

Acute Pancreatitis Complicated by Stress Cardiomyopathy With Persistent Apical Akinesis: A Case Report and Literature Review

Journal of Investigative Medicine High
Impact Case Reports
Volume 7: 1–4
© 2019 American Federation for
Medical Research
DOI: 10.1177/2324709619893197
journals.sagepub.com/home/hic


Temidayo Abe, MD¹, Melvin Simien, MD¹,
and Hayes Dolphurs, MS¹

Abstract

Takotsubo cardiomyopathy or stress cardiomyopathy is a transient reversible cardiomyopathy characterized by regional wall motion abnormalities that usually extend beyond a single epicardial vascular distribution. It is often precipitated by acute physical or emotional stressors. In this article, we present the case of a postmenopausal woman who was admitted for management of acute pancreatitis. On the second day of admission, she developed shortness of breath and electrocardiographic abnormalities. A transthoracic echocardiogram revealed left ventricular systolic dysfunction and apical akinesis, and coronary angiography revealed normal coronary arteries. She was diagnosed with takotsubo cardiomyopathy triggered by acute pancreatitis and started on guideline-directed heart failure medications. A follow-up echocardiogram 4 months later revealed persistent systolic dysfunction and apical akinesis.

Keywords

stress cardiomyopathy, pancreatitis, takotsubo

Introduction

Takotsubo cardiomyopathy (TCM) or stress cardiomyopathy is a transient reversible cardiomyopathy characterized by regional wall motion abnormalities that usually extend beyond a single epicardial vascular distribution in the setting of emotional or physical stress.^{1,2} The incidence of TCM has increased in recent years due to the availability of early invasive coronary angiography and increased awareness.³ In this case report, acute pancreatitis was the precipitating factor. While acute pancreatitis remains the leading gastrointestinal cause of hospitalization in the United States, the likelihood of developing secondary TCM is very rare.³ To promote better understanding, we reviewed all cases of pancreatitis-induced TCM in the current literature.

Case Report

A 57-year-old African American female with a history of alcohol abuse and diabetes mellitus presented to the emergency department with a 2-day history of severe diffuse abdominal pain with radiation to the back. Associated symptoms included nausea and vomiting. She consumed 5 bottles of beer daily with the most recent alcohol intake 2 days prior to presentation. Vital signs on presentation were blood

pressure 123/90 mm Hg, pulse 125 beats/minute, respiratory rate 17 breaths/minute, and temperature 36.8°C. Physical examination was significant for a mildly tender abdomen. Laboratory findings revealed leukocytosis of 14 600/mm³ and lipase of 882 U/L (normal = 16–62 U/L). Computed tomographic imaging of the abdomen with and without contrast revealed peripancreatic fat stranding suggestive of acute interstitial pancreatitis. The patient was admitted for intravenous fluid resuscitation and pain management.

On day 2 of admission, the patient became dyspneic and hypoxemic (digital pulse oximetry 82%) on room air. Chest radiography showed pulmonary edema, and abdominal ultrasound revealed a dilated inferior vena cava. Troponin I 0.97 ng/mL (normal <0.03 ng/mL) and brain natriuretic peptide 1627 pg/mL (normal <100 pg/mL) levels were elevated. A 12-lead electrocardiogram (ECG; Figure 1) obtained revealed

¹Morehouse School of Medicine, Atlanta, GA, USA

Received September 17, 2019. Revised October 27, 2019. Accepted October 29, 2019.

Corresponding Author:

Temidayo Abe, MD, Internal Medicine Residency Program, Morehouse School of Medicine, 720 Westview Drive SW, Atlanta, GA 30310, USA. Email: tabe@msm.edu



Creative Commons CC BY: This article is distributed under the terms of the Creative Commons Attribution 4.0 License

(<http://www.creativecommons.org/licenses/by/4.0/>) which permits any use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

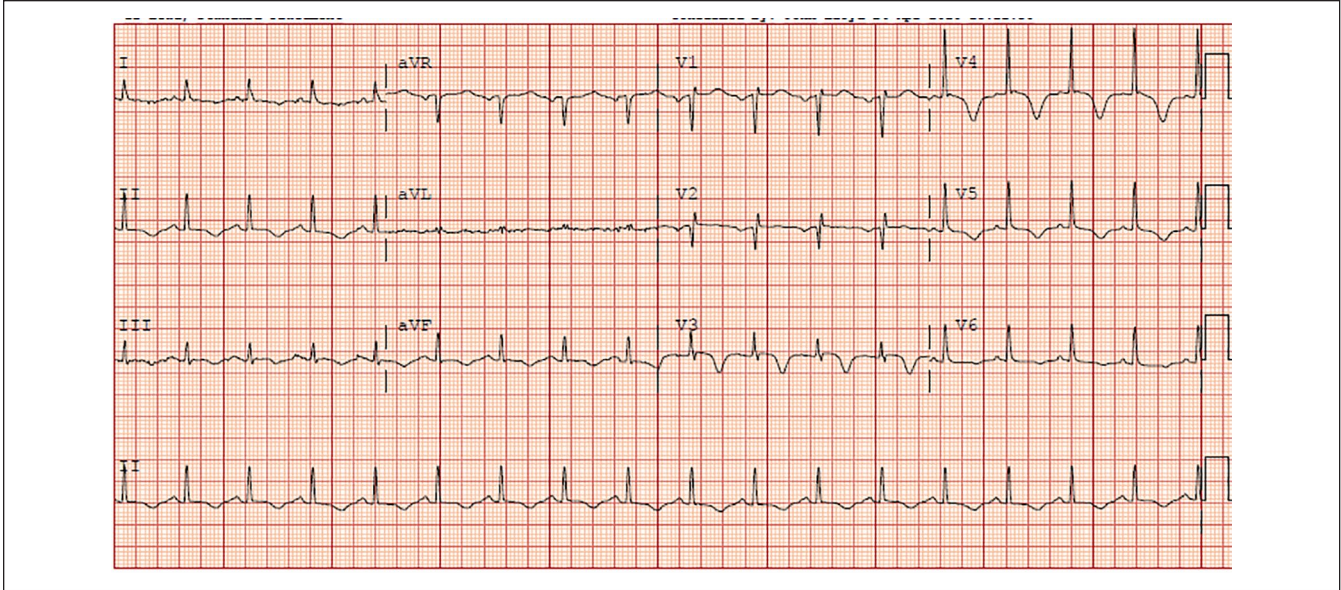


Figure 1. Electrocardiogram with T-wave inversion in V3-V5, II, III, and aVF.

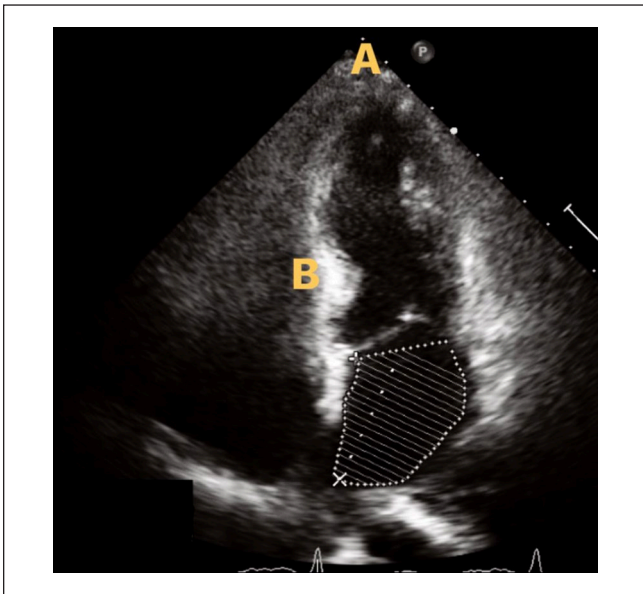


Figure 2. Echocardiogram reveals apical akinesis (A) and basal hyperkinesis (B) consistent with takotsubo cardiomyopathy.

diffuse ischemic T-wave inversion. The patient was aggressively diuresed with significant improvement in respiratory status. Transthoracic echocardiography revealed a left ventricular ejection fraction of 40% with basal segment hyperkinesis but apical akinesis consistent with stress-induced cardiomyopathy (Figure 2). Coronary angiography revealed normal coronary vessels.

The patient's abdominal pain resolved, and there were no further complications from her pancreatitis. She was started on an angiotensin converting enzyme (ACE) inhibitor and a

β -blocker and discharged to home in stable condition. A repeat transthoracic echocardiography obtained 4 months later revealed unchanged left ventricular ejection fraction and persistent apical akinesis in the setting of persistent alcohol use. The ACE inhibitor and β -blocker were continued, and she was counselled on alcohol cessation.

Discussion

Takotsubo cardiomyopathy is a clinical syndrome characterized by severe ventricular dysfunction in the absence of obstructive coronary artery disease with regional wall motion abnormalities that usually extend beyond a single epicardial vascular distribution.^{2,4} Since its discovery in the 1990s, it has been increasingly recognized in recent years.^{4,5} On presentation, clinical signs and symptoms are usually consistent with acute coronary syndrome. Current diagnostic criteria include the following: (1) transient left ventricular dysfunction (hypokinesia, akinesia, or dyskinesia) presenting as apical ballooning or midventricular, basal, or focal wall motion abnormalities; (2) usually an emotional, physical, or combined trigger; (3) new ECG abnormalities are present (ST-segment elevation, ST-segment depression, T-wave inversion, and QTc prolongation); (4) levels of cardiac biomarkers (eg, troponin) are moderately elevated and significant elevation of brain natriuretic peptide is common; (5) absence of significant coronary artery disease; and (6) no evidence of infectious myocarditis.⁶ Initially considered a benign disease, recent studies have demonstrated mortality and morbidity in patients with TCM.¹

Although the exact pathogenesis remains unclear, it is proposed to be secondary to exaggerated myocardial catecholamine exposure, which may induce myocardial damage from direct toxic effects or indirectly via microvascular spasm in

Authors	Age	Sex M/F	Etiology of pancreatitis	Presenting symptoms	Onset of symptoms from admission date	Troponin	EKG findings	Echocardiography or ventriculography	Coronary angiography	Treatment	Left ventricular recovery	Time of recovery in weeks	Deaths
Abdul-Ghani Sankri-Tarichi, et al	56	F	Choledocholithiasis	Shortness of breath, Chest pain	3 days	TnI 2.39 ng/ml	T wave inversion V2-V5	Apical Hypokinesia	Normal coronary arteries	aspirin, beta blocker, ace inhibitor	YES		1 N
Ronak Rajani, et al	72	F	N/A	Chest pain	7 days	TnT 0.32 ug/l.	T wave inversion V4-V5, II, III, aVF	Apical hypokinesia	Non obstructive CAD	aspirin, heparin, beta blocker, ace inhibitor	N/A	N/A	N
Joseph D. Bruenjes, et al	55	M	Alcohol	None	1 day	TnI 0.658 ng/ml	T wave inversion V1-V6, II, III, aVF	Apical hypokinesia and basal hyperkinesia	Non obstructive CAD	aspirin, beta blocker, ace inhibitor	YES		3 N
Jason K. Leubner MD	76	F	Choledocholithiasis	None	1 day	TnI 9.94 ng/ml	10 mm ST elevation anterior septal	Apical hypokinesia and basal hyperkinesia	Normal coronary arteries	ERCP	N/A	N/A	N
Michael Cheezum, et al	76	F	Choledocholithiasis	Shortness of breath	3 days	TnI 0.67 ng/ml	ST elevation in the Lateral leads	Apical hypokinesia	Non obstructive CAD	Beta blocker, ace inhibitor, MRCP	YES	N/A	N
Peter Boulos	47	F	N/A	Nausea	N/A	TnI 0.30 ng/ml	T wave inversion V3-V6, II, III, AVF	Apical hypokinesia	N/A	N/A	N/A	N/A	N
Andree H Koop	63	M	N/A	Shortness of breath	3 days	N/A	N/A	Global hypokinesia	N/A	N/A	YES		3 N
Manali Pednekar	70	F	N/A	Sudden cardiac arrest	1 day	TnI 3.13 ng/ml	ST elevations in the inferior leads and T wave inversions in lateral leads	Reduced ejection fraction (30%)	Normal coronary arteries	beta blocker, ace inhibitor	YES		6 N
Marta Garbowska	47	F	Alcohol	Chest pain	7 days	TnI 9.65 ng/ml	ST elevation in V2	Apical hypokinesia	Normal coronary arteries	IV hydration, antibiotics, analgesic	YES		2 N

Figure 3. Cases of pancreatitis induced takotsubo reported in the literature. References [10-16].

Abbreviations: M, male; F, female; N/A, not available or provided by the authors; TnI, troponin I; TnT, troponin T; ERCP, endoscopic retrograde cholangiopancreatography; % MRCP, magnetic resonance cholangiopancreatography %.

predisposed patients due to genetic mutation, underlying endothelial dysfunction or reduced in estrogen levels.^{1,7} Also, regional differences in myocardial β -adrenergic receptors densities coupled with a downregulation of the receptors by exaggerated catecholamine exposure are thought to play a role.⁷ It is predominantly seen in postmenopausal women in a setting of an emotional or physical stressor (ie, acute lung diseases and central nervous system disorders).⁸ Notably, patients who developed TCM as a result of physical stressors tend to have a poorer prognosis with one study reporting in-hospital mortality rate of 20.9% compared with 2.6% in those with an emotional stressor.⁹

Takotsubo cardiomyopathy in association with acute pancreatitis, as observed in our patient, has rarely been reported. To our knowledge, only 9 cases have been previously reported (Figure 3).¹⁰⁻¹⁶ Most patients were female (7/9) and >55 years of age (7/9). All patients presented within a week of pancreatitis onset, often with shortness of breath and chest pain; however, one patient presented with sudden cardiac death. Troponin was elevated in all patients, ranging from TnI 0.32 ng/mL to 9.94 ng/mL. As with our case, ECG findings were mostly T-wave inversion, especially in the anterior leads (n = 4/7). Most patients had apical akinesia with basal hyperkinesia (n = 8/9). Most patients were reportedly treated with heart failure medications (n = 5/7), and unlike our case, ventricular function normalized within 6 weeks for all patients with follow-up imaging studies (n = 6/6).

Complete recovery of left ventricular systolic dysfunction and wall motions abnormalities is expected within 2 months

of onset.¹⁷⁻¹⁹ The unique feature of our case is persistent left ventricular apical akinesia at 4 months follow-up despite treatment with an ACE inhibitor and a β -blocker. We suspect that persistent alcohol abuse might be contributing to the delayed left ventricular recovery in our patient; however, it has not been reported in the literature. More recent studies evaluating left ventricular recovery pattern with 2-dimensional speckle-tracking echocardiography in patients with TCM suggests that left ventricular recovery might not be complete as previously suggested.^{20,21}

Conclusion

Takotsubo cardiomyopathy should be considered in patients with pancreatitis who develop clinical signs and symptoms suggestive of acute coronary syndrome. Despite our increased understanding of the clinical implications of TCM, more studies are needed with regard to long-term follow-up and recovery patterns.

Authors' Note

This work was presented in abstract form at the American College of Gastroenterology 2019 Annual Meeting; October 25 to 30, 2019; San Antonio, Texas.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethics Approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed Consent

Verbal informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

References

- Cusma-Piccione M, Longobardo L, Oteri A, et al. Takotsubo cardiomyopathy: queries of the current era. *J Cardiovasc Med (Hagerstown)*. 2018;19:624-632.
- Medina de Chazal H, Del Buono MG, Keyser-Marcus L, et al. Stress cardiomyopathy diagnosis and treatment. *J Am Coll Cardiol*. 2018;72:1955-1971.
- Y-Hassan S, Tornvall P. Epidemiology, pathogenesis, and management of takotsubo syndrome. *Clin Auton Res*. 2018;28:53-65.
- Peery AF, Dellon ES, Lund J, et al. Burden of gastrointestinal disease in the United States: 2012 update. *Gastroenterology*. 2012;143:1179-1187.
- Vallabhajosyula S, Deshmukh AJ, Kashani K, Prasad A, Sakhuja A. Tako-subo cardiomyopathy in severe sepsis: nationwide trends, predictors, and outcomes. *J Am Heart Assoc*. 2018;7:e009160.
- Minhas AS, Hughey AB, Koliass TJ. Nationwide trends in reported incidence of takotsubo cardiomyopathy from 2006 to 2012. *Am J Cardiol*. 2015;116:1128-1131.
- Ghadri JR, Wittstein IS, Prasad A, et al. International expert consensus document on takotsubo syndrome (part I): clinical characteristics, diagnostic criteria, and pathophysiology. *Eur Heart J*. 2018;39:2032-2046.
- Pelliccia F, Kaski JC, Crea F, Camici PG. Pathophysiology of takotsubo syndrome. *Circulation*. 2017;135:2426-2441.
- Nyman E, Mattsson E, Tornvall P. Trigger factors in takotsubo syndrome—a systematic review of case reports. *Eur J Intern Med*. 2019;63:62-68.
- Sobue Y, Watanabe E, Ichikawa T, et al. Physically triggered takotsubo cardiomyopathy has a higher in-hospital mortality rate. *Int J Cardiol*. 2017;235:87-93.
- Bruenjes JD, Vallabhajosyula S, Vacek CJ, Fixley JE. Acute pancreatitis-induced takotsubo cardiomyopathy in an African American male. *ACG Case Rep J*. 2015;3:53-56.
- Cheezum MK, Willis SL, Duffy SP, et al. Broken pancreas, broken heart. *Am J Gastroenterol*. 2010;105:237-238.
- Koop AH, Bailey RE, Lowman PE. Acute pancreatitis-induced takotsubo cardiomyopathy and cardiogenic shock treated with a percutaneous left ventricular assist device. *BMJ Case Rep*. 2018;2018:bcr-2018-225877.
- Leubner JK, Ortiz Z, Wolfrey J, Drake L. Can gallstones break the heart? Pancreatitis-induced takotsubo cardiomyopathy mimicking acute myocardial infarction. *J Am Geriatr Soc*. 2014;62:1814-1815.
- Rajani R, Przedlacka A, Saha M, de Belder A. Pancreatitis and the broken heart. *Eur J Emerg Med*. 2010;17:27-29.
- Sankri-Tarbichi AG, Mathew PK, Matos M, His D. Stress-related cardiomyopathy. *Heart Lung*. 2007;36:43-46.
- Garbowska M, Kurek K, Sobkowicz B. Takotsubo cardiomyopathy resulting from exacerbation of chronic pancreatitis. *Folia Cardiologica*. 2016;11:473-476.
- Scally C, Rudd A, Mezincescu A, et al. Persistent long-term structural, functional, and metabolic changes after stress-induced (takotsubo) cardiomyopathy. *Circulation*. 2018;137:1039-1048.
- Gianni M, Dentali F, Grandi AM, Sumner G, Hiralal R, Lonn E. Apical ballooning syndrome or takotsubo cardiomyopathy: a systematic review. *Eur Heart J*. 2006;27:1523-1529.
- Valbusa A, Abbadessa F, Giachero C, et al. Long-term follow-up of tako-tsubo-like syndrome: a retrospective study of 22 cases. *J Cardiovasc Med (Hagerstown)*. 2008;9:805-809.
- Nowak R, Fijalkowska M, Gilis-Malinowska N, et al. Left ventricular function after takotsubo is not fully recovered in long-term follow-up: a speckle tracking echocardiography study. *Cardiol J*. 2017;24:57-64.