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Case Report

Broken Heart Syndrome: A Risk of Teenage Rhinoplasty

Michael Glamore, MD; Carlos Wolf, MD;
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Abstract

“Broken heart” syndrome is a rare phenomenon characterized by transient ballooning of the left ventricle and chronic heart failure, usually presenting in postmenopausal women. It is formally known as acute stress-induced cardiomyopathy and, although described in the cardiology literature, it has not been previously described in plastic surgery patients. It is thought to occur secondary to increased catecholamine levels. This case report outlines two instances of the syndrome occurring in teenage girls undergoing cosmetic rhinoplasty.

Level of Evidence: 5

Keywords

broken heart syndrome, stress-induced cardiomyopathy, rhinoplasty, teenager

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Stress-induced transient cardiomyopathy is an acute coronary syndrome characterized by left ventricular ballooning and congestive heart failure. This potentially deadly disease is most commonly seen in postmenopausal women after acute emotional stress, and thus it has also been referred to as the “broken heart” syndrome. Although the initial clinical presentation mimics myocardial infarction with chest pain and elevation of the ST-segment on electrocardiogram (ECG), subsequent workup does not reveal coronary artery obstruction.^{1,2} Instead, echocardiogram demonstrates ballooning of the base of the heart with poor contractility. Initial reports attributed stress-induced cardiomyopathy to elevated serum levels of endogenously produced epinephrine and norepinephrine.³ Subsequent investigators have recognized that a similar phenomenon can also occur with the therapeutic administration of epinephrine.^{4,5}

Our report focuses on two teenage aesthetic rhinoplasty patients. Rhinoplasty is commonly performed for cosmetic reasons, to improve the appearance of the nose. Plastic surgeons generally consider the procedure safe and effective, and it is associated with a high degree of patient satisfaction. In our two patients, infiltration of 2% xylocaine with epinephrine, which we administered for vasoconstriction and to reduce the need for general anesthetic,

led to stress-induced cardiomyopathy. These patients, ages 16 and 18 years, are much younger than the usual patient with “broken heart” syndrome and represent the first cases reported in conjunction with rhinoplasty.^{1,2,6} Both patients presented with the clinical picture of chronic heart failure (CHF) at the time of rhinoplasty and required subsequent hospitalization and supportive care to recover.

CASE REPORTS

Patient 1

An 18-year-old Hispanic girl underwent rhinoplasty with general anesthesia in July 2005. She had a history of a negative workup for hypotension one month earlier. Prior

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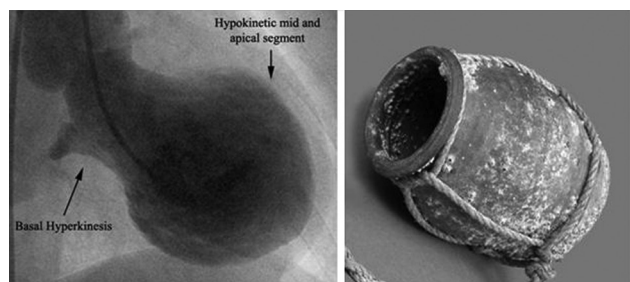


Figure 1. A cardiac catheterization demonstrating the likeness of the unusual shape of the heart to a Japanese octopus trap. Reprinted with permission from Shahid et al.⁸

to osteotomy, the surgeon injected 2 mL of 2% xylocaine with 1:100,000 epinephrine into the subcutaneous plane above the nasal bones and radix. Three minutes later, the patient developed tachycardia with a heart rate (HR) of 140 beats per minute (bpm), which returned to 80 to 90 bpm after incremental administration of esmolol totaling 45 mg. Approximately 45 minutes later, a second injection of local anesthetic resulted in another episode of tachycardia, which was again controlled with esmolol totaling 50 mg. Closed reduction was performed, and the patient was extubated. In recovery, the patient's blood pressure (BP) was 86/52 mm Hg, and her heart rate was 127 bpm. Her (PaO_2) was 93% on 5 liters of oxygen and was associated with a productive cough and frothy sputum. The clinical picture was one of acute CHF.

The patient was admitted to the intensive care unit in acute respiratory distress and required treatment with bilevel positive airway pressure. Subsequent chest x-ray showed pulmonary edema, and an ECG revealed sinus tachycardia and diffuse ST-segment abnormalities. The initial ejection fraction (EF) was 15% to 20%, and 2D echocardiogram revealed left ventricle apical hypokinesis with anterior wall motion abnormalities. The patient also had positive troponins (2.9) and elevated creatine kinase (CK)-MB (28) along with leukocytosis. With supportive care, she gradually improved, and by Postoperative Day (POD) 4, her EF was nearly normal, at 50% to 55%. After the event, she revealed that she had a grandmother who was sensitive to lidocaine. She was discharged in good condition on POD 6.

Patient 2

The second patient was a 16-year-old girl who underwent rhinoplasty under general anesthesia with a different anesthesiologist in June 2010. Her personal and family histories were negative. She received a constant intravenous drip totaling 1300 mL of fluid over 90 minutes. Upon injection of 2 mL of 2% xylocaine with epinephrine 1:100,000, she had a sudden rise in BP to 170/100 mm Hg with accompanying tachycardia. Esmolol (80 mg) was administered incrementally, and her pulse and BP returned to normal. At the end of surgery, her PaO_2 dropped to

89%, and frothy sputum was suctioned from the endotracheal tube. Bilateral breath sounds were diminished with rales suggesting pulmonary edema. Furosemide (60 mg) was administered intravenously in 20-mg increments along with albuterol endotracheally. The patient was gradually allowed to awaken but remained intubated, so that further suctioning of respiratory secretions could be performed. Her PaO_2 returned to normal over the next 90 minutes, and she was extubated. She was admitted to the hospital where she complained of retrosternal pain. ECG and chest x-ray were within normal limits. Lab tests showed normal CK-MB (1.2) with elevated troponin (0.5). She was discharged in good condition on POD 2.

DISCUSSION

Plastic surgeons routinely administer epinephrine and should be aware of the potentially deadly complication of acute stress-induced cardiomyopathy, or broken heart syndrome. Although this syndrome was previously thought to occur primarily in the elderly, our report documents two cases occurring in teenagers undergoing rhinoplasty. The mechanism by which catecholamines induce broken heart syndrome is not clearly understood, although excessive sympathetic stimulation of cardiomyocytes has been implicated.^{6,7} The asymmetric cardiac shape seen on echocardiography may be explained by the higher density of β -adrenoreceptors in the apical myocardium.⁷ This unusual shape led Japanese physicians to label the syndrome "takotsubo" cardiomyopathy because the heart was shaped like an octopus trap (Figure 1).

Patient 1 exhibited the classic signs of acute stress cardiomyopathy. Her elevated troponins, left ventricular apical hypokinesis, leukocytosis, and relatively quick recovery time were consistent with this diagnosis. Her pulmonary edema and congestive heart failure with decreased ejection fraction required a six-day hospitalization to resolve. In contrast, Patient 2 was treated earlier with furosemide and endotracheal tube suction, which prevented the development of frank congestive heart failure and decreased her hospital stay. In both cases, the emotional states of the patients did not seem to play a role; both were calm prior to surgery.

Local anesthetics with epinephrine should be injected slowly, while carefully monitoring the patient's heart rate. The initial signs are an exaggerated reaction to xylocaine with epinephrine, as evidenced by hypertension and tachycardia. The subsequent presentation may include signs of decreased cardiac function with decreased PaO_2 , hypotension, and increased pulmonary secretions. With appropriate recognition and support, broken heart syndrome should gradually resolve. Early aggressive treatment with diuresis may shorten the patient's hospital stay.

Plastic surgeons and anesthesiologists should consider the potential for acute stress-induced cardiomyopathy in rhinoplasty patients. We believe that the problem may be more prevalent than is currently recognized. Although epinephrine is commonly administered in dental procedures, a MEDLINE/PubMed search revealed only one reported

instance in the dental literature.⁹ We believe that an increased awareness in our practice accounts for us recognizing this rare problem twice.

CONCLUSIONS

Broken heart syndrome is a rare complication that can potentially occur in teenagers undergoing rhinoplasty. Plastic surgeons should be aware of this phenomenon when injecting epinephrine and be suspicious of exaggerated reactions to injection. Ultimately, early diagnosis and treatment appear to result in decreased morbidity and faster recovery.

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