



CASUISTIC PAPER

Postpartum takotsubo cardiomyopathy complicated with severe pulmonary edema and cardiogenic shock – a case report

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ABSTRACT

Introduction and aim. Takotsubo cardiomyopathy (TCM) is a rare but life-threatening illness that can affect middle aged, young and pregnant women. It is a cardiac emergency and can mimic many other life threatening conditions like myocardial infarction, acute myocarditis, peripartum cardiomyopathy or dilated cardiomyopathy and is diagnosed by exclusion.

Description of the case. Here we report a rare case of takotsubo cardiomyopathy in a young 28 year old female immediately post vaginal delivery of her normal full term twin pregnancy, who was otherwise a healthy female. She went on to develop complication of left ventricular heart failure and cardiogenic shock, which were successfully managed by conservative treatment leading to a full recovery.

Conclusion. Takotsubo or stress cardiomyopathy is a rare entity and often a missed diagnosis, which if caught on time and treated leads to great prognosis. Our patient made a full recovery and is living a healthy life.

Keywords. cardiogenic shock, left ventricular dysfunction, postpartum, stress cardiomyopathy, takotsubo, twins

Introduction

Takotsubo cardiomyopathy (TCM) also known as stress induced cardiomyopathy that is characterized by acute onset left ventricular dysfunction associated with variable wall motion abnormalities with absence of any significant coronary artery disease.¹ Cardiac function often spontaneously recovers in most patients within days or weeks, if the severity of the disease does not cause death.² The common precipitating factors of TCM are emotional, physical psychological stressors with a greater incidence in patients with pre-existing psychiatric conditions.³ Most of cases of TCM associated with pregnancy are reported during the peripartum period and were not related to the mode of delivery making peripartum cardiomyopathy an important differential which is difficult to distinguish.^{2,4}

Aim

In this article, we present a case of a 28-year-old female who presented with normal antenatal period at 38weeks 2 days of gestation, with twin normal vaginal delivery. She subsequently developed TCM, immediately post-delivery, which was complicated with severe pulmonary edema and cardiogenic shock, which was successfully managed conservatively. We further review the current literature on stress-induced cardiomyopathy in pregnancy.

Description of the case

A 28 year old Indian female with P1L2 on postpartum day 1 of a full term (38 weeks 2 days), normal vaginal delivery on 27/12/2021 presented to our hospital 5-6 hours after delivery of twins at a local nursing home with chief complaints of severe progressive sub sternal pressure like throbbing chest pain since 2-3 hours(2

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hours after normal vaginal delivery). The pain was 10/10 on VAS (visual analog scale), non-radiating associated with diaphoresis and shortness of breath. History of feeling “fluttery” with lightheadedness and palpitations was present since 2 hours. The pain was not relieved by I.V. (intravenous) analgesics and I.V. antacids. On presenting to the emergency department, blurring of vision and severe throbbing headache present since 15-20 minutes. No history of PPH (post-partum hemorrhage) or such episodes previously.

The pregnancy was a booked one with normal antepartum period all tests within normal limits except a slight deranged SGOT/SGPT (100/121) during last few months of pregnancy. It was a spontaneously conceived pregnancy with an uneventful ante and peripartum period. The twins were one boy (2.6 kg) and one girl (2.8 kg). Both of them cried immediately post-delivery and were normal.

No history of GDM (gestational diabetes mellitus), preeclampsia, eclampsia during the pregnancy. Family history was only significant for twin pregnancies, otherwise there was no significant history of any cardiac illness or sudden deaths/cardiac arrests/heart failures. No family history of any chronic illness. Past history not significant and no history of any illness or medications. She is a non-vegetarian with normal bowel/bladder habits and no addictions, works as a social worker and does not experience much stress in her life but the twin pregnancy and delivery was a “ONE TIME BIG LIFE CHANGING EVENT” for her.

On examination patient was conscious but confused, diaphoretic. Vitals suggestive of accelerated hypertension with a high blood pressure of 220/120 mmHg, sinus tachycardia at 145 beats/min, Respiratory rate -22/min, SpO₂ 94% on room air and afebrile.

In view of high BP, Intravenous infusion of Nitroglycerine (at an initial dose of 10 mcg/min) started immediately, emergency non contrast CT (computed tomography scan) head done and reported normal, basic investigations sent and shifted to medical intensive care unit (ICU). Patient was anxious, in acute distress, dehydrated, peripheries cold, clammy with no apparent rashes. Neck was soft and non-tender with no apparent masses or jugular distension or adenopathy. Thyroid was normal in size, symmetrical and no bruits. Cardiovascular examination unremarkable with sinus tachycardia, normal rhythm with no murmurs or gallops or rubs. Lung auscultation suggestive of bilateral basal crept, rest within normal limit. Abdomen was soft, tender normoactive bowel sounds, no significant organomegaly or masses. Uterus was well contracted and palpated in suprapubic region. A neurological examination showed grossly intact cranial nerves (light touch, pinprick, position & vibration sense), normal sensation, strength was full bilaterally, normal reflexes,

unable to walk but normal coordination. Pronator drift of outstretched arms absent, with normal muscle bulk and tone. Bilateral pitting pedal edema present but no skin discolorations, clubbing, deformities or cyanosis. The capillary filling time was normal. Speech was fluent, with appropriate comprehension and retention.

Initial investigations showed a baseline hemoglobin of 11.2 gm/dL, TLC: 9,600/mm³, platelets 246 000/mm³ ECG on admission as in figure 1 and a differential of ACS (acute coronary syndrome) post-partum was considered. Inj. Tramadol (50 mg IV thrice a day) and O₂ Therapy with nasal prong initiated. Troponin I was 0.40 ng/ml (Normal-0 -0.2), BNP:1240 pg/ml (Normal:- <100 ng/ml). In view of acute LVF (left ventricular failure), decongestant therapy with Inj. Furosemide infusion at the rate of 5 mg/hr was initiated. ACS Protocol activated, anti-platelet, high dose statins and anticoagulants S/C (subcutaneously) started after gynecological reference for ruling out PPH or retained tissue/placenta on ultrasound (T Aspirin 375mg stat, T. Atorvastatin 40 mg once a day, Inj. Enoxaparin (0.4 ml/40mg, S/C once a day).

All investigations sent in view of the differential diagnosis which were all normal. Also CECT abdomen and chest were reported normal. S.FDP (fibrin degradation product), APLA Profile (lupus anticoagulant), ANA Profile, Thyroid Profile, Thyroid Antibodies, Lipid Profile, Urine dipstick protein-negative. Routine investigations were normal except transaminitis as SGOT/SGPT (112/114 mg/dl) elevated. An urgent bedside 2D echo done revealed apical LV hypokinesia with LVEF (left ventricular ejection fraction) of 20%, LVDD (diastolic dysfunction) grade I with no mitral regurgitation/mitral stenosis/aortic stenosis/aortic regurgitation/clots/vegetation or PE (pulmonary embolism). A cardiac angiography was planned and performed for the patient with differentials of coronary artery disease, but reported normal. A D-DIMER and CTPS (CT pulmonary angiography) was done which was normal and ruled out pulmonary embolism (Fig. 2).

On day 2 of admission patient developed sudden onset generalized tonic clonic seizure for 2-3 minutes, after which patient's blood pressure and pulse become non recordable. Cardiopulmonary resuscitation was initiated for cardiac arrest, Inj. Adrenaline (1ml IV stat) and inotropes (Inj. Noradrenaline at the rate of 0.4 mcg/kg/minute infusion) along with IV fluids NS (normal saline) bolus of 500ml. Patient was in cardiogenic shock and post CPR Trop I increased 0.51 ng/ml. BNP increased to 2560 pg/ml, chest X-ray revealed mild bilateral pleural effusion, bilateral alveolar edema and kerley B lines suggestive of pulmonary edema, D-Dimer increased to 2500 ng/ml).

Inj nitroglycerin and Inj. Furosemide stopped, inotropic support (Inj. Noradrenaline and Inj. Vasopressin

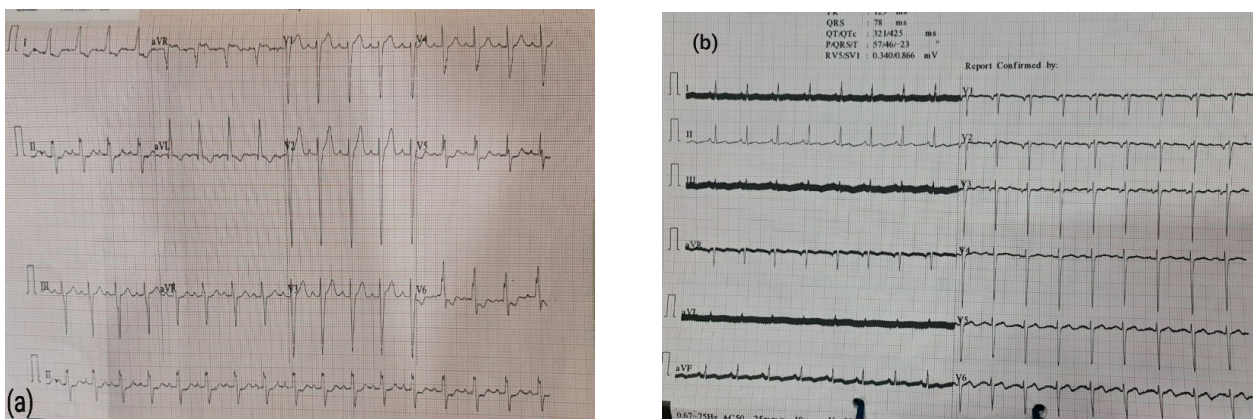


Fig. 1. (a) ECG on day 1 showing marked ST elevation changes which evolve to (b) on day 5

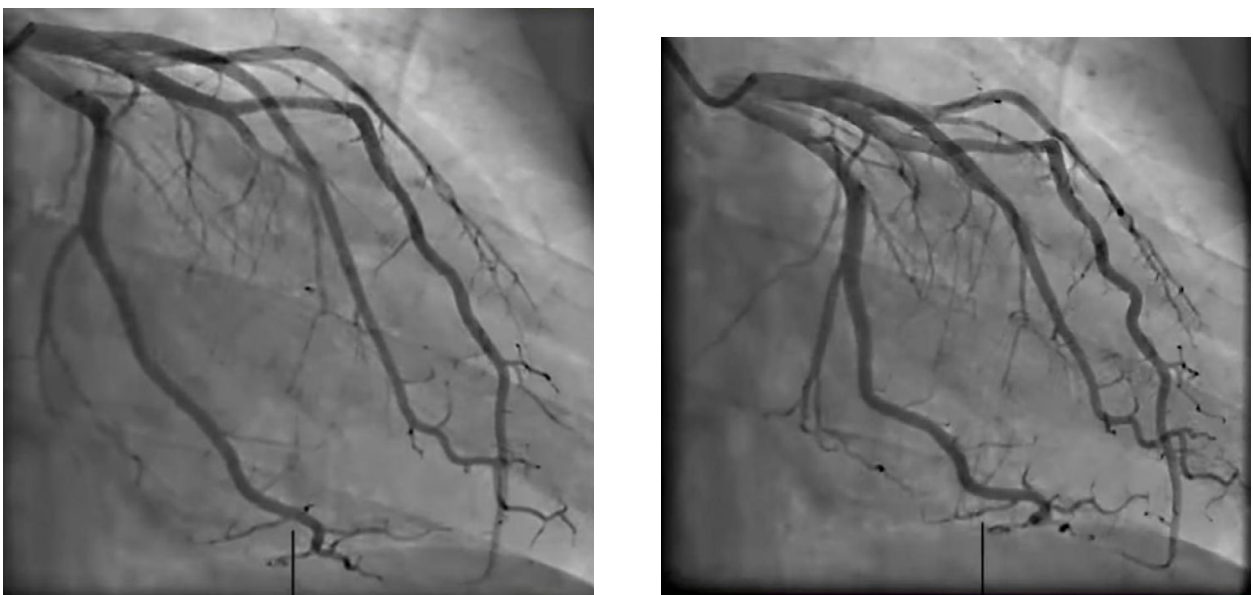


Fig. 2. Cardiac angiography which was normal in our 28yr old female patient

at the rate of 0.3 units/hr) along with IV fluids at the rate of 60ml/hr started immediately. Noninvasive ventilatory support given. Neurologist advised MRI Brain with contrast done and was normal. Further on cardiac magnetic resonance was planned. A repeat bed side transthoracic echocardiogram done which showed LVEF of 18% with a hypokinetic apical and mild distal walls and hyperdynamic basal walls of LVEF consistent with apical ballooning syndrome. Cardiac MRI done and reported as Tako-Tsubo cardiomyopathy (Fig. 3).

For the next 4 days close monitoring of vitals and routine investigations done while inotropic support, low dose Inj. Furosemide and other supportive treatment continued. Patient responded well to treatment, vitals stabilized, oxygen and inotropes tapered. On 01.01.2022 a repeat TTE (trans-esophageal echocardiography) was done which showed LV hypokinesia and LVEF improved to 43%. On day 7 patient developed one episode of high grade fever with abdominal pains and cramps.

Patient had leukocytosis (TLC: 40,000/mm³), blood and urine cultures were sent, fever profile done, se-

rum procalcitonin done and a high vaginal swab culture (HVSC) taken. Her antibiotics were upgraded to Inj. Piperacillin and Tazobactam (4.5gm IV, 6 hourly). Serum procalcitonin was high 50.19 ng/ml, diagnosis of septic shock made and isotope support and fluid resuscitation reinitiated. HVSC showed growth of Klebsiella which was sensitive to antibiotics and her TLC started decreasing with no more fever spikes and rest of fever profile was normal. Thereafter in consultation with cardiologist inotropic support was continued. BNP was still high on day 7 with pitting pedal edema and Chest X-ray suggestive of acute LVF for which decongestion titrated up (T. Eplerenon 25mg once a day added to Inj. Furosemide) along with beta blocker (T. Metoprolol 12.5 mg BD) along with inotropes. Further on day 9 patient developed sudden severe anemia wherein her hemoglobin dropped to 5.6 gm/dl from 9.6 gm/dl on 01.01.2022. A full anemia workup to rule out hemorrhage was done (urine, stool routine, occult blood). Hemolysis ruled out by negative direct and indirect coombs test and normal total bilirubin). Gynecologist rereviewed USG to rule

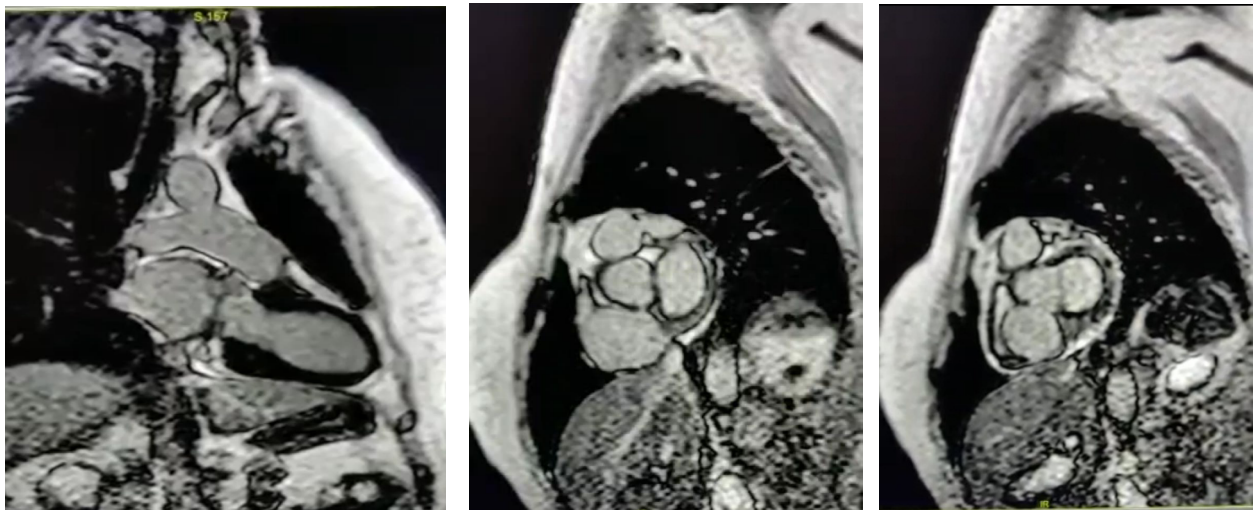


Fig. 3. Vertical and horizontal long axis in systolic and diastolic cine MR images from 28-year-old woman with Takotsubo cardiomyopathy. MRI was performed on second day of onset of symptoms. Apical akinesis produces apical ballooning, resembling Japanese takotsubo

out any retained tissue or atonic uterus and only spotting PV (per vaginal) was present. She was transfused 2 unit PRBC over 2 days and her hemoglobin increased to 8gm/dl. Gastroenterologist reference taken to rule out any gastrointestinal bleed, endoscopy and colonoscopy performed and reported normal. On day 10, hemoglobin and other reports normalized, serial BNP showed consistent decrease and she responded well to treatment. Vitals were stable off inotropes and oxygen. Patient was asymptomatic and chest X-ray cleared. Keeping everything in view, diagnosis of stress cardiomyopathy made. Our patient was discharged on day 14 on Beta blocker (T. metoprolol 25mg BD (twice a day)), T. furesomide/spironolactone BD, anti-epileptic (T. LEVETIRACETAM 500 mg BD), antibiotics T. cefuroxime 500mg BD and T. metronidazole ER 600 mg BD and supportive treatment. On follow up, 15 days later she was asymptomatic and denied any episodes of chest pain, palpitations or shortness of breath or pedal edema. She was breast feeding both her babies along with top feed. Repeat chest X ray was clear and echocardiogram showed LVEF of 45%. An angiotensin converting enzyme inhibitor (ACEI Ramipril 2.5 mg OD) initiated on follow up. On 1 month follow up, Cardiac MR chest was repeated with 2D echo which revealed no residual cardiac anomaly and LVEF of 55%.

Discussion

TCM is a rare but life-threatening illness that can affect middle aged, young and pregnant women. It is considered a cardiac emergency and can mimic many other life threatening conditions like myocardial infarction, acute myocarditis, peripartum cardiomyopathy or dilated cardiomyopathy and is diagnosed by exclusion. TCM usually presents with acute severe retrosternal chest pain,

palpitations and diaphoresis.² Affected patients may progress to develop symptoms of left heart failure like paroxysmal nocturnal dyspnea, orthopnea and dyspnea caused due to fluid overload.¹

TCM may be precipitated by physical and/or psychosocial stressors in individuals with premonitory psychiatric illnesses at higher risk.³ Our patient had a history of general anxiety illness which may have predisposed her to TCM. In addition to this it is possible that an acute elevation of blood pressure from the baseline post-delivery triggered TCM (Fig. 4).

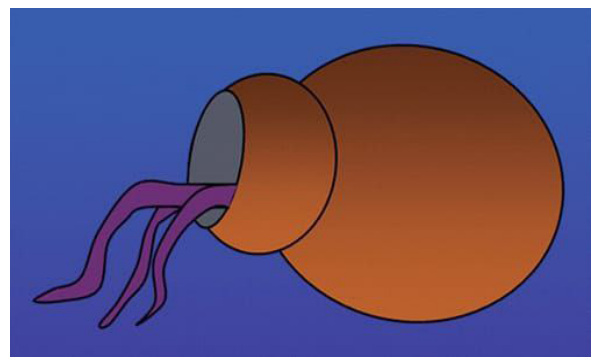


Fig. 4. Schematic drawing shows takotsubo, a pot which is used in Japan to catch octopi. It is round at bottom with a narrow neck to keep the octopus from escaping

Diagnostic evaluation of TCM is based on an electrocardiogram (ECG), positive cardiac biomarkers, echocardiography, left heart angiography and cardiac MRI. The ECG abnormalities most commonly reported include ST segment elevation in the anterior and/or precordial leads with reciprocal ST segment depression.⁵ Rarely QT interval prolongation, abnormal Q waves, T wave inversion or non-specific abnormalities may be

noted.⁵ Majority of cases have elevated cardiac troponin levels along with normal to mildly elevated creatinine kinase. The natriuretic peptides (brain natriuretic peptide (BNP) and pro-BNP) may be elevated in most of the cases indicative of ventricular strain.⁵

Transthoracic echocardiography very often shows a large area of regional wall motion akinesia of the LV, mostly extending beyond the territory of a single coronary artery.⁶ Apical ballooning of the LV with normal basal contractility is noted in a few cases. The LV ejection fraction is invariably reduced (ranging from 20 to 49%).⁷ Mitral regurgitation with or without a systolic anterior motion of the anterior leaflet may also be present in some cases.¹

The diagnosis of TCM can be based on the Mayo clinic diagnostic criteria.¹ The criteria includes presence of left ventricular transient akinesia, hypokinesia or dyskinesia with or without apical involvement; the regional ventricular wall motion abnormality typically extends beyond a single epicardial vascular perfusion territory helping rule out myocardial infarction. Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture supports the diagnosis of TCM further. ECG abnormalities in TCM include ST-segment elevation with or without T-wave inversion. Cardiac troponin levels are mild to moderately increased. According to criteria myocarditis and phaeochromocytoma should be excluded.¹ Our patient had transient ECG abnormalities, increased cardiac markers and no angiographic evidence of acute plaque rupture or vessel occlusion fulfilling the Mayo criteria for TCM. Hence a diagnosis of stress cardiomyopathy was made.

Few TCM cases tend to develop Left Ventricular Outflow Tract (LVOT) obstruction caused by increased contractility of base of the heart.⁷ This is easily diagnosed by use of echocardiography and initiation of timely management results in good prognosis.⁸ The detection of LVOT obstruction is important as the patients usually present with hypotension and the use of inotropic agents may increase the intraventricular pressure gradient, inducing cardiogenic shock, which was very well excluded in our case by both trans-thoracic and trans-oesophageal echocardiography.⁷

TCM cases recover to normal cardiac function within 4 to 8 weeks of onset.² Our patient had resolution of heart failure symptoms with full recovery by 12 weeks post-delivery, confirmed by repeat echocardiography and CMR (cardiac magnetic resonance). Care of these patients should be directed at managing symptoms and medical cardiac optimization with diuretics, angiotensin-converting enzyme inhibitors or beta blockers. Our case was adequately treated conservatively and symptomatically which lead to good prognosis.

Once the physical or emotional stress resolves, resulting in rapid resolution of symptoms and left ventricular ballooning and dysfunction, though some patients

develop life threatening acute complications such as acute heart failure and cardiogenic shock, like in our case requiring coronary cardiac unit admission. Some cases may require invasive techniques such as intra-aortic balloon pump or cardiopulmonary support.⁸

Recurrence of TCM in rarely occurs in premenopausal women like our case.⁹ But she was subjected to a close weekly follow up upon discharge, preventing the patient to deteriorate and develop any major adverse cardiac or cerebrovascular events.¹

Conclusion

TCM is a rare cardiac condition, even rarer especially in pregnancy, with multiple life threatening conditions like postpartum cardiomyopathy, thromboembolism, myocardial infarction etc. Management in pregnancy and post pregnancy has challenges crowded by safety concerns of the drugs used for managing the condition. Longitudinal studies are much needed for evaluating the reproductive history of women with TCM and further assess its association with preeclampsia and other condition, developing criteria and identifying pregnant women at risk of developing life threatening TCM. We strongly advocate for a multidisciplinary approach in order to optimize outcomes for the mother and child.

Declarations

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Author contributions

Conceptualization, R.A.B and R.R.; Methodology, R.R.; Software, R.A.B.; Validation, R.A.B. and R.R.; Formal Analysis, R.A.B.; Investigation, R.A.B.; Resources, R.R.; Data Curation, R.A.B. and R.R.; Writing – Original Draft Preparation, R.A.B.; Writing – Review & Editing, R.R.; Visualization, R.A.B. and R.R.; Supervision, R.R.; Project Administration, R.A.B.

Conflicts of interest

The authors have no conflict of interest.

Data availability

The data may be made available to interested persons at the request of the corresponding author via e-mail.

Ethics approval

All subjects gave informed consent to the inclusion prior to participating in the study.

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