

Takotsubo Syndrome as a Cause of False Acute Abdomen in the Early Postoperative Period After Bariatric Surgery—a Report of Two Cases

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Published online: 9 August 2016
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Abstract Takotsubo syndrome, also known as broken-heart syndrome, stress-induced cardiomyopathy or transient apical ballooning syndrome, is a transient disorder characterized by segmental left ventricular failure in the absence of obstructive coronary artery disease. Most cases of Takotsubo syndrome are caused by acute stress that leads to a sudden, temporary weakening of the cardiac musculature. This stress triggers a rise in circulating catecholamine levels that results in acute ventricular dysfunction. In this report, we describe two cases of Takotsubo syndrome in the early postoperative period after bariatric surgery.

Keywords Bariatric surgery · Stress-induced cardiomyopathy · Takotsubo syndrome

Background

Takotsubo syndrome (TS) is a classic condition of acute cardiac dysfunction that involves transient left ventricular failure accompanied by nonspecific symptoms such as chest, epigastric or retrosternal pain, severe hypotension or shock that is unresponsive to large volumes of fluids and catecholamines, altered sensory, mental confusion, and hypoxia [1]. The electrocardiograph (ECG) is usually abnormal, and there is typically a marked elevation in marker enzymes that mimics acute myocardial infarction. The absence of significant obstructive coronary disease and the reversibility of left ventricular dysfunction are important indicators for the accurate diagnosis of TS.

The trademark characteristic of TS is bulging of the apex of the heart with preserved function of the base that leads to a syndrome called “tako tsubo”, meaning “octopus pot”, in reference to the shape of the pots used to catch octopuses in Japan, where the disease was first described by Hikaru Sato in 1990 [2]. This classification stimulated considerable scientific interest in the syndrome, with a resulting marked increase in reports on this condition (from two publications in 2000 to at least 300 in 2010). TS has since become widely recognized and studied in many countries, including Australia, Belgium, Brazil, China, France, Germany, Iceland, Israel, Mexico, South Africa, South Korea, Spain, and Turkey.

Several mechanisms have been proposed to explain TS, although the true causes are still not fully understood: (1) Wrap-around left anterior descending artery; (2) Transient spasm: multiple simultaneous spasms of the coronary arteries; (3) Microvascular dysfunction: the occurrence of coronary artery dysfunction at a level no longer detectable by coronary angiography; (4) Mid-ventricular obstruction: this involves thickening of the mid-ventricular wall with the obstruction of blood flow [3]; and (5) Abnormal response to

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catecholamines, such as epinephrine and norepinephrine, released in response to stress [4].

In this report, we describe two cases of TS in the early postoperative period after bariatric surgery that involved a laparotomy.

Case Report

Case 1

A 40-year-old white female patient born in Rio de Janeiro has a body weight of 100 kg, height of 1.52 m, and body mass index (BMI) of 43.28 kg/m². The patient's obesity had been increasing since childhood and became more accentuated with age. She had two cesareans a few years earlier and had hypertension that was being treated with losartan (100 mg/day). The patient had a good social and cultural level and was always collaborative in the preoperative period. A sleeve gastrectomy was performed at 1:40 p.m. on the day of surgery (operating time, 70 min). There were no complications during the surgery and the patient was discharged 48 h postsurgery.

The initial recovery period evolved with no complications and involved ordinary tube removal on day 10. Eighty-three days after surgery, the patient had a low fever that receded with symptomatic medication. On day 91, she was admitted to the emergency room with high fever and malaise. Routine tests and a CT scan of the abdomen were requested. The tomography showed the presence of approximately 40 ml of fluid suggestive of a sub-phrenic abscess; however, no oral contrast or path for fluid accumulation was found. A 10-day course of antibiotic therapy was initiated and a new CT scan after completion of the treatment revealed no presence of fluid. However, the fever returned on postoperative day 105 (September 4, 2012). Another CT scan confirmed a new accumulation of fluid and revealed the extravasation of oral contrast that communicated with a fistula. The main hypothesis was the occurrence of a late fistula of the angle of HIS.

A laparoscopy with drainage was done. Six hours after surgery, the patient experienced abdominal pain, with a heart rate of 125 bpm, thin wrist, abdominal distension, restlessness, and severe hypotension with refractory shock that was unresponsive to fluids, dopamine, and norepinephrine. The hematocrit fell by four points, but the drain showed no loss of blood. However, intra-abdominal bleeding remained the principal hypothesis and the patient required a new laparoscopic intervention. In the operating room, she experienced severe respiratory distress and a laparotomy was done. The exploratory laparotomy revealed that the cavity was free of bleeding or leaks and that the drains were well-positioned. The patient returned to the postoperative unit in respiratory prosthesis with FiO₂ 100 % to maintain a saturation of 91 %. The main hypothesis was now pulmonary embolism. An eco-Doppler of

the lower and upper limbs provided no evidence of thrombosis. The echocardiogram revealed apical akinesia with average hypokinesia in the other regions and severe left ventricular dysfunction (Fig. 1). The patient responded very well to dobutamine and showed progressive improvement in her clinical picture without sequelae; she was discharged to an intermediate unit after 9 days. The fistula was successfully treated with an endoscopic prosthesis. The patient was discharged, and the implant was removed after 60 days.

Case 2

A 31-year-old white patient has a body weight of 98 kg, height of 1.60 cm, and BMI of 38.28 kg/m². She was using losartan (100 mg/day) to control blood pressure. Her surgical history involved a previous breast reduction and a cesarean with no complications. She underwent a laparoscopic sleeve gastrectomy (65 min). General anesthesia and tracheal intubation were uneventful, and the patient remained stable during the procedure. The anesthetic drugs used were sufentanil and clonidine, with rocuronium for neuromuscular blockade that was reversed after the procedure. A total of 1.5 l of crystalloids was infused. Thrombus prophylaxis, antibiotic therapy (cefazolin 15 mg), and intradermal morphine were given at the end of the procedure. At the end of anesthesia, the patient was scored nine on the Aldrete Kroulik scale. The patient was admitted to the postoperative unit at 1:30 p.m. with a blood pressure of 105/69 mmHg, heart rate of 81 bpm, and was a little sleepy; she had an RASS-1 with no complaints of pain. Residual hematic drainage was empty.

At 2:30 p.m. the patient was still drowsy with cold sweats, heart rate of 87 bpm, arterial pressure of 67/52 mmHg, and just 100 ml of blood in the Blake. Two liters of crystalloid were administered, an ECG was obtained, and laboratory tests and chest X-ray done. At this point, the patient's hemoglobin was 12.1 mg/dl. At 5:30 p.m., her condition worsened; she went unconscious and experienced sustained hypotension (79/52 mmHg) after the 2 l of crystalloid, and the Blake contained 200 ml of serohematic fluid. Laboratory tests showed a lactate level of 66 U/l (normal value ≤20 U/l) and hemoglobin levels of 10 mg/dl.

The surgical team was contacted, and an infusion of dopamine (5 µg/kg/min) was initiated. At this point, the patient was transferred back to the operating room and on the way (at 6:45 p.m.) she complained of intense dyspnea. Upon reaching the operating room, the dyspnea worsened, with an O₂ saturation of 74 % and she was placed on a respiratory machine. Hemoptysis suggestive of acute pulmonary edema was observed. In view of the patient's severe condition, a laparotomy was

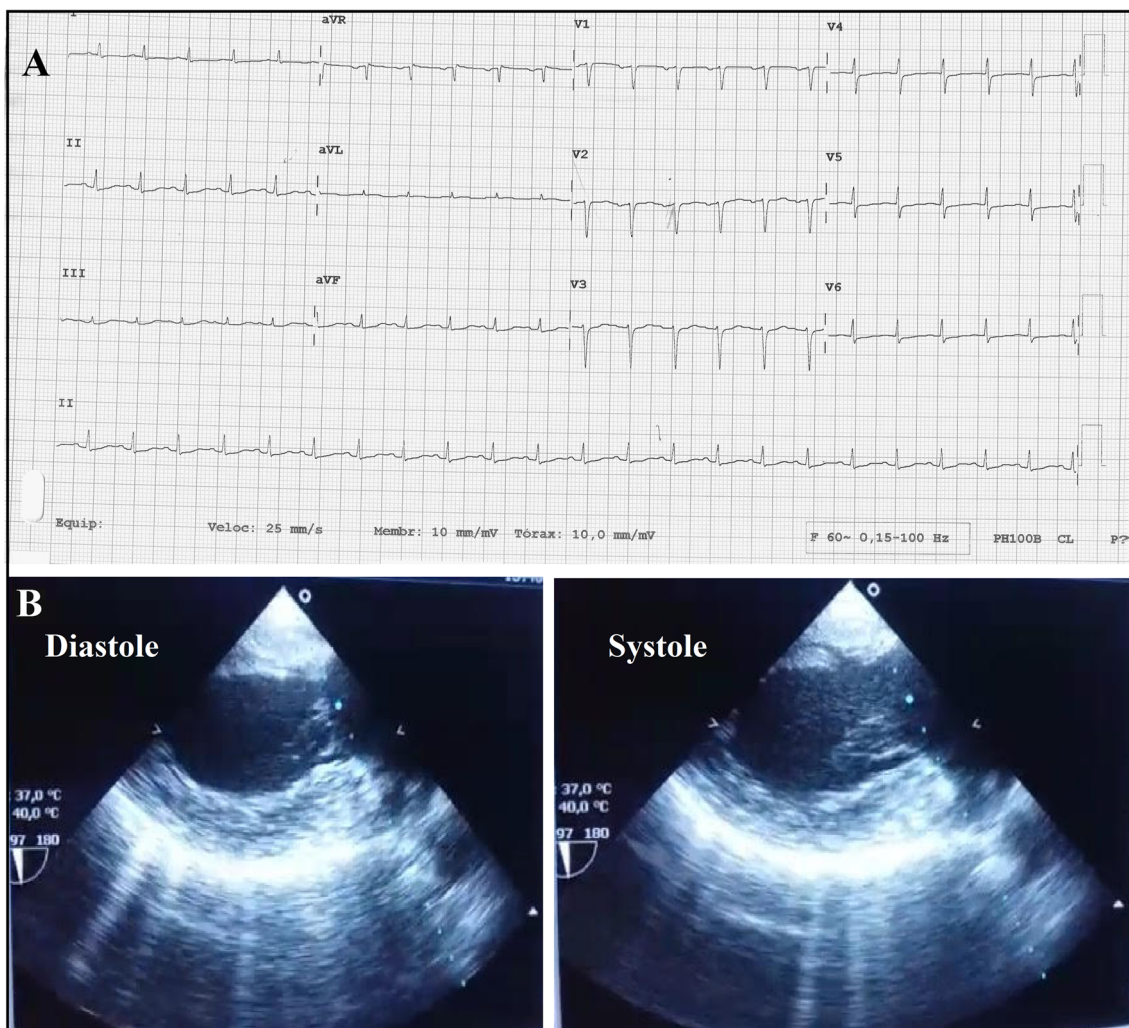


Fig. 1 Patient 1 exams. **a** EKG showing the typical alterations of Takotsubo Syndrome, a diffuse T-wave inversion with QT prolongation. **b** Echocardiogram demonstrating apical dyskinesia and akinesia of the ventricular segments, giving the characteristic appearance of “apical ballooning”

done but showed no evidence of bleeding or other surgical complications. Ultrasound of the lower and upper limbs revealed no thrombosis. However, the patient showed cardiac apical akinesia with normal hypokinesia in the other regions, in addition to severe left ventricular dysfunction (Fig. 2). Dobutamine infusion (5 µg/kg/

min) was initiated and shortly thereafter the pressure stabilized (123/88 mmHg; heart rate–129 bpm). Once back in the postoperative unit, the patient required an O₂ inspired fraction of 100 % to maintain saturation >92 % with a PEEP of 10. After 12 days in the hospital, the patient was discharged.

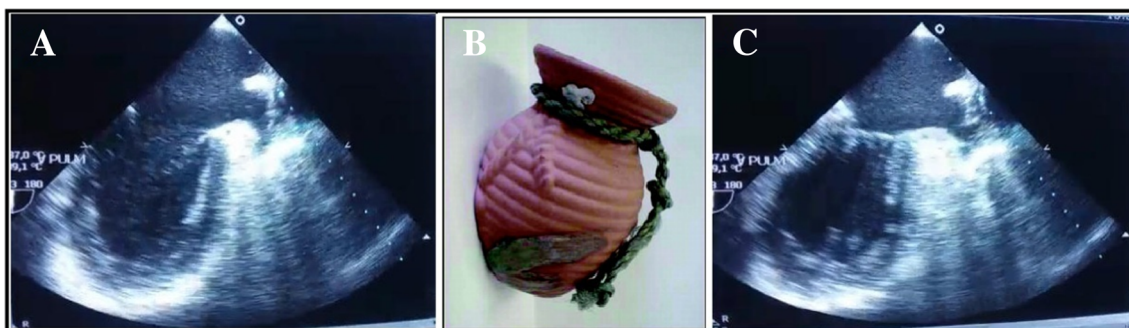


Fig. 2 Patient 2 exams. **a** Echocardiogram showing ventricular akinesia during the diastole. **b** A clay jar that remember this typical characteristics during the echocardiogram. **c** Akinesia during the systole

Discussion

Analysis of the clinical data led to the suspicion that both patients were affected by TS in the immediate postoperative period. As indicated by Azzarelli et al. [5], TS is most common in 60–75-year-old postmenopausal women with a history of recent serious physical or emotional stress. This profile can represent up to 90 % of patients with the syndrome [6]. At the time of the events described here, the patients were 40 and 31 years old, respectively. Hence, age was not a major factor in these cases. A more likely cause was the great physical and emotional stress caused by the bariatric surgery itself.

Some studies pointed out that hypertension has a prevalence of 76 % in cases of TS and is a major risk factor for the disease [6, 7]. In agreement with this, both patients were hypertensive and were being treated with losartan (100 mg/day). However, during admission, patients with TS usually present serious conditions such as cardiogenic shock (4.2–6.5 %), acute pulmonary edema (3.8 %), and ventricular fibrillation (1.5 %), although the mortality rate is low (3.2 %).

The treatment of TS is generally supportive [8]. The use of inotropic agents generally aggravates the syndrome because of an already elevated level of catecholamines; hence, inotropic substances should not be administered. Some authors recommend the use of intra-aortic balloon pumps, fluids, and negative inotropic agents, such as β -blockers or calcium channel blockers [8].

In the first case, the conditions that led to the need for tests and an abdominal CT scan within 6 h postsurgery may have accelerated the onset of TS. The patient had abdominal pain that was quite difficult to understand, numbness, a heart rate of 115 bpm, thin wrist, abdominal distension, restlessness, severe hypotension with refractory shock unresponsive to fluids or inotropic agents (dopamine and norepinephrine), a hematocrit that was down four points, and a drain devoid of blood. This combination of manifestations suggested the possibility of intra-abdominal bleeding in both cases. The finding that the cavity was free of bleeding and the drains were well-positioned indicated that the initial diagnosis of surgical acute abdomen was incorrect. This false diagnosis reflected the rarity of TS and the lack of experience of the medics involved in interpreting symptoms with causes other than bleeding.

In 2006, the American Heart Association classified TS as an acquired cardiomyopathy that was denominated as stress-induced cardiomyopathy. We had an ECG after laparotomy which revealed an apical akinesia with average hypokinesia in the other regions and severe left ventricular dysfunction. These findings partially agreed with

the criteria of Akashi et al. [9] who considered stress to be the main factor in TS, with 85 % of cases being attributable to a stressful physical or emotional event that triggered the onset of symptoms. Possible sources of stress were identified in both patients, as indicated in the case descriptions. In addition, we considered the epigastric pain experienced by both patients in the immediate postoperative period to be abnormal after bariatric surgery, whereas the dyspnea, shock, and ECG abnormalities were all probably caused by the acute hypovolemia. The range of manifestations involving abdominal pain, numbness, heart rate >120 bpm, thin wrist, abdominal distension, psychomotor agitation, and severe hypotension with refractory shock is contrary to the affirmations of most authors that the manifestations of TS are difficult to interpret and can make it difficult to distinguish between this condition and acute myocardial infarction or pulmonary embolism.

Conclusion

The diagnosis of TS is generally achieved by a process of elimination and may be confused with acute surgical abdomen in the postoperative period after bariatric surgery due the profile of these patients.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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