



Broken Heart SYNDROME

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CASE STUDY

- **A 50-year-old lady was admitted with complaint of sudden onset of chest pain. She was previously fit and well, with no history of cardiac disease and no cardiac risk factors. Notably, she had lost her husband the night before the episode of acute chest pain.**
- **An electrocardiogram(ECG) showed acute anterior ST elevation myocardial infarction (MI) Cardiac enzymes showed modest troponin rise.**
- **A coronary angiography was performed, which showed left main stem (LMS), left anterior descending (LAD), left circumflex (LCX) and right coronary artery (RCA) patent with no evidence of spasm or atherosclerosis (LV angiography demonstrated characteristic apical ballooning and hypokinesia with good basal contractility).**

BROKEN HEART SYNDROME

Broken Heart Syndrome has emerged as an important acute cardiac condition.

Acute rare , transient reversible non-ischaemi cardiac syndrome that involves dramatic left ventricular dysfunction or a variety of wall-motion abnormalities ie apical akinesis or ballooning mimicking acute coronary syndrome (ACS) in a distribution, which does not correlate with the coronary artery blood supply but in the absence of significant obstructive coronary artery disease usually resolves spontaneously over a period of weeks.

Typically occurs in the context of severe emotional distress (“broken heart syndrome“) or serious physical illness .

WHAT IS IN A NAME?

- ✓ **Takotsubo cardiomyopathy**
- ✓ **Transient Apical ballooning syndrome**
- ✓ **Stress cardiomyopathy**
- ✓ **Colloquially known as Broken Heart Syndrome.**

WHY IS IT CALLED TAKOTSUBO CARDIOMYOPATHY

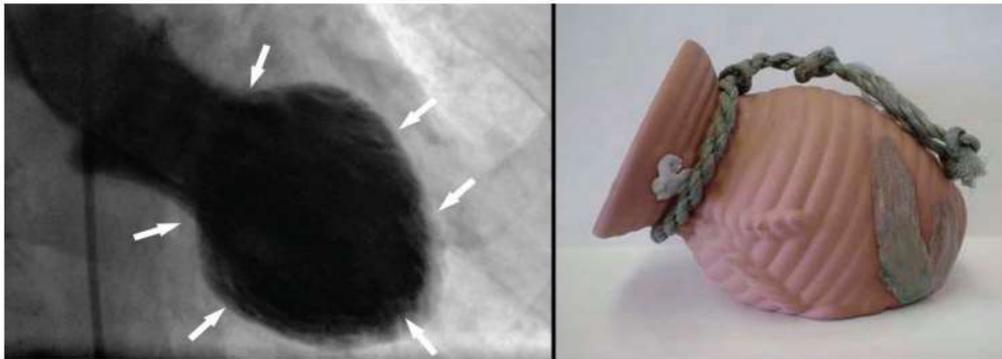
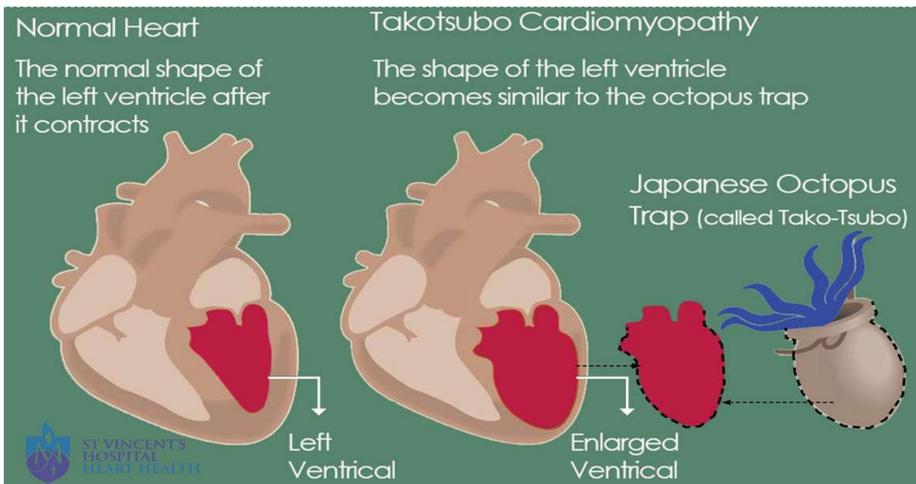


Figure 2. Left, X-ray of the heart during the contraction phase from a patient with takotsubo. Note the distinctive shape with a narrow neck and ballooned lower portion (arrows), which contracts abnormally. Right, The Japanese takotsubo (ceramic pot used to trap octopus) has a shape that closely resembles that of the heart on the left. This image courtesy Dr Satoshi Kurisu, Hiroshima, Japan.

depression of the contractile function of the mid and apical segments of the left ventricle with compensatory hyperkinesis of the basal walls. This leads to ballooning of the ventricular apex with systole.

It was given the name 'takotsubo' due to the visual similarities with a traditional Japanese octopus-catching pot (in Japanese 'takotsubo' means 'fishing pot for trapping octopus').



EPIDEMIOLOGY

- **First described in Japan...in 1990 by Sato et al.**
- **initially considered rare but 1.7-2.2% of patients who had suspected acute coronary syndrome were subsequently diagnosed with broken heart syndrome.**
- **Patients are typically Asian or white. 57.2% of patients were Asian, 40% were white, and 2.8% were other races.**
- **Average age was in the mid-to-late 60's. Mean patient age of 67 years, although cases have occurred in children and young adults**
- **Nearly 90% cases are postmenopausal women.**

STRESSORS ASSOCIATED WITH BROKEN HEART SYNDROME

- Natural disaster
- Unexpected death , illness, or injury of a close relative, friend, or pet
- Receiving a devastating medical diagnosis Serious illness Cancer
- Domestic violence or abuse
- Gambling and financial catastrophe
- Relationship conflicts
- Robbery
- Stress caused from public speaking
- Work related stress
- Fierce argument
- Positive event including a wedding or birthday party
- A surprise party or other sudden surprise

- Acute physical trauma
- Motor vehicle accidents
- Severe pain
- Intense fear
- Subarachnoid hemorrhage
- Sepsis
- Physical activities
- Sudden drop in blood pressure
- Major surgical procedures
- Asthma attack
- Medical procedure (e.g., cardiac stress test)
- Drug overdose

However, approximately 20–35% of cases may not reveal any obvious precipitant.



PATHOGENESIS

Still uncertain .

Where do broken hearts go? Songs sang by Whitney Houston and One Direction didn't really provide the answer

- ❖ Catecholamine excess or surge
- ❖ Coronary artery spasm Microvascular Spasm
- ❖ Myocardial stunning
- ❖ “Aborted myocardial infarction” (transient thrombosis and dissolution
- ❖ Sympathetic nervous system activation.
- ❖ Underlying LVOTO.

It is described as a depression of the contractile function of the mid and apical segments of the left ventricle with compensatory hyperkinesis of the basal walls. This leads to ballooning of the ventricular apex with systole

Pathophysiology

EMOTIONAL AND PHYSICAL STRESS

Excitation of limbic system, hypothalamus

Excitation of medullary autonomic center

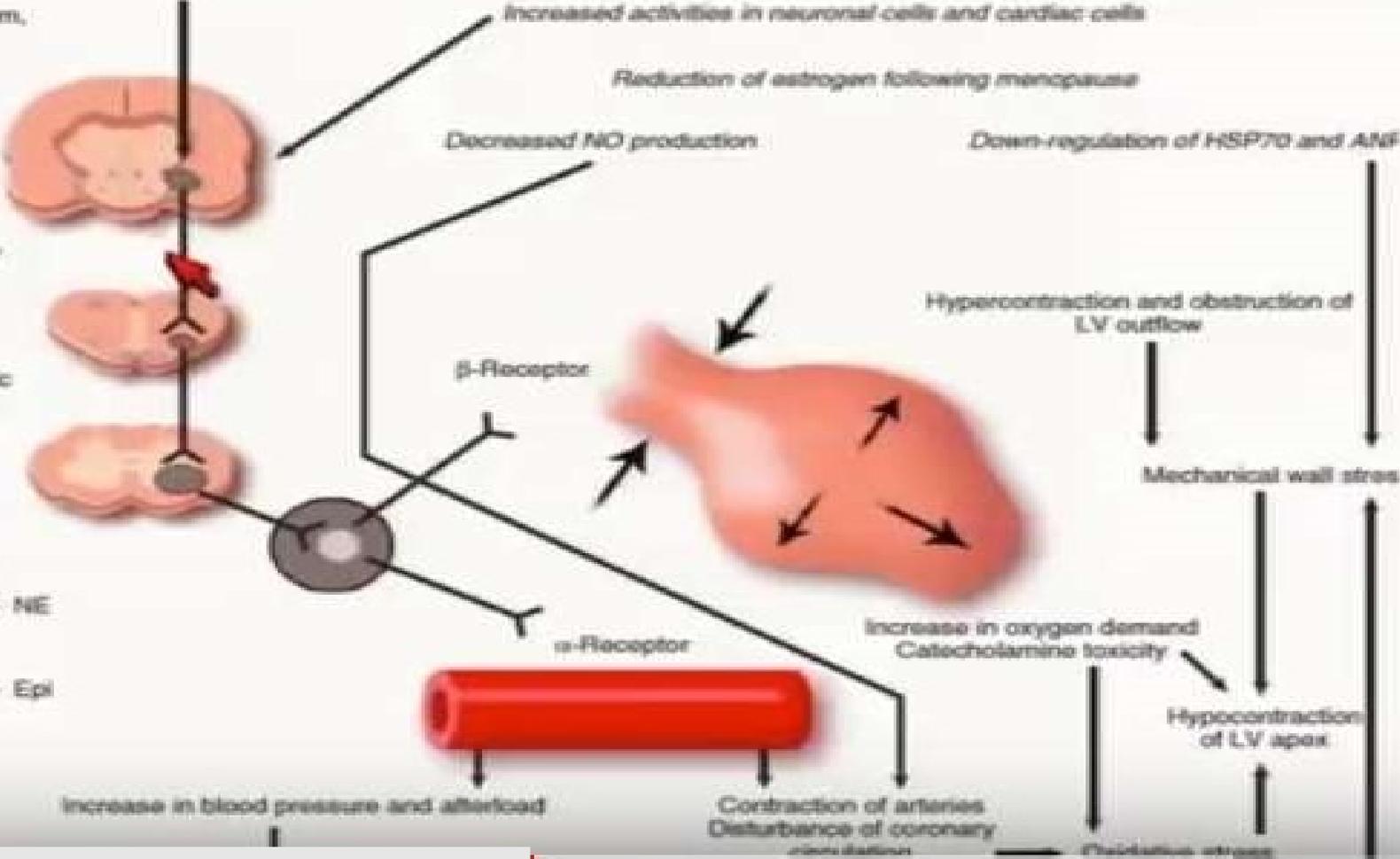
Excitation of presynaptic sympathetic neuron

Excitation of postsynaptic sympathetic neuron

NE

Adrenal medulla

Epi



HISTORY

- ✓ **Previously healthy**
- ✓ **Usually have no evidence of any coronary heart disease.**
- ✓ **Almost exclusively women, most of whom are postmenopausal.**
- ✓ **Usually have a lower incidence of traditional cardiac risk factors,**
- ✓ **Unique feature is its association with a preceding emotionally or physically stressful trigger event, occurring in approximately two thirds of patients**
- ✓ **The clinical presentation of patients ultimately broken heart syndrome is usually indistinguishable from acute coronary syndrome (ACS).**
- ✓ **The most common presenting symptoms are sudden severe chest pain and dyspnea, although palpitations, nausea, vomiting, syncope and, rarely, cardiogenic shock mimicking ACS.**

PHYSICAL EXAMINATION

- ✓ **Physical examination findings in patients with takotsubo (stress) cardiomyopathy (broken heart syndrome) are nonspecific and often normal**
- ✓ **the patient may exhibit the clinical appearance of acute coronary syndrome or acute congestive heart failure.**
- ✓ **Patients may appear anxious and diaphoretic.**
- ✓ **Tachydysrhythmias and bradydysrhythmias**
- ✓ **Hypotension can occur from a reduction in stroke volume because of acute left ventricular systolic dysfunction or outflow tract obstruction.**
- ✓ **Murmurs and rales may be present on auscultation in the setting of acute pulmonary edema.**

INVESTIGATIONS

- ✓ ECG
- ✓ Cardiac enzyme biomarker levels.
- ✓ Echocardiography
- ✓ Coronary Angiogram
- ✓ Ventriculogram

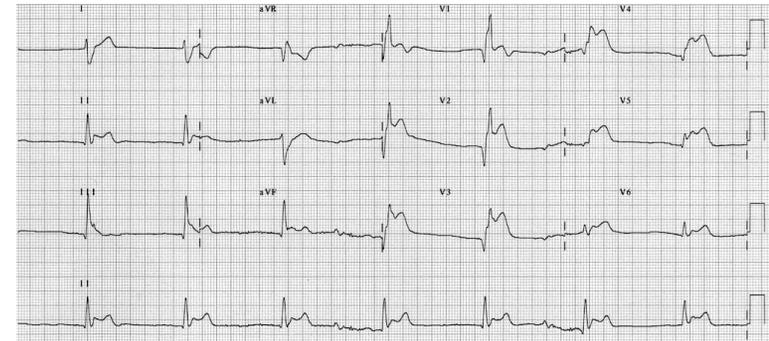
INVESTIGATIONS

The most common acute ECG findings are ST segment elevation in the precordial leads and T-wave inversion in most leads.

ECG changes are not limited to one coronary vascular territory.

This differs from the typical ECG changes in an acute STEMI, which include elevation of the ST segments in contiguous leads accompanied by reciprocal ST depression in leads remote from the site of an acute infarct..

Electrocardiogram changes are often dramatic and not in proportion with the changes in troponin levels.



| ECG change | Example | Prevalence in TTC |
|--|---------|-------------------|
| ST segment elevation, most commonly in precordial leads | | Common (46–100%) |
| Diffuse deep symmetric T-wave inversion. Resolves slowly and often partially | | Common |
| Pathologic Q-waves that typically resolve before hospital discharge, with restoration of normal R-wave progression | | 37% |
| Prolonged QT interval (beginning of Q-wave to end of T-wave) which usually normalises in 1–2 days | | |
| Prolonged PR (beginning of P-wave to beginning of QRS complex) interval | | 26% |

INVESTIGATIONS

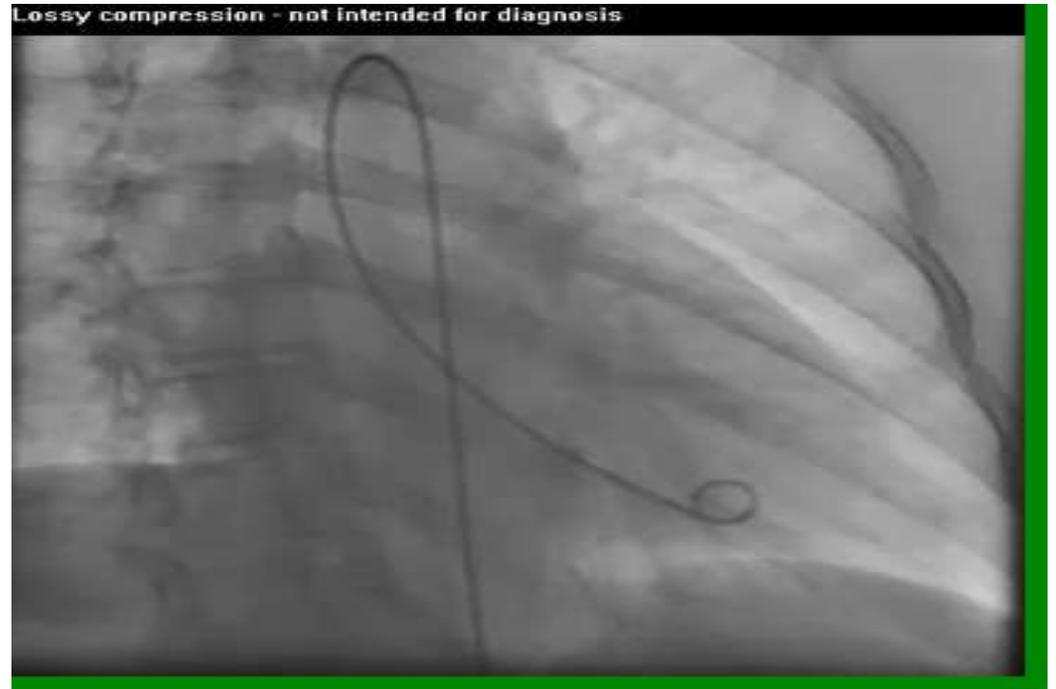
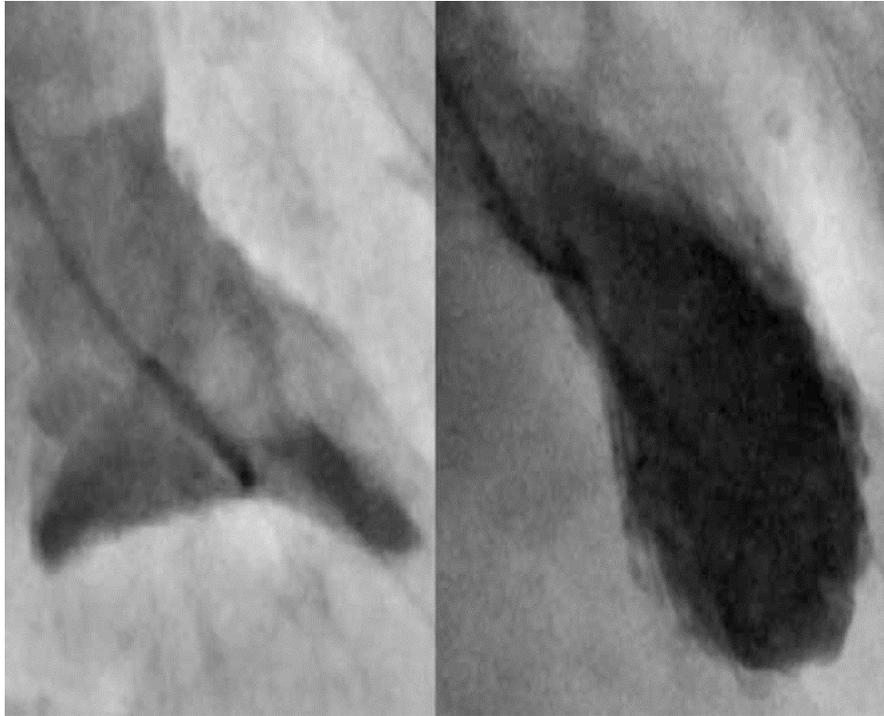


Figure-1: Coronary angiography: Selective left coronary artery angiography (A) and right coronary artery angiography (B) shows no angiographically detectable coronary artery disease.

Table 1. Types of takotsubo cardiomyopathy based on wall motion abnormality⁷

| Type | Description |
|---|--|
| Classic, apical ballooning or takotsubo type | Apical ballooning (most commonly reported) |
| Reverse apical ballooning or reverse takotsubo type | Hyperdynamic apex and akinesia of the base of the left ventricular wall (uncommon) |
| Midventricular type | Involves the mid left ventricular wall, sparing the base and the apex |
| Local type | Localised wall motion abnormality affecting a segment of the left ventricular wall. Most often affects the anterior wall |

INVESTIGATIONS



Ventriculogram of contractile phase of normal left ventricle (left) contrasted against Broken heart syndrome (takotsubo cardiomyopathy) ventriculogram showing apical ballooning of the left ventricle hypercontractile basal portion of the left ventricle (right)

THE MODIFIED MAYO CLINIC CRITERIA FOR DIAGNOSIS

The diagnosis requires the presence of all four of the following

- ✓ **Transient hypokinesis, dyskinesis, or akinesis of the LV midsegments, with or without apical involvement; the regional wall-motion abnormalities extend beyond a single epicardial vascular distribution, and a stressful trigger is often, but not always, present**
- ✓ **Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture**
- ✓ **New ECG abnormalities (either ST-segment elevation and/or T-wave inversion) or modest elevation in the cardiac troponin level**
- ✓ **Absence of pheochromocytoma or myocarditis**

DIFFERENTIAL DIAGNOSES

- Acute Coronary Syndrome
 - ❖ early acute ST elevation myocardial infarction (STEMI)
 - ❖ acute non-ST elevation myocardial infarction or
- acute pulmonary embolism.
- Angina Pectoris
- Aortic Dissection
- Boerhaave Syndrome
- Cardiac Tamponade
- Cardiogenic Shock
- Cocaine-Related Cardiomyopathy
- Coronary Artery Vasospasm
- Dilated Cardiomyopathy
- Hypertrophic Cardiomyopathy
- Esophageal spasm
- Gastroesophageal reflux disease

ACS OR BROKEN HEART SYNDROME?

- Indistinguishable from a STEMI in the ED.
- No criteria can be safely used to differentiate between the two conditions
- Has a better prognosis than STEMIs with a similar ECG but it is certainly not benign.
- Can only be distinguished by performing a coronary angiography and left ventriculography otherwise difficult objectively to distinguish Broken Heart Syndrome from acute coronary syndrome.
- When the diagnosis is in doubt, it should be treated as acute coronary syndrome until proven otherwise.

MANAGEMENT OF BROKEN HEART SYNDROME

- ✓ There are no definite guidelines for management.
- ✓ Most patients should be hospitalized for confirmation of the diagnosis and subsequent management.
- ✓ Treatment is usually supportive.
- ✓ β -blockade have an important role haemodynamically stable patients
- ✓ Diuretics given as necessary for volume overload.
- ✓ Angiotensin converting enzyme inhibitor (ACEI) or an Angiotensin receptor antagonist without a left ventricular outflow tract gradient should be prescribed an to prevent cardiac remodeling.

COMPLICATIONS

Occur in 20% of cases of Broken heart Syndrome, particularly in the early stage

- Left heart failure with and without pulmonary edema**
- Cardiogenic shock**
- Left ventricular (LV) outflow obstruction**
- Mitral regurgitation**
- Ventricular arrhythmias**
- LV mural thrombus formation**
- LV free-wall rupture**
- Death**

CAN BROKEN HEART SYNDROME BE PREVENTED?

- There are no known treatments for preventing broken heart syndrome but learning stress management, problem-solving, and relaxation techniques can be helpful in improving both psychological and physical health.
- Managing stress can also be improved with physical exercise and anxiety medications.
- It is also important to avoid poor choices in managing stress such as drinking, overeating, illicit drug use or smoking. These are not permanent solutions, and could lead to additional health problems.

PROGNOSIS

- ✓ The long- term prognosis broken heart syndrome or takotsubo (stress) cardiomyopathy is typically excellent.
- ✓ Nearly 95% of patients experiencing complete recovery within 4-8 weeks.
- ✓ the annual recurrence rate is approximately 1.5% but that the frequency of ongoing symptoms is greater.
- ✓ Estimates of mortality have ranges from 1% to 3.2%
- ✓ The symptoms of broken heart syndrome are treatable, and the condition usually reverses itself in days or weeks.
- ✓ Very unlikely that it will happen twice in the same individual.

CONCLUSION

- ✓ **Broken Heart Syndrome (Takotsubo cardiomyopathy) has important implications because its clinical presentation mimics that of an acute coronary syndrome.**
- ✓ **Increased awareness of this condition will likely result in its being diagnosed more frequently.**
- ✓ **avoid potentially unnecessary invasive interventions (eg, coronary artery stent placement)**
- ✓ **Prospective studies are needed in order to determine more accurately the incidence of takotsubo cardiomyopathy and to ascertain the long-term outcomes.**
- ✓ **Studies are also needed to elucidate the specific pathophysiologic mechanisms responsible for this cardiomyopathy.**

