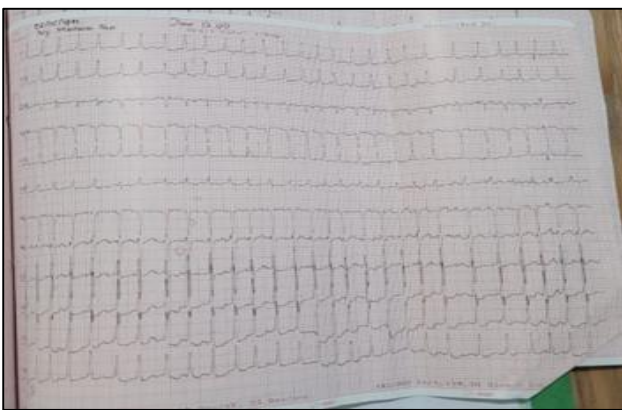


Figure 1: The patient's ECG results found irregular rhythms in the form of AF.

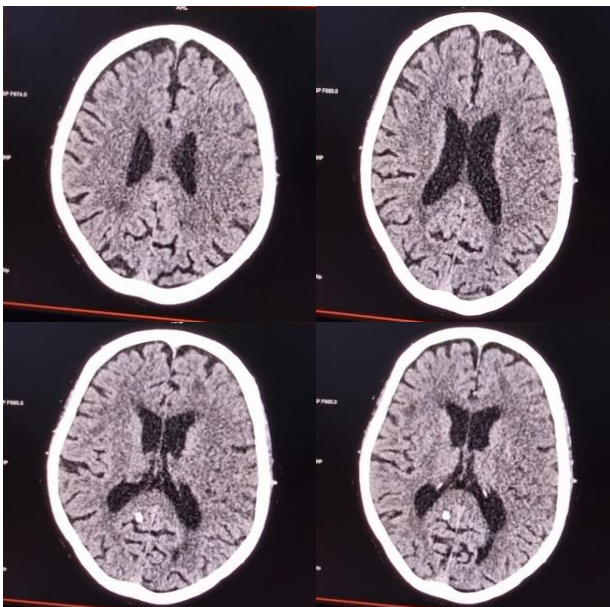


Figure 2: The results of a non-contrast head CT scan found cerebral atrophy and senile cerebellum accompanied by a suspicion of infarction in the left globus pallidus.

DISCUSSION

Twenty-six million people worldwide experience a stroke each year, making it the second leading cause of death and the leading cause of long-term disability. One-third of strokes represent intracerebral or subarachnoid hemorrhage, whereas two-thirds represent cerebral ischemia. Ischemic stroke can be caused by various causes, such as atherosclerosis of the cerebral circulation, occlusion of cerebral small vessels, and cardiac embolism.

Of these causes, cardioembolic stroke is important for several reasons. First, cardiac emboli cause more severe strokes than other ischemic stroke subtypes. Second, as treatment for hypertension and dyslipidemia improves, cardiac embolism has contributed to an increasing share of stroke in high-income countries, such as Canada. Despite a reduction in the overall incidence of stroke, cardioembolic stroke has tripled over the last few decades and may triple again by 2050 according to projections from the UK.⁵

Based on Riskesdas 2018 data, the prevalence of stroke in Indonesia is 10.9% with stroke attacks more in the age group >75 years (50.2%), 65-74 years (45.3%) and 55-64 years (32.4%). Based on gender, the prevalence of stroke was more in men (11%) than women (10.9%). East Nusa Tenggara itself ranks 12th with the prevalence of stroke based on the diagnosis of health workers in 2013 amounted to 66,695 and those diagnosed based on clinical symptoms amounted to 48,307 people.⁶

Data in 2017, non-hemorrhagic stroke was higher in men compared to women with a total of 7.74 million new cases globally. Of all stroke patients in Indonesia, ischemic stroke or non-hemorrhagic stroke (SNH) is the most common type, which is 52.9 followed by intracerebral hemorrhage, embolism and subarachnoid hemorrhage with incidence rates of 38.5%, 7% respectively and 1.4%.⁷ In this patient, an 81-year-old woman had a high risk of stroke by age, and ischemic stroke was the most common type of stroke.

Risk factors for cardioembolic stroke are AF, heart failure, myocardial infarction, patent forame ovale, aortic atheroma, endocarditis and artificial heart valves. AF is the most common risk factor in cardioembolic stroke patients. AF is associated with a 3-to 5-fold increased risk of stroke.⁸

Risk factors associated with the development of AF include obesity, smoking, hypertension, diabetes, and the presence of heart disease such as coronary heart disease, heart failure, rheumatic heart disease, and valvular heart disease. Hypertension and diabetes are the most common medical conditions associated with AF worldwide, hypertension is found in more than 70% and diabetes is found in more than 19% of patients with AF.⁹

The incidence of stroke associated with AF increased progressively with age, ranging from 6.7% in individuals aged 50 years to 59 years to 36.2% in those aged 80 to 89 years. This patient has several risk factors that can trigger an ischemic stroke that is currently experienced, including age 81 years, obesity, history of previous stroke and also heart rhythm disorders (AF).¹⁰

The mechanism of thrombus formation in AF patients is not fully understood, blood stasis in the left atrium is thought to have an important role. Beyond stasis, pathophysiological changes in the atrial wall and endothelium are thought to promote activation of coagulation while inhibiting protective antithrombotic mechanisms such as nitric oxide.¹¹

The most widely used risk score to estimate the incidence of ischemic stroke in AF is the CHA2DS2-VASc score, which is recommended by national and international guidelines.¹² The CHA2DS2-VASc score is a strong independent predictor of risk of death and disability, demonstrating the usefulness of this score for prediction of stroke risk in AF and assessment of outcome after stroke due to AF.¹³

In addition, the CHA2DS2-VASc score is important in determining which patients with AF may benefit from oral anticoagulants (OACs) and the possibility of aspirin therapy to reduce stroke risk. Some examples of OACs that can be used for stroke prevention in AF: warfarin (with an international normalized ratio (INR) goal of 2-3 and percent time in therapy INR (TTR) remaining 70%), dabigatran, rivaroxaban, apixaban.¹⁴

Table 1: CHA2DS2-VASc scoring.

Risk factors	Points
Congestive heart failure	+1
Hypertension	+1
Age (≥75 years)	+2
Diabetes mellitus	+1
Previous stroke, TIA or thromboembolism	+2
Vascular disease (Prior MI, PAD or aortic plaque)	+1
Age 65-74 years	+1
Female gender	+1

In addition to the CHA2DS2-VASc score, there is also a scoring system used in AF patients, namely HAS-BLED. The HAS-BLED score is a scoring system that aims to determine whether the patient has a low or high risk for bleeding.

Classically, cardioembolic strokes present with sudden onset of maximal neurologic deficit at onset, whereas strokes caused by small vessel occlusion (also known as lacunar stroke) or large artery atherosclerosis may have a slower course. Cardiac embolism often occurs in the distal arteries supplying the cerebral cortex while small

vessel occlusion affects the subcortical tissue, so that cardioembolic strokes can be distinguished from lacunar strokes by cortical signs, such as aphasia or visual field deficits. However, clinical characteristics alone are not reliable. classify the underlying causes of ischemic stroke. Thus, accurate classification also requires the integration of neuroimaging, cardiac, and vascular evaluations.¹⁵

Table 2: HAS-BLED scoring.

Risk factor	Score
Hypertension	1
Abnormal renal/liver function	1 or 2
Stroke	1
Bleeding tendency	1
Labile INR	1
Age (>65 years)	1
Drugs (E.g., concomitant aspirin, NSAIDs, etc.) or alcohol	1 or 2
Maximum score	9

Note: A score of 0-2 indicates low risk of bleeding; a score of ≥3 indicates high-risk of bleeding. Hypertension is defined as a systolic blood pressure >106 mm Hg. One point is awarded for each of abnormal renal or liver function, and drugs or alcohol.

Patients with ischemic stroke should have a vascular evaluation to rule out large arterial plaque and a cardiac evaluation to identify patients who have heart conditions at high risk for stroke. To determine the cause of stroke, it is necessary to perform extracranial (cervical) carotid artery vascular imaging to exclude carotid stenosis and a 12-lead ECG to exclude AF or MI. In cardioembolic stroke, CT scan or MRI results show a pattern of cerebral infarction coupled with the presence of a high-risk heart condition and the absence of a clear cause of stroke. Ideally the patient should have a CT Scan Angiography or MRA to find where the blockage is. Generally, in cardioembolic stroke, the blockage is found in a large blood vessel (cortical/cerebral). In the acute phase, vascular scans usually show sudden rupture or narrowing of the vessels without significant atherosclerotic narrowing of the upstream vessels.

Treatment of ischemic stroke in general has the goal of ensuring patient stability and preventing/limiting neuronal death. General management with 5B guidelines (Breathing, blood, brain, bladder, bowel) must be implemented properly. In addition to 5B, patients with ischemic stroke can also be given pharmacological management which includes fibrinolytic which can be given within 3-4,5 hours, anticoagulant, antiplatelet, antihypertensive and neuroprotective drugs.

Management of AF aims to reduce the risk of thromboembolic stroke by using anticoagulants or antiplatelet agents. With the help of the CHA2DS2-VASc score can help categorize the patient's condition because this score includes congestive heart failure, hypertension,

age, diabetes and previous strokes.¹⁶ Patients with nonvalvular AF and a CHA2DS2-VASc score of 0, may be considered against antithrombotic therapy. For CHA2DS2-VASc scores >1 in males and >2 in females, it is recommended to give OAC if the score is not more than 3. For CHA2DS2-VASc scores >2 in males and >3 in females, OAC is recommended (Class He), it is also recommended to give NOAC (non-vitamin K antagonist oral anticoagulant) or VKA (Vitamin K antagonist).¹⁷

In this patient, the result of measuring the CHA2DS2-VASc score was 7. This patient was in the category of high risk of thromboembolism. And on the HAS-BLED score, the result is 4. This patient is in the high-risk category for bleeding. Ideally the patient is given OAC with NOAC/ VKA because the CHA2DS2-VASc score is above 2 as long as there are no contraindications to treatment. According to ESC 2020, despite having a high risk of bleeding based on the HAS-BLED score, these patients should ideally be given OAC accompanied by identification and improvement of modifiable bleeding risk factors and education about signs and symptoms of bleeding to watch out for.

CONCLUSION

One of the most common causes of cardioembolic stroke is AF. Therefore, it is important to carry out appropriate management and routine control for high-risk patients with heart rhythm disorders such as AF to prevent embolic strokes.

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