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HIGH-RISK ANAESTHETIC MANAGEMENT IN AN ADULT PATIENT WITH CONGENITAL HEART DISEASE UNDERGOING RIGHT TOTAL HIP REPLACEMENT: A CASE REPORT

Anaesthesiology

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ABSTRACT

Congenital heart disease (CHD) is increasingly encountered in adults presenting for non-cardiac surgery due to improved survival rates. Anaesthetic management in such patients is challenging because of altered cardiovascular physiology, presence of shunts, and associated pulmonary hypertension. We report the successful perioperative management of a 34-year-old male with acyanotic congenital heart disease with a suspected ostium secundum atrial septal defect and pulmonary hypertension posted for elective right total hip replacement. A combined spinal epidural (CSE) anaesthesia technique was employed to ensure haemodynamic stability and effective postoperative analgesia. Careful planning, vigilant monitoring, and multidisciplinary coordination contributed to a favourable outcome. This case highlights the utility of regional anaesthesia techniques such as CSE in high-risk cardiac patients undergoing major orthopaedic surgery.

KEYWORDS

Anaesthetic management, congenital heart disease, non-cardiac surgery, left-to-right shunt, pulmonary hypertension, combined spinal epidural

INTRODUCTION

Congenital heart disease (CHD) encompasses a spectrum of structural and functional cardiac abnormalities present since birth. Advances in diagnostic modalities and surgical or medical management have significantly improved survival, leading to a growing population of adults with CHD presenting for non-cardiac surgeries. These patients pose unique challenges to anaesthesiologists due to altered haemodynamics, presence of intracardiac shunts, pulmonary hypertension, arrhythmias, and compromised ventricular function.

Atrial septal defects (ASDs) are among the most common acyanotic congenital heart lesions in adults. Left-to-right shunting results in increased pulmonary blood flow, progressive pulmonary hypertension, and right ventricular volume overload. Anaesthetic goals include maintenance of systemic vascular resistance, avoidance of increases in pulmonary vascular resistance, prevention of arrhythmias, and preservation of adequate oxygenation. This case report describes the anaesthetic management of an adult patient with CHD undergoing right total hip replacement using combined spinal epidural anaesthesia.

Acyanotic CHD	Cyanotic CHD	Shunt	No shunt
VSD	TOF	Increased Pulmonary Blood flow (Lt to Rt)	Obstruction to blood progression
ASD	TGA	Septal defects without pulmonary obstruction	AS, PS, CoA
PDA	TAPVR	Acyanotic group till Eisenmengerisation	Regurgitant lesion:
AVSD		Decreased Pulmonary Blood flow (Rt to Lt)	Mitral valve with AVSD, ASD
AP window		Septal defects with pulmonary obstruction	
		Cyanotic Group	
PS	Tricuspid atresia	Uncommon. Each <1% of CHD, pulmonary atresia	
AS		Ebstein's anomaly	
CoA	Truncus arteriosus		

VSD – Ventricular septal defect; ASD – Atrial septal defect; PDA – Patent ductus arteriosus; TGA – Transposition of the great arteries; TAPVR – Total anomalous pulmonary venous return; AVSD – Atrioventricular septal defect; AP – Aortopulmonary; CHD – Congenital heart disease; PS – Pulmonary stenosis; AS – Aortic stenosis; CoA – Coarctation of the aorta; TOF – Tetralogy of Fallot

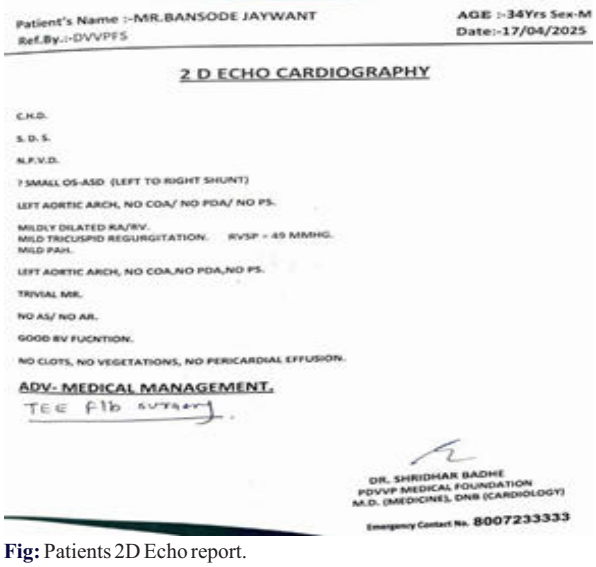
Fig: Classification of CHD.

Case Report

A 34-year-old male patient weighing 80 kg and measuring 180 cm in height was scheduled for elective right total hip replacement surgery. The patient was a known case of congenital acyanotic heart disease. He had no history of cyanotic spells, syncope, or heart failure symptoms but reported occasional exertional dyspnoea.

Preoperative electrocardiogram showed sinus bradycardia with a resting heart rate of 52 beats per minute. Two-dimensional echocardiography revealed findings suggestive of congenital heart disease with suspected small ostium secundum atrial septal defect with left-to-right shunt, mildly dilated right atrium and right ventricle, mild tricuspid regurgitation, right ventricular systolic pressure of 49 mmHg, and mild pulmonary arterial hypertension. Left ventricular systolic function was preserved.

The patient underwent preoperative cardiology evaluation and was advised trans-oesophageal echocardiography for further assessment. He was classified as a moderate-risk candidate for non-cardiac surgery and accepted for surgery with appropriate precautions. Routine laboratory investigations were within normal limits.


Patient's Name :-MR.BANSODE JAYWANT AGE :-34Yrs Sex-M
Ref.By.:-DVVPFS Date:-17/04/2025

2 D ECHO CARDIOGRAPHY

C.H.D.
S. D. S.
N.F.V.D.
? SMALL OS-ASD (LEFT TO RIGHT SHUNT)
LEFT AORTIC ARCH, NO COA/ NO PDA/ NO PS.
MILDLY DILATED RA/RV.
MILD TRICUSPID REGURGITATION. RVSP – 45 MMHG.
MILD PAH.
LEFT AORTIC ARCH, NO COA,NO PDA,NO PS.
TRIVIAL MR.
NO AS/ NO AR.
GOOD BV FUCNTION.
NO CLOTS, NO VEGETATIONS, NO PERICARDIAL EFFUSION.

ADV- MEDICAL MANAGEMENT.
TEE f/b surgery.

DR. SHRIDHAR BADHE
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Fig: Patients 2D Echo report.

Anaesthetic Plan

The primary anaesthetic objectives were to maintain haemodynamic stability, avoid sudden changes in heart rate, prevent hypoxia and hypercarbia, and minimize increases in pulmonary vascular resistance. Considering the patient's cardiac status and the nature of surgery, combined spinal epidural (CSE) anaesthesia was planned to provide controlled onset of anaesthesia and effective postoperative analgesia.

Intraoperative Management

After confirming adequate nil per oral status, standard monitors including electrocardiography, non-invasive blood pressure, pulse oximetry, and temperature monitoring were applied. Supplemental oxygen was administered via face mask. Intravenous access was secured, and preloading was done cautiously to avoid fluid overload.

Combined spinal epidural anaesthesia was administered in the sitting position under strict aseptic precautions. An 18G Tuohy needle was

used to identify the epidural space, and an epidural catheter was inserted and fixed at 10 cm. Subarachnoid block was then performed using a 25G Quincke needle. Intrathecal drugs administered included 3 ml of 0.5% hyperbaric bupivacaine along with fentanyl 25 micrograms.

Adequate sensory block was achieved, and surgery was allowed to proceed. Intraoperative haemodynamics were closely monitored. Episodes of hypotension and bradycardia were managed promptly with mephentermine and judicious fluid administration. Oxygen saturation remained stable throughout the procedure, and no arrhythmias were noted. The surgery was completed uneventfully.

Postoperative Management

Postoperative analgesia was provided using an epidural infusion containing 0.2% ropivacaine (48 ml) with fentanyl 100 micrograms. Pain control was satisfactory, and haemodynamic parameters remained stable in the postoperative period. The patient was mobilised on postoperative day one and had an uneventful recovery.

DISCUSSION

Adults with congenital heart disease undergoing non-cardiac surgery represent a high-risk population. In patients with ASDs, left-to-right shunting leads to increased pulmonary blood flow, right heart dilation, and eventual pulmonary hypertension. Anaesthetic management should focus on maintaining a balance between pulmonary and systemic vascular resistance to prevent shunt reversal and right heart failure.

Regional anaesthesia techniques offer several advantages in such patients by avoiding airway manipulation, reducing stress response, and allowing better haemodynamic control. Combined spinal epidural anaesthesia provides rapid onset of dense surgical anaesthesia while offering the flexibility of extending the block and ensuring effective postoperative analgesia through the epidural catheter.

However, spinal-induced hypotension can be detrimental in patients with CHD; therefore, careful dosing, vigilant monitoring, and prompt management of haemodynamic changes are essential. Multidisciplinary coordination between anaesthesiologists, cardiologists, and surgeons plays a crucial role in achieving favourable outcomes.

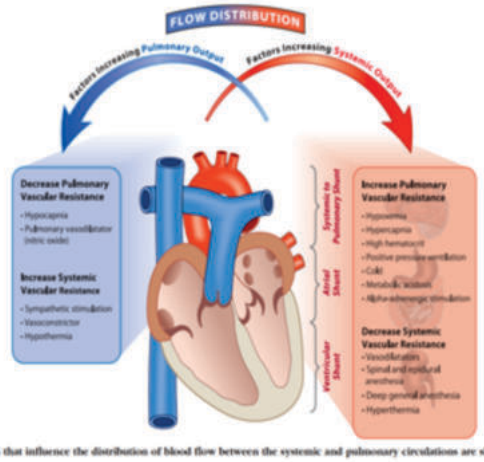

Fig. 1. Factors that influence the distribution of blood flow between the systemic and pulmonary circulations are shown.

CONCLUSION

This case highlights that with meticulous planning, vigilant monitoring, and multidisciplinary coordination, major non-cardiac surgery can be safely performed in adults with congenital heart disease. Combined spinal epidural anaesthesia proved to be an effective and safe technique in this high-risk patient by providing stable intraoperative conditions and excellent postoperative analgesia.

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