



# Perioperative Management of Pheochromocytoma in the Setting of Prior Takotsubo and Reverse Takotsubo Cardiomyopathy

Mike Antonell M.D., Thomas Martin M.D., Dhamodaran Palaniappan M.D.

Department of Anesthesiology, Hartford Hospital, Hartford, CT  
University of Connecticut School of Medicine, Farmington, CT



## INTRODUCTION

-Takotsubo cardiomyopathy (TTCM) is a stress cardiomyopathy described as an acute but often reversible left ventricular dysfunction triggered by intense physical or emotional stress. TTCM is characterized by apical ballooning and basal hyperkinesis of LV without obstructive coronary artery disease.

-Reverse TTCM is a variant characterized by basal hypokinesis/akinesis and apical hyperkinesis.

-Pheochromocytomas are rare neuroendocrine tumors arising from chromaffin cells within adrenal gland, which secrete catecholamines and can potentially cause cardiomyopathies including Takotsubo and reverse Takotsubo.

-The left ventricular dysfunction caused by stress cardiomyopathies can have significant perioperative management ramifications.

Here we present a case report of a patient with pheochromocytoma and history of TTCM and reverse TTCM undergoing adrenalectomy for pheochromocytoma removal.

## CASE REPORT

A 62-year-old female with PMH of T2DM, HTN, hypothyroidism presented for left laparoscopic adrenalectomy for removal of pheochromocytoma. She had been admitted 7 months earlier for TTCM with LVEF 35% and troponin peaking at 15.8. She was discharged on metoprolol and follow up echo demonstrated LVEF improvement to 45%. 5 months after initial admission she presented with hypertensive urgency and reverse TTCM. She was diagnosed with pheochromocytoma during this admission, and eventually discharged on prazosin and metyrosine.

On day of surgery, her preop SBP was greater than 200mmHg and was managed with anxiolytics.

Standard ASA monitors, arterial line were used. TEE was available. Induction, intubation and CVL placement occurred without issues. Intraoperatively, anesthesia was maintained with sevoflurane and hemodynamics were optimized. Patient had a bradycardic event with HR 22 after trocar placement prior to insufflation, which responded to atropine.

Patient required nicardipine infusion for most of the case even after tumor removal and did not require pressors postoperatively. The patient made good recovery without recurrence of TTCM. She was discharged on antihypertensives to treat her primary hypertension.



I) Takotsubo Cardiomyopathy



II) Reverse Takotsubo



III) Reverse Takotsubo

## DISCUSSION

Although TTCM is thought to be a benign condition, recent observational data suggest that cardiogenic shock and death rates are comparable to patients with acute coronary syndrome. While pre-hospital TTCM typically presents like an acute coronary syndrome, only a minority of perioperative TTCM cases present this way. More often, perioperative cases manifest with evidence of heart failure, arrhythmias, or cardiac arrest. Thus, one must consider TTCM when any of these signs and symptoms occur during the perioperative period. Surgical procedures and anesthesia could be a trigger for TTCM especially with pheochromocytoma.

Preventing recurrence of TTCM is critical. Although the exact pathophysiology of TTCM is not completely understood, avoiding catecholamine surge is considered essential in preventing recurrence. In this case, preoperative treatment with alpha blockade and tyrosine hydroxylase inhibitor metyrosine can help attenuate intraoperative catecholamine release. After an episode of TTCM, surgery should be delayed until LVEF improves close to baseline. General anesthesia is the preferred technique of choice with the presented case. Invasive continuous arterial pressure monitoring is key to management of these cases. Flotrac/Vigileo™ system could be very helpful as a non-invasive monitoring tool to assess stroke volume variation and cardiac output.

If recurrence of TTCM is suspected, TEE should promptly be performed. Assess for left ventricle outflow tract obstruction (LVOTO) if patient is hemodynamically unstable. Inotropes are contraindicated with LVOTO, with preferred treatment being beta-blockers, IV fluid and vasopressors. With hemodynamic instability and the absence of LVOTO, inotropes such as dobutamine and milrinone are first line treatment. Some favor the use of mechanical circulatory support such as IABP, ECMO, or temporary LV assist devices to minimize or avoid inotropic therapy. Anticoagulation may be beneficial at some point if ventricular thrombus detected.

In summary, a multidisciplinary approach in a tertiary care center is key to safe management of cases like the one presented here.

## REFERENCES

Management of Takotsubo Syndrome: A Comprehensive Review. *Cureus*, 2020; 12(1): e6556.  
Reverse Takotsubo cardiomyopathy: A comprehensive review. *Ann Transl Med* 2018;6(23):460  
Takotsubo cardiomyopathy and its relevance to anesthesiology: A narrative review. *Can J Anesth* 2016; 63:1059–1074