

CASE REPORT

Takotsubo Cardiomyopathy with Extracorporeal Membrane Oxygenation (ECMO) Requirement after Atrial Myxoma Surgery

Fernando Garagoli, Aníbal Arias, Vadim Kotowicz, Arturo Cagide, César Belziti

Hospital Italiano de Buenos Aires, Caba – Argentina

Introduction

Takotsubo's syndrome is a cardiomyopathy characterized by transient left ventricular dysfunction. This condition is often described in postmenopausal women secondary to physical or emotional triggers.¹ The clinical behavior mimics an acute coronary syndrome. However, angiography shows no obstructive epicardial coronary artery disease.²

This syndrome is considered a reversible cardiomyopathy.³ However, patients with Takotsubo cardiomyopathy have risk of serious complications, such as cardiogenic shock, ventricular tachycardia and ventricular thrombus.⁴

Takotsubo's syndrome has been described as a possible complication of cardiac surgery.⁵ We report a case of Takotsubo's syndrome with ECMO requirement for refractory cardiogenic shock. This is the first case after atrial myxoma surgery.

Case Report

A 72-year-old woman with atrial myxoma was referred to our hospital. She had no history of cardiovascular disease. Two months previously, she had an onset of progressive dyspnea, so an echocardiogram was requested. It showed a mobile left atrial mass which prolapsed into the mitral valve during diastole causing mild restriction to ventricular filling. Left ventricular ejection fraction was preserved. Cardiac magnetic resonance was performed. Left atrium presented a mobile

mass attached to the interatrial septum at the level of the fossa ovalis. It presented heterogeneous late gadolinium enhancement. These features were consistent with left atrial myxoma (Figure 1A).

Given these findings, heart surgery was indicated. Previously, coronary angiography was performed. There was no obstructive epicardial coronary artery disease. Resection of left atrial myxoma with reconstruction of the atrial septum was performed. Cross-clamp time was 72 minutes and bypass time was 101 minutes. No intraoperative complications were reported. Intraoperative transesophageal echocardiogram revealed normal left ventricular ejection fraction.

During the immediate postoperative period, moderate doses of norepinephrine were administered due to postcardiopulmonary bypass vasoplegia. Invasive monitoring showed cardiac output of 7 L/min, cardiac index of 3.5 L/min/m² and systemic vascular resistance of 500 dyn-s/cm⁵. On the second postoperative day, the patient reported sudden midsternal chest pain. An electrocardiogram scan showed nonsustained ventricular tachycardia and ST segment elevation in leads V3-6 (Figure 1B). An echocardiogram scan demonstrated severe left ventricular systolic dysfunction with hypokinesis in the mid and apical segments and hyperkinesis in basal segments (Figure 2A). Emergency coronary angiography was performed, revealing normal coronary arteries and left ventriculogram showed the typical apical ballooning. High-sensitive cardiac troponin T levels were 500 pg/ml (reference value: less than 15 pg/ml) and pro-brain natriuretic peptide levels peaked at 33000 pg/ml (reference value: less than 350 pg/ml).

Subsequently, the patient developed low cardiac output. High doses of inotropes (norepinephrine: 2 micrograms/Kg/min; epinephrine: 1.5 micrograms/Kg/min; dopamine: 20 micrograms/Kg/min) were

Keywords

Takotsubo Cardiomyopathy/surgery; Takotsubo Cardiomyopathy/complications; Extracorporeal Membrane Oxygenation; Ventricular Dysfunction, Left.

Mailing Address: Fernando Garagoli

Peron, 4190. Postal Code: C1183AEG, Almagro, Ciudad Autónoma de Buenos Aires – Argentina.

E-mail: fernando.garagoli@hospitalitaliano.org.ar



Figure 1 – 1A. Cardiac magnetic resonance. 4-chamber image shows mobile left atrial mass (50x40x24 mm), which prolapsed into the mitral valve during diastole. 1B. Electrocardiogram shows ST segment elevation in leads V3-4-5-6.

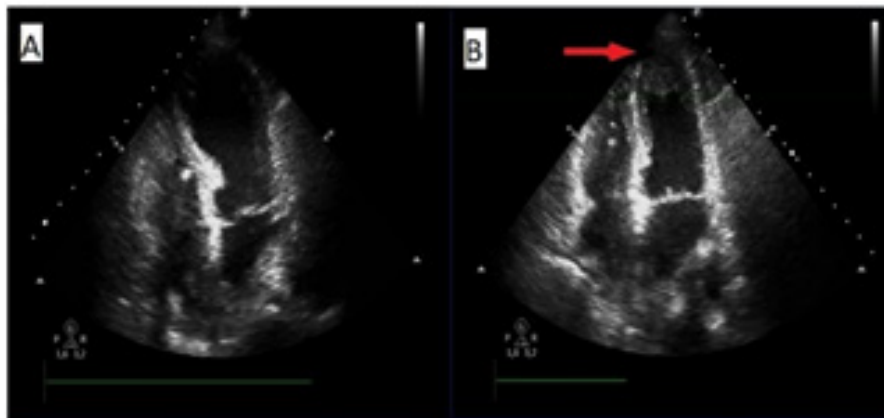


Figure 2 – 2A. Transthoracic echocardiography. 4-chamber view shows severe left ventricular dysfunction with apical hypokinesis. 2B. Transthoracic echocardiography. 4-chamber view reveals recovery of left ventricular function and apical thrombus.

required. Due to the refractory cardiogenic shock, therapy with femoral vein-to-axillary arterial ECMO was placed as a bridge-to-decision or myocardial recovery. After the fifth day, hemodynamic parameters improved significantly (cardiac index of 3 L/min, mean arterial pressure of 65 mmHg and pulmonary wedge pressure of 10 mmHg) with low doses of norepinephrine (0.1 micrograms/Kg/min). A new echocardiogram revealed improvement of left ventricular ejection fraction and apical thrombus despite adequate intravenous anticoagulation (Figure 2B). Regarding echocardiogram data and hemodynamic improvement, ECMO weaning was achieved uneventfully and subsequently removed.

Before discharge, transthoracic echocardiogram revealed recovery of left ventricular function and no apical thrombus was evidenced.

Discussion

Takotsubo's syndrome was first described in Japan in 1990 by Sato et al.⁶ The pathogenesis of this reversible cardiomyopathy is not clear. Several hypotheses have been proposed: coronary spasm, microvascular dysfunction and catecholamine-mediated myocardial stunning. Female hormones seem to have a protective effect.

This explains why this cardiomyopathy is most frequent in postmenopausal women. In most cases, the Takotsubo syndrome is associated with emotional or physical triggers. Activation of the sympathetic system by a stressful event increases serum catecholamine levels.⁷ Abraham et al.⁸ reported nine cases of Takotsubo's syndrome after administration of epinephrine and dobutamine.

In our case, the Takotsubo cardiomyopathy was precipitated mainly for two reasons: 1) cardiac surgery involves physical stress; 2) inotropic support in the perioperative period.

Takotsubo's syndrome has been described as a possible complication of cardiac surgery.⁵ There are only few cases reported in the literature. All cases developed after mitral valve surgery.⁹ We describe the first case of Takotsubo cardiomyopathy after atrial myxoma surgery.

Coronary embolism, coronary atherosclerotic plaque rupture and deficient myocardial protection were also *considered plausible diagnosis of acute ventricular dysfunction after cardiac surgery.*

Left ventricular ejection fraction assessment in the operating room showing normal function and high cardiac output during the first 48 hours ruled out the possibility of deficient myocardial protection.

Regional wall motion abnormalities extended beyond the distribution of an epicardial coronary vessel and myocardial dysfunction was transient. In addition, there was no obstructive coronary disease on angiography and no pathologic Q-waves on electrocardiogram. Coronary embolism and coronary atherosclerotic plaque rupture were ruled out. These findings support Takotsubo cardiomyopathy as final diagnosis.

In addition, major complications have been associated with this disease. Templin et al.⁴ have reported 7.1% risk of major cardiovascular and cerebrovascular events during the first 30 days after admission. Patients with this disease have risk of other serious complications such as cardiogenic shock, ventricular tachycardia, ventricular thrombus and ventricular rupture.⁴ Our patient developed three major complications:

cardiogenic shock, ventricular tachycardia and ventricular thrombus. In our case, heart failure was refractory to inotropic therapy, so ventricular assist device was employed. Venoarterial ECMO allows hemodynamic support in patients with refractory cardiogenic shock. In this case, this device was an useful therapeutic tool as a bridge to myocardial recovery.¹⁰

Conclusion

We believe that this is a new case of postoperative Takotsubo's syndrome. It is very important to consider Takotsubo's syndrome as differential diagnosis in patients with acute heart failure in the immediate postoperative cardiac period. Early implantation of a ventricular assist device allowed adequate hemodynamic support until myocardial recovery.

Author contributions

Conception and design of the research: Garagoli F, Arias A, Kotowicz V, Cagide A, Belziti C. Acquisition of data: Garagoli F, Arias A, Arias A, Kotowicz. Analysis and interpretation of the data: Garagoli F, Kotowicz V. Writing of the manuscript: Garagoli F, Arias A, Cagide A, Belziti C. Critical revision of the manuscript for intellectual content: Garagoli F, Arias A, Kotowicz V, Cagide A, Belziti C.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

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