CASE REPORT

REVERSE TAKOTSUBO CARDIOMYOPATHY FOLLOWING A CASE OF SUSPECTED MENINGOENCEPHALITIS AND LITERATURE REVIEW

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Reverse Takotsubo cardiomyopathy is a rare variant of stress cardiomyopathy. A 22-year-old male presented with altered mentation and fever. He was intubated due to low Glasgow Coma Scale. CT head plain showed diffuse cerebral oedema. Patient had raised troponin-I and echocardiogram revealed reduced ejection fraction with hyperdynamic apical segments and akinetic basal to mid segments suggestive of reverse Takotsubo cardiomyopathy (rTCM). Association of rTCM with neuropsychiatric disorders such as intracranial/epidural haemorrhages and anorexia nervosa has been defined. However, it is rare to have rTCM with meningoencephalitis.

Keywords: Stress cardiomyopathy; Takotsubo; Non-ischemic cardiomyopathy; Meningoencephalitis

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INTRODUCTION

Takotsubo cardiomyopathy (TCM) derives its name from a Japanese word Takotsubo meaning 'octopus trap'. It is classically defined as transient apical, mid-ventricular or basal left ventricle (LV) segmental wall motion abnormalities following a physical, emotional, or combined stress with new electrocardiographic (ECG) abnormalities and/or raised cardiac biomarkers. TCM was first described in 1990 by Sato *et al*.[1] Thereafter, various variants have been described. Reverse Takotsubo cardiomyopathy (rTCM) is a one of the rare variants of Takotsubo cardiomyopathy (TCM). rTCM, as the name implies, applies to wall motion abnormalities opposite to that of classic TCM with the same underlying pathophysiology of stress CMP. It oppositely presents as hyperdynamic apex and dysfunctional basal and/or mid-ventricular segments of LV. In contrast to patients with classic TCM, patients with rTCM are more likely to be younger and will almost always have certain stress preceding the presentation.[2] rTCM is known to be associated with neuro-psychiatric disorders such as subdural hematomas following head injuries, relapse of multiple sclerosis and anorexia nervosa.[3–5] In this report, we present a case of a young man presenting with meningoencephalitis and rTCM.

CASE REPORT

A 22-year-old man presented with complaints of fever for 3 days and altered mentation and vomiting for one day. On arrival, he had blood pressure (BP) of 120/76 mmHg, heart rate of 130 beats per minute, respiratory rate of 26 breaths per minutes, temperature of 38 degree Celsius and oxygen saturation of 98% on room air. On presentation, he was confused and disoriented to time, place, and person. His Glasgow coma scale (GCS) was 11/15 and sign of neck rigidity was positive.

Computed tomography (CT) head was done which showed diffuse cerebral oedema with effacement of sulci and ventricles. There was no evidence of tonsillar herniation on initial CT head. In one hour of presentation, he developed worsening GCS (7/15) and hence was intubated. CT head was repeated which then showed progression of cerebral oedema and development of cerebellar tonsillar herniation (Figure-1).

Cardiology was taken on board for ECG and raised cardiac biomarkers. ECG showed normal sinus rhythm with frequent premature atrial contractions and horizontal ST-segment depressions from V1 to V4 (Figure-2). His initial troponin was 0.3 ng/ml which increased to 4 ng/ml. Echocardiogram was done which showed ejection fraction of 30–35%; all apical segments were hyperkinetic, and rest of the segments were akinetic. Chest radiograph showed hilar congestion and prominent interstitial marking suggestive of pulmonary oedema. Other laboratory investigations showed raised leucocyte counts (23X10^9), raised C-reactive protein (152 mg/L), Creatinine Phosphokinase (5250 I.U/Litre) and procalcitonin levels (4 ng/ml).

Based on a high clinical suspicion of meningoencephalitis, patient was empirically treated with antibiotics, antiviral medicines, and steroids. Intermittent intravenous furosemide was also given with an aim to maintain adequate diuresis. Hyperosmolar therapy with hypertonic saline was continued for cerebral oedema.

Despite the optimal therapy, there was no change in neurological outcome. Patient continued to have GCS of 3/15 and loss of all neurological reflexes. Hyperosmolar therapy failed to be of any benefit and dismal neurological status precluded neurosurgical intervention. Patient rapidly developed worsening sepsis, renal function, and metabolic acidosis over the hospital course. On family's decision, patient was

withdrawn from mechanical support. Cardiac catheterization, ventriculography or cardiac magnetic resonance (CMR) imaging could not be done due to change of code status foreseeing futility of further investigations.

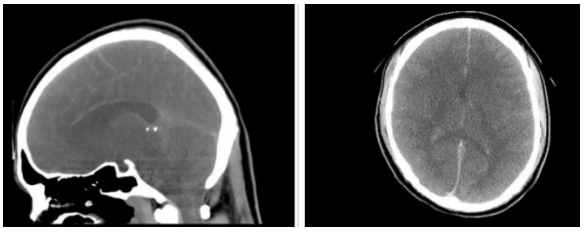

Figure 1: CT head plain showing diffuse cerebral oedema and complete effacement of cortical sulci, ventricles, and basal cisterns along with tonsillar herniation

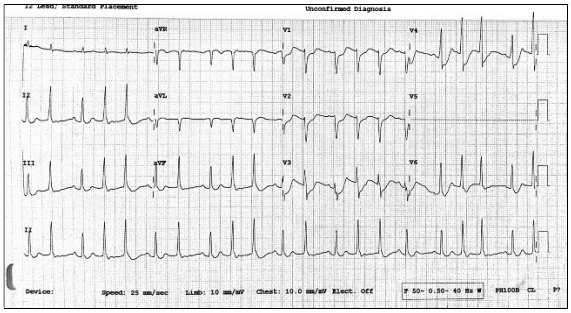

Figure-2: Electrocardiogram showing normal sinus rhythm with frequent premature atrial contractions and horizontal ST-segment depressions from V1 to V4.

DISCUSSION

Both TCM and rTCM are types of stress cardiomyopathy (CMP). The classic TCM typically presents as hyperkinetic basal and mid ventricular segments and dysfunctional apical segments along with ballooning and can confound as acute coronary syndrome (ACS).

Increasingly, other variants of TCM are being recognized such as reverse Takotsubo cardiomyopathy (rTCM). rTCM presents as dysfunctional basal and mid-ventricular segments and hyperdynamic apex. It carries an overall incidence of 1–23% of all TCM cases. In an International Registry of Takotsubo of 1, 750 patients, rTCM was identified only in 2.2% cases (basal akinesia and apical hyperkinesia) with majority being apical (82%) followed by mid-ventricular (14.6%) and focal (1.5%).[6]

The occurrence of rTCM in association with neuropsychiatric disorders has been defined. It has been defined in eating disorders[7] including anorexia nervosa[4], following intrathecal injection[8], following methamphetamine consumption[9], medulla oblangata[10] and cerebellar hemorrhages[11] and following spinal subdural hematoma[3]. Interestingly, it is known to happen in one case after radiofrequency catheter ablation for chronic atrial fibrillation[12] and even after consumption of an energy drink[13]. However, our case is the first one to define association of rTCM with meningoencephalitis.

Occurrence of neurocardiac lesions is increasingly being recognized. Neuro-psychiatric stress preceding stress cardiomyopathies is well described but the precise mechanism for in vivo neurocardiac lesions remains unknown. [14] The possible mechanisms include catecholamine excess, coronary vasospasm, microvascular dysfunction or oestrogen deficiency in post-menopausal women.[15] Catecholamine excess leads to direct myocardial injury[15] as well as cause microvascular spasm or dysfunction resulting in myocardial stunning.[16] Reasons for predilection for apical ballooning and sparing of basal and mid segments are not known.

Physical or emotional stress precedes occurrence in majority of cases of rTCM. However, no cause can be identified in 30% of patients.[17] Like any form of stress CMP, rTCM can present as ACS. Unlike TCM, it happens at a younger age, causes lesser decline in ejection fraction, a greater ST-T segment depression, a lower pro-Brain Natriuretic Peptide, and is more commonly associated with neurological diseases. In a cohort of 1750 patients with Takotsubo syndrome, rTCM constituted 18.3% of all cases. The in-hospital mortality is comparable. However, the rTCM pattern carries a better 1-year outcome. After one year, the outcome does not differ.[18]

Our patient had ST-T changes on ECG. Generally, ECG changes in rTCM can be as for any stress CMP including ST-T changes, QT prolongation, T- wave inversions and new bundle branch blocks. However, rTCM is more likely to present with ST-depressions and QT prolongation in comparison to classic TCM which is more likely to present with ST segment elevation, atrial fibrillation, and T wave inversions.[18] In case series of 5 patients with rTCM and intra-cranial haemorrhage, all patients had ST-depressions in inferolateral leads. 4 out of 5 patients also had ST-segment elevation in lead aVR and aVL.[19] Based on literature review, table-1 summarizes major differences between apical and reverse TCM variants.[20]

The ultimate diagnosis of rTCM is made on cardiac catheterization and ventriculography. CMR additionally helps in excluding infarction and myocarditis. Possible complications of rTCM include cardiogenic shock, pericardial or pleural effusions, LV thrombus or myocarditis. rTCM is managed as any form of stress cardiomyopathy. Management generally includes treatment of complications such as use of inotropes and vasopressors in cardiogenic shock, betablockers in event of LV outflow tract dynamic

obstruction, diuretics in case of pulmonary edema, oxygen and/or mechanical ventilation and treatment of arrhythmia.

Prognosis of rTCM is generally same as any form of stress CMP and type of variant does not seem to affect long term outcomes. The recurrent rate is 10%.[21] Overall, ejection fraction less than 45%, neurological disorder and occurrence of atrial fibrillation has been associated with poor outcomes.[18]

From a 10-years local experience on TCM in our centre, we know that it most commonly occurs in females with a mean age of 61 years. Anterior ST elevation was the most common ECG finding (41.39%) and stress factor was identified in 62% of patients. Majority of patients had ejection fraction of 30–35% (44.8%) with apical variant being the most common echocardiographic presentation (89.65%) with remainder of three patients having mid-ventricular variant.[22]

CONCLUSION

We encountered a rare pattern of Takotsubo Cardiomyopathy in association with meningoencephalitis. rTCM is a pattern of stress cardiomyopathy. Recognition of rTCM in any stressful condition particularly neurological disorder is important and carries prognostic implications. Patients with rTCM generally require treatment of underlying cause. The reason for predilection of various disorders for different segments of heart in any stress cardiomyopathy is yet to be discovered.

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