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Children with Substantial Vascular Inversion and the Effects of A Unilateral Inflatable Cardiac Septostomy

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Abstract

Aortic translocation (TGA) is the most common congenital heart disease, accounting for 5-7% of all heart defects, with a prevalence of 0.2-0.3 per 1,000 live births. Our primary objective was to evaluate the clinical safety and potential complications of neonatal balloon atrial septostomy. Furthermore, we are unable to perform surgery on all TGA patients with small atrial septal defects, regardless of oxygen saturation, and emergency corrective surgery due to the lack of a permanent cardiac surgery team for the arterial switch. I was trying to decide if it should be done at the center. We conducted a retrospective observational study at a single tertiary care center of 92 neonates with TGA who were referred to our institution for specialty care from January 2008 to April 2022. Did. The average age at the time of Rashkind surgery was 4 days but mostly transient (metabolic acidosis and arterial hypotension - 21.8%). Twenty TGA patients treated at our hospital underwent radical corrective surgery (arterial switch surgery) at an average age of 13 days. Most of the patients (82.6%) were term neonates, but 16 were preterm. Emergency balloon atrial septostomy is often the only solution to restore adequate systemic perfusion. Bedside balloon atrial septostomy is a safe and effective first-line palliative procedure for neonates with TGA that can be performed in the neonatal ward.

Keywords: Transposition of the great arteries; Rashkind procedure; Echocardiography; Newborn

Introduction

Transposition of the great arteries, the main indication for balloon atrial septostomy

Aortic translocation (TGA) is the most common congenital heart disease, accounting for 5-7% of all heart defects, with a prevalence of 0.2-0.3 per 1,000 live births. The pulmonary artery arises from the left ventricle (LV), resulting in mismatched ventricular-arterial connections. This abnormality may occur alone or in association with other heart defects [1]. Deoxygenated blood is thus returned to the body through the connection between the right ventricle and the aorta. Meanwhile, oxygen-rich blood is returned to the lungs via the connection between the left ventricle and the pulmonary artery. Patient survival requires at least two possible connections between the systemic and pulmonary circulation [2].

Therefore, aortic dislocations can be classified according to the presence or absence of a ventricular septal defect (VSD). Simple TGA with an intact interventricular septum (IVS) and complex TGA associated with other cardiac abnormalities including VSD [3].

Once the diagnosis of TGA is confirmed by transthoracic echocardiography, the atrial septal defect should be evaluated to ensure that there is an adequate left-to-right shunt supplying oxygenated blood to the systemic circulation. I have. In mild atrial septal defects, the postnatal physiologic increase in pulmonary blood flow and left atrial pressure can cause the valve of the foramen ovale to close [4].

The hemodynamics of interatrial shunts and PDA in right aortic transposition (D-TGA) with an intact interventricular septum is complex. It depends on the relative differences in pulmonary and systemic vascular resistance and ventricular compliance. D-TGA with a normal IVS may be associated with persistent pulmonary hypertension and reduced pulmonary vascular resistance, resulting in reduced hemodynamics and flow through the PDA and patent foramen ovale (PFO). Atrial shunts depend on the size of the ASD and the right and left atrial pressure. Atrial wall compliance, venous return, and ventricular compliance determine atrial pressure [5].

If diagnosed prenatally, it is recommended that birth planning be considered at a tertiary care center with particular experience in treating complex congenital heart disease. There, rapid and adequate stabilization is ensured, followed by surgical repair and postoperative multidisciplinary management [6]. Patients with mixed circulatory disorders (i.e., simple TGA with restricted foramen ovale and ductus arteriosus) present with symptoms of extreme cyanosis, hypoxia, and acidosis shortly after birth, as well as cyanosis, hypoxia, Increased lactate, decreased urine output, and ultimately circulatory failure. Left untreated, TGA leads to progressive hypoxia, acidosis, and ultimately death [7].

Initial neonatal therapy with TGA focuses on stabilization, with the goal of achieving adequate tissue oxygenation and arterial oxygen saturation of 75-85% (>70% in preterm infants). Optimization of blood mixing between systemic and pulmonary circulation consists of continuous infusion of prostaglandin E1 (PGE1) to maintain ductus arteriosus (PDA) patency. Balloon atrial septal fistula, mild hyperventilation, and increased inspired oxygen (FiO2) reduce pulmonary vascular resistance and increase pulmonary blood flow [8]. Blood transfusion to increase oxygen-carrying capacity. Sedation and paralysis to reduce oxygen consumption. Inotropic support for increased cardiac output and oxygenation [9].

Discussion

There are significant regional differences in the management of neonates with aortic dislocation. In the absence of comprehensive prenatal diagnosis in Romania, TGA neonates must be stabilized in

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local hospitals and transferred to tertiary care centers experienced in the treatment of congenital heart disease, where they undergo cardiovascular surgical treatment. Ideally, to allow proper reorientation and stabilization prior to transport, in addition to initiating her PGE1 infusion to maintain ductal patency in some cases of TGA A local atrial septostomy should be performed. In our 14-year experience, 92 of her TGA neonates were admitted to our NICU. There were almost two: The ratio of males (63%) to females (36.9%) in 1 patient is consistent with her two-fold predominance of males reported in other studies. A similar distribution was observed for neonates in the BAS group (60% boys and 40% girls) [10].

The incidence of low birth weight infants in TGA patients was 8.7%, nearly three times the reported incidence of 3%. Low birth weight and prematurity are associated with perioperative technical and physiological challenges. However, delaying activation of the arterial switch to account for weight gain results in higher morbidity and mortality. Our experience with cardiovascular surgery for this category of vulnerable neonates is limited, with one low birth weight infant (2490 g) and one preterm infant (36 weeks of gestation) being operated at our facility. There were only 4 people and the success rate was 80%. However, 4 preterm infants (minimum gestational age 33 weeks) and 2 low birth weight infants (minimum weight 1900 g) underwent Rashkind surgery, all of which were successful.

Conclusion

A small proportion of neonates with cardiac malformations are diagnosed prenatally, delaying diagnosis and initiation of appropriate cardiovascular treatment. This study incorporated BAS into the standard management protocol (extended for neonates with good oxygen saturation but not very high ASD) of TGA neonates in medical center NICUs where surgical correction is expected to be delayed beyond initial treatment. Provide evidence of incorporation. Due to this type of procedure or other logistical reasons, access to heart surgery is permanently impossible, so 3 days to live, but he shall not exceed 2 weeks. Under these circumstances, further research is needed on the benefits of her extended BAS and the optimal preoperative strategy for her TGA neonates.

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