

Anaesthetic Management of an Infant with Myocarditis for Non-Cardiac Surgery.

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ABSTRACT

We report a case of two months old infant diagnosed with acute myocarditis, with a ventricular septal defect (VSD) of 0.9 mm size, admitted to our hospital with gangrene of left foot. A below knee amputation was planned under general anaesthesia with caudal block. Digoxin and diuretics were continued. Induction was done with fentanyl and sevoflurane and supraglottic device was used to secure the airway. Caudal block with bupivacaine was administered. The recovery was satisfactory and postoperative stay was uneventful.

Keywords: Myocarditis, ventricular septal defect, non-cardiac surgery, infant.

INTRODUCTION

Myocarditis is the most common cause of heart failure in children and may progress to dilated cardiomyopathy.^[1] It causes significant morbidity and mortality in children.^[1] We report anaesthetic management of an infant with myocarditis scheduled for non-cardiac surgery.

CASE REPORT

A two months old, 4 kg male infant, diagnosed with acute myocarditis was referred to our hospital with gangrene of left foot. The patient had presented 10 days earlier to a private hospital with complaints of fever, cough, respiratory distress and recurrent seizures. He was diagnosed as a case of pneumonitis with septicemic shock and evolving gangrene of left foot. He was managed with antibiotics, inotropes, digoxin, diuretics, anticonvulsants and required ventilatory support for nine days. He was then referred for surgical intervention of left foot gangrene.

On admission to our hospital, the patient was on treatment with syrup frusemide, digoxin and levetiracetam. On examination, the baby was

lethargic with a weak cry, heart rate (HR) was 142/minute, blood pressure (BP) was 72/48 mmHg in right arm, respiratory rate was 35-40/minute and SpO₂ on room air was 94% and with FiO₂ of 0.4 was 100%. On auscultation, a pansystolic murmur was heard at lower left sternal border and there were bilateral crepitations in chest. Liver was palpable 3 cm below the costal margin. On local examination of the left lower limb, there was dry gangrene of foot and lower one third of leg with line of demarcation 10 cm below the knee. Popliteal and femoral pulses were palpable above the gangrenous part.

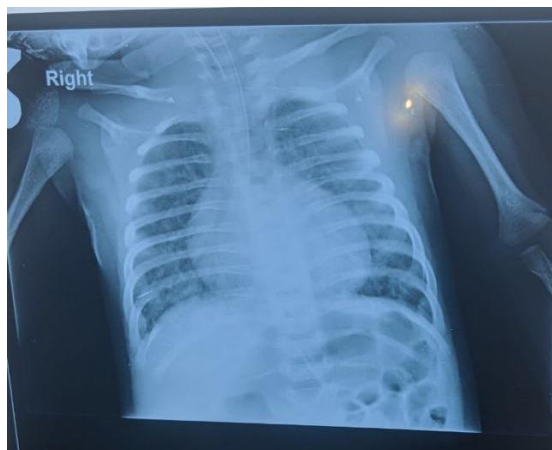
Lab investigations revealed haemoglobin 11.1g/dL, total leukocyte count 15.2 x10⁹/L, urea 14mg/ dL, creatinine 0.1mg/dL, sodium 133mmol/L, potassium 5.6mmol/L and INR 0.93. Cardiac enzymes were raised. (SGOT 136U/L, CK-MB 12.4 ng/mL)

A 12-lead electrocardiography (ECG) showed normal sinus rhythm with tall R wave in V1 and V2. Chest X-ray revealed cardiomegaly (CTR=0.6) [Figure 1]. The 2D echo showed 0.9mm perimembranous VSD with left to right shunt and a pressure gradient of 49 mmHg. Left atrium and left ventricle were moderately enlarged while right atrium and right ventricle were mildly enlarged. There was global hypokinesia of left ventricle with reduced left ventricular ejection fraction of 30-35%. USG doppler of the left lower limb revealed thrombosis of tibial vein.

A diagnosis of VSD with myocarditis with left foot gangrene was established and a below knee amputation was planned after obtaining written informed consent.

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Pic 1: Chest X-ray revealing cardiomegaly.

General anaesthesia with caudal block was planned. Intravenous (iv) line had already been secured in the left forearm and the patient was administered injection (inj) digoxin 15µg iv and inj lasix 4 mg iv preoperatively. After taking the patient in the operating room, pulse oximetry, ECG and non-invasive blood pressure monitors were applied and baseline values were recorded. Patient was preoxygenated with 100% O₂ and induced with inj fentanyl 3µg/kg iv and 1% sevoflurane in 100% O₂. Muscle relaxation was achieved with inj vecuronium 0.1 mg/kg iv and airway was secured with i-gel#1. After ensuring asepsis, a caudal block with 3ml of 0.25% bupivacaine was administered. Anaesthesia was maintained with mixture of oxygen, air (FiO₂-0.5) and 1% sevoflurane (0.9 MAC) with intermittent boluses of inj vecuronium. The patient remained stable intraoperatively (HR: 140-150/minute, BP: 60-70/35-45 mmHg, SpO₂: 100%, EtCO₂: 34-38 mmHg and ECG showing sinus rhythm throughout). Inj paracetamol 7.5 mg/kg iv was given 30 minutes before the end of surgery. Surgery lasted for 90 minutes and residual neuromuscular blockade was reversed with inj glycopyrrolate (0.01 mg/kg iv) and inj neostigmine (0.05 mg/kg iv). I-gel was removed once the patient was awake with return of protective airway reflexes and adequate spontaneous respiratory efforts. The patient was shifted to paediatric ICU after monitoring for 2 hours in the postoperative area. Digoxin and diuretic were continued in the postoperative period and subsequently the patient was discharged after 7 days with advice to follow up in paediatric cardiology.

DISCUSSION

Myocarditis has a variable clinical spectrum. Many patients present with a history of respiratory tract infection or gastroenteritis or nonspecific symptoms such as shortness of breath, vomiting, anorexia, fever, myalgia and lethargy.^[1] Atypical manifestations such as syncope, seizures, and sudden

death also have been reported.^[1,2] Newborns and infants are more likely to have circulatory shock.^[1] Nonspecific markers of inflammation and cardiac enzymes are often elevated in myocarditis.^[3] The most common echocardiographic finding is left ventricular dilatation and reduced ejection fraction.^[3] The goals of anaesthetic management in myocarditis consist of avoidance of decreased myocardial contractility, ensuring the systemic vascular resistance (SVR) is not elevated, and avoidance of tachycardia. In VSD with a left to right shunt, SVR and pulmonary vascular resistance (PVR) need to be maintained.

We chose to induce our patient with iv fentanyl and low concentration of sevoflurane (1%) as opioids cause little or no cardiovascular depression. Although, all volatile anaesthetic agents are myocardial depressants and vasodilators in high concentrations, low doses are usually well-tolerated. Dopamine infusion was kept ready during induction of anaesthesia though the patient did not require it. Though etomidate is being administered off-label to children due to its favourable hemodynamic profile, it is currently FDA approved for induction in children ≥10 years of age.^[4]

For maintenance of anaesthesia, we used mixture of oxygen, air (FiO₂ 0.5) and 1% sevoflurane (MAC-0.9). Ventilation with 100% oxygen was avoided as it causes pulmonary vasodilation and increase in left to right shunt. Nitrous oxide was not used as it increases PVR and may cause cardiovascular depression.

It is imperative to provide adequate analgesia to prevent increase in HR and SVR. Caudal block was administered to decrease the maintenance requirement of inhalational anaesthetic and to provide postoperative analgesia.

CONCLUSION

Anaesthetic management of patients with myocarditis poses a challenge for the anaesthesiologist. A balanced anaesthetic technique according to patient's cardiac condition and meticulous perioperative monitoring is required for a favourable outcome.

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