

Anesthetic Induction In Pediatric Pericardial Tamponade

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Citation

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Abstract

Pediatric cardiac emergencies are almost always associated with major degrees of hemodynamic instability and cardiovascular compromise. Immediate surgical intervention is required especially if the pediatric patient presents with signs of cardiac tamponade. Anesthetic management is a major challenge in these patients, with induction of anesthesia being the most important stage as sudden cardiovascular collapse can occur immediately after induction of anesthesia. Here we present a 11 month old child, with signs and symptoms suggestive of pericardial tamponade, who was posted for total pericardiectomy. The patient was hemodynamically unstable with heart sounds barely audible. The child had considerable thickening of the pericardium with 2 layers investing the heart, the second being closely adherent to the heart. There was no effusion and hence pericardiocentesis was not possible. All emergency and resuscitation drugs were kept ready. The patient was induced with ketamine, with graded cautious doses of midazolam and fentanyl after cannulating internal jugular vein and femoral artery. Intraoperatively, Inj. Dobutamine was started and the surgery proceeded uneventfully. Patient was shifted on post operative ventilatory support and was extubated the next day. This report highlights the importance of induction of anesthesia in pediatric patients, with hemodynamically unstable pericardial tamponade which cannot be drained by pericardiocentesis, hence have to be taken up for open heart surgery.

CASE REPORT

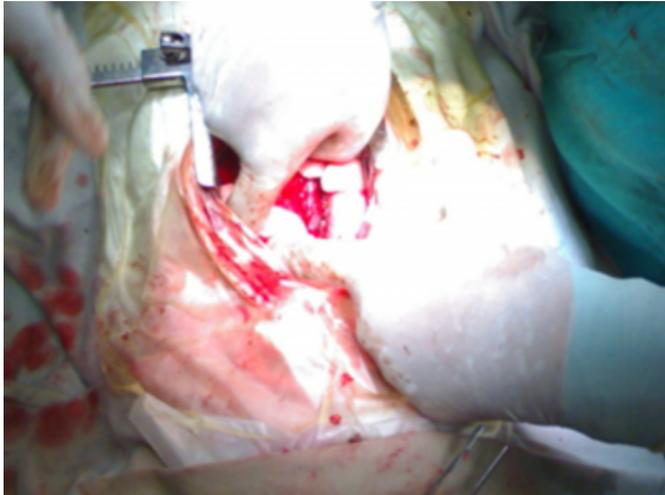
A 11 month old child, weighing 5 kg, presented with history of breathlessness, poor feeding and irritability over the previous 15-20 days. Prior to that, the patient also had intermittent episodes of fever and lower respiratory tract infections, for which he was treated. Birth history was normal and there were no episodes of cyanosis or tet spells. On examination, the child was irritable, with fever and tachycardia, with tachypnoea. Auscultation revealed a normal respiratory system but the heart sounds were barely audible. The peripheral arterial pulses were feeble. Investigations revealed raised leukocyte counts, with a normal Hb, and cardiomegaly on Chest X ray. The ECG revealed low voltage QRS complexes. 2 D Echocardiography revealed a thick pericardium enclosing the heart, with minimal effusion. A decision for surgery was undertaken, and the child was posted for sternotomy and pericardiectomy on an emergency basis. Drugs for induction of anesthesia as well as emergency drugs for resuscitation were kept ready. Pediatric cardiopulmonary bypass system was also kept ready in view of any unexpected complication.

Upon obtaining high risk consent, the patient was taken into the Operation theatre and monitors attached. The patient was induced with Inj. Ketamine and Inj. Succinylcholine,

followed by graded doses of Inj. Midazolam and Inj. Fentanyl, the patient was intubated with endotracheal tube no. 4.5 with air entry confirmed and tube was secured. The right femoral artery was cannulated with a 22 G Jelco. The right internal jugular vein was cannulated with a 5 Fr triple lumen set. Preoperative blood pressure was 55-60 mm Hg and central venous pressure was 25/8 mmHg. Surgery proceeded with sternotomy being done. Intraoperatively, blood pressure dropped to 40-45 mm Hg, with associated tachycardia, Inj. Dobutamine infusion was started. After sternotomy, the thick investing layer of pericardium was visualized, with the heart not visible to the eye. After careful dissection and separating the layer of pericardium on either side, it was found that a second layer was closely adherent to the heart, which had to be carefully removed. (Fig 1).

Figure 1

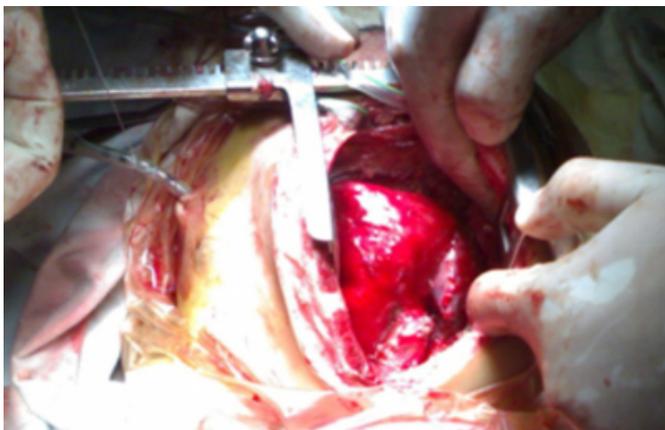
Figure 1 : Showing dissection around investing layer of pericardium



Once the constriction effect on the heart was relieved, blood pressure improved to 85-90 mm Hg and central venous pressure dropped to 6-8 mm Hg. (Fig 2).

Figure 2

Figure 2 : A normal looking heart after all the constrictions have been relieved



The rest of the surgery was uneventful. Intraoperative ABG and blood sugars were maintained within normal limits. The patient was electively shifted on mechanical ventilatory support and was extubated on the next day.

DISCUSSION

Pericardial tamponade is almost always associated with significant hemodynamic compromise, especially so in pediatric patients. Such patients need immediate intervention, either in the form of pericardiocentesis or

surgical decompression. The goal of anesthetic management is to maintain cardiac output. Supportive measures, fluid restriction, and inotropic support are the principles of initial treatment. Prompt recognition and initiation of appropriate therapy in pediatric cardiac emergencies are essential for favorable outcomes. (1).

There are relatively few situations where cardiac emergencies can occur in a child. A very specific treatment plan is essential in the management of such patients, which may be available only in tertiary medical centers. In such a scenario, transport of the patient to the tertiary centre is crucial and valuable time may be lost in doing so. (2).

Another matter of importance is, many of the pediatric patients present with symptoms of initially what is considered as a primary pulmonary disorder such as pneumonia, asthma, or bronchiolitis. Airway stabilization and ventilatory support, if needed, remain the first steps in stabilizing the patient. Considering the possibility of a cardiac problem as the cause for the presenting symptoms is the initial step in successful management. (3).

The period of induction of anesthesia is the most crucial and important stage in the anesthetic management of these patients. Pediatric patients have a limited cardiac reserve, and when the cardiac output is severely compromised, induction agents can trigger cardiovascular collapse, which may be refractory to treatment unless the tamponade is relieved. Our patient had a similar clinical scenario, in addition, the tamponade had to be relieved only surgically by an open heart surgery. The time between induction of anesthesia and surgical pericardiectomy is vital. Ketamine is the induction agent of choice in such patients, due to its ability to increase systemic vascular resistance, and produce the least fall in blood pressure as compared to sedation-narcotic induction. Inhalational agents should be avoided at any cost as they add to the myocardial depression and can trigger rapid cardiovascular collapse. Hence ketamine induction is safer compared to other modes of induction in a hemodynamically compromised pediatric cardiac patient.

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