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Takotsubo Syndrome

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Introduction

Takotsubo Syndrome, also known as Takotsubo cardiomyopathy, is a bizarre, often misunderstood, and arguably underdiagnosed, due to the nature of presentation of symptoms and the rarity of its occurrence. Autopsies are unreliable for finding Takotsubo cardiomyopathy, making it hard to know if more people die from it more often than known cases (Angelini, 2018). Takotsubo cardiomyopathy was originally discovered in Japan in the 1990s. The Japanese term for 'octopus trap' is Takotsubo, which is the shape that the left ventricle resembles when individuals have Takotsubo Syndrome (Yadsar, Sarchahi, lakziyan, & Abavisani, 2019).

There are multiple names for this type of reversible cardiomyopathy, including Stress-induced heart failure, or Broken Heart Syndrome (Galván et al., 2018). These names were chosen due to the fact that Takotsubo Syndrome is usually preceded by a psychologically or physically stressful event in an individual's life (Misumida et al., 2019). It is a disorder that catches attention by many people because of the fact that an emotional broken heart can cause a physically broken heart. Takotsubo Syndrome is mysterious and needs more research to better understand and more effectively be treated.

Presentation of Case/Processes

A 38-year-old female patient presents with no cardiac history complaining of sudden and severe chest pain. The chest pain is accompanied by shortness of breath. Her only history is depression and hysterectomy 6 weeks prior due to fibroids. Her mother passed away suddenly this week.

Upon examination, she is alert and oriented and answering questions appropriately. She has 8 out 10 left sided chest pain and has tachypnea. Her vitals are as follows:

- Temperature: 98.3
- Respiratory rate: 32
- Heart rate: 71
- Blood pressure: 132/64
- Oxygen saturation: 96% on room air

The Advanced Practice Nurse orders an EKG which finds that there are ST changes. The patient is sent to the ICU to be closely monitored. While in the ICU, the patient has lab work sent. The results are unremarkable with the exception of troponin and CK where mildly elevated. The Advanced Practice Nurse orders an echocardiogram. The results show that the patient has an ejection fraction of 20% and has left ventricle dysfunction with apical akinesis.

The patient is emergently taken to the Cath lab for cardiac catheterization where normal coronary arteries are noted. The provider administers nitroglycerin into the coronary arteries. When the patient awakes, her pain is relieved. After returning to her room, she is closely monitored and eventually is able to go home.

Her Advanced Practice Nurse explains that she is lucky that she was diagnosed early and that treatment was quickly effective, avoiding ECMO. The patient is placed on oral anticoagulation to prevent stroke and told to come back if symptoms re-demonstrate. She has follow up serial echocardiograms until her ejection fraction is improved to 55%.

Signs & Symptoms

This can be confusing because Takotsubo Syndrome presents similarly to Acute Coronary Syndrome. This can be problematic because treatment for Takotsubo Syndrome differs from treatment from Acute Coronary Syndrome.

Symptoms typically present as (McLean, Slama, & Chew, 2018):

- Chest pain
- Dyspnea
- Syncope

Usually presents in:

- those with acute psychological or physical distress (Misumida et al., 2019), hence the name of 'broken heart syndrome'
- females (McLean, Slama, & Chew, 2018)
- elderly (Galván et al., 2018)
- postmenopausal (Galván et al., 2018)
- those with neurological or psychiatric disorders (McLean, Slama, & Chew, 2018)
- postoperative patients (Galván et al., 2018)
 - including those with recent cesarean section (Kucia, 2015)
- individuals with: pheochromocytoma, chemotherapy (Angelini, 2018), malignancy (Cammann, 2019).



Australian Family Physician. (2012). [Echo image of LV dysfunction]. Broken Heart Syndrome. Retrieved from <https://www.racgp.org.au/afp/2012/january/february/broken-heart-syndrome/>

Significance

The significance of understanding the pathophysiology for Advanced Practice Nurses is important for any disorder. It is especially imperative for those with Takotsubo Syndrome because understanding the pathophysiology can change whether an individual is treated incorrectly for Acute Coronary Syndrome or, correctly, for Takotsubo Syndrome. A misdiagnosis can mean incorrect treatment and could lead to poor outcomes for patients.

While most people recover from this syndrome, there is still the possibility of death. Other complications include cardiogenic shock, ventricular arrhythmias, left heart failure, left ventricular thrombus, left ventricular wall rupture, and mitral regurgitation (Yadsar, Sarchahi, lakziyan, & Abavisani, 2019).

Underlying Pathophysiology

The underlying pathophysiology is, unfortunately, not fully understood. There is still research being done on this more newly discovered syndrome. There are some ideas for what may be the causes. They are as follows:

- Catecholamine toxicity
 - Acute catecholamine surges seem to be the primary cause of Takotsubo Cardiomyopathy. Stressful event can trigger an increase in the endocrine system causing the hypothalamus and pituitary gland to release high amounts of catecholamines. Takotsubo Syndrome is the cardiovascular response (Ansari et al., 2018).
- Microvascular dysfunction or vasospasms
 - These vasospasms lead to apical ballooning (Bill et al., 2018).
 - These vasospasms are said to be caused by stressful events (Yadsar, Sarchahi, lakziyan, & Abavisani, 2019).
 - Left Ventricular dysfunction with apical dyskinesia
 - This causes low ejection fraction and can progress to other cardiac and systemic issues.

In most cases, it appears that the pathological path of Takotsubo Syndrome begins with a stressful trigger that is psychological or physical in nature, leading to high levels of catecholamines, which results in microvascular dysfunction and vasospasms, which, in turn causes left ventricular dysfunction. While these can happen separately, it appears that usually one causes the trickle down of events causing chest pain, dyspnea, and/or syncope.

Implications for Nursing Care

- Diagnosis
 - Obtaining an accurate history is needed, looking especially at recent psychological or physical stressors.
 - Utilizing echocardiograms to assess the left ventricle function of a heart is the quickest way to diagnose patients even before there is dysfunction in ejection fraction (Dias, 2018). An echocardiogram will show dyskinesia of the left ventricle with hypercontraction of the basal wall (Galván et al., 2018).
 - Cardiac Enzymes are usually mildly elevated, partially due to the fact that it is non-ischemic (Galván et al., 2018).
 - EKG changes are significant including ST elevation, T-wave changes, a prolonged QT interval (Galván et al., 2018).
 - Heart Cath typically shows normal coronary arteries, even though heart function is off.
- Treatment
 - While catecholamines are the first line treatment for those with Acute Coronary Syndrome, it is incredibly important that catecholamines are NOT used with Takotsubo Syndrome, since high levels of catecholamines can cause Takotsubo Syndrome.
 - Intracoronary nitroglycerin administration helps treat symptoms (Angelini, 2018)
 - Extracorporeal Membrane Oxygenation (ECMO) seems to be the best treatment for unstable patients with Takotsubo Syndrome (Dandel & Hetzer, 2018).
 - There is an element of self-healing that seems to work for those with mild symptoms (Angelini, 2018). Individuals usually recover within 3-4 weeks.
 - Some studies have found that the use of oral anticoagulation is helpful because of the dyskinesia of the left ventricle. This can result in clotting, so to prevent strokes, anticoagulation is considered (Santoro, 2018).
- Education
 - The implications for Nurses and Advanced Practice Nurses lays with making sure patients are well educated. If patients meet criteria for being at risk for Takotsubo Syndrome they need to know to call 911 if they have symptoms of this disorder. After surgery, traumas, or severe emotional distress, patients should all be educated.
 - Along with patients, other healthcare providers need to be educated on signs and symptoms of Takotsubo Syndrome, and to know the treatment so that patients have the best possible outcome.

Conclusion

Takotsubo cardiomyopathy has many names and many causes. It is not very well understood at this time, and it is not fully clear how to treat it effectively. While symptoms can be scary and sudden, they tend to subside quickly and, generally, people tend to recover well. There is a risk of death, especially if treated incorrectly. Understanding the pathophysiology of Takotsubo Syndrome is incredibly important. Advanced Practice Nurses need to make sure that they are comprehensive in their diagnostic interventions, and examination of each patient that presents with typical signs and symptoms. Treatment needs to be quick and patients need to be monitored closely. The better Advanced Practice Nurses become at understanding Takotsubo Syndrome, the better care patients will receive.

References

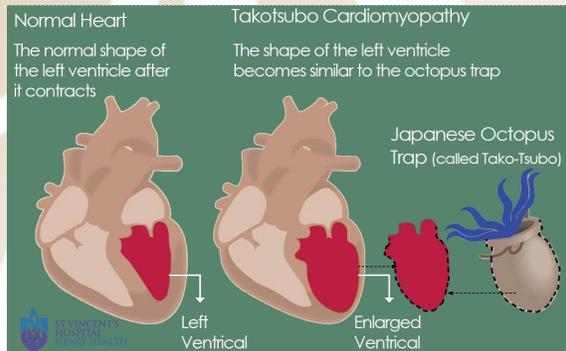


EKG change	Example	Prevalence in TTD
ST segment elevation, most commonly in precordial leads		Common (46-100%)
Diffuse deep symmetric T-wave inversions		Common
Pathologic Q-waves that typically resolve before hospital discharge, with maintenance of normal R-wave progression		37%
Prolonged QT interval (beginning of Q-wave to end of T-wave) which usually normalizes in 1-2 days		26%
Prolonged ST segment (beginning of QRS complex to normal)		

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