Post operative Takotsubo Cardiomyopathy in a Patient Following Liver Transplant surgery

Muhammad Mubashir MD, Arun S. Uthayashankar MD, Noor S. Abdalla MD, Michael D. Kaufman MD, Sohail K. Mahboobi MD

Lahey Hospital and Medical Center, Burlington, MA

Introduction

Stress induced/ Takotsubo cardiomyopathy (TCM) is an acute non-ischemic cardiomyopathy causing transient acute left ventricular dysfunction that occurs in stressful situations such as major surgery. This may lead to hemodynamic instability and ventricular arrhythmias. Patients with End stage liver disease (ESLD) have several precursors for the development of Takotsubo cardiomyopathy. Awareness of this condition with a high index of suspicion, utilization of echocardiogram for rapid diagnosis and timely supportive measures can lead to enhanced recovery with minimal detriment to the patient.

Case Description

A 52 year old caucasian female with decompensated alcoholic ESLD with a Model for End stage Liver Disease score (MELD) of 28 presented for living donor liver transplantation. Prelisting dobutamine stress echocardiogram and transthoracic echocardiogram (TTE) were normal. The intraoperative course was uneventful. Phenylephrine and Norepinephrine infusions were used to maintain a MAP over 65 mmHg. Vasopressin infusion was used during hepatectomy to modulate splanchnic blood flow and aid surgical dissection. There was no evidence of ischemia by both EKG and Transesophageal echocardiogram (TEE) and the cardiac function was normal intraoperatively. (Figure A, B). Patient had an uneventful immediate post operative course. On POD 2 the patient started experiencing chest pain with dyspnea and oxygen desaturation. Auscultation of the lungs revealed crackles

EKG showed minimal ST-T wave changes. Troponin I peaked at 1.49. TTE showed dilatation and akinesis of middle to apical portion of the left ventricle with a normally contracting base. Ejection fraction was 20%. (figure C - diastolic, D – systolic). Coronary angiogram showed no evidence of occlusive disease. A provisional diagnosis of Takotsubo's cardiomyopathy was made and the patient was managed with diuresis, beta blockade and oxygen supplementation. On POD 6 a follow up TTE showed slight improvement of ejection fraction to 30% and hypokinesis of mid left ventricle to the apex (figure E - diastolic, F - systolic). Another follow up TTE on POD 11 showed complete resolution of cardiomyopathy with LVEF of 60% and no wall motion abnormalities (figure G - diastolic, H - systolic). The patient gradually improved and on POD 14 , she was discharged from the hospital.

Discussion

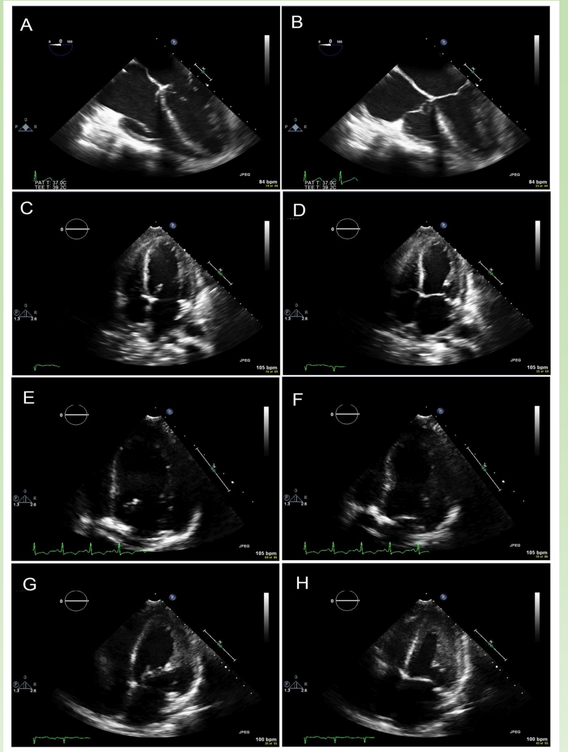
Patients with ESLD presenting for liver transplant have prolonged sympathetic hyperactivity resulting from stimulation of baroreceptors due to decreased central blood volume. This leads to direct cardiac myocyte damage and decreased beta-adrenergic sensitivity due to down regulation of beta-adrenergic receptors. Other factors involved in causing cardiac myocyte damage include increased inflammatory mediators like TGF - beta , endogenous cannabinoids, Na/Ca exchanger abnormalities causing apoptosis and a rapid drop in bilirubin, which has cardioprotective properties.

The magnitude of perioperative events places a significant physical and emotional stress on the transplant recipients leading to an increase in serum catecholamines. This in turn causes furthur cardiac myocyte dysfunction and vasospasm of the coronary arteries. The apex of the heart is particularly vulnerable because it is structurally weaker compared with the base due to the thinned out middle myocardial layer. The end result is Acute left ventricular systolic failure caused by a hypokinetic apex and a normally contracting base, which resembles a japanese fishing pot used for trapping octopus known as Takotsubo in an echocardiogram. It is important to differentiate this non- obstructive clinical entity from obstructive CAD by doing Coronary angiography.

The prevalence of postoperative TCM is 17.74 per 100000 , whereas in post liver transplant patients, it is1-7%.

Strategies for managing TCM post - liver transplantation include diuretics, inotropic medications and vasopressor support. If these fail, percutaneous devices for circulatory support can be considered. Adrenergic blockade can prevent recurrence as well as reverses the preexisting damage on the myocardium. Psychiatric counseling, anxiolytics and Aspirin are useful . There are successful reports of bridging therapy with ventricular assist devices to aid myocardial recovery in patients who do not respond to supportive therapy.

Greater than 80% of patients recover completely within 2-8 weeks, the remaining progress to chronic heart failure.



Intraoperative TEE : A - Diastolic, B - Systolic

Postoperative day # 2, TTE : C – Diastolic, D - systolic

Postoperative day # 6, TTE : E – Diastolic, F - systolic

Postoperative day # 11, TTE : G – Diastolic, H - systolic

References

1.Møller Set al: Cirrhotic cardiomyopathy: a pathophysiological review of circulatory dysfunction in liver disease.Heart.2002.Jan;87(1):9-15

.2..Maneerat Chayanupatkul et al :Cirrhotic cardiomyopathy: review of pathophysiology and treatment. Hepatol Int. 2014 Jul; 8(3): 308–315.

3. Nancy Gupta, et al.Bilirubin in coronary artery disease: Cytotoxic or protective? World J Gastrointest Pharmacol Ther. 2016 Nov 6; 7(4): 469–476.

4. Siew Yen Ho*.Anatomy and myoarchitecture of the left ventricular wall in normal and in disease. European Journal of Echocardiography (2009) 10, iii3–iii7.

5. Tak Kyu Oh, In-Ae Song , Young-mi Park et al..Prevalence and risk factors for postoperative stress-related cardiomyopathy in adults.Published: December 20, 2017

6. Yataco ML et al. Reversible non-ischaemic cardiomyopathy and left ventricular dysfunction after liver transplantation: a single-centre experience. Liver Int. 2014;34(6):e105–e110