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RESEARCH ARTICLE

HEALTHCARE INEQUITIES IN PEDIATRIC CARDIOLOGY: A CASE OF TGA AND TOF IN LOW-INCOME FAMILIES

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ABSTRACT

Background: Congenital heart defects (CHDs) are the most common birth defects globally. CHD often requires specialized care for survival. However, healthcare inequities in pediatric cardiology limit access to prompt diagnostic and holistic therapeutic interventions in low-income families. ***Case Presentation:*** We explore two critical CHDs, tetralogy of Fallot (TOF) and transposition of great arteries (TGA), highlighting the intersection of financial limitations, inadequate infrastructure, and suboptimal care. Despite accurate diagnoses and planned interventions, the cases reveal systemic barriers to equitable pediatric cardiac care. ***Clinical Discussion****:* Both cases demonstrate the intersection between critical CHD presentations and socioeconomic barriers that exacerbate health inequities. Delayed or missed surgical repairs contribute to morbidity and mortality, while reliance on occasional outreach missions is insufficient to meet the growing need. ***Conclusion:*** Addressing health inequities in CHD management demands systemic reforms, local capacity improvement, and international collaboration to prioritize pediatric cardiology in developing countries.

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INTRODUCTION

Congenital heart disease (CHD) is the most common type of birth defect and the leading cause of mortality among affected children (1,2). Globally, CHD affects approximately 10% of all births (3). Moreover, 25% of CHD are categorized as critical since they require advanced care for survival (4). Tetralogy of Fallot (TOF) and transposition of the great arteries (TGA) are the most critical of CHD (5,6). The survival rates of patients with CHD have significantly improved in developed countries, clocking at 90% (7,8,9). However, in the developing regions of the world, especially Sub-Saharan Africa, there are still high mortality rates attributed to CHD (10,11). Limited access to specialized pediatric cardiology services and socioeconomic constraints exacerbates health inequities for affected families (11). This report explores two cases of infants with TOF and TGA and highlights the systemic barriers to holistic care in resource-constrained settings. Thus, illustrating the urgent need for integrated strategies to improve access to life-saving interventions for children with CHD.

Case Presentation: This report highlights two cases of congenital heart defects: transposition of the great arteries (TGA) and tetralogy of Fallot (TOF).

Case 1: An 8-month-old male infant weighing 5.4 kg presented with a three-day history of fever, difficulty breathing, irritability, reduced feeding, and chronic poor weight gain. This marked his 5th hospital admission, as the infant was diagnosed with TOF and under regular follow-up at a tertiary facility. Previous admissions were attributed to recurrent chest infections. The infant was on anti-heart failure therapy (spironolactone 6.25 mg OD and furosemide 2.5 ml BD), with reported adherence by the mother. On examination, the infant appeared unwell, exhibiting mild breathlessness, a hyperexpanded chest, intercostal retractions, and pallor.

Vital signs included a heart rate of 120 beats per minute and O_2 saturation of 92% on room air. Respiratory findings were unremarkable, but cardiovascular examination revealed a harsh crescendo-decrescendo systolic murmur, best heard at the left upper sternal border with posterior radiation. Echocardiography findings revealed situs solitus, large atrial septal defect (ASD), large confluent ventricular septal defect (VSD) spanning inlet to outlet, mild outlet septum deviation, mild pulmonary valve doming, pulmonary valve measuring 3–14 mm, mild supravalvular narrowing, right ventricular outflow tract (RVOT) gradient of 2.8 m/s, confluent pulmonary arteries, and normal coronary artery origins with a left aortic arch.l. The diagnosis of pink TOF with secundum ASD and a high pulmonary-to-systemic blood flow ratio (Qp) was confirmed. The family's socioeconomic constraints limited management options. Although the infant was clinically stable on anti-failure therapy, definitive surgical correction was unattainable domestically or abroad due to financial barriers. We outlined plans for potential surgical correction during cardiology outreach missions or health camps, which offer subsidized care. The parents were counseled on the importance of frequent follow-ups to monitor for worsening symptoms or complications. The family could not explore treatment options overseas, particularly in India, where specialized pediatric cardiac surgeries are more accessible.

Case 2

A 2-month-old male infant weighing 4.2 kg was referred from a tertiary facility with a history of respiratory difficulty since birth, which had progressively worsened, particularly during crying. Additional symptoms included a mild productive cough, 1 day of refusal to breastfeed, and irritability. The parents requested the transfer due to the financial burden of ongoing care at the tertiary facility. The infant had been diagnosed with dextro-transposition of the great arteries (D-TGA) based on echocardiographic findings, which revealed D-TGA with an intact atrial septum, a small high muscular ventricular septal defect (VSD) with restricted flow, a tiny closing patent ductus arteriosus (PDA), and an adequate left ventricular size. The management plan at the tertiary facility included urgent open-heart surgery (arterial switch operation), feeding optimization, and oxygen supplementation to maintain saturations above 60%.

Despite thorough counseling regarding the diagnosis, clinical status, and prognosis, the parents opted to continue care at our facility while addressing financial constraints. On examination, the infant appeared severely ill, with apparent respiratory distress, oxygen saturation of 55% on room air, and both peripheral and central cyanosis. Respiratory examination revealed bilateral coarse crackles and bronchial breathing, while cardiovascular examination identified murmurs. Chest radiography demonstrated a boot-shaped heart. The patient was managed with oxygen delivered via a non-rebreather mask at 15 L/min and anti-heart failure medication (sildenafil 7 ml OD, spironolactone 4 mg OD) and ceftazidime (210 mg TDS for 5 days) to address concurrent respiratory infection. The family was counseled on the urgency of definitive surgical intervention and the potential risks of delayed treatment, including worsening hypoxemia, heart failure, and poor developmental outcomes.

DISCUSSION

CHD affects approximately 1% of live births yearly (1,2, 10). TOF comprises a ventricular septal defect (VSD), right ventricular hypertrophy, pulmonary stenosis, and aorta overriding the obstruction (12). Several variations in the anatomical presentation of TOF invariably affect the severity of symptomatology and management approach (13). In D-TGA, the great vessels are reversed, resulting in poor oxygenation of the systemic circulation (14). Both cases demonstrate the significance of timely and accurate diagnosis and the financial capability to support life-saving surgical repairs. Although 'pink' TOF permits some oxygenation, D-TGA without adequate mixing lesion is incompatible with life beyond the neonatal period and requires prompt surgical correction (15, 16). The health inequities faced by the families in these cases reflect broader systemic challenges in Africa in pediatric cardiology. Socioeconomic status influences the health-seeking behavior of patients (17, 18, 19). Most patients in Kenya come from low-income households and can hardly afford diagnostic evaluations, anti-heart failure medications, or even definitive surgical procedures (20). In both scenarios, financial hurdles compelled the families to forgo care at a higher-cost tertiary institution. Most patients with CHD in Kenya are subjected to delayed or suboptimal management due to financial challenges (21,22).

Moreover, the limited availability of pediatric cardiac surgery worsens the problem (23). Most children requiring surgical repair are placed on long waiting lists and rely on occasional medical missions (24). Thus, children from poorer families are less likely to undergo timely surgery for CHD in comparison to those from higher-income households. This disparity shows how socioeconomic inequities intersect with barriers to holistic care. TOF management involves a definitive surgical repair within the first year of life (26). However, D-TGA requires an urgent arterial switch operation (ASO) within the first weeks of life (27). Be that as it may, in both cases, the families faced significant financial challenges that hindered timely surgical interventions. The cost of open-heart surgery in most African countries exceeds what is affordable to many families (28). Therefore, most children with CHD are left at risk of preventable complications and even death (10).

The patient with TOF was managed with anti-heart failure medication while awaiting possible surgical repair during outreach missions. This approach is suboptimal as it exposes the infant to prolonged periods of hypoxemia, recurrent infections, and the risk of permanent pulmonary vascular disease. In the other case, the child with D-TGA, while receiving supportive care, the absence of surgical repair places him at risk of health deterioration. Most patients with CHD in Africa rely on palliative care for CHD in the absence of affordable surgical options (29). The burden of untreated CHD in Africa goes beyond individual cases (30). Suboptimally managed CHD has significant implications for public health (31). Delayed surgical correction of CHD leads to increased healthcare utilization due to repeated hospital admissions (32). Moreover, the long-term sequelae of untreated CHD, such as failure to thrive, developmental delays, and reduced life expectancy, impose substantial societal and economic costs (33).

To address the needs of children with CHD, we must strengthen health systems, expand access to perinatal screening, and invest in local cardiac care infrastructure. Consequently, adequate training of pediatric cardiac surgeons and the establishment of specialized cardiac centers play critical roles in reducing dependency on foreign medical missions (34,35). We must raise awareness among policymakers, healthcare providers, and the public about the prevalence and impact of CHD (36).

CONCLUSION

The cases of TOF and D-TGA presented in this report showcase the impact of CHD on children and their families, especially in resource-constrained households. Low-income families' financial and systemic barriers remain formidable hurdles to achieving equitable access to care. We must address these challenges by expanding local cardiac care infrastructure, reducing the cost of care, and implementing policies that prioritize the need of children with CHD.

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