

*Case Report*

PRIMARY SPONTANEOUS BRAINSTEM HEMORRHAGE LEADING TO SUDDEN CARDIOPULMONARY DEATH: A CASE REPORT

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ABSTRACT

Introduction Brainstem hemorrhage refers to bleeding that occurs in the pons, pontomedullary junction, pontomesencephalic junction, midbrain, and medulla oblongata. It is an uncommon form of intracerebral hemorrhage, with a prevalence of 5-10% in Indonesia, but it is associated with high mortality due to its critical location affecting vital functions.

Case Summary A 57-year-old man, without significant personal or family medical history, presented at a private hospital with a severe headache. Initially, he was conscious, with normal blood pressure and a suspected diagnosis of stroke with 12th cranial nerve paresis. Within hours, his condition deteriorated rapidly, progressing to unconsciousness, coma, and cardiopulmonary death within four hours of admission. Computed tomography revealed a brainstem hemorrhage.

Discussion Primary Spontaneous Brainstem Hemorrhage (PBSH) is a rare but fatal form of stroke, often associated with hypertension, age, and personal living habits. However, in this case, no significant risk factors were identified except for age. The rapid deterioration from full consciousness to death highlights the aggressive nature of PBSH. Factors such as low Glasgow Coma Scale (GCS), tachycardia, hypotension, and the need for mechanical ventilation significantly contribute to poor outcomes. Brainstem hemorrhage leads to respiratory and vasomotor dysfunction, which can cause sudden death. Prompt management of respiratory and circulatory functions is crucial to improve survival chances.

Conclusion PBSH has a low incidence but high mortality, often leading to sudden death. Early detection and aggressive management of respiratory and circulatory complications are essential in preventing fatal outcomes.

Keywords: brainstem; death; hemorrhage

INTRODUCTION

Stroke is among the leading causes of death and disability worldwide. Intracerebral hemorrhage (ICH) frequency ranges from 6.5% to 19.6% of all strokes and is associated with high mortality¹. Brainstem hemorrhage is an uncommon form of

ICH and prevalence with 5-10% in Indonesia but poses a high fatality risk due to the brainstem's role in regulating vital functions such as consciousness, respiration, and cardiovascular control^{1,2,3}. Brainstem hemorrhage refers to bleeding that happens in the pons, pontomedullary junction, pontomesencephalic

junction, midbrain, and medulla oblongata^{1,3,4}. The rationale for this study arises from the need to highlight

the clinical unpredictability and extremely rapid progression of primary spontaneous brainstem hemorrhage (PBSH), which often leads to cardiopulmonary collapse within a short time window. Although PBSH has been discussed in literature, most existing studies focus on patients who are admitted in comatose states or with significant neurological deficits, with average hospital stays ranging from several days to weeks^{1,3}.

This case report aims to describe an unusual progression of PBSH in a patient who arrived fully conscious (GCS 15), then deteriorated to cardiopulmonary death within four hours. This rapid evolution without prior significant medical history is rarely documented. There is a gap in the literature concerning the early identification and management of PBSH in patients presenting with mild or non-specific initial symptoms, particularly those who rapidly decline despite normal vital signs at admission. The novelty of this report lies in its documentation of an extremely rapid fatal course of PBSH in a normotensive, previously healthy

individual, reinforcing the need for heightened clinical suspicion and immediate intervention in similar presentations.

CASE REPORT

A 57-year old man, without a significant personal and family medical history, went to a private hospital for a severe headache at 01.21 a.m. with an onset of one hour, where a diagnose was made of 12th cranial nerve paresis suspected of stroke, blood pressure (BP) normal (120/90 mmHg), and the consciousness was composmentis. Two hours later, the patient lost of consciousness with the Glasgow Coma Scale (GCS) score of 6 out of 15 which was preceded by vomiting and unilateral weakness, BP 90/60 mmHg. Normal blood glucose. Computed tomography revealed the presence of blood in the brainstem. Another one hour later, the patient experienced a coma and pulmonary arrest, his body temperature was high, but his pulse still palpable at 153 beats/min. Following inadequate ventilatory resuscitation, he was found in cardiopulmonary death at 05.29 a.m.

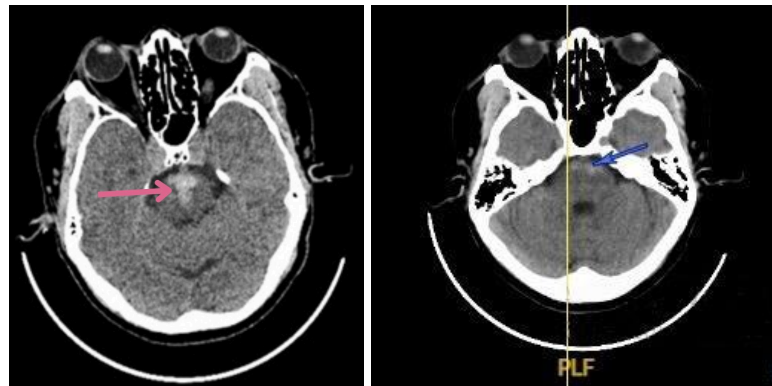


Figure 1. Non-contrast brain CT in a 57-year-old man showing a brainstem hemorrhage (arrow)

The patient was admitted with a working diagnosis of acute ischemic stroke with suspected cardioembolic etiology due to atrial fibrillation. He was started on IV citicoline and mecobalamin, oral atorvastatin, and anticoagulation therapy as advised by the cardiology team. Cardiovascular management included digoxin, spironolactone, bisoprolol, and gastric protection.

During hospitalization, the patient persistently complained of hiccups, which were only temporarily relieved by drinking water. Pharmacological management with IV omeprazole, oral domperidone, and chlorpromazine 25 mg once daily led to partial improvement. Despite persistent hiccups, the patient was discharged on day 8 with GCS E4VxM5, global aphasia, and right-sided hemiparesis (grade 1–2). At the follow-up visit on day

13, the patient remained unable to communicate effectively and continued to experience hiccups intermittently, which resolved completely by day 14 with continued pharmacologic therapy.

DISCUSSION

Primary Spontaneous Brainstem Hemorrhage (PBSH) is relatively rare and the most fatal subtype of intracerebral hemorrhage. It is invariably associated with poor prognosis and has the clinical characteristics of sudden onset, rapid evolution, and high morbidity and mortality^{1,3}. The incidence is higher in men than in women, probably because of personal living habits³. PBSH most often occurs in patients aged 40 to 60, with hypertension as the main risk factor. Age plays a vital prognostic role in brainstem hemorrhage and is associated with poor outcomes³. In

this case, no etiology such as hypertension, anticoagulant use, or tumor was present. The only notable factor was age, and possibly personal habits, contributing to the occurrence of brainstem hemorrhage. It has been hypothesized that with advancing age and arterial hypertension, the elasticity of vessel walls diminishes, increasing the risk of hemorrhage. Venous congestion and prolonged intracranial pressure have also been considered contributing mechanisms that may lead to vascular thrombosis, evolving into hemorrhage³.

In younger individuals, brainstem hemorrhages can occur without hypertension and are frequently due to vascular malformations³. These hematomas are typically small and cause milder deficits. However, certain clinical factors—such as tachycardia, the need for mechanical ventilation, and systolic blood pressure below 100 mmHg—have been identified as predictors of death or poor functional outcomes after PBSH^{1,2,3}. The majority of hospitalized PBSH patients present with a Glasgow Coma Scale (GCS) score between 3 and 8, and low GCS is a well-established indicator of poor prognosis^{2,3,4}.

Coma in PBSH is often caused by rapid destruction of the brainstem, particularly the ascending reticular activating system in the upper third of the pontine tegmentum, as well as by the effects of acute hydrocephalus⁴. This case was unusual because the patient arrived at the hospital with a GCS of 15 and no loss of consciousness, yet deteriorated to coma and cardiopulmonary death within four hours of admission—much faster than reported in most literature. Previous studies noted a hospital stay averaging 2.5 ± 3.8 days in terminally ill patients, with death occurring within hours to a day of presentation^{1,2,5}.

Brainstem hemorrhage often causes dysfunction of the respiratory and vasomotor centers, leading to sudden death. In addition to cerebral edema, secondary mechanisms such as lethal arrhythmias, myocardial infarction, pulmonary embolism, or aspiration due to dysphagia can be indirect causes of death in stroke patients^{4,5}. To prevent such fatal outcomes, immediate and effective management of both respiratory and circulatory systems is essential, along with treatment strategies tailored to the severity and type of

death caused by stroke. Management of respiratory and circulatory systems are required to prevent sudden death due to a brainstem hemorrhage.

CONCLUSION

In conclusion, PBSH has a low incidence but high mortality and frequently the direct cause of sudden

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