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CASE REPORT

Uncovering the Hidden Cause of Recurrent Chest Infections in a Child: A Case Report

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Abstract: Recurrent chest infections can present diagnostic challenges, especially when the underlying cause remains elusive despite initial evaluations and treatments. This case report details the clinical journey of a patient experiencing recurrent chest infections over several months, during which conventional diagnostic approaches initially failed to provide lasting relief. Here, we present the case of a 16-month-old female child who had been experiencing recurrent chest infections since the age of 10 months, ultimately diagnosed as a case of Partial Anomalous Pulmonary Venous Return (PAPVR).

Keywords: pneumonia, paeds, PAPVR, pulmonary

Introduction

Pneumonia is a major problem in children, especially those younger than 5 years, accounting for up to 5 million deaths each year in developing countries. Diagnosing pediatric patients with pneumonia might be challenging for clinicians. In developing countries, pneumonia is the primary cause of morbidity and mortality for children under the age of five.[1,2] Recurrent pneumonia has been defined as at least 2 pneumonia episodes in 1 year or more than 3 at any time, with radiographic clearing between episodes. The recurrence of respiratory infections in the early years of life affects the development of broncho-alveolar and vascular systems of the lungs. This could lead to long-term effects on the child's health. As a result, depending on the etiology, early treatment should be commenced. Data from the World Health Organization (WHO) indicates that a child may experience four to eight episodes of respiratory infections, primarily affecting the lower respiratory system, every year during their first 5 years of life.[1,3]

Recurrent respiratory tract infections have several etiologies. The most significant and prevalent ones are aspiration pneumonia, primary immunodeficiency, and congenital heart diseases.[4] It is important to consider less common etiologies when the clinical course deviates from the expected, even when typical causes like asthma and bacterial pneumonia are commonly encountered.

In this case report, we present the clinical journey of a patient who experienced recurrent chest infections over a period of several months, with initial assessments and treatments failing to provide sustained relief. The complexity of this case lies in the subtle nature of the underlying condition, which evaded conventional diagnostic strategies and underscored the importance of a multidisciplinary approach to uncovering the hidden cause.

Case Presentation

A 16-month-old female child, born at full term, was presented to the Emergency Department with a three-day history of cough, upper respiratory tract infection (URTI), and fever. The patient exhibited signs of moderate respiratory distress and was subsequently admitted to the pediatric department with a diagnosis of Acute Asthma Exacerbation with superadded bacterial pneumonia on the right side.

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Upon physical examination, the temperature of 38.5°C, pulse rate of 167 bpm, respiratory rate of 75 bpm, blood pressure of 115/53 mmHg, and oxygen saturation of 96% on 2 L nasal cannula. The patient's weight was 9.1 kg, falling on the 25th percentile for her age. Despite being alert and active, she displayed moderate respiratory distress.

Respiratory examination indicated tachypnea with equal breath sounds, bilateral crackles, and rhonchi, more pronounced on the right side. Cardiovascular examination revealed no murmur, normal rhythm, good pulses, no edema, and normal peripheral perfusion. The remainder of the examination yielded unremarkable findings.

Laboratory results showed normal renal function, hypochromic microcytic anemia on complete blood count, and an elevated CRP level of 54 mg/l. Venous blood gas analysis revealed a pH of 7.43, pO2 of 62 mmHg, pCO2 of 24 mmHg, HCO3 of 16, and a base deficit of −6.8 mmol/L. The Respiratory Viral Panel MDX confirmed the presence of Rhinovirus, while blood culture results were negative.

Radiological findings indicated bilateral infiltrates, particularly on the right side, suggesting right middle lobe pneumonia Figure 1. Experts result in an accurate diagnosis and a suitable treatment plan.

A review of the patient's medical history revealed recurrent admissions for asthma exacerbation secondary to viral or bacterial pneumonia from the age of 10 months, with persistent and worsening right-sided infiltrates evident in chest X-rays conducted every 2 months Figure 2.

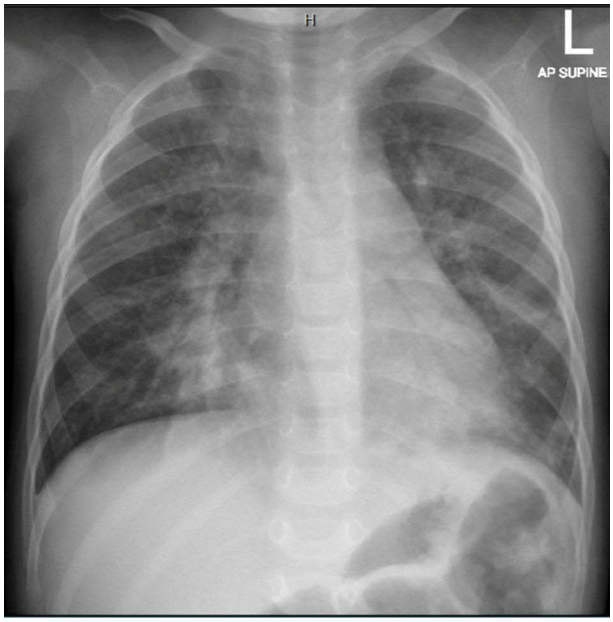

Figure 1 Radiographic Evidence of Right Middle Lobe Pneumonia with Bilateral Infiltrates Dominantly Affecting the Right Side.

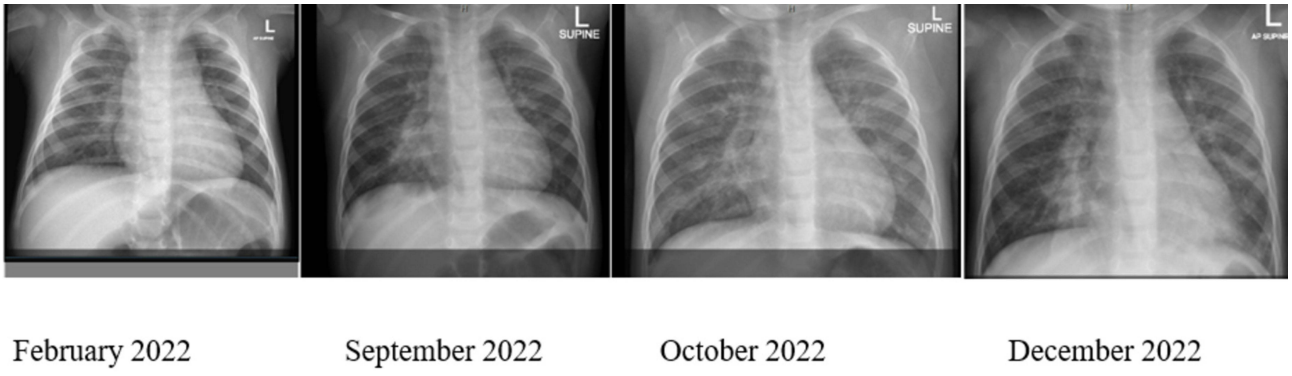

Figure 2 A series of X-ray images over a period of time, showing persistent right-sided infiltrate.

The differential diagnosis for recurrent pneumonia was explored, including intraluminal bronchial obstruction, extraluminal compression, and anatomic abnormalities. Despite the absence of foreign body signs and negative maternal history, further investigation was warranted. Pulmonology consultation was sought, leading to a decision to refer the patient for outpatient evaluation.

Considering congenital heart disease (CHD) as a potential cause, the medical team explored the possibility of a Scimitar sign, indicative of partial anomalous pulmonary venous return (PAPVR). To avoid bias, an electrocardiogram (ECG) was initially performed, revealing left-axis deviation, Peaked P wave, with incomplete Right bundle branch block. Figure 3.

Subsequently, an echocardiogram confirmed partial anomalous pulmonary venous return of the right upper pulmonary vein to the right-atrium Figure 4. Urgent intervention was deemed necessary, leading to the referral of the patient to the cardiology team for further investigations and management.

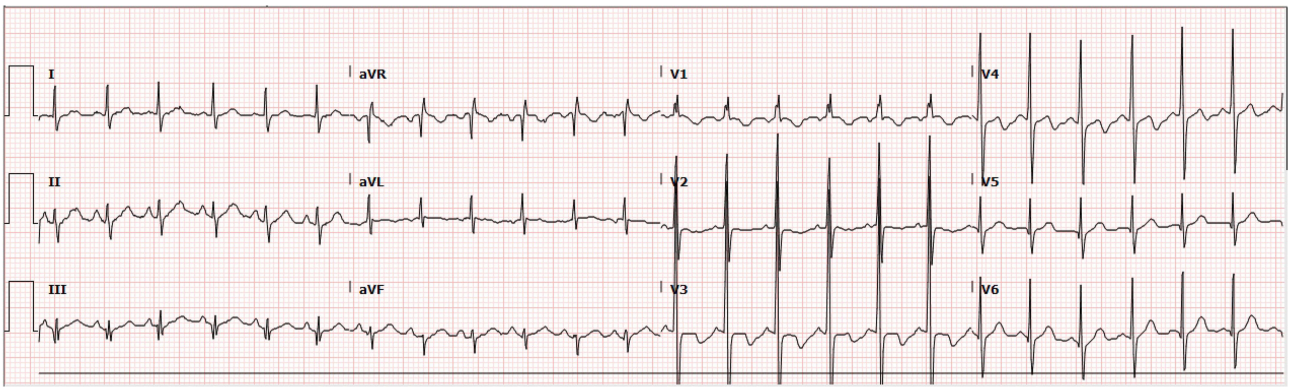

Figure 3 ECG showed left axis deviation, Peaked P wave, with incomplete RBBB.

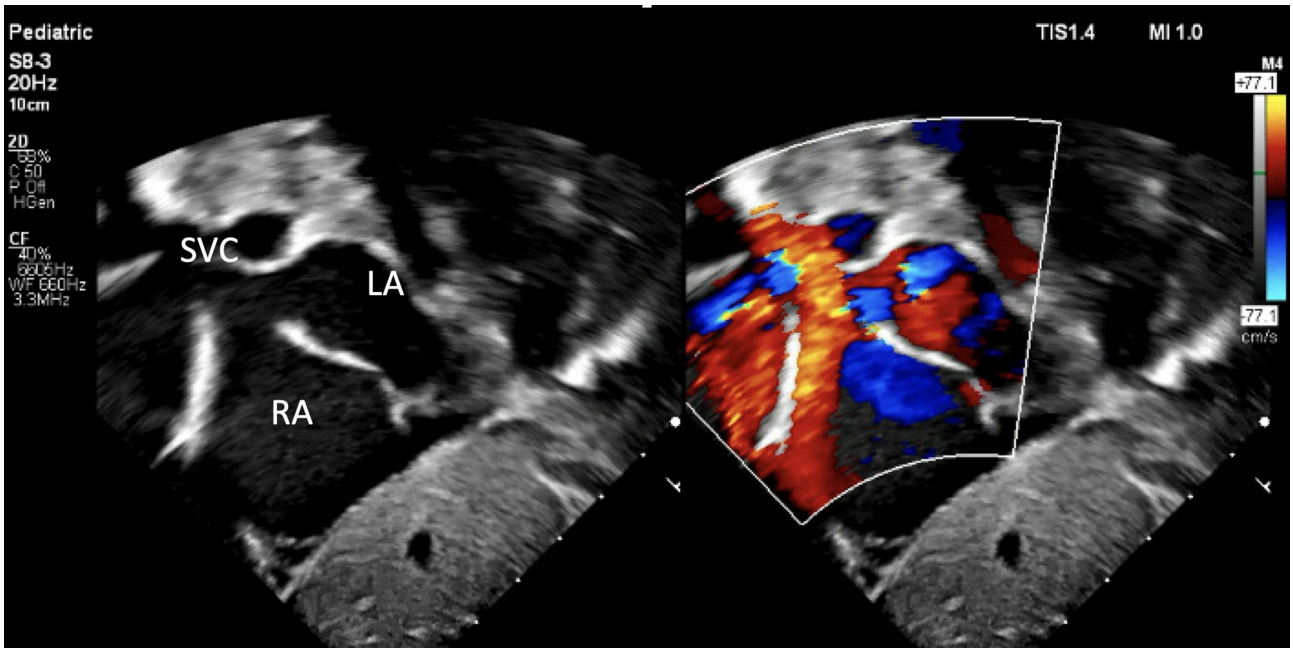

Figure 4 Echocardiography Revealing Sinus Venosus Atrial Septal Defect (ASD) with Partial Anomalous Pulmonary Venous Return (PAPVR) of Right Upper Pulmonary Vein (RUPV) to Right Atrium (RA).

Discussion

Children with congenital heart defects (CHD) are more susceptible to viral lower respiratory tract infections, which can exacerbate their already poor respiratory condition and increase morbidity 6. PAPVR encompasses a range of congenital heart anomalies, affecting approximately 0.7% population.[5] Winslow first characterized this condition in 1739, describing it as a persistent connection between the systemic and pulmonary venous systems from the embryonic stage.[6] In PAPVR, one or more pulmonary veins drain into the right atrium or its venous tributaries instead of the left atrium, causing a shunt from left to right and increasing the risk of pulmonary over circulation and repeated respiratory tract infections.[7,8] It primarily affects the right pulmonary veins in 80% of the cases.[9]

A study by Owayed et al revealed that most patients with recurrent pneumonia have an underlying disease, with congenital cardiac defects identified as one of the major underlying causes.[10] The recurrence of pneumonia strongly correlates with the underlying pathology. Mei et al found that congenital heart defects (CHD) account for 11.6% of the cases of recurrent pneumonia.[11] Similarly, a study from Iran reported that CHD is responsible for 20.17% of pneumonia cases.[12]

Diagnosing PAPVR can be challenging due to nonspecific signs and symptoms that may mimic more prevalent respiratory conditions. In this case, the presence of a Scimitar sign, indicative of PAPVR, prompted further investigation, including an electrocardiogram (ECG) and echocardiography. Echocardiography is the first-line diagnostic tool for suspected PAPVR, although standard scan planes may provide limited information.[13]

The patient's ECG revealed left-axis deviation, peaked P wave, with incomplete right bundle branch block, and echocardiography showed sinus venosus ASD with dilated right atrium/ventricles, along with PAPVR of the right upper pulmonary vein to the right atrium, which was found in a similar study.[14] Treatment approaches vary based on patients' symptoms and presentation, with surgical intervention recommended in cases directly linked to the shunt, involvement of multiple anomalous veins, or moderate-to-severe shunt magnitude. The objective of surgery is to alleviate symptoms, reduce RV size, and lower pulmonary hypertension pressures. However, surgical repair carries risks such as thrombosis in the surgically altered vein.

The Warden procedure, established in 1984, is commonly used to address PAPVC cases involving connection to the SVC, effectively reducing the risk of venous obstructions.[15] Despite its efficacy, post-procedure complications like pulmonary venous obstruction, SVC obstruction, and sinus node dysfunction highlight the need for meticulous and regular follow-up care.[16]

Conclusion

This case underscores the critical importance of considering underlying causes when treating patients with recurrent symptoms, particularly when symptomatic treatment alone does not resolve the condition. Timely recognition and appropriate treatment of conditions such as PAPVR can significantly enhance patient outcomes. It also highlights the necessity of a multidisciplinary approach, involving collaboration between cardiology and pulmonology specialists, to ensure comprehensive management and optimal patient care.

Ethical Approval

This study received ethical approval from the Standing Committee for Scientific Research at Tawam Hospital. For publication: No institutional approval was required.

Consent

Consent for publication was obtained from the patient's parents. All identifying information has been removed to ensure patient anonymity.

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Disclosure

The authors report no conflicts of interest in this work.

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