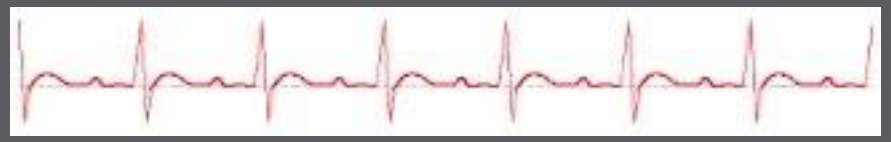
Summer 2015

Takotsubo Cardiomyopathy

Angela J. Occidental
Otterbein University, angela.occidental@otterbein.edu



Takotsubo Cardiomyopathy

Angela J. Occidental BSN, RN
Otterbein University, Westerville, Ohio

Broken Heart Syndrome

Introduction

Takotsubo cardiomyopathy is a rare, reversible form of cardiomyopathy. First cases of takotsubo cardiomyopathy were described in Japan, twenty years ago (Milinis, & Fisher, 2012). takotsubo cardiomyopathy is a transient left ventricular dysfunction, typically triggered by severe emotional or physical distress.

Left ventricular ballooning is characteristic of Takotsubo syndrome. Images of this ballooning resemble a takotsubo vessel used in Japan for collecting octopus, thus the reason for the syndrome name (Pellicia, et. al, 2014). In recent years, this cardiomyopathy has been described as "Broken heart syndrome" because severe emotional stress has been implicated as the cause of this cardiomyopathy in "approximately two-thirds of patients" (Abisse, & Poppas, 2014, p. 24).

Clinical presentation is similar to ST segment elevated MI (STEMI). Patients present with symptoms of : chest pain, dyspnea, and ischemic ECG changes. Because of presentation most patients undergo coronary angiography. However, instead of finding blockages contributing to the myocardial ischemia vessels are often clear, and left ventricular ballooning is observed (Abisse, & Poppas, 2014). Most often this form of cardiomyopathy occurs in postmenopausal women. For this reason, strong evidence suggests a connection with hormonal imbalance.

Although, takotsubo cardiomyopathy is not as widely recognized as other forms of cardiomyopathy the prevalence is increasing in the United States. Because of this, providers of cardiac patients should be aware of this syndrome, and consider Takotsubo cardiomyopathy in the differential diagnosis for acute chest pain.

Case Presentation

A 72 year-old, Caucasian post-menopausal female, presented to the emergency department with complaint of sub sternal crushing chest pain. Vitals signs were: temperature 37.1 degrees Celsius, heart rate 94, sinus rhythm, blood pressure 178/84, respiration tachypneic rate 24, with oxygen saturation 96% on 2 liters/min nasal cannula oxygen. Pain was described as "heavy and crushing"; pain did not radiate and was not relieved by rest. An Electrocardiogram demonstrated ST elevation in precordial leads. Troponin 1 level is slightly elevated at 0.64. Although, elevated a troponin level is typically much higher with an ST elevated myocardial infarction (STEMI) the ED physician made the decision to call a code heart, so this patient was immediately transferred to the cardiac catheterization lab. (Bradbury, & Cohen, 2011). Coronary angiography demonstrated clean vessels with no significant atherosclerosis. After recovery this patient was transferred to the Progressive Care Unit, for further observation.

During the admission process, the patient reported that her husband of 50 years passed away three days ago. All family, and visitors had left, leaving her alone at home for the first time. The patient became tearful while speaking of her husband, and said, "I don't know how I am going to manage all alone."

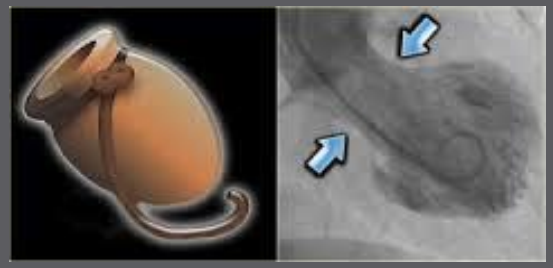
Patient interview indicated no significant past medical history, she is postmenopausal, and has two healthy grown children. Medications included Vitamin D supplement, and multivitamin/mineral supplement. She denied use of alcohol, tobacco, or illicit drugs. BMI is normal at 25. In addition, this patient reported exercise four times weekly at the local senior center.

Repeat laboratory testing revealed:

- Six hour troponin level of 1.02
- BNP level 689
- Excessive serum catecholeamines

Additional diagnostic testing included:

- Echocardiogram which demonstrated wall-motion abnormalities such as apical ballooning and hypokinesis
- CT scan confirming no pheochromocytoma.

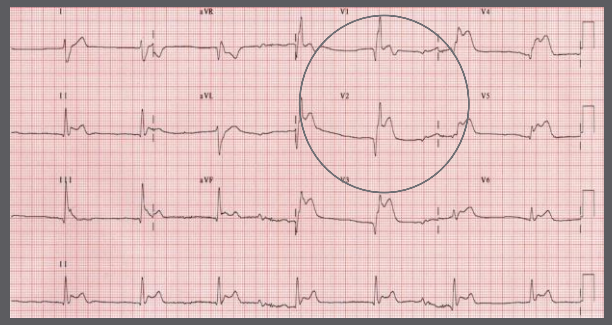


Left image is takotsubo pot used for collecting octopus. Right is cardiac radiology image of takotsubo cardiomyopathy
Image copyright www.nursebarb.com

Pathophysiology

Takotsubo cardiomyopathy is precipitated by a marked hyperadrenergic state (Andrade, & Stainback, 2014). Although, different stressors may contribute to the transient and reversible apical dysfunction, catecholamine excess is the cause for dysfunction. "Ninety percent of patients diagnosed with takotsubo cardiomyopathy are postmenopausal women 61 to 76 years of age" (Andrade, & Stainback, 2014, p. 300). In addition, emotional triggers are more commonly seen in women.

Severe mental stress precipitates a surge of catecholamine release. In susceptible individuals, this excess of catecholamines causes impaired myocardial perfusion, myocyte injury, and in some cases may impair left ventricular output (Wan, & Liang, 2014). Although the basic cause of takotsubo cardiomyopathy is unknown, strong connection regarding stress on the autonomic nervous system is the usual association. "Activation of alpha 1-adrenoceptors in the blood vessels and activation of beta 1-adrenoceptors in the heart are mainly responsible for stress-induced alteration of cardiac and vascular gene profiles" (Pirzer, Elmas, Haghi, Lippert, Kralev, Lang, Borggrefe, & Kalsch, 2011 p. 186). When hormones such as adrenaline are released in excess, the heart muscle can be stunned. Myocardial stunning is a reduction of function of heart contraction, which is reversible , and caused by reduced blood flow (Wan, & Liang, 2014).



ST segment elevation observed in takotsubo cardiomyopathy
Image copyright www.lifeinthefastlane.com

Significance of Pathophysiology

Both physical and emotional stressors have been reported to cause the catecholamine release leading to takotsubo cardiomyopathy. Patients often first present as experiencing an ST elevated MI (STEMI). However, once heart catheterization rules out atherosclerosis as the cause of acute chest pain. Treatment should be supportive in order to reduce complications (Gentry, & Childers, 2015). Once takotsubo cardiomyopathy is suspected immediate support is vital to prevent serious complications such as cardiogenic shock, pulmonary edema, ventricular tachycardia, as well as death (Milinis, & Fisher, 2012). In addition, some therapies used for acute coronary syndromes, such as anticoagulation, could be harmful in takotsubo cardiomyopathy due to increased risk for ventricular rupture (Milinis, & Fisher, 2012).

Signs & Symptoms

- Acute chest pain after a stressful event
- Shortness of breath
- Anxiety
- EKG changes such as ST elevation
- Mildly elevated Troponin 1
- Elevated BNP
- Non remarkable cardiac catheterization
- Abnormal wall motion and apical ballooning on echocardiogram

Diagnostic criteria for Takotsubo Cardiomyopathy

- Left ventricular hypokinesia and apical ballooning commonly following a stressful trigger.
- Absence of obstructive coronary disease or no evidence of a plaque rupture.
- ECG changes such as ST segment elevation or T-wave inversion with a modest increase in troponin.
- No evidence of pheochromocytoma or myocarditis

Implications for Nursing Care

Excellent nursing care is vital for recovery from an episode of takotsubo cardiomyopathy. Maintaining a healthy lifestyle, promotes optimal recovery from takotsubo cardiomyopathy (Gentry, & Childers, 2015). Nurses of all levels can participate in recovery by:

- Identifying potential causes of emotional stress
- Diligent reporting of abnormal vital signs and assessment data
- Embracing a multidisciplinary care approach
- Providing education and assisting with coping skills

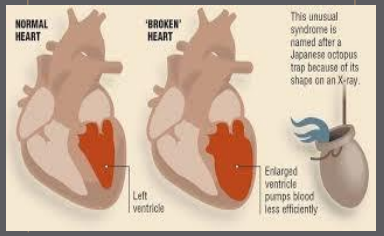
Advanced practice nurses may also manage and monitor medication regimens, or provide outpatient mental health care

Conclusions

Ninety-five present of patients who experience takotsubo cardiomyopathy will not have a recurrence of disease, even after enduring other stressful events (Sharkley, Lesser, & Maron, 2011).

The case patient was hospitalized for five days. On discharge, her BNP was 105, and troponin 1 was less that 0.015. She had no complaints of chest pain, and was looking forward to going home. Discharge medications included: Furosemide, Metoprolol, and Lisinopril. Outpatient appointments scheduled included, follow-up with primary care provider; follow-up with cardiologist, as well as referral to primary mental health practitioner. Home health services were consulted to assist with monitoring of weight, and vital signs, and provide ongoing medication monitoring. In addition, community resources such as, grief counseling services, and meals services were provided. Long-term prognosis suggests no deterioration of heart muscle after a takotsubo event (Sharkey, Lesser, & Maron, 2011).

Image copyright
www.victoriaadvocate.com



OTTERBEIN UNIVERSITY

References Cited

Abisse, S., & Poppas, A. (2014). Takotsubo cardiomyopathy: A clinical review. Rhode Island Medical Journal.

Andrade, A., & Stainback, R. (2014). Takotsubo cardiomyopathy. *Texas Heart Institute Journal, 41*, 299-303. http://dx.doi.org/10/14503/THIJ-14-4108

Gentry, K., & Childers, W. (2015). Is takotsubo cardiomyopathy in your differential diagnosis? The Clinical Advisor, 43-48.

Milinis, K., & Fisher, M. (2012). Takotsubo cardiomyopathy: Pathophysiology and treatment. Postgrad Med Journal, 88, 530-538. doi:10.1136/postgradmedj-2012-130761

Pellicia, F., Greco, C., Vitale, C., Rosana, G., Gaudio, C., & Kaski, J. (2014). Takotsubo syndrome (stress cardiomyopathy): An intriguing clinical condition in search of its identity. The American Journal of Medicine, 127(8), 699-704. http://dx.doi.org/10.1016/j.amjmed.2014.04.004

Pirzer, R., Elmas, E., Haghi, D., Lippert, C., Kralev, S., Lang, S., . . . Kalsch, T. (2011). Platelet and monocyte activity markers and mediators of inflammation in takotsubo cardiomyopathy. *Heart Vessels, 27*, 186-192. doi:10.1007/s00380-011-0132-6

Sharkey, S., Lesser, J., & Maron, B. (2011). Takotsubo (stress) cardioyopathy. *Circulation Journal of the American Heart Association, 124*, 460-462. doi:10.1161/CIRCULATIONAHA.111.052662

Wan, S., & Liang, J. (2014). Takotsubo cardiomyopathy: Etiology, diagnosis, and optimal treatment. *Research Reports in Clinical Cardiology, 5*, 297-303. http://dx.doi.org/10.2147/RRCC.S54602 1

Additional Resources

Bradbury, B., & Cohen, F. (2011). Early postoperative takotsubo cardiomyopathy: A case report. *AANA Journal, 79*(3), 181-188.

Yoshikawa, T. (2014). Takotsubo cardiomyopathy, a new concept of cardiomyopathy: Clinical features and pathophysiology. International Journal of Cardiology, 182, 297-303. http://dx.doi.org/10.1016/j.ijcard.2014.12.116