

Takotsubo Cardiomyopathy/ Stress-Induced Cardiomyopathy

Takotsubo cardiomyopathy, also known as **transient apical ballooning syndrome**, **apical ballooning cardiomyopathy**, **stress-induced cardiomyopathy**, **broken-heart-syndrome** and simply **stress cardiomyopathy**, is a type of non-[ischemic cardiomyopathy](#) in which there is a sudden temporary weakening of the [myocardium](#) (the muscle of the heart). Because this weakening can be triggered by emotional stress, such as the death of a loved one, the condition is also known as **broken heart syndrome**. It has also been reported in cases of partial drowning. The presence of a trigger such as emotional or physical has been reported in 33% to 100% of the cases.

The typical presentation of someone with takotsubo cardiomyopathy is a sudden onset of [congestive heart failure](#) or chest pain associated with [EKG](#) changes suggestive of an [anterior wall myocardial infarction](#). During the course of evaluation of the patient, a bulging out of the left ventricular apex with a hypercontractile base of the left ventricle is often noted. It is the hallmark bulging out of the apex of the heart with preserved function of the base that earned the syndrome its name "tako tsubo", or octopus trap in [Japan](#), where it was first described. The cause appears to involve high circulating levels of [catecholamines](#) (mainly [adrenaline/epinephrine](#)). Evaluation of individuals with takotsubo cardiomyopathy typically includes a [coronary angiogram](#), which will not reveal any significant blockages that would cause the [left ventricular](#) dysfunction. Provided that the individual survives their initial presentation, the left ventricular function improves within 2 months. Takotsubo cardiomyopathy is more commonly seen in post-menopausal women. Often there is a history of a recent severe emotional or physical stress.

Diagnosis

Transient apical ballooning syndrome or takotsubo cardiomyopathy is found in 1.7–2.2% of patients presenting with [acute coronary syndrome](#). While the original case reports reported on individuals in Japan, takotsubo cardiomyopathy has been noted more recently in the United States and Western Europe. It is likely that the syndrome went previously undiagnosed before it was described in detail in the Japanese literature.

The diagnosis of takotsubo cardiomyopathy may be difficult upon presentation. The [EKG](#) findings are often confused with those found during an acute anterior wall [myocardial infarction](#). It classically mimics ST-segment elevation myocardial infarction, and is characterized by acute onset of transient ventricular apical wall motion abnormalities (ballooning) accompanied by [chest pain](#), [dyspnoea](#), ST-segment elevation, T-wave inversion or QT-interval prolongation on [EKG](#). Elevation of myocardial enzymes is moderate at worst and there is absence of significant [coronary artery disease](#).

The diagnosis is made by the pathognomic wall motion abnormalities, in which the base of the left ventricle is contracting normally or is hyperkinetic while the remainder of the left ventricle is akinetic or dyskinetic. This is accompanied by the lack of significant coronary artery disease that would explain the wall motion abnormalities. Although, apical ballooning has been classically described as the angiographic manifestation of takotsubo, it has been shown that left ventricular dysfunction in this syndrome includes not only the classic apical ballooning, but also different angiographic morphologies such as mid-ventricular ballooning and rarely local ballooning of other segments.

The ballooning patterns were classified by Shimizu et al. as takotsubo type for apical akinesia and basal hyperkinesia, reverse takotsubo for basal akinesia and apical hyperkinesia, mid-ventricular type for mid-

ventricular ballooning accompanied by basal and apical hyperkinesia and localized type for any other segmental left ventricular ballooning with clinical characteristics of takotsubo-like left ventricular dysfunction.

Histology

Focal myocytolysis is reported as an origin of this cardiomyopathy. No microbiological agent has been associated so far with takotsubo cardiomyopathy. Kloner et al. reported that a pathologic change in the myocardium was not demonstrated in the stunned myocardium. Infiltration of small mononuclear cells has been documented in some cases; these pathologic findings suggest that this cardiomyopathy is a kind of inflammatory heart disease, but not a coronary heart disease. There is also a report describing histologic myocardial damage without coronary heart disease.

Treatment

The treatment of takotsubo cardiomyopathy is generally supportive in nature. In individuals with hypotension, support with inotropic agents or an intra-aortic balloon pump has been used. In many individuals, left ventricular function normalizes within 2 months. Aspirin and other heart drugs also appear to help in the treatment of this disease, even in extreme cases.

Prognosis

Despite the grave initial presentation in some of the patients, most of the patients survive the initial acute event, with a very low rate of in-hospital mortality or complications. The patients are expecting a favorable outcome once recovering from the acute stage of the syndrome, and the long-term prognosis is excellent. Even when ventricular systolic function is heavily compromised at presentation, it typically improves within the first few days and normalizes within the first few months. Although infrequent, recurrence of the syndrome has been reported and seems to be associated with the nature of the trigger.

Statistical analysis

The increased awareness of this syndrome led life insurers to analyze mortality rates in general. In a March 2008 study, Jaap Spreeuw and Xu Wang of the [Cass Business School](#) observed that in the year following a loved one's death, women were more than twice as likely to die than normal, and men more than six times as likely.

The *broken heart syndrome* also led financial analyst [David X. Li](#) to develop the [Gaussian copula](#) models for the pricing of [collateralized debt obligations](#) where at times seemingly unrelated entities become subject to sympathetic financial defaults based on common (but at times not obvious) links.

In popular culture

In an episode of E.R., *The Heart of the Matter*, a woman suffers a heart attack as a result of stress cardiomyopathy after learning of her husband's death.

[Post-Rock](#) band [Maybeshewill](#) have a song called "Takotsubo" on their album [Not For Want Of Trying](#).

In Season 6 of Entourage, Johnny Chase, a.k.a. Drama, is diagnosed with takotsubo cardiomyopathy after a meltdown during an audition for Melrose Place.

On English death certificates, doctors would write "broken heart" as the cause of death if they died inexplicably following the death of a spouse.

In an episode of Grey's Anatomy Dr. Isabell Stevens diagnoses a patient with stress cardiomyopathy. The woman had been suffering from the illness for 7 years, triggered after her affair with her neighbor who suddenly passed away, she claimed he was her "soul mate."

In an episode of Scrubs a woman whose husband died suffered from a similar condition.

In House MD, episode 11 of season 3, a patient is diagnosed with Broken Heart Syndrome. The cause was his love for his brother's fiancée. The patient chose the treatment of electric currents through his brain to remove part of his memory.