A Ruptured Basilar Aneurysm Resulting in Takotsubo Cardiomyopathy.

Ryan Murphy DO  
*Lehigh Valley Health Network, Ryan.Murphy@lvhn.org*

Apurva Vyas MD  
*Lehigh Valley Health Network, apurva_v.vyas@lvhn.org*

Megan Leary MD  
*Lehigh Valley Health Network, Megan_C.Leary@lvhn.org*

Follow this and additional works at: [https://scholarlyworks.lvhn.org/medicine](https://scholarlyworks.lvhn.org/medicine)

Part of the [Cardiology Commons](https://scholarlyworks.lvhn.org/collection/medicine/cardiology), [Medical Sciences Commons](https://scholarlyworks.lvhn.org/collection/medicine/medicalsciences), and the [Neurology Commons](https://scholarlyworks.lvhn.org/collection/medicine/neurology)

**Published In/Presented At**


This Poster is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact LibraryServices@lvhn.org.
A Ruptured Basilar Aneurysm Resulting in Takotsubo Cardiomyopathy

R Murphy, DO¹, A Vyas, MD², M Leary, MD³
¹Department of Medicine, ²Department of Cardiology, ³Department of Neurology, Lehigh Valley Health Network, Allentown, PA

INTRODUCTION

Subarachnoid hemorrhage (SAH) can often be a devastating clinical diagnosis. The most common cause is a ruptured saccular cerebral aneurysm, with a reported 30-50% fatality as high as 45% and permanent disability in 50% of the survivors [1]. This high morbidity and mortality is imperative for patient recovery. Reversible cardiac dysfunction is a well-known complication of subarachnoid hemorrhage. Amythystis, myocardial infarction, and cardiac arrest are well-known complications in patients with SAH and can result in death and delayed cerebral ischemia [2-3]. Rarely, SAH can also be associated with Takotsubo cardiomyopathy, which has a prevalence of 0.8% among all patients with aneurysmal SAH [4].

The development of Takotsubo cardiomyopathy (TCM), a transient dysfunction of the left ventricle which often mimics myocardial infarction, is extremely recognized as a complication. TCM was first reported in Japan, when the peculiar ventricular morphology was noted to be quite similar in shape to the takotsubo, a vase with a rounded bottom and narrow neck used by Japanese fishermen as an octopus trap (Fig. 1) [5]. Patients with the syndrome show evidence of coronary artery patency on catheterization. TCM, while generally considered a self-limiting process, is important to recognize because it is associated with increased mortality rates resulting from the development of left ventricular thrombus, congestive heart failure (CHF), and amythystis [2]. It is a complication that is sometimes described in case reports and small case series. It is generally agreed upon that conservative medical management is the mainstay of therapy for TCM, however no clinical trials to date exist to help guide treatment. This case report serves as an opportunity to discuss the evolution and pathophysiology of this entity in order to raise awareness of this cardiac complication and the need for optimum clinical management.

CASE

A 79-year-old female with hyperlipidemia and no known coronary artery disease presented to the Emergency Department (ED) after suddenly grabbing her chest and collapsing onto the floor unconscious.

On physical exam, she was afebrile, hypertensive with a blood pressure of 162/96 mmHg, pulse of 114 bpm and a respiratory rate of 24. Cardiopulmonary exam was unremarkable. Neurologically she was unresponsive with Glasgow Coma Scale of 8. Hunt and Hess grade 4. Fisher 4, and intubated for airway protection. Computer Tomography (CT) of her head revealed diffuse subarachnoid hemorrhage with intraventricular hemorrhage (Fig. 2). CT Angiography (CTA) demonstrated a 6.5 mm basilar tip aneurysm, and the patient underwent endovascular coil embolization (Fig. 3). After an initial screening troponin I of 0.02 ng/mL obtained during ED assessment, a second troponin I elevated to 1.43 ng/mL, at the eleven hour mark and later down trended to 0.90 ng/mL. An echocardiogram showed mild to moderate reduction in left ventricular systolic function with severe hypokinesis of the apical segments (Fig. 4). Cardiomyopathy was thought to be ischemic in nature. Given echocardiographic findings and clinical scenario, there was a suspicion for stress-induced (Takotsubo) cardiomyopathy. A recommendation was made to wean off the dopamine as this was likely exacerbating the catecholamine effect onto the heart. Repeat echocardiogram was performed 15 days later which showed complete resolution of prior left ventricular dysfunction and apical hypokinesis (Fig. 5). As there was a clear improvement in cardiac function, an ischemic workup with an exercise stress test was performed. In the absence of any abnormal stress test results, a second echocardiogram was performed which showed complete resolution of TCM with a left ventricular ejection fraction of 52%.

DISCUSSION

The prevalence of TCM is estimated to be 0.4% among all patients of aneurysmal SAH [9]. Many other TCM prevalence studies and meta-analyses in SAH patients do not distinguish an aneurysmal and non-aneurysmal cause. A meta-analysis of 10 studies, [9] patients were admitted with SAH, of which 157 patients were found to have developed TCM symptoms, representing 4.4% of the total patient population [9]. In another meta-analysis of over 50 papers, the incidence of TCM varied drastically from 0.8% to 33% [10].

Patients who develop SAH-induced TCM are shown to be at increased risk of worse outcomes. Patients with TCM were more likely to have severe subarachnoid bleed (such as our patient) as measured by the Hunt and Hess classification [11]. There are significant increases of in-hospital mortality in patients that develop TCM [2, 9]. Patients with SAH-induced TCM are more likely to have low Glasgow coma scale scores [10]. SAH alone carries a significantly high mortality. Although TCM carries a favorable prognosis in the general population, this pattern of cardiac dysfunction in patients with SAH may be associated with pulmonary edema, prolonged intubation, and cerebral vasospasm, potentially further escalating risk of mortality [7]. The pathophysiology behind the development of TCM in the setting of aneurysmal SAH (if proven) still remains, however high levels of catecholamine release is the most widely accepted theory. It is believed that this catecholamine surge can cause direct coronary vasospasm, which during a dysautonomic state can lead to poor cardiac perfusion and dysfunction. There is also evidence for catecholamines causing direct toxicity to the mycardium [2]. This supposition adds additional challenges on the hemodynamic management of the patient. Patients in terms of optimal blood pressure and central perfusion [2]. The use of vasopressors and intropes remains controversial, as permissive hypotension is a key therapeutic goal in patients with SAH. While there is existing evidence that vasopressor agents can exacerbate TCM [9], more recent research suggests that vasopressors can be used safely [2].

In this case, the patient’s TCM was not discovered until after the patient underwent interventional therapy. This raises the question as to whether or not early cardiac screening with serial myocardial enzyme testing, ECGs and an echocardiogram should be standard studies for all SAH patients. Current American Heart Association Guidelines for the management of aneurysmal subarachnoid hemorrhage do not recommend routinely obtaining these studies during emergency evaluation and preparative care, nor indicate to obtain these studies post-procedure [12]. Given that TCM may contribute to mortality in this population, potentially this change in current practice guidelines may be beneficial. Further research is necessary as there is a paucity of data on early recognition of TCM.

Since first being described in the literature, Takotsubo cardiomyopathy has become an increasingly recognized complication of SAH. It is an important diagnostic consideration in the initial evaluation and management of SAH. Further research is necessary to define the role of this rare complication in SAH patients with aneurysms. Cardiac screening may be beneficial, however no clear guidelines are present to help guide therapeutic management. While outcomes are favorable with conservative care, there are still questions to be answered, particularly of the role vasopressors play in management. Awareness of this syndrome and reporting of it in the literature only serves to the benefit of medical treatment and patient outcomes.

CONCLUSION

References:

1. Rabinstein AA, Emery MJ, Higashida RT, et al. Guidelines for the management of aneurysmal subarachnoid hemorrhage do not recommend routinely obtaining these studies during emergency evaluation and preparative care, nor indicate to obtain these studies post-procedure [12]. Given that TCM may contribute to mortality in this population, potentially this change in current practice guidelines may be beneficial. Further research is necessary as there is a paucity of data on early recognition of TCM.