

# Takotsubo cardiomyopathy presenting as cardiac arrest with late gadolinium enhancement on cardiac MRI.

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## Introduction:

Takotsubo cardiomyopathy (TTC) is characterized by reversible, transient ballooning of the apical and/or mid sections of the left ventricle in the absence of obstructed epicardial coronary arteries, commonly preceded by emotional or physical stress. Patients typically present with chest pain and shortness of breath, with ECG changes mimicking an acute coronary syndrome. However, TTC associated with cardiac arrest is rare, especially when coupled with the presence of late gadolinium enhancement (LGE) on cardiac MRI. The presence of both these phenomena makes for an interesting dilemma of cause and effect with significant prognostic and therapeutic ramifications.

## Case description:

A 64-year-old gentleman with no known prior cardiac illness underwent elective discectomy under general anaesthesia for lumbar disc disease. In the immediate post op period, he developed sustained ventricular tachycardia which resolved with administration of amiodarone. He subsequently became hypotensive and unresponsive and required emergent intubation for airway protection. While he was being transported to our hospital for higher level of care, he was noted to have transient PEA arrest which resolved spontaneously. Laboratory data was unremarkable except for potassium level of 2.7 mEq/L and initial troponin of 0.28 ng/ml, which peaked at 7.7 ng/ml with a subsequent downtrend. ECG at the time of admission revealed sinus tachycardia with left bundle branch block and a QTc interval of 438 ms. Chest x-ray showed pulmonary oedema. Patient underwent emergent coronary angiogram which showed normal coronary arteries. Transthoracic echocardiogram showed LVEF of 18%, diffuse hypokinesia and akinesia of the apex and mid ventricle with hyperkinesia of the base, concerning for TTC. Cardiac MRI performed 7 days after cardiac arrest confirmed TTC with ballooning and severe akinesia of apical and mid segments of the left ventricle, basal hyperkinesia and normal myocardial perfusion. There was uniform increase in T2 intensity in the left ventricular mid segments suggestive of myocardial edema, corresponding with the wall motion abnormalities. Extensive LGE was noted in the apical and mid segments of the anterior left ventricular wall.

## Discussion:

The presence of LGE on cardiac MRI in patients presenting with cardiac arrest who are subsequently diagnosed to have TTC has very rarely been reported. The true incidence of TTC presenting as cardiac arrest is unknown. In hospital mortality alone was reported at 2.5%, with majority of deaths due to malignant ventricular arrhythmias. A review of published cases by Singh et al showed that cardiac arrest was secondary to ventricular fibrillation (46%), monomorphic ventricular tachycardia (24%), polymorphic ventricular tachycardia (19%), asystole (15%) and pulseless electrical activity (2%). 9% of patients were reported to have recurrent episodes of cardiac arrest. In 26% of cases cardiac arrest occurred following general anaesthesia for non-cardiac surgery.

LGE on cardiac MRI is indicative of contraction band necrosis, inflammatory infiltrate, edema and interstitial fibrosis. Its absence was considered as one of the distinguishing features of TTC. However, several authors have described the presence of late gadolinium enhancement in the contrast sequences of cardiac MRI as opposed to what was previously described. LGE was shown to disappear by 3 to 12 months in most patients. Patients in whom LGE persisted had lower ejection fraction, showed slower recovery of ejection fraction, longer duration for ECG normalization and higher incidence of cardiogenic shock when compared to others. LGE has also been shown to be an independent predictor of malignant arrhythmic prognosis in non-ischemic cardiomyopathy and can help identify patients who may benefit from ICD therapy. Such patients could be at increased risk of recurrent malignant arrhythmias leading to sudden cardiac death.

#### Conclusion:

Takotsubo cardiomyopathy in the setting of cardiac arrest post successful resuscitation poses an interesting dilemma in terms of evaluation for ICD placement given the reversible nature of the disease although the timeframe of recovery can be variable. Those in whom a reversible cause for the cardiac arrest cannot be identified, need close follow up and repeat cardiac MRI after recovery from the initial event. Further studies are needed to identify patients at high risk among this cohort who would benefit from electrophysiological studies and ICD placement to prevent sudden cardiac death.