

CASE REPORT

Total Anomalous Pulmonary Venous Connection (TAPVC) Presenting with Respiratory Distress and Cyanosis in an Infant: A Case Report with Nursing Management

Jayavel M¹, Radika², Solomon James³, Joyce Joseph⁴, Raghu VA⁵

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ABSTRACT

Introduction: Total anomalous pulmonary venous connection (TAPVC) is a rare congenital cyanotic heart disease in which all pulmonary veins drain into the systemic venous circulation instead of the left atrium. Survival depends on the presence of an interatrial communication, such as an atrial septal defect (ASD), which permits mixing of oxygenated and deoxygenated blood. Abnormal venous drainage may also cause mechanical obstruction to blood flow, leading to severe respiratory distress and heart failure. Early diagnosis and surgical correction are essential to improve survival and prevent complications.

Case Presentation: A 3-month-old male infant presented with respiratory distress, poor feeding, cyanosis, and failure to gain weight since birth. Clinical examination revealed tachypnea, central cyanosis, and hypoxia. Echocardiography and computed tomography angiography confirmed supracardiac TAPVC with dilated right-sided cardiac chambers and pulmonary hypertension.

Management and Outcome: The infant was managed with oxygen therapy, diuretics, inotropic support, and nutritional supplementation before undergoing corrective cardiac surgery. Comprehensive nursing management included monitoring oxygen saturation, maintaining airway patency, supporting feeding, preventing infection, and educating caregivers. Following treatment and surgery, the infant showed improvement in oxygen saturation, feeding tolerance, and respiratory status.

AUTHOR'S AFFILIATION:

¹Nursing Tutor, Child Health Nursing, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.

²Student Nurse, Child Health Nursing, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.

³Nursing Tutor, Child Health Nursing, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.

⁴Lecturer, Child Health Nursing, College of Nursing, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.

⁵Nursing Tutor, Child Health Nursing, Jodhpur, Rajasthan, India.

CORRESPONDING AUTHOR:

Jayavel M, Nursing Tutor, Child Health Nursing, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.

E-mail: jayavel.jai@gmail.com

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Conclusion: This case highlights the importance of early recognition and multidisciplinary management of TAPVC in infants. Prompt diagnosis, timely surgical intervention, and effective nursing care are crucial for improving clinical outcomes and survival.

KEYWORDS:

• Total Anomalous Pulmonary Venous Connection • Tapvc • Congenital Heart Disease • Cyanosis • Pediatric Cardiac Nursing.

INTRODUCTION

Total anomalous pulmonary venous connection (TAPVC) is a rare congenital cyanotic heart disease accounting for nearly 1–3% of all congenital heart diseases. In this condition, there is no direct connection between the pulmonary veins and the left atrium; instead, all pulmonary veins drain into the right atrium or one of its tributaries through abnormal venous pathways. Survival after birth depends on the presence of an interatrial communication such as an atrial septal defect (ASD) or patent foramen ovale (PFO), which allows mixing of oxygenated and deoxygenated blood.^{1,2}

TAPVC is classified into supracardiac, cardiac, infracardiac, and mixed types based on the site of anomalous venous drainage. Supracardiac TAPVC, where drainage occurs above the diaphragm into vessels such as the superior vena cava (SVC), is the most common type.³ The abnormal pulmonary venous return may lead to mechanical or functional obstruction, resulting in pulmonary congestion, pulmonary hypertension, cyanosis, acidosis, respiratory distress, and heart failure.⁴

Infants commonly present with cyanosis, tachypnea, recurrent respiratory infections, poor feeding, and failure to thrive. Early diagnosis using echocardiography and CT angiography is essential for timely surgical correction and prevention of life-threatening complications. Nursing management plays a vital role in maintaining oxygenation, monitoring hemodynamic status, ensuring nutritional support, and providing family-centered care. This report presents a case of supracardiac TAPVC in an infant with emphasis on clinical presentation, multidisciplinary management, and nursing care.

Case Presentation

Patient Information

A 3-month-old male infant was brought to the pediatric emergency department

with complaints of rapid breathing, bluish discoloration of the lips, poor feeding, and excessive sweating during feeding since birth. The symptoms had progressively worsened over the previous 10 days. The infant also had recurrent episodes of cough and respiratory distress associated with reduced activity and irritability.

The baby was born at term by normal vaginal delivery with a birth weight of 2.8 kg and cried immediately after birth. Antenatal and perinatal history were uneventful, with no history of maternal infections, fever, diabetes, hypertension, or drug exposure during pregnancy. Immunization status was appropriate for age, and developmental milestones were normal for age. There was no family history of congenital heart disease or genetic disorders.

On admission, the infant appeared cyanosed and tachypneic with signs of respiratory distress. Difficulty in feeding and poor weight gain were noted by the parents. The family belonged to a low socioeconomic background and reported difficulty in accessing specialized pediatric cardiac services due to financial constraints.

This case report has been prepared in accordance with CARE (Case Report) guidelines.

Timeline

Time Period	Clinical Events
Birth	Mild cyanosis and poor feeding noted
2 months before admission	Recurrent respiratory infections and failure to gain weight
5 days before admission	Increased respiratory distress and sweating during feeds
2 days before admission	Echocardiography and CT angiography confirmed supracardiac TAPVC
Current admission	Medical stabilization followed by corrective surgery
During hospitalization	Improvement in oxygen saturation and feeding

Clinical Examination

On admission, the infant was conscious but irritable, tachypneic, and centrally cyanosed, with signs of increased respiratory effort. The child appeared poorly nourished and underweight for age.

Vital Signs

- Temperature: 36.8°C
- Heart rate: 158 beats/minute (tachycardia)
- Respiratory rate: 62 breaths/minute (tachypnea)
- Oxygen saturation: 78% on room air

Anthropometric Assessment

- Weight: 4.2 kg, which was below the expected weight for age, suggestive of failure to thrive.

General Physical Examination

- Central cyanosis involving lips and tongue
- Nasal flaring and subcostal retractions indicating respiratory distress
- Excessive sweating during feeding
- Mild pallor present
- Peripheral pulses palpable but low in volume
- Capillary refill time mildly prolonged (approximately 3 seconds)

No peripheral edema or clubbing noted

Cardiovascular Examination

- Precordium appeared hyperdynamic
- Apex beat palpable at the left 5th intercostal space
- Wide fixed splitting of the second heart sound (S2) heard on auscultation
- Grade 2/6 systolic ejection murmur best heard at the left upper sternal border
- No added heart sounds or pericardial rub detected

Respiratory Examination

- Tachypnea with increased work of breathing
- Bilateral fine crepitations heard over both lung fields
- Equal air entry present bilaterally
- No wheeze or stridor noted

Abdominal Examination

- Mild hepatomegaly present, liver palpable 3 cm below the right costal margin
- Abdomen soft and non-distended
- Bowel sounds present and normal

Neurological and Other Systemic Examination

- Infant was responsive with normal tone and reflexes for age
- No focal neurological deficits observed
- Other systemic examinations were within normal limits.

Investigations

- Laboratory Investigations
- Hemoglobin: 11.2 g/dL
- Total leukocyte count: 12,500/mm³
- Arterial blood gas analysis showed hypoxemia
- Serum electrolytes were within normal limits

Radiological and Cardiac Findings

Chest X-ray

- Cardiomegaly with increased pulmonary vascular markings
- “Snowman” or “figure-of-eight” appearance suggestive of supracardiac TAPVC.

Echocardiography

- Supracardiac TAPVC with pulmonary veins draining into the superior vena cava through a vertical vein
- Dilated right atrium and right ventricle
- Moderate pulmonary hypertension
- Large atrial septal defect with right-to-left shunting

CT Angiography

Confirmed supracardiac TAPVC with anomalous pulmonary venous drainage and enlarged pulmonary arteries.

Diagnosis

The infant was diagnosed with:

- Supracardiac total anomalous pulmonary venous connection (TAPVC)

- Cyanotic congenital heart disease
- Pulmonary hypertension
- Failure to thrive

Therapeutic Intervention

Medical Management

The infant received the following treatment:

- Oxygen therapy via nasal cannula
- Injection Furosemide intravenously (diuretic)
- Inotropic support with dopamine infusion
- Broad-spectrum antibiotics for respiratory infection prophylaxis
- Nutritional supplementation with high-calorie feeds
- Surgical correction of TAPVC after stabilization

Nursing Management

1. Impaired gas exchange related to altered pulmonary circulation as evidenced by cyanosis and low oxygen saturation.

Interventions

- Monitored oxygen saturation continuously
- Maintained airway patency and positioned infant in semi-Fowler's position
- Assessed respiratory distress and breath sounds regularly
- Administered oxygen therapy as prescribed
- Minimized handling to reduce oxygen demand

Evaluation

Oxygen saturation improved and respiratory distress reduced.

2. Decreased cardiac output related to structural cardiac defect as evidenced by tachycardia and poor perfusion.

Interventions

- Monitored heart rate, perfusion, and blood pressure regularly
- Assessed for signs of heart failure
- Administered prescribed medications

and inotropic support

- Maintained thermoregulation to reduce metabolic demand
- Observed for signs of worsening cyanosis

Evaluation

Cardiac status stabilized with improved perfusion.

3. Imbalanced nutrition: less than body requirements related to poor feeding and increased metabolic demand as evidenced by failure to thrive.

Interventions

- Monitored feeding tolerance and daily weight
- Provided small frequent feeds
- Assisted mother with feeding techniques
- Administered high-calorie nutritional supplementation
- Observed for fatigue and sweating during feeds

Evaluation

Feeding tolerance improved and gradual weight gain observed.

4. Risk for infection related to hospitalization and invasive procedures.

Interventions

- Maintained strict hand hygiene and aseptic precautions
- Monitored temperature and laboratory markers for infection
- Administered antibiotics as prescribed
- Educated caregivers regarding infection prevention
- Maintained clean environment and equipment

Evaluation

No evidence of hospital-acquired infection observed.

5. Anxiety among caregivers related to child's critical illness and surgery.

Interventions

- Provided emotional support to parents
- Explained disease condition and treatment plan clearly

- Encouraged caregiver participation in care
- Addressed parental concerns regarding surgery and prognosis
- Facilitated communication with healthcare team

Evaluation

Parents verbalized understanding and showed reduced anxiety.

DISCUSSION

TAPVC is a rare but life-threatening congenital cardiac anomaly requiring early diagnosis and prompt surgical intervention to improve survival.^{2,3} In the present case, the infant presented with typical clinical features such as cyanosis, tachypnea, respiratory distress, poor feeding, excessive sweating during feeding, and failure to thrive. Similar clinical manifestations have been widely reported in infants with TAPVC, particularly in cases associated with pulmonary venous obstruction.^{4,5}

Supracardiac TAPVC is the most common anatomical subtype and often presents with characteristic radiological findings such as the “snowman” or “figure-of-eight” appearance on chest radiography.⁶ In this case, echocardiography played a major role in identifying the anomalous pulmonary venous drainage and associated cardiac abnormalities. CT angiography further confirmed the anatomy and assisted in planning definitive surgical correction.⁷

The infant developed pulmonary hypertension and recurrent respiratory symptoms due to increased pulmonary blood flow and mixing of oxygenated and deoxygenated blood through the interatrial communication. Obstruction to pulmonary venous return can further worsen hypoxemia, pulmonary congestion, and cardiac failure. Early stabilization with oxygen therapy, diuretics, fluid management, and supportive treatment was therefore essential before surgery.⁸

Comprehensive nursing management contributed significantly to the infant’s stabilization and recovery. Continuous monitoring of oxygen saturation, respiratory pattern, heart rate, feeding tolerance, and fluid balance helped in early identification of complications. Nutritional support, infection

prevention, maintenance of thermoregulation, and parental counseling were also important components of care. Postoperative nursing care remains vital in preventing complications such as arrhythmias, pulmonary hypertensive crisis, infection, and low cardiac output syndrome following congenital cardiac surgery.⁹

This case highlights the importance of early recognition, timely referral, multidisciplinary management, and specialized nursing care in improving clinical outcomes and survival among infants with TAPVC.

CONCLUSION

This case highlights the importance of considering TAPVC in infants presenting with cyanosis, respiratory distress, recurrent respiratory infections, feeding difficulty, and poor weight gain. Early recognition and prompt diagnosis using echocardiography and CT angiography are essential to prevent life-threatening complications such as pulmonary hypertension and heart failure. Timely surgical correction along with coordinated multidisciplinary management, including comprehensive nursing care, plays a vital role in improving survival, recovery, and long-term outcomes in infants with TAPVC.

Patient Consent

Informed consent was obtained from the patient’s guardian.

Conflict of Interest

The authors declare no conflict of interest.

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