Case Report

Milking-Like Effect in Takotsubo Syndrome

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Abstract

Takotsubo cardiomyopathy is a heart syndrome associated with transient contractile dysfunction. Although several mechanisms have been proposed, the pathophysiology is not yet fully understood. However, emotional and physical stress followed by excessive release of catecholamines might play a pivotal role in the development of this syndrome. We report the case of a 76-year-old woman who developed a Takotsubo syndrome after a neurosurgery. The coronary angiography revealed the imaging of a circumflex coronary artery constriction during the systole. This milking-like effect was described in relation to compression of the artery during systolic ventricular filling due to the apical ballooning with no myocardial bridging (MB).

INTRODUCTION

Takotsubo cardiomyopathy is characterized by transient left ventricular apical ballooning with the absence of coronary occlusion, which typically occurs in older women after emotional or physical stress. A mechanism that might worsens myocardial ischemia is the milking-like effect described in the present case: systolic compression of a coronary artery due to systolic expansion secondary to apical ballooning (Takotsubo syndrome) and no MB. Previously, it has been described this phenomenon secondary to post-infarction left ventricular aneurysm [1] or pseudoaneurysm [2]. Also, it has been described that myocardial bridging (MB) of the left anterior descending coronary artery (LAD) is a frequent finding in Takotsubo syndrome compared with controls, as revealed both by coronary angiography or by computed tomography angiography suggesting a role of MB in the pathogenesis of Takotsubo syndrome [3,4]. In the present case, we report a rare case of a circumflex milking-like effect without MB during Takotsubo syndrome.

CASE PRESENTATION

A 76-year-old woman with a history of hypertension, dyslipidemia and chronic kidney disease presented with hypotension 12 hours after a brain meningioma resection neurosurgery. On evaluation, she was in cardiogenic shock, needing intravenous noradrenaline to maintain an adequate mean arterial pressure. The electrocardiogram showed sinus tachycardia and 2 mm ST elevation in leads V4-V6, II, III and aVF. Serial cardiac enzymes were positive for myocardial necrosis. The left ventriculogram showed balloon-like apical ballooning at the apex with hypercontraction of the basal segment (Figure 1). Subsequently, cardiac catheterization showed normal coronary arteries with the imaging of a middle left circumflex coronary artery constriction during systole, without myocardial bridging (Figure 2 and video 1). This milking-like effect was attributed to compression of the artery during systolic ventricular filling (apical ballooning). The cranial computed tomography scan rules out cerebral hemorrhage or any postoperative complications. The patient was successfully treated with pharmacological therapy that included initial intravenous inotropic drugs and diuretics. When she was hemodynamically stable we added angiotensin-converting enzyme (ACE) inhibitors

The reported case of milking-like effect due to compression of the artery during systolic ventricular filling (apical ballooning) in Takotsubo syndrome is rare and never previously described elsewhere in the circumflex coronary artery. This pathogenic mechanism is another way of induction of myocardial ischemia during the stress cardiomyopathy. We cannot conclude which event occurred first since the exact pathogenesis of the Takotsubo syndrome is unknown, but various hypotheses have been suggested and previously discussed, including mainly catecholamine-induced myocardial stunning and coronary microvascular dysfunction. The management is purely pharmacological because the disease is transient. Furthermore, Acari et al [6] showed that, among patients with Takotsubo Syndrome, coronary angiographies more frequently exhibit anatomic variants and that coronary artery tortuosity (CAT) and long recurrent wraparound left anterior descending artery (wrap-LAD) are more prevalent compared with gender-matched controls, whereas MB prevalence does not differ between Takotsubo Syndrome patients and controls. The latter agrees with our case. Although we did not find CAT or wrap-LAD, the middle left circumflex coronary artery had a clear wall anomaly that without being stenosis could favor the milking-like effect. The use of Optical Coherence Tomography (OCT) could be useful in this assessment for future cases.

This case is a clinical presentation as part of the wide spectrum of neuro-cardiogenic injury. Elgendy et al [7] in a systematic review demonstrates that the incidence of Takotsubo syndrome in patients with spontaneous subarachnoid hemorrhage seems to be high with a trend towards higher risk of in-hospital mortality. However, our patient did not present an intracranial bleeding or any postoperative complication, and the surgical stress was enough to trigger this cardiovascular condition.

Finally, this case emphasizes the role of milking-like effect as another pathogenic mechanism of induced myocardial ischemia during Takotsubo syndrome, whose etiology remains incompletely understood. A coronary angiography can give the diagnosis and a left ventriculogram can confirm it.

CONFLICT OF INTEREST

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