

Anesthesia Challenges in Patent Ductus Arteriosus Stenting for Congenital Heart Disease

The Editor,

Ductus arteriosus is communication present between pulmonary artery and proximal descending aorta. It is essential in fetal life to shunt blood from right ventricle bypassing the underdeveloped lungs. It closes functionally soon after birth and anatomically by days to few weeks. Ductal patency may be lifesaving in few cyanotic congenital heart diseases to maintain pulmonary blood flow. Typical duct-dependent lesions include pulmonary and tricuspid atresia, critical pulmonary stenosis, and tetralogy of Fallot with pulmonary stenosis. These patients require either prostaglandin infusion for maintaining ductal patency or palliative shunt surgeries such as Blalock Taussig (BT) shunt. Patent ductus arteriosus (PDA) stenting is an attractive, less invasive procedure and equally effective as BT shunt.^[1]

In the current era, with the advancement in surgical skills and perioperative care, there has been a growing trend toward early corrective surgeries for complex congenital heart diseases.^[2] Instead of doing staged surgeries, PDA stenting followed by correct surgery offers a promising alternative.

We present a case of a 20-day-old, 3 kg child who presented to casualty with bluish discoloration. On examination, the child had central cyanosis, tachypnea with continuous murmur in the left second intercostal space. On transthoracic echocardiography (TTE), the child had corrected transposition of great arteries with pulmonary atresia and PDA. The child was medically stabilized with prostaglandin E1 infusion started at 0.05 µg/kg/min and taken up for PDA stenting. 24-gauge peripheral cannula was secured. Oxygen saturation with Pulse-oxymeter, noninvasive blood pressure, and temperature monitoring were done. Anesthesia induced with 100% oxygen, fentanyl 2 µg/kg, ketamine 2 mg/kg, rocuronium 0.1 mg/kg and maintained with sevoflurane and atracurium. Prostaglandin E1 infusion was continued throughout the procedure. 5 F sheath was secured in the femoral vein and 4 F sheath was secured in the femoral artery. 0.5 mg/kg heparin was given, and 3.5 stent was inserted in PDA and confirmed by transthoracic echo. With TTE, correct placement of the stent and continued flow across PDA were seen. During the procedure, the child was stable, and saturation improved from 65% to 88%. Prostaglandin E1 infusion was stopped, child reversed and extubated.

Anesthesia for PDA stenting poses unique challenges. Goals include maintaining adequate preload and

contractility. The decrease in systemic vascular resistance and increase in pulmonary vascular resistance (PVR) can be done away with as these will cause further reduction in pulmonary blood flow and hypoxia. Factors which lead to increase in PVR such as hypoxia, hypercarbia, and acidosis can cause sudden deterioration in clinical condition. Other challenges include hypoglycemia and hypothermia. Warm blankets and warm saline for flushing and fluid warmer for intravenous infusion were used in our case. Adequate hydration needs to be done to reduce viscosity. The role of cardiac anesthetist also extends to transthoracic imaging. Confirmation of diagnosis, correct placement of the stent across PDA, adequate flow across stent, and any complications such as stent migration have to be looked for while doing TTE.

Reported complications such as acute stent thrombosis, pre-stent ductal spasm, and pulmonary congestion have to be kept in mind as well.^[3]

PDA stenting is an attractive, less invasive, palliative procedure for duct-dependent complex congenital heart diseases where the definitive procedure is to be done at slightly later date.^[4] Anesthesiologist's role lies in maintaining arterial saturation, hemodynamics, securing vascular assess, maintaining temperature, and transthoracic imaging, and thorough understanding of underlying physiology holds the key.

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Conflicts of interest

There are no conflicts of interest.

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