

Cardiogenic shock due to recurrent Takotsubo cardiomyopathy with mid-ventricular hypokinesis causing LVOT obstruction

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BACKGROUND

Recurrent Takotsubo cardiomyopathy (TCM) is a rare potential cause of cardiogenic shock. While recurrent TCM is typically associated with apical hypokinesis, it may instead cause mid-ventricular hypokinesis leading to left ventricular outflow tract (LVOT) obstruction from hyperkinesis at the base of the left ventricle. This finding significantly alters cardiogenic shock (CGS) management. We present a case of a patient with recurrent, mid-ventricle variant TCM causing CGS.

CASE SUMMARY

50 year-old female avid cyclist with history of TCM/HFrecEF and depression.

Admission 1:

- Presented to ED with complaint of fatigue, dyspnea, diaphoresis, and syncope. Hs-troponin negative. TTE with normal LVEF, no LVOT obstruction, mild mitral valve prolapse. Patient observed for 24 hours then discharged home.

Admission 2:

- Patient re-presented to ED 48 hours after initial visit with complaint of chest pain and near syncope.
- The patient developed hypotension (BP 70/30s), diaphoresis, and lethargy after arrival. Norepinephrine infusion was initiated in ED.
- TTE with EF 40-45%, dynamic LVOT obstruction (pk/mn gradient 134/69 mmHg), and MV SAM.
- CICU team was called for evaluation given concern for CGS.

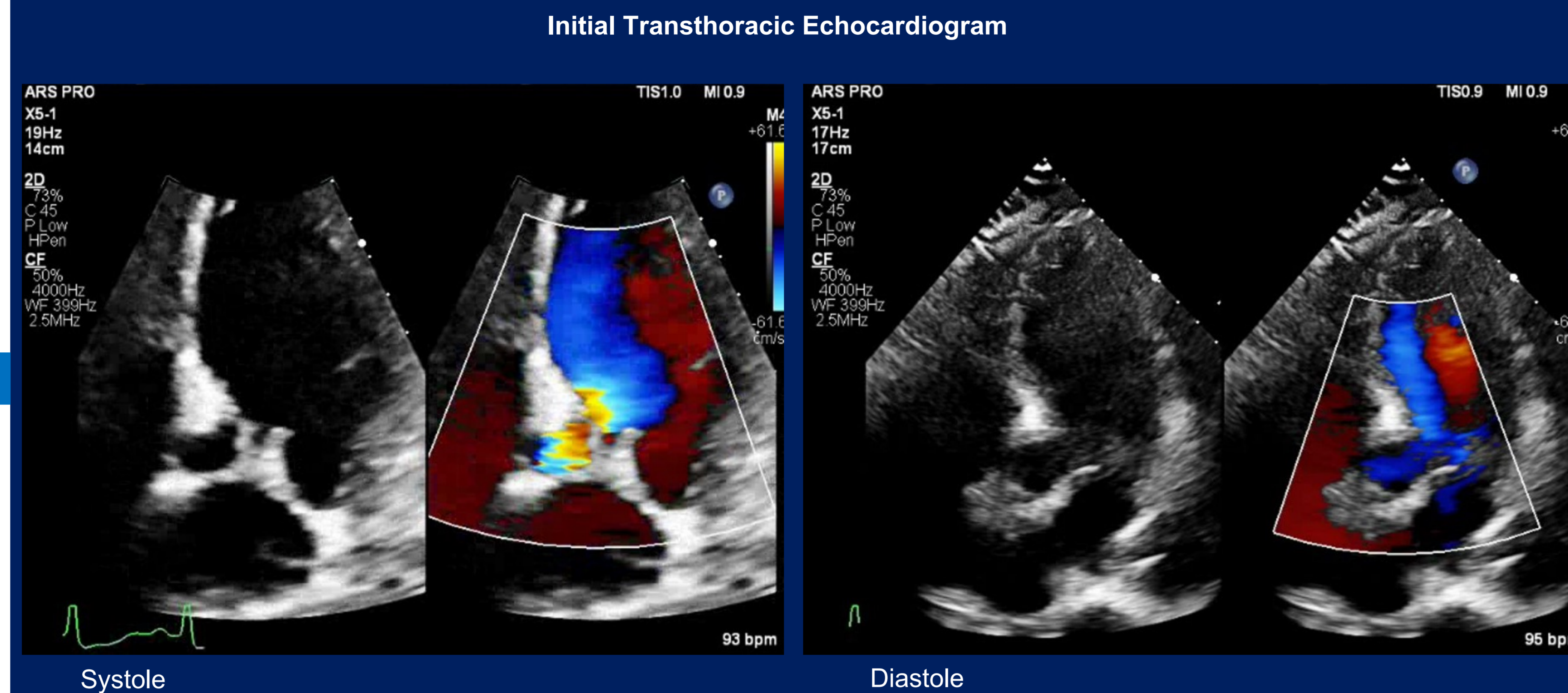
Management strategy:

- Norepinephrine transitioned to phenylephrine. Ultimately discharged on midodrine due to borderline hypotension.
- Fluid resuscitation with crystalloid fluids as well as blood products to maintain Hgb > 8.0.
- Introduction of beta-blockade to target HR 60 bpm.

Outpatient Course:

- TTE with recovery of LVEF to 50-55%, no LVOT obstruction.
- Patient tolerating BB therapy without side effects and has been weaned off midodrine.
- Patient has returned to cycling and is implementing stress management strategies.

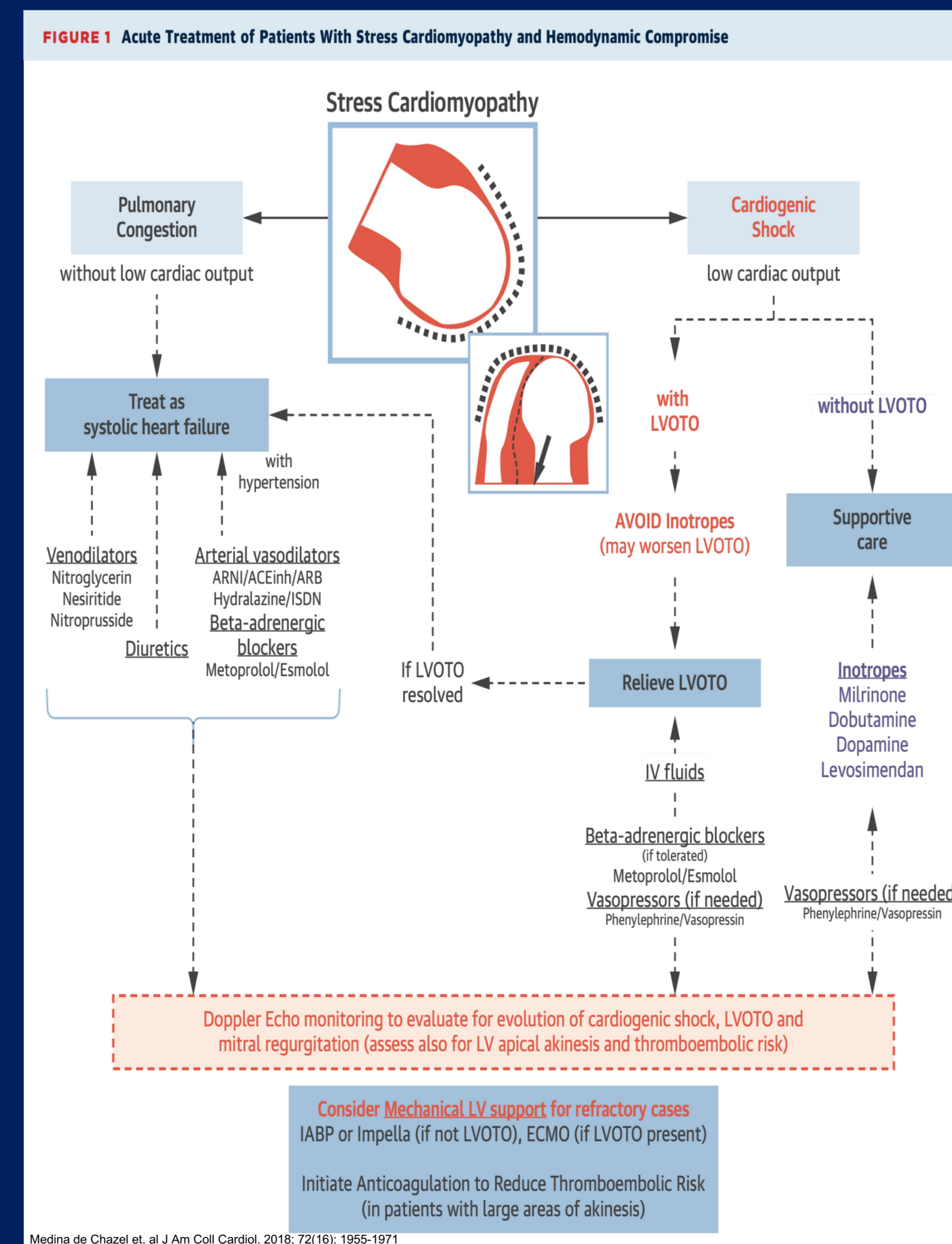
LVOT obstruction dramatically alters the management strategy for patients in cardiogenic shock.



Systole

Diastole

TCM Treatment Algorithm from Medina de Chazal et al. (2018)



Physical Exam	
<ul style="list-style-type: none"> Lethargic, diaphoretic 3/6 systolic murmur at the right upper sternal border. Cold extremities, no peripheral edema. No JVD. 	
CV Testing	
<ul style="list-style-type: none"> EKG: ST depression, LVH, repolarization abnormality LHC: negative for CAD CTA chest: negative for PE or aortic dissection TTE: EF 40-45%, dynamic LVOT obstruction (pk/mn gradient 134/69 mmHg), and MV SAM 	
Labs	
Hs-trop I	338 ng/L
Hemoglobin	8 g/dL
Hematocrit	24.8%
Lactic acid	4.4 mmol/L

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DISCUSSION/CLINICAL PEARLS

Incidence of Takotsubo cardiomyopathy:

- TCM accounts for 2-3% of all patients who present with acute coronary syndrome. 80-90% of TCM patients are female.⁵
- The incidence of recurrent TCM is poorly defined but is reported between 4-12%.^{1,5} Up to 20% of patients with recurrent TCM present with a different variant than their original diagnosis.¹
- Mid-ventricle variant TCM is the second most common form of TCM and is present in 10-20% of patients.^{2,3} LVOT obstruction occurs in only 10-15% of patients and mitral regurgitation/SAM occurs in 10-20% of patients with TCM. CGS occurs in approximately 10% of TCM patients.⁵
- Variant TCM is more prevalent in younger patients, and they are more likely to present with ST depression, have lower BNP levels, and have less pronounced reduction in LVEF.²

Patient Management:

- The mainstays of treatment for CGS without LVOT obstruction are afterload reduction, fluid management guided by invasive hemodynamic monitoring, and positive inotropic, vasoactive, and mechanical circulatory support (as needed) managed by a multi-disciplinary shock team.⁴
- Phenylephrine is the vasoactive medication of choice for hypotension with TCM and LVOT obstruction.³ An increase in afterload is advantageous in decreasing the degree of obstruction in the LVOT.
- Norepinephrine and epinephrine should be avoided as catecholamine surge is presumed to be the etiology of TCM.^{3,5}
- Beta-blockers are advantageous in CGS secondary to LVOT obstruction increasing diastolic filling time and decreasing the degree of LVOT obstruction.^{3,5}
- If mechanical circulatory support (MCS) is required, patients with LVOT obstruction typically require VA ECMO.³ Percutaneous LVAD or IABP is not recommended as they reduce afterload and LVEDV, both of which can be deleterious for LVOT obstruction.

CONCLUSION

- Early recognition of recurrent TCM with LVOT obstruction is critical due to the impact on choices of initial vasoactive medication, fluid volume goal, and choice of MCS strategy, if required.
- TCM with LVOT obstruction should be considered in patients who present with typical ACS symptoms but have normal coronary angiography, systolic murmur on exam, and cardiogenic shock.

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DISCLOSURE INFORMATION

No relevant financial relationship(s) to disclose.

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