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Case Report

Extracorporeal Membrane Oxygenation for Tako-Tsubo Cardiomyopathy that Developed After Atrial Myxoma Surgery: A Case Report

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Abstract

Takotsubo cardiomyopathy or "stress cardiomyopathy" is a reversible heart dysfunction mimicking acute coronary syndrome, while the coronary artery shows normal findings. It is a transient left ventricular dysfunction that can lead to serious complications which can go up to cardiogenic shock. The condition is often precipitated by acute emotional or physical stress and frequently occurs in postmenopausal women. Clinically, it affects patients with chest pain associated with an initial elevation of the ST segment on the electrocardiogram as well as an increase in cardiac enzymes compatible with a myocardial infarction, however the absence of coronary artery stenosis is noted in angiography. Takotsubo cardiomyopathy may also occur in the perioperative period after cardiac and noncardiac surgery; surgery-associated Takotsubo cardiomyopathy reportedly accounts for 2% - 23%. Among these perioperative cases, cardiothoracic surgery accounted for 16%. However, few cases have been reported in patients undergoing cardiac surgery and managed with extracorporeal membrane oxygenation (ECMO). We report a case of Takotsubo cardiomyopathy managed by ECMO in an intensive care unit patient after surgery for atrial myxoma.

Keywords: *Extracorporeal Membrane Oxygenation; Cardiac Surgery; Atrial Myxoma; Tako-Tsubo Cardiomyopathy*

Introduction

Tako-Tsubo Syndrome is a heart disease that was recognized in Japan in the early 1990s [1]. This pathology also known as Stress Cardiomyopathy is characterized by its acute onset in a context of chest pain with electrical signs suggestive of acute coronary syndrome that the coronary artery shows normal findings, also characterized by apical ballooning in Echocardiography and its character most often completely reversible. But this syndrome can have serious complications such as cardiogenic shock, arrhythmia and intraventricular thrombus [3]. Tako-Tsubo syndrome has been described as a complication of cardiac surgery [5]. We report a case of Takotsubo cardiomyopathy managed with ECMO (extracorporeal membrane oxygenation) that occurred in a patient in the intensive care unit (ICU) after atrial myxoma surgery.

Case Report

A 56-year-old woman was scheduled to undergo atrial myxoma surgery in March 2020 in our cardiac surgery department. She had a history of left leg fracture in 2001. The symptoms began two months before her hospitalization with the onset of progressive dyspnea

prompting the patient to have a cardiology consultation, the Echocardiography shows a mass in the left atrium with an implantation base at the level of the interatrial septum and in the anterior of the mitral valve annulus, otherwise the left ventricular ejection fraction was 60%. The transesophageal echocardiography shows a huge heterogeneous left intra-atrial mass with calcifications within it and a moderately obstructive wide implantation base citing first a left atrial myxoma. Given all these elements surgery was indicated for resection of the myxoma. The preoperative coronary angiography was normal. An excision of the left atrial myxoma was made, the aortic clamping time was 80 minutes, cardiopulmonary bypass surgery (CPB) was 120 minutes, and circulatory support of 27 minutes was required. No intraoperative complications have been reported. Immediate postoperative transthoracic echocardiography showed good left ventricular function, an ecstatic left atrium, and slight impairment of right ventricular function secondary to CPB. The patient was taking a low dose of norepinephrine to counteract vasoplegia due to CPB, invasive blood pressure was 110/70 MmHg, heart rate 80 beats per minute, and oxygen saturation 99%. The patient was extubated on postoperative day 1 with good tolerance. Eight hours later, she manifested respiratory distress, 80% desaturation with crackling of the two pulmonary fields, hemodynamic instability with arterial pressure at 50/35 MmHg and ventricular tachycardia at 135 beats per minute from where an introduction of dobutamine and adrenaline, increased doses of norepinephrine and the patient to be mechanically ventilated were required. The electrocardiogram showed an elevated ST segment shift (Figure 1), troponin kinetics were increasing, and the echocardiography diagnosed an aspect of hypokinetic heart disease, a 15% ejection fraction with apical akinesia and a basal hyperkinesia (Figure 2). Coronary angiography and management were not possible at the time due to the patient's condition. Due to the hemodynamic deterioration, a refractory cardiogenic shock was suggested and arteriovenous ECMO was indicated. Femoro-femoral arteriovenous ECMO was performed, dose regression of dobutamine and norepinephrine, and epinephrine withdrawal were allowed. After four days of circulatory assistance, the evolution was marked by an improvement in the contractility of the left ventricle with an ejection fraction increased to 35% from which weaning of the ECMO was made on day 5 of the installation and extubation on day 15 postoperative. The patient was transferred to general ward one month after surgery and was discharged from the hospital after 40 days of hospitalization in total with a discharge echocardiography showing good left ventricular function with 60% EF, minimal mitral insufficiency, ectatic left atrium and little impaired right ventricular function. The patient continues to make periodic consultations in our structure and she shows no deterioration in her cardiovascular condition.

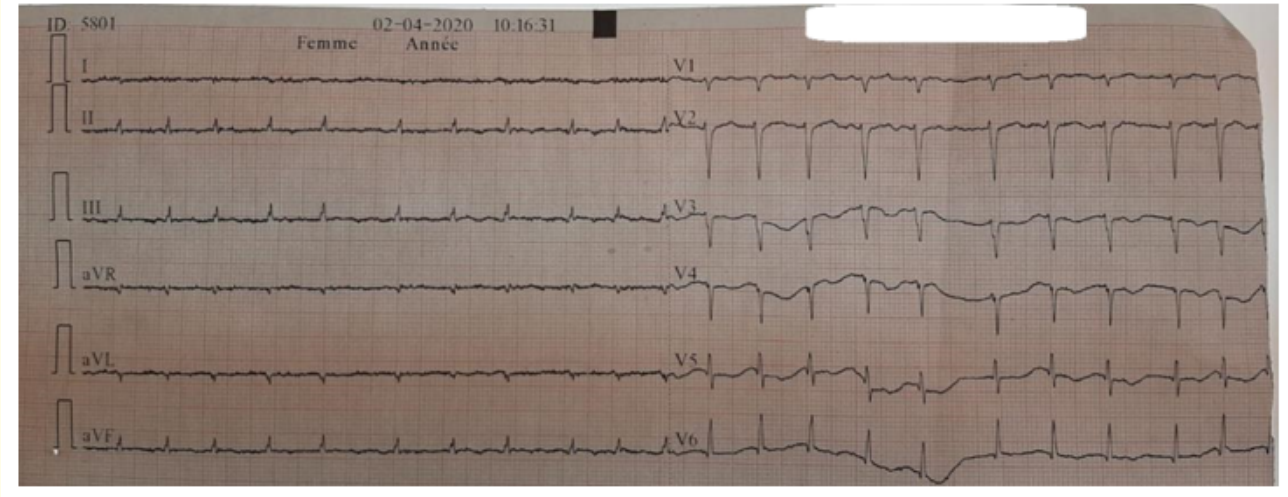

Figure 1: *Electrocardiogram with elevated ST segment shift.*

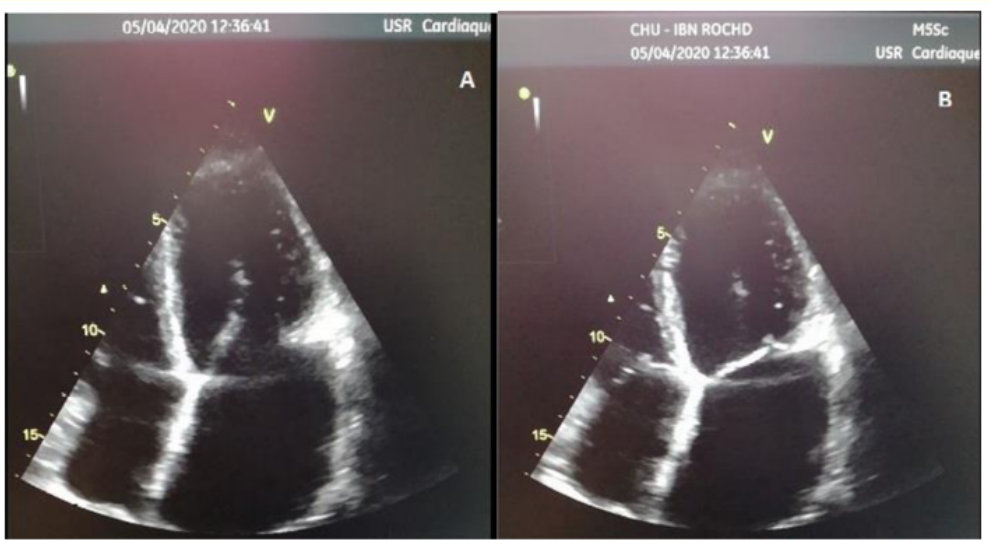

Figure 2: *Left ventricle with akinesia of the apical and mid segments on transthoracic echocardiography. (A) Diastole. (B) Systole.*

Discussion

Tako-Tsubo syndrome is a relatively rare myocardial disease, although many cases have been reported in the literature in recent years [2,4]. Its prevalence is estimated to be between 0.5 and 2% of acute coronary syndromes [2,4,6]. This heart disease mainly affects postmenopausal women, anxiodepressive, exposed to intense physical stress (acute illness, surgery, pain) or most often emotional (bereavement, major fear). For our patient the triggering factor was cardiac surgery, inotropic peri-operative support and when we delved into her history we found that she went through multiple emotional shocks in her life. The physiopathological mechanisms leading to the development of this syndrome are not fully understood. However, it is believed that the myocardial damage observed is related to a significant release of catecholamine into the bloodstream during emotional stress and myocardial hypersensitivity to these catecholamine [7]. The clinical presentation of the pathology resembles an acute coronary syndrome and associated with chest pain, dyspnea and sometimes syncope or sudden death [4]. The electrocardiogram shows ST-segment elevation or ST-segment depression [4]. The Echocardiography shows hypo or unsystematic akinesia of the apex of the left ventricle [4]. On the other hand, the contractility of the base of the heart is normal or even increased, which can then constitute a dynamic obstacle at the level of the ejection of left ventricle outflow tract. In front of the absence of coronary lesion on coronary angiography and the typical echocardiography appearance that the diagnosis of Tako-Tsubo syndrome must then be evoked. According to the recommendations of ESC (European Society of Cardiology) 2018, our patient has an InterTAK score estimated at 80%. Troponin levels in the blood are most often normal or slightly increased. BNP (Brain Natriuretic Peptide) is sometimes elevated as the patient may have acute heart failure [6]. Tako-Tsubo syndrome can occur following surgery with an incidence of 3% -23%, of which 16% of cases have been reported after cardio-thoracic surgery [8,9]. This syndrome has been described as a complication of cardiac surgery [5]. Rare cases have been reported in the literature, especially secondary to valve surgery [10]. The first case developed after surgery of an atrial myxoma was reported in 2017 by Garagoli F., *et al* [11]. Coronary thrombus, rupture of an atherosclerotic plaque or poor myocardial protection can be considered to be the cause of left ventricular dysfunction postoperatively after cardiac surgery. The left ventricular ejection fraction which was normal in the immediate

postoperative period and the patient's favorable outcome within the first 48 hours eliminate any defect in myocardial protection per CBP. Coronary angiography, which was normal preoperatively and the reversible aspect of the left ventricular dysfunction, eliminates any rupture of atheromatous plaque or coronary thrombus. Major complications have been associated with this pathology. Templin., *et al*. reported a risk of major cardiovascular and cerebrovascular events during the first month after admission [13]. Patients with Tako-Tsubo syndrome are at risk of developing other serious complications such as cardiogenic shock, ventricular tachycardia, ventricular thrombus, and ventricular rupture. Our patient developed two major complications: cardiogenic shock and ventricular tachycardia. In our case, the heart failure was refractory to the inotropic drugs, so a ventricular assist device was required. Arteriovenous ECMO provides hemodynamic support in patients with refractory cardiogenic shock. In this case, this device was a useful therapeutic tool as a bridge to myocardial recovery [12].

Conclusion

Our case is a very rare form of postoperative Tako-Tsubo syndrome, however, it is very important to consider this syndrome as a differential diagnosis in patients with acute heart failure postoperatively after cardiac surgery. Early implantation of a circulatory support device may provide adequate hemodynamic support until myocardial recovery.

Informed Consent

Informed consent was obtained from the patient in this case report.

Conflicts of Interest

The authors report no conflicts of interest in this work.

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