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Case Report

Spontaneous Pneumomediastinum in Rhinovirus Infection

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Abstract ***Background:*** Spontaneous pneumomediastinum (SPM), a spontaneous mediastinal air-leak without any trauma or mechanical ventilation, is a rare paediatric emergency that typically occurs secondary to asthma attack in children. Herein, we report a case of SPM with subcutaneous emphysema in a 3-year-old child following rhinovirus (RV) infection. ***Case:*** A 3-year-old male patient was referred from another medical centre when respiratory distress, tachypnoea, and wheezing developed in addition to an ongoing cough and runny nose. It was the first wheezy attack and there was no history of atopy and no allergic diseases, foreign body aspiration, or trauma. Upon examination of the patient, who was admitted to emergency services, there were no pathological findings except for respiratory distress, common crepitations in the bilateral neck and chest walls, and bilateral wheezing during the respiratory system examination. Chest radiograph findings were compatible with pneumomediastinum and RV was detected in his nasal swab sample based on multiplex polymerase chain reaction methods. The patient improved spontaneously with conservative treatment. ***Conclusions:*** RV infections in children can lead to serious, life-threatening complications such as pneumomediastinum without pneumothorax. Thus, it should be considered a triggering agent of SPM in children even without a history of asthma.

Key words Child; Pneumomediastinum; Rhinovirus

Introduction

Spontaneous pneumomediastinum (SPM) is the presence of air in the mediastinum without mechanical ventilation, trauma, or interventional procedures.[1,2] It is rare in children and is commonly seen in tall, slender male adolescents.[1] Although the most common cause in children is asthma, vomiting, screaming, violent coughing, and intense sports activities can also lead to SPM.[3]

Human rhinovirus (RV), which is a member of the family of Picornaviruses, can cause many diseases – such as cold, bronchiolitis, and lower respiratory tract infections such as pneumonia, and may also lead to an acute asthma attack.[4]

Here, we present a case that was admitted to the emergency department with signs of respiratory distress and subcutaneous emphysema, without a history of asthma or airway sensitivity; the diagnosis was SPM caused by RV.

To the best of our knowledge, this is the second report in the English literature of RV-induced SPM.[5]

Case

A 3-year-old male patient was admitted to our hospital's emergency department with ongoing cough for 2 days, runny nose, and wheezing complaints.

Concerning his anamnesis, it was discovered that, the day

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before, he took salbutamol nebuliser treatment in an outer health centre. He had no trauma history. He was born as a term baby and his medical history was not significant; he had no history of wheezing or atopy, and there was no history of asthma in his family. He also had no history of foreign body aspiration.

When the patient was referred to the hospital, he was restless and had increased respiratory effort, but the circulation and skin findings were normal. Upon physical examination, his pulse was 150/min, respiratory rate was 40/min, blood pressure was 90/45 mmHg, body temperature was 37°C, and oxygen saturation was 95% (normal room air saturation).

When palpated, there were crepitations in the front side of the chest and neck of the patient; there were also subcostal and intercostal retractions, bilateral rhonchi in the lungs, and a prolonged expiration time on auscultation. The other systemic examinations, excluding sinus tachycardia, were normal. There was no Hamman's sign. Based on laboratory investigations, haemoglobin was 12 g/dL, white blood cell was 25.9 x 10^9/L, neutrophil was 18.0 x 10^9/L, C-reactive protein was 48.86 nmol/L, blood gas pH was 7.38, pCO_2 was 4.39 kPa, pO_2 was 11.97 kPa, and total immunoglobulin E (IgE) was 10 kU/L. On posterioranterior (PA) chest radiography, linear air density – starting from the neighboring area of the left lung and extending parallel to the wall of the left ventricle, which is compatible with pneumomediastinum and cervical, axillary, and bilateral chest wall subcutaneous emphysema – was observed. Pneumothorax was not observed (Figure 1). Viral (RV) load was detected based on viral panel real-time polymerase chain reaction (PCR) from the nasopharyngeal swab material. The patient was diagnosed with RV infection-caused SPM based on clinical findings and PA chest radiography.

The patient was treated with bed rest, a 6 L/min moistened oxygen mask, intravenous maintenance fluid, and salbutamol nebuliser solution. Possible heart failure and cardiac tamponade were discussed with the Department of Cardiology. Cardiologic and echocardiographic examinations were normal. Respiratory distress symptoms regressed from the third day of observation. The findings of subcutaneous emphysema began to diminish after the 5th day, and findings on chest radiography improved. After all respiratory symptoms had regressed, the patient was discharged on the condition that he be followed-up at the Children Allergy Polyclinic in case asthma occurred. During 8 months of follow-up, the patient had no wheezing attack until the present time.

Discussion

Despite the reported incidence of SPM being 1/8,302, it is believed that the condition is more common than estimated because it is not well-known and has a good prognosis in children.[6,7] SPM is most commonly seen in children under 4 years of age and adolescents.[6] Our patient was 3 years old.

The most common reason for SPM is asthma attack during the childhood years.[6-8] Gasser and colleagues reported that asthma was the most common concomitant disease of SPM (49%); in order, the next most common diseases were cough (45.6%), severe vomiting (10.3%), and foreign body aspiration (8.3%).[7] Our case had not had an attack of wheezing previously; moreover, there was no family history of allergic rhinitis, atopy, or asthma. There was also no history of foreign body aspiration and the chest radiograph did not show foreign body aspiration. Furthermore, symptoms such as runny nose began with upper respiratory tract infections. The patient had no vomiting but did experience a vigorous cough. He was aged above 2 years and was not diagnosed with bronchiolitis. However, RV may trigger severe episodes of lower airway dysfunction in children with asthma and in atopic individuals.[9] Because of the absence of atopy and wheezy history, as well as the normal total IgE value, we did not consider an asthma attack in our patient. We believed that this could be the first attack of late occurring wheezing triggered by RV. Therefore, there

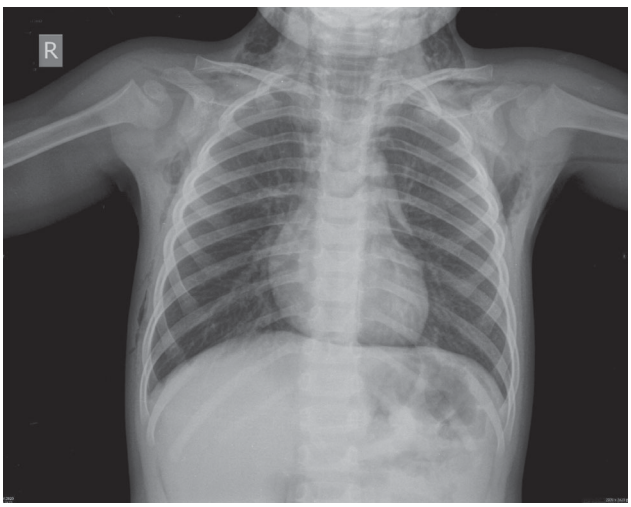

Figure 1 Chest radiography showed linear aeration around the left heart border and subcutaneous emphysema without pneumothorax or pulmonary infiltration.

were no identifiable risk factors other than the cough in addition to serious RV infection.

Having RV infections in the first 3 years of life increases asthma risk 10-fold after 6 years of age.[10] The mechanism by which RV infections lead to the development of asthma remains unclear, but the virus is thought to increase airway inflammation through T2 helper cells. A previous study suggested performing respiratory function tests (RFT) after SPM attacks, but our patient was not eligible for RFT because of his age. We believe that serious RV infections may be a marker for future development of asthma, so after discharge we directed our patient to the Allergy and Asthma Department.

Subcutaneous emphysema is the most common finding with SPM, despite not being pathognomonic.[7] Another characteristic finding is Hamman's sign, which is characterised by a crunching sound; however, it is seen in only 11.6% of cases. In our case, Hamman's sign was not present, but the presence of subcutaneous emphysema extending through the chest wall and neck led us to consider a diagnosis of SPM.

PA chest radiography was sufficient for diagnosis.[7] According to some reports, if the diagnosis is confirmed based on PA chest radiography, and intrathoracic organ perforation is not seen, further investigations are not required for differential diagnosis.[10] In our patient, PA chest radiography was sufficient for diagnosis; therefore, we did not perform any further examinations.

If the SPM is not complicated, the treatment should be supportive, as in our case.

Conclusions

Subcutaneous emphysema that occurs with SPM is rare in children without chest trauma. Because of being self-limiting, as well as the high possibility of missing the diagnosis, paediatricians should be aware of SPM signs and symptoms. RV infections can cause SPM without asthma attack. Children diagnosed with SPM that is triggered by RV infection should be followed due to the risk of asthma.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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