

Occurrence of Takotsubo Cardiomyopathy after Nasal Administration of Lidocaine with Epinephrine in an Outpatient Surgery Center: A Case Report

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ABSTRACT

Although outpatient surgeries are safe, providers must always be vigilant for rare, life-threatening conditions that might need immediate diagnosis, treatment, and possible transfer of the patient to a higher level of care. We present the case of a 37-year-old woman who presented to an outpatient center for nasal surgery. Induction of general anesthesia was uneventful. However, after receiving an intranasal injection of local anesthesia with epinephrine just prior to the surgical incision, she developed profound hypertension and subsequent cardiovascular instability that required emergent transfer to the emergency department and then an intensive unit care. Transthoracic echocardiography showed marked impairment in cardiac motion and severely reduced ejection fraction, which improved a few days later and returned to normal within a month. The patient was diagnosed with Takotsubo cardiomyopathy (TC), a non-ischemic cardiomyopathy that can result from severe stress. Administration of local anesthetic with epinephrine can lead to TC during common, elective outpatient procedures in healthy ASA 1 patients. In an outpatient surgery center where resources for acute care may be limited, TC should be recognized quickly and treated by the anesthesiologist. Prompt transfer of the patient to an acute care facility can prevent long-term sequelae.

Keywords: Takotsubo cardiomyopathy; Outpatient surgery center; Outpatient surgery emergencies; Complications of sinus surgery

INTRODUCTION

Over the past 40 years, the proportion of surgeries performed in outpatient settings has increased dramatically [1]. In 1980, only 16% of all surgeries were performed in the outpatient setting, but by 2007 that number had increased to over 60% [2]. In 2017, the number of ambulatory surgery centers (ASCs) grew at a rate of 2.4% to 5603 [3]. Patient selection and advances in perioperative care have allowed outpatient surgical procedures to be performed with an exceedingly low rate of morbidity or mortality. Most patients who undergo procedures in an outpatient setting will likely be ASA Class 1 and 2. However, certain life-threatening conditions such as anaphylaxis, malignant hyperthermia, local anesthetic systemic toxicity, and unanticipated difficult airway can still occur [4]. It is crucial that

anesthesiologists be able to promptly diagnose and treat these conditions. Additionally, the care team must be able to stabilize and organize early transfer to a higher level of care. In this article, we discuss the case of an unexpected critical condition, Takotsubo cardiomyopathy (TC) that occurred in a healthy ASA 1 patient during routine, outpatient nasal surgery.

CASE PRESENTATION

A 37-year-old, 58 kg woman with a history of nasal obstruction, deviated nasal septum, and hypertrophy of the inferior nasal turbinate presented for septoplasty with submucosal resection of the inferior nasal turbinates in an outpatient facility. The patient was ASA 1, a former active dancer, and denied alcohol, illicit drug use, and smoking. The patient received acetaminophen in

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the preoperative area and was taken to the operating room. General anesthesia was induced with fentanyl, lidocaine, propofol, and rocuronium, after which the patient was easily intubated. General anesthesia was maintained with sevoflurane (1%) and a propofol infusion at 150 mcg/kg/min. Cefazolin was administered as surgical antibiotic prophylaxis.

Five minutes after the patient was intubated, the surgeon injected 7 mL of lidocaine 1% with epinephrine 1:100,000 into the nasal septum sub mucosally and into the inferior turbinates bilaterally. One minute after injection, the patient's blood pressure increased from 105/70 to 197/103 mmHg and her heart rate increased from 62 to 142 beats per minute (BPM). After 7 minutes of similarly elevated blood pressure readings, 5 mg of esmolol was administered. Incision was made 2 minutes later when the blood pressure returned to 149/65 mmHg. At this point, the anesthesia team attributed the change in vital signs to the intravascular injection of epinephrine with the lidocaine. Approximately 18 minutes after incision, the patient developed hypotension, with systolic blood pressure in the 70s and diastolic blood pressure in the 40s. The hypotension was refractory to 100-200 mcg boluses of phenylephrine, and heart rate remained elevated in the range of 100-119 BPM. Oxygen saturation and end-tidal CO₂ were normal throughout the case. Given the persistent hypotension to as low as 65/44 mmHg, the sevoflurane was discontinued and the propofol infusion decreased. The anesthesia team asked the surgeon to expedite the surgery. The patient received 2 L of normal saline with a total of 2 mg of phenylephrine, 15 mg of ephedrine, and 3 units of vasopressin, all in divided doses. The surgery was completed and the patient was extubated approximately 1 hour after the hypotension ensued. In the recovery room, the patient was alert and oriented; however she remained hypotensive with systolic blood pressure in the 70s-80s. She denied any chest pain or shortness of breath and was afebrile without rigors. Her EKG showed sinus tachycardia without ischemic change and her chest x-ray was normal. Anaphylaxis, acute coronary syndrome, and some less likely differential diagnoses such as pulmonary embolism and sepsis were considered, though none completely fit the clinical picture. Attempts at temporizing the patient's clinical condition were made in the recovery room, with more fluid and small boluses of vasopressors. The anesthesia team made multiple consults by phone to an intensivist and a cardiac anesthesiologist. After the patient had been in the recovery room for approximately 4 hours, she experienced a sudden, brief syncopal episode, during which the cardiac monitor showed a drop in heart rate from 110 to 58 BPM. The patient promptly regained consciousness and was quickly transferred via ambulance to the affiliated hospital. In the emergency department, initial cardiac troponin was 1.56 ng/mL. Full blood count was remarkable for a white blood cell count of $2 \times 10^4/\text{mm}^3$. Renal and hepatic function tests were within normal limits. Serum calcium, magnesium, and phosphorus levels were normal. Chest CT showed extensive ground glass and consolidative opacities occupying most of the lung, with associated interlobular septal thickening. A transthoracic echocardiogram (TTE) showed an ejection fraction of 10-15% with anterior, anterolateral, inferolateral, apical, and inferior akinesis and 1 cm \times 1 cm echo-density at the left ventricle apex

concerning for apical thrombus. It was not until the TTE showed the markedly decreased ejection fraction that the diagnosis of TC was made. The patient was transferred to the intensive care unit where she was treated with norepinephrine, broad spectrum antibiotics, and a heparin drip. Her hospital course was further complicated by epistaxis, owing to her recent sinus surgery and anticoagulation. On postoperative day 5, TTE showed an improvement in left ventricular function to 40%. The patient was discharged to home on postoperative day 6 with prescriptions for apixaban and metoprolol. At the 1-month follow-up, TTE revealed normal left ventricular function and an ejection fraction of 60%-65%.

DISCUSSION

Although the patient described here had a favorable outcome and recovered completely, her case brings up an invaluable learning point, especially for providers who practice at free-standing ASCs. TC is just one of many unanticipated life-threatening perioperative events that can occur in the outpatient surgical setting. It has been reported that 0.43% of patients were transferred from an ASC to a hospital in 2016, equivalent to approximately 21,000 patients per year [3]. As more surgeries move from the hospital to an outpatient surgical setting, clinicians who work in such centers can expect to see these complications more often. Emergencies in ASCs often must rely on fewer staff and more limited resources than are present in a hospital [5]. In most cases, it is imperative that the patient be transferred rapidly to an acute care setting for proper treatment. Furthermore, because the patient population tends to be healthier, staff should consider methods to avoid complacency and prepare themselves for less common emergent situations. Simulation-based training has been found to increase emergency response preparedness through practice in "real-life" scenarios [6]. Additionally, use of checklists such as the stanford manual have been shown to improve performance in surgical crisis simulations [7]. In the case presented here, TC was not immediately identified in the outpatient setting because the cause of the hypotension was unclear. The anesthesia team considered a differential diagnosis that included anaphylaxis, sepsis, pulmonary embolism, hypovolemia, anesthetic overdose, and medication error. Acute coronary syndrome was lower on the differential, given that the patient was otherwise healthy. Much of the recovery room efforts were dedicated to diagnostic and supportive efforts. However, the syncopal episode necessitated immediate transfer. After workup in the emergency department and intensive care unit, it was determined that this previously healthy ASA-1 patient had experienced TC. Echocardiographic evidence showed transient left ventricular dysfunction and subsequent rapid recovery. TC is a non-ischemic cardiomyopathy that generally occurs after an emotional or physical stressor [8]. It results in an acute, but reversible, left ventricular ballooning and dysfunction. The stressor in this case was likely inadvertent intravascular injection of the lidocaine-epinephrine mixture prior to surgical incision. Local anesthetics with added epinephrine are commonly used as vasoconstrictors in healthy patients undergoing outpatient surgical procedures. The pathophysiology remains unknown, but a catecholamine-mediated myocardial stunning has been

postulated [9]. TC is estimated to occur in 1-2% of people presenting with an initial primary diagnosis of acute coronary syndrome. TC is more common in women than in men, as nearly 90% of all reported cases have been in women [10]. Postmenopausal women are at the highest risk and <3% of cases have occurred in individuals less than 50 years of age. In patients who present from home, common symptoms are similar to those of a myocardial infarction and include chest pain and dyspnea. TC can also occur among the critically ill and in the perioperative period. Because patients who develop TC under anesthesia cannot complain of symptoms, the diagnosis must be made swiftly based on the clinical picture. The Mayo Clinic has proposed four diagnostic criteria, which must all be present [10]. 1) Transient hypokinesia, akinesia, or dyskinesia of the left ventricle, with abnormalities extending beyond a single epicardial vascular distribution; 2) Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture; 3) New electrocardiographic abnormalities or modest elevation in cardiac troponin; and 4) Absence of pheochromocytoma or myocarditis. Especially in outpatient settings farther from hospital resources, it is important to review the causes and presentation. Patients should be transferred to the nearest capable acute care facility as soon as the diagnosis is suspected. The admission mortality of TC is reported to be 2.4% and the annual rate of long-term mortality 3.5%.

CONCLUSION

We report a case of TC after inadvertent intravascular injection of epinephrine with a local anesthetic agent in a healthy patient presenting for a common elective outpatient procedure. This case reinforces the need for prompt recognition and transfer to

acute care, which can facilitate appropriate treatment and most often a full recovery.

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