Summer 7-27-2016

Takotsubo Cardiomyopathy: The Pathophysiology of Broken Heart Syndrome

Mason Murrey
Otterbein University, mason.murrey@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn

Part of the Nursing Commons

Recommended Citation
Murrey, Mason, "Takotsubo Cardiomyopathy: The Pathophysiology of Broken Heart Syndrome" (2016). Master of Science in Nursing (MSN) Student Scholarship. 143.
https://digitalcommons.otterbein.edu/stu_msn/143

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Master of Science in Nursing (MSN) Student Scholarship by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact shickey@otterbein.edu.
Takotsubo cardiomyopathy: The Pathophysiology of Broken Heart Syndrome

Mason Murray, BSN, RN, CCRN
Otterbein University, Westerville, Ohio

Introduction

Takotsubo cardiomyopathy (Takotsubo) is a syndrome that was identified in the early 1990s in Japan based on an acute coronary syndrome (ACS) presentation without the typical coronary artery occlusion that accompanies ACS. Although now, Takotsubo cardiomyopathy of broken heart syndrome, has become a topic of interest in the world of cardiology. It has been named the medical world of its initial presentation to a ST-elevated myocardial infarction (STEMI) with sympathetic surge, ST-segment elevation on 12-lead EKG, elevated myocaridial enzyme markers, and moderate to severe left ventricular wall motion abnormality without coronary artery occlusion.

Signs and Symptoms

Classic signs and symptoms of myocardial infarction (MI):
• Chest pain or discomfort
• Pain or discomfort in other parts of the body (arm, shoulder, neck, jaw, or back)
• Shortness of breath
• Nausea or other gastrointestinal symptoms
• sweating

Left Ventricular Apical Ballooning

The term tako-tsubo, a Japanese term, “describes a narrow neck fishing pot used to catch octopus” (see Fig 2). This narrow neck and bulging out at the pot are characteristic of the left ventricle ballooning out during the acute event. The apex is saturated with Beta-adrenergic receptors and during episodes of catecholamine excess, it is believed to be in hyper-drive and attributes to the exaggerated shape, left ventricular dysfunction, and leaking of tricuspid, which is a manifestation of myocardial damage. This hyperthyroid is led to increased rising of pressure and cause a significant decrease in the EF.

Coronary Artery Vasospasms

Surgs of epinephrine during intense periods of physical or emotional stress also occur in the coronary arteries and believe to cause vasospasms of the coronary vasculature, causing myocardial ischemia and the ST-segment elevation classically identified during STEMI (ST-elevated myocardial infarction) and TC.

Underlying Pathophysiology

Massive Catecholamine Release

During acute stress, the sympathetic nervous system is over-drive, producing an excessive of catecholamines like epinephrine and norepinephrine. These to adrenergic chemicals stimulate the Beta-adrenergic cells located in the heart that increase heart rate and contractility and induce hyperthyroid on the cells. This is seen in the ballooning of the left ventricle apex most common in TC.

Significance of Pathophysiology

The significance of the pathophysiology lies in its exact mimicking of acute coronary syndrome. Patients must be treated per ACS protocol and only once coronary angiography confirms there is an absence of coronary occlusion and criterion is met can a patient be diagnosed and treated with TC. The underlying pathophysiology has not been clearly defined so far on the research condition on the highly warranted. TC is significant in its causative factor being endogenous – although risk factors such as hyperlipidemia, smoking, and a kohol use has been identified, the internal catecholamine surge is not a modifiable factor.

Parasympathetic Dysfunction

Norrile-Kaufmann et al., (2016) introduce their findings that participants in their study had a para sympathetic dysfunction that led to prolonged periods of sympathetic stimulation after stress that contributed to the cardiomyopathy. Without the typical “not and dig” function of the parasympathetic nervous system, the sympathetic nervous system continues to stimulate catecholamine production and induces the left ventricular apical ballooning typical of TC.

Implications for Care

Treatment of TC mimics the treatment of a non-STEMI:
• nitroglycerin infusion → vasodilation and decreased preload/afterload
• heparin infusion
• Beta-blockers → decrease catecholamine stimulation and cardiac demand
• Nitroprusside → intra-aortic balloon pump

Conclusion

Takotsubo cardiomyopathy is a complex condition. Although necessary, increased cost, patient stress, and superficial hospital resources occur as in the condition mimics acute coronary syndrome and must be treated as such until the diagnosis of TC can be achieved. An excess in the catecholamines produced by such events of physical or emotional stress seem to be evident in all current research, but a dysfunction in the parasympathetic nervous system and coronary vasospasms have also been attributing factors. Quick recognition and treatment with aspirin, heparin, nitroprusside, beta-blockers, possibly IABP, as well as vasopressors are indicated to increase cardiac function, to enhance end-organ perfusion and prevent cardiogenic shock with as well thrombosis formation. Emotional support along with anxiolytic therapy is recommended because the catecholamine levels decrease, the myocardium has proven to reverse itself back to the present status of function. Healing a broken heart may be complicated, but with evidence-based treatment and intervention, nursing care, TC is entirely reversible.

References


Figure 2: On the left: the dilated ballooning of the left ventricular apex can be seen in Takotsubo cardiomyopathy. On the right: the Japanese pot in which Takotsubo cardiomyopathy was named after. “Tako” meaning octopus and “tsubo” meaning pot. Notice the narrowed neck with enlarged base of the pot.