

CASE REPORTS

Anaesthetic Management of Paediatrics Patient with Dilated Cardiomyopathy Posted for Wound Debridement

Karthik C.¹, Vishnuvardhan², Anushri³**How to cite this article:**

Karthik C., Vishnuvardhan, Anushri. Anaesthetic Management of Paediatrics Patient with Dilated Cardiomyopathy Posted for Wound Debridement. Ind J Anesth Analg. 2025; 12(2): 121-124.

ABSTRACT

Introduction: Dilated Cardiomyopathy is a syndrome characterized by cardiac enlargement and impaired systolic function of one or both ventricles. A large number of cases are idiopathic. The known causes are ischemic, valve dysfunction and post viral infection. DCM can also be found in association with sickle cell disease, muscular dystrophy, excess alcohol, hypothyroidism and some chemotherapy agents or during peripartum period. Patients with dilated cardiomyopathy are regarded to be of high risk for perioperative complications, necessitating diligent anaesthetic management.

Case report: A 2 year old girl child diagnosed with the cellulitis of left upper limb and left foot, with query of osteomyelitis of left elbow joint posted for incision and drainage and wound debridement. Child presented with a history of dilated cardiomyopathy diagnosed at the age of 6 months and was put on medication. 2D echocardiography showed dilated left ventricle with global hypokinesia of left ventricle with severe left ventricular systolic dysfunction, with ejection fraction of 20 percent. On examination wound to have severe anaemia with Hb of 5g%.

Through pre-operative cardiovascular stabilisation done by consultation of cardiologist opinion in view of DCM and Paediatrician in view of anaemia. Standard monitoring ensured perioperatively with keen monitoring over cardiovascular status.

On the day of surgery, patient Blood Pressure (BP) was 96/60 mm Hg, Heart Rate (HR) was 130/min and oxygen saturation (SaO₂) was 100% on room air. Other parameters monitored were ECG, end tidal carbon dioxide and oxygen saturation. anaesthesia was induced slowly with iv ketamine 3.5mg, and iv succinylcholine

AUTHOR'S AFFILIATION:

¹ Junior Resident, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Kolar, Karnataka, India.

² Professor, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Kolar, Karnataka, India.

³ Senior Resident, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Kolar, Karnataka, India.

CORRESPONDING AUTHOR:

Vishnuvardhan, Professor, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Kolar, Karnataka, India.

E-mail: voletivishnu@gmail.com

➤ **Received:** 25-01-2025 ➤ **Accepted:** 06-03-2025



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7 mg. LMA of size 2 was used. Anaesthesia was maintained with O₂/N₂O, sevoflurane (mac 3.5-1). Surgery was completed in 60 minutes Intraoperatively total IV fluids 60 ml given. At the end of surgery LMA removed and patient was kept in Paediatrics icu for one day for observation

Conclusion: As the patient posted for wound debridement with known history of DCM. Hemodynamic management and support was extremely useful to these patients. Due to short procedure, LMA was selected to avoid the post intubation responses. And maintained minimal IV fluids In this case, the anaesthetic management was handled successfully without any consequences.

Key Messages: Different types of cardiomyopathy are there of which obstructive cardiomyopathy is more symptomatic. In our patient it was a dilated cardiomyopathy which may present as cardiac failure when the patient is exposed to any stress (surgical or anaesthetic). Anaemia may further worsen the condition. So hemodynamic monitoring and fluid management plays a major role in avoiding complication. We managed this case with meticulous planning, minimal fluids, pain relief and ended up with a successful outcome.

KEYWORDS

• Anaesthetic management • DCM • Wound debridement

INTRODUCTION

Dilated Cardiomyopathy (DCM) is a condition marked by the enlargement of the heart and a reduction in the systolic function of one or both ventricles. A significant proportion of DCM cases are classified as idiopathic, meaning their exact cause remains unknown. However, several identifiable factors contribute to the development of this syndrome, including ischemic heart disease, valvular dysfunction, and infections following viral illnesses. Additionally, DCM may occur in conjunction with various medical conditions such as sickle cell disease, muscular dystrophy, excessive alcohol consumption, hypothyroidism, and certain chemotherapy drugs, as well as during the peripartum period.

Patients diagnosed with dilated cardiomyopathy are considered to be at an elevated risk for complications during surgical procedures, which underscores the importance of careful anesthetic management. The complexities associated with this condition necessitate a thorough understanding of the patient's cardiovascular status and potential challenges that may arise during the perioperative phase. Consequently, healthcare professionals must adopt a meticulous approach to ensure optimal outcomes for individuals affected by this syndrome.

CASE REPORT

A two-year-old female patient was diagnosed

with cellulitis affecting the left upper limb and left foot, alongside a suspected case of osteomyelitis in the left elbow joint. She was scheduled for incision and drainage, as well as wound debridement. The child exhibited swelling in her left hand and foot for the past week. Notably, she had a medical history of dilated cardiomyopathy, diagnosed at six months of age, for which she received medication for six months, although specific details regarding the treatment were unavailable. A preoperative cardiac assessment was conducted, including a 2D echocardiogram that revealed a dilated left ventricle with global hypokinesia and severe left ventricular systolic dysfunction, indicated by an ejection fraction of 20 percent. Upon examination, the patient was found to be severely anaemic, with a haemoglobin level of 5 g/dL.

Preoperative cardiovascular stabilization was achieved through consultations with a cardiologist, considering her dilated cardiomyopathy, and a paediatrician, addressing her anaemia. By blood transfusion before posting for the surgical procedure and finally Standard monitoring protocols were implemented preoperatively, with particular attention to her cardiovascular status.

On the day of the procedure, the patient's blood pressure was recorded at 96/60 mm Hg, heart rate at 130 beats per minute, and oxygen saturation at 100% while breathing

room air. Additional parameters monitored included ECG and end-tidal carbon dioxide levels. Anaesthesia was induced gradually using intravenous ketamine at a dose of 3.5 mg and intravenous succinylcholine at 7 mg. The patient's airway was secured with a size 2 laryngeal mask airway (LMA), which was inflated for maintenance. Anaesthesia was sustained with a mixture of oxygen and nitrous oxide, along with sevoflurane at a minimum alveolar concentration of 3.5-1. The surgical procedure lasted for 60 minutes, during which there was minimal response to the LMA. A total of 60 mL of intravenous fluids was administered intraoperatively. Following the completion of the surgery, the LMA was removed, and the patient was transferred to the paediatric intensive care unit for a one-day observation period.

DISCUSSION

Dilated Cardiomyopathy (DCM) is characterized by heart enlargement and reduced systolic function in one or both ventricles. Many cases are idiopathic, with unknown causes, but recognized contributors include ischemic heart disease, valve dysfunction, and post-viral infections. DCM can also be associated with factors like sickle cell disease, muscular dystrophy, excessive alcohol use, hypothyroidism, certain chemotherapy drugs, and the peripartum period.¹

Dilated cardiomyopathy (DCM) in children is typically characterized by the presence of an unobstructed, dilated, and contracting left ventricle, often leading to heart failure. The primary factors contributing to DCM include myocarditis and various neuromuscular disorders. Among these, Duchenne and Becker muscular dystrophies have been linked to a limited number of cases with viral associations. Additionally, viral myocarditis is frequently observed in paediatric patients with DCM, with notable pathogens including parvovirus B19, influenza, Epstein-Barr virus, human immunodeficiency virus, coxsackievirus, herpes viruses, and adenoviruses.

Patients diagnosed with dilated cardiomyopathy (DCM) present a complex set of challenges for anaesthesiologists, necessitating a thorough understanding of the condition and its implications for perioperative care. DCM is characterized by the dilation

and impaired contraction of the left ventricle, leading to a decrease in cardiac output and an increased risk of heart failure. As a result, these patients often exhibit a range of cardiovascular abnormalities that can complicate anaesthesia management. One of the primary concerns for anaesthesiologists is the elevated risk of postoperative mortality associated with DCM. This heightened risk necessitates careful preoperative assessment and optimization of the patient's cardiovascular status, including the management of heart failure symptoms and the optimization of medications.

The management of patients prior to surgery involves several critical components. It is essential that all patients continue their regular medications, with particular attention given to optimizing treatment for those exhibiting symptoms of heart failure. Furthermore, any arrhythmias present should be effectively managed prior to the surgical procedure, utilizing either pharmacological interventions or the implantation of devices to ensure proper rate and rhythm control. Additionally, echocardiography plays a crucial role in evaluating the degree of ventricular dysfunction and identifying any valvular abnormalities that may be present.³

The objectives of anaesthesia management for patients diagnosed with dilated cardiomyopathy (DCM) include the prevention of myocardial depression, the maintenance of sufficient preload while avoiding any rise in after load, and the avoidance of tachycardia. Additionally, it is crucial to prevent abrupt hypotension through the meticulous titration of anaesthetic agents.

Different Intraoperative monitoring systems could be used in accurate monitoring of the patient:

- The utilization of arterial and central venous catheters is recommended for effective monitoring.
- Transoesophageal echocardiography (TOE) offers a real-time evaluation of myocardial performance.
- In situations where TOE is not available, oesophageal Doppler may be an alternative option.
- Bispectral index monitoring can assist in the precise adjustment of anaesthetic medications.⁽⁴⁾

Following surgery, it is essential to move patients to an intensive care unit where they can receive invasive monitoring and appropriate management of postoperative hemodynamic and fluid therapy. And also ensuring effective pain management is crucial, as it helps mitigate the harmful consequences associated with elevated systemic vascular resistance (SVR).

CONCLUSION

The management of patients with dilated cardiomyopathy presents a significant challenge for anaesthesiologists. However, these individuals can be effectively cared for through comprehensive preoperative evaluations and appropriate medical interventions, which facilitate establishing well-structured anesthetic plans and remaining vigilant in recognizing and addressing potential complications.

Conflict of Interest: None

Support: Self

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