Tako-tsubo cardiomyopathy: reversible heart failure with favorable outcome in patients with intracerebral hemorrhage

Case report

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✓ In patients with intracerebral hemorrhage, cardiac dysfunction is a common phenomenon. Tako-tsubo cardiomyopathy is characterized by complete reversibility and therefore may constitute an entity with a favorable outcome. In this case report the authors describe a previously healthy 23-year-old man with no history of cardiac disease who suffered a severe fourth ventricular hemorrhage due to an angioma of the vermis cerebelli. After emergency surgery, progressive tachycardia, fibrillation, and electromechanical decoupling developed in the patient. An echocardiogram revealed left ventricular apical akinesia and basal hyperkinesis characteristic of tako-tsubo cardiomyopathy. One week after admission, cardiac function was normal. Tako-tsubo cardiomyopathy differs from common cardiac dysfunction in its reversible nature. This characteristic must be taken into consideration when treating patients with intracerebral hemorrhage to avoid misclassification of the disease.

KEY WORDS • tako-tsubo cardiomyopathy • cerebellar angioma • intraventricular hemorrhage • catecholamine-induced cardiac failure

Abbreviations used in this paper: CT = computed tomography; SAH = subarachnoid hemorrhage.
Postoperative Course. Six hours after surgery, the patient exhibited progressive heart failure with hypotension and tachycardia. A CT scan showed only mild focal brain edema. A chest x-ray film revealed a bottle-like formation of the heart (Fig. 1B). Progressive supraventricular tachycardia, fibrillation, and electromechanical decoupling then developed in the patient. Cardioversion and mechanical resuscitation were successful. An echocardiogram confirmed an ejection fraction of 15%. Left ventricular apical akinesia and basal hyperkinesia characteristic of tako-tsubo cardiomyopathy were revealed (Fig. 1C and D). After stabilization, a pulmonary artery catheter was inserted, and we confirmed left ventricular dysfunction. Progressive multorgan failure with hepatic, pulmonal, hematopoietic, and renal dysfunction then occurred. On Day 7 postadmission, the patient’s heart rate, blood pressure, and left ventricular function were close to normal. A CT scan showed periaqueductal hypodensities. The patient was released from our institution in a locked-in–like condition.

Discussion

In intracerebral hemorrhage, cardiac dysfunction is a frequently observed complication. Although decompensation of epicardial stenoses is most common, myocardial stunning has been recognized in a subgroup of patients. Recently, tako-tsubo cardiomyopathy has been described as a novel cardiac disease characterized by transient left ventricular apical hypokinesis and basal hyperkinesis.

Myocardial Stunning

The cardiac changes that occur in association with myocardial stunning are thought to result from increased central sympathetic activity, which results in a hyperdynamic cardiovascular state. Peripheral vasoconstriction may also further aggravate the left ventricular decompensation by increasing the cardiac afterload. A transient increase in sympathetic nervous activity induces myocardial damage, which is hypothetically caused by oxygen-derived free radicals or transient calcium overload. Both free radical and calcium overload are associated with decreased responsiveness of contractile filaments to calcium due to selective troponin I proteolysis. Characteristically, myocardial stunning is reversible within 48 hours.

Tako-Tsubo Cardiomyopathy

Tako-tsubo cardiomyopathy resembles common cardiomyopathy in the elevation of cardiac biomarkers and clinical syndromes, although obstructive epicardial coronary thrombosis is usually not observed. Patients with tako-tsubo cardiomyopathy usually present with ST segment elevation recorded by chest leads V1 to V3, but there is still no reliable way to distinguish apical ballooning syndrome–associated ST segment elevation on the presenting electrocardiogram from elevation caused by plaque rupture and acute coronary thrombosis. The overall prognosis seems to be favorable, although isolated cases of death have been reported. The cause of transient left ventricular apical ballooning syndrome is still unknown. Several mechanisms have been proposed, including multivessel epicardial spasm, myocardial dysfunction mediated through catecholamine-induced damage, microvascular coronary spasm or dysfunction, and neurogenically mediated myocardial stunning.
Tako-tsubo cardiomyopathy in a patient with cerebellar angioma

It is unclear whether coronary microvascular dysfunction is the primary mechanism involved in the pathogenesis of the syndrome or whether it is simply an associated secondary phenomenon.

**Disease Differentiation**

Differentiating between tako-tsubo cardiomyopathy and well-known myocardial stunning by catecholamines is based on echocardiographic observations alone. The wall motion abnormalities in tako-tsubo cardiomyopathy are not typical of those found in SAH or intracranial hemorrhage in which the apex is generally spared and the basal left ventricular segments are affected.

The incidence of tako-tsubo cardiomyopathy in patients with intracerebral hemorrhage remains unknown. Because of the reversible nature of tako-tsubo cardiomyopathy, patients with the disease may have a favorable outcome that must be taken into consideration to avoid misclassification of the disease.

**References**


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