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Anaesthetic Management of a Child with Tricuspid Atresia Post Glenn Shunt with Drug Resistant Epilepsy Undergoing Lesionectomy-A Case Report

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KEYWORDS

Tricuspid atresia, Glenn shunt, drug-resistant epilepsy, lesionectomy, anaesthetic management, congenital heart disease

ABSTRACT:

Background: Tricuspid atresia is a rare cyanotic congenital heart disease that accounts for 1–3% of all congenital cardiac malformations. It requires staged surgical palliation for survival, with the Glenn shunt being a key procedure that diverts systemic venous return directly into the pulmonary circulation. Anaesthetic management in such patients is challenging due to dependence on passive pulmonary blood flow, altered hemodynamics, and increased susceptibility to perioperative complications.

Case Presentation: We describe the anaesthetic management of a child with tricuspid atresia, status-post Glenn shunt, who presented for lesionectomy in view of drug-resistant epilepsy. The child had recurrent seizures refractory to medical management and underlying hypoxemia. A multidisciplinary approach involving cardiology, neurology, and anaesthesiology was undertaken for preoperative assessment and optimization.

Method: Anaesthetic management focused on maintaining adequate pulmonary blood flow and avoiding increases in pulmonary vascular resistance. Intraoperative goals included prevention of hypoxia, hypercarbia, acidosis, and hypothermia. Low airway pressures, careful fluid balance, and continued anticonvulsant therapy were ensured. Monitoring included invasive and non-invasive techniques for hemodynamic stability, and anaesthetic agents were carefully selected to balance cerebral and cardiovascular requirements during neurosurgery.

Conclusion: Children with Glenn physiology present unique perioperative challenges, particularly when undergoing non-cardiac surgery. Successful outcomes require individualized anaesthetic strategies, vigilant monitoring, and close multidisciplinary collaboration. This case highlights the importance of tailoring anaesthetic techniques to maintain Glenn shunt physiology while addressing coexisting conditions such as drug-resistant epilepsy.

INTRODUCTION

Tricuspid atresia is a rare form of congenital cyanotic heart disease, accounting for approximately 1–3% of cases. It is characterized by complete absence of the tricuspid valve, resulting in a lack of direct communication between the right atrium and right ventricle. when a result, oxygenated and deoxygenated blood mix when systemic venous return is transferred into the left atrium through an atrial septal defect. If treatment is not received, this aberrant physiology leads

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to progressive heart failure, cyanosis, and systemic desaturation.[1]

In order to optimise systemic oxygenation and lessen the volume stress on the one functioning ventricle, tricuspid atresia is managed using a sequence of phased surgical procedures. Usually done in infancy or early youth, the bidirectional Glenn shunt is one of the most significant intermediate surgeries. This procedure involves dividing and ligating the major pulmonary artery and anastomosing the superior vena cava (SVC) end-to-end with the right pulmonary artery (RPA). The Glenn shunt offers passive, non-pulsatile pulmonary blood flow without adding to the ventricle's volume strain by rerouting SVC blood flow straight into the pulmonary circulation.[2]

This physiological change lowers cyanosis, increases systemic arterial oxygen saturation, and gets the patient ready for the Fontan operation, the last palliation step. However, conditions like unhindered pulmonary venous return and minimal pulmonary vascular resistance are crucial for the Glenn circulation. Thus, pulmonary blood flow and oxygenation may be jeopardised by any rise in pulmonary vascular resistance, hypoventilation, hypercarbia, hypoxia, acidosis, or high intrathoracic pressure. Significant anaesthetic issues arise from these particular haemodynamic characteristics, particularly in patients undergoing non-cardiac operations.[3]

CASE REPORT

4 year old male child a known case of Tricuspid Atresia with open atrial septostomy and right sided bidirectional GLENN shunt at 6 months of age and has global developmental delay came with complaints of involuntary movements of bilateral upper and lower limb lasting for 5mins since 2.5yrs of age with increased frequency of seizure episode inspite of being treated with multiple antiepileptic drugs.

Preoperative assessment:

Room air saturation:upper limb-84%,lower limb-78%.

ECHO: post open atrial septostomy with right sided bidirectional GLENN shunt large OS type ASD right to left shunt SVC to RPA flow unobstructed. Hypoplastic right ventricle

Induction: Child induced with inhalational anaesthetic agents oxygen and sevoflurane.IV FENTANYL 30mcg, ETOMIDATE 4mg given.Postinduction child developed bradycardia HR -62/min -IV ATROPINE 40mcg given. Patient had persistent Hypotension and 50ml PRBC was transfused.

Postoperative course: Patient shifted to ICU with elective ventilation and was extubated on postoperative day 1 after taking serial ABGs with stable hemodynamics

DISCUSSION

GLENN shunt is a palliative procedure which aims at diverting systemic venous return directly into pulmonary vasculature and increases pulmonary blood flow thus reduces volume load on the single ventricle.[4-5] End to end anastomosis of SVC to right pulmonary artery and then main pulmonary artery is divided and ligated. This increases systemic arterial oxygen saturation without increasing pulmonary vascular resistance.[6]

Figure 1: Preoperative Echocardiography

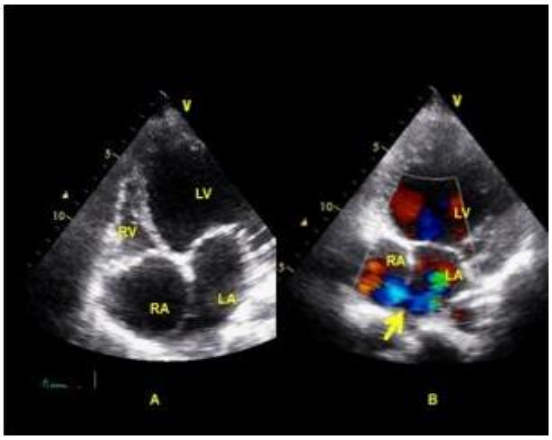

Figure 2: Intraoperative Echocardiography findings

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Figure 3: Intraoperative monitoring

Goals:

1. Cardiac grid:

- adequate preload-to allow uninterrupted blood flow through anastomosis site
- maintain SVR, PVR balance to preserve forward flow
- avoid increased PVR-by maintaining adequate oxygenation, normocapnia, avaoidance of high airway pressures
- normal sinus rhythm
- adequate contractility
- prevent arrythmia, myocardial depression

2. risk of paradoxical air embolism-avoid air bubbles
3. attenuation of intubation response
4. goal directed fluid therapy
5. control of intracranial pressure

CONCLUSION

cyanotic heart disease patient such as single ventricle physiology with post glenn shunt undergoing non cardiac surgery require vigilant anaesthesia management and multidisciplinary approach for a favourable outcome.coexisting neurological comorbidities and prolonged anaesthetic exposure further increase the complexity.

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