

Interval Surgery for Unstable Traumatic Ventricular Septal Defect

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Abstract

Blunt or penetrating thoracic wall trauma can lead to formation of a traumatic ventricular septal defect. This is a serious cardiac complication that can have dire hemodynamic consequences in a setting of ongoing hemorrhage. This demands urgent surgical repair to cease further deterioration. We describe a patient with traumatic VSD who underwent successful interval repair after management of acute abdomen and stabilization of hemodynamics using vasopressors and Intra-Aortic Balloon Pump (IABP).

Keywords: Traumatic VSD; patch repair; left ventricle

Introduction

Traumatic Ventricular Septal Defect (VSD) is a form of Blunt Cardiac Injury (BCI). According to the American Association for the Surgery of Trauma, traumatic VSD can be a Grade III or IV BCI depending on the severity of hemodynamic compromise. Ensuing mortality rates from blunt cardiac injury can be as high as 13.9% [1]. Incidence of traumatic VSD ranges around 2-10% of patients who suffer thoracic trauma in the U.S. [2].

After exclusion of any congenital defects rapid treatment for a traumatic VSD is emphasized to optimize cardiac output in a patient that may already have multiple ongoing hemodynamic problems. We define a rare instance of interval repair for a traumatic VSD after stabilization of other acute injuries.

Case Report

A 36-year-old male presented after a MVA involving car crashing against pole. On initial triage, the patient was hemodynamically unstable with increasing troponin values. Bilateral pulmonary contusions and free abdominal fluid were found. He underwent a diagnostic cardiac catheterization. The coronary vasculature was normal although a shunt fraction (Qp/Qs) equivalent to 4:1 was revealed.

On bedside Transthoracic Echocardiogram (TTE) a large VSD was observed Figure 2. The size of the VSD and ensuing hemodynamic compromise pointed towards a traumatic origin. The patient received multiple transfusions but was difficult to stabilize in a background of increasing abdominal free fluid level and a large VSD. The cardiology team recommended open repair

due to the large size (3.5 cm) of the VSD and hemodynamics of the patient. He subsequently underwent an IABP placement to provide time for stabilization of the acute abdomen.

Over the next couple of days, the patient remained febrile and dependent on inotropic support. Sequential CT scans demonstrated increasing abdominal free fluid resulting in plan to delay correction of VSD. Eleven days after admission the patient underwent laparotomy with right hemicolectomy due to increasing abdominal free fluid, pneumatosis and leukocytosis.

Two weeks after initial admission the patient was planned for VSD repair albeit still requiring IABP. Cardiac catheterization demonstrated significant shunting with progressive dilatation of the right ventricle. The timing for surgery was not ideal and was carefully deliberated considering the operative risk of cardiac surgery risk during multiorgan dysfunction. The team decided to proceed with surgery sooner than later due to increasing right ventricular dilation and pressures.

A standard VSD repair with patch closure Figure 1 was performed Postoperatively, The patient had prolonged intubation necessitating percutaneous tracheostomy. The patient stabilized within 4 weeks on trach mask. During this period the patient had an episode of hypoxic respiratory arrest necessitating CPR and was stabilized after removal of clot near the carina. The patient did not have further complications during the course of his hospitalization.

Discussion

A VSD can occur spontaneously on impact at the time of accident or it may gradually form as injured tissue reorganizes after a cardiac contusion [3]. A VSD may be overlooked during triage of patients presenting with multiple other manifest injuries in the emergency department. It may result in a persistent hematological instability and/or rising troponin values. These patients should be investigated with an emergency point of care echocardiogram and then followed up with a comprehensive echocardiogram in a few days as these injuries evolve over time. A traumatic VSD complicated with hemodynamic instability is a surgical emergency and requires immediate definitive surgical management. However, in most cases there may be simultaneous

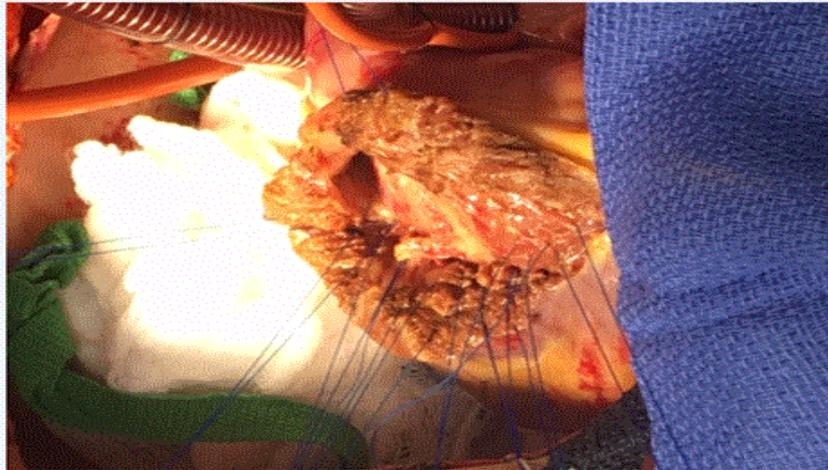


Figure 1: VSD repair through left ventriculotomy

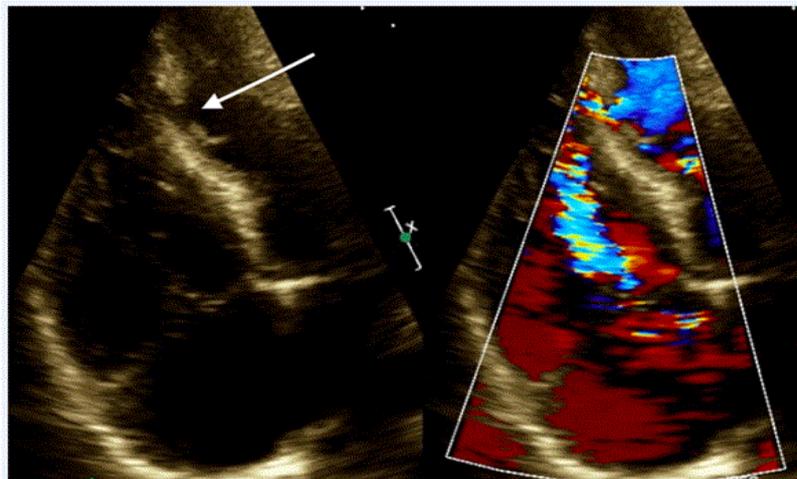


Figure 2: Echocardiogram demonstrating VSD and significant intra-cardiac shunting (white arrow)

multi-organ dysfunction that warrants careful stabilization of the patient before surgical management. For these cases the use of an intra-aortic balloon pump or pressors to stabilize the patient for an interval of up to two weeks before performing an invasive cardiac operation may be the ideal strategy. This delay is typically suggested for patients who are not eligible for an urgent percutaneous closure. Interval surgery can help stabilize the patient and allow for control on bleeding. An open VSD repair involves full heparinization that may increase the chances of bleeding complications in a patient already hemodynamically compromised.

The most common surgical approach to repair a traumatic VSD is through the left ventricle with subsequent patch closure [4]. The most common postoperative complication is complete heart block (most likely due to septal manipulation) requiring permanent pacemaker placement however, other complications may also arise [4].

Our case demonstrates that delayed closure of a traumatic VSD in a hemodynamically unstable patient is possible. Judicious use of an intra-aortic balloon pump and optimization with vasopressors is necessary in the interim period. These cases are associated with an extreme risk of mortality and an inter-team collaborative decision making process is necessary. Delaying surgery more than a few weeks is not recommended as pulmonary decompensation ensues.

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