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A Very Rare Complication Due to Cough in Pediatric Emergency Clinic: Spontaneous Pneumomediastinum and Diffuse Subcutaneous Emphysema

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Abstract

Pneumomediastinum is the presence of free air in the mediastinum. Spontaneous pneumomediastinum (SPM) occurs when air enters the interstitial space and mediastinum as a result of rupture of the alveoli in cases of increased intrathoracic pressure such as asthma and lung infection. A 3-year-old girl was admitted to the Pediatric Emergency Department with cough. On physical examination, his general condition was moderate and he had groaning due to respiratory distress. Pulmonary sounds were decreased on the left side with auscultation and rhonchus on the right side. Bilateral crepitation was detected between chest and shoulder. After imaging, SPM, retrosternal emphysema, subcutaneous emphysema and minimal pneumothorax were detected in the chest and neck region. The patient was admitted to the Pediatric Intensive Care Unit for further follow-up and treatment. Our patient was followed up in the intensive care unit for two days and inpatient service for two days and discharged without any complication with conservative treatment. We suggest that patients with a diagnosis of SPM should be followed for at least 24 hours in terms of complications and prophylactic antibiotics should be given to prevent the development of mediastinitis.

Keywords: *Subcutaneous emphysema, Cough, Pneumomediastinum*

Introduction

Pneumomediastinum is the presence of free air in the mediastinum (1). Pneumomediastinum was first observed by Laennec in 1819 after trauma and was defined as a posttraumatic complication (2). Spontaneous pneumomediastinum (SPM), on the other hand, occurs when air is transferred to the interstitial space and mediastinum by increasing intrathoracic pressure, such as asthma, lung infection, esophageal or tracheal rupture, increased intraalveolar pressure due to idiopathic reasons (1). In addition, accompanying subcutaneous emphysema is detected in 70-90% of cases with SPM (3). Newcomb et al. found the incidence of spontaneous pneumomediastinum 1/30.000 among patients admitted to the emergency room within five years (4). Although SPM clinic generally shows good prognosis, it can be life-threatening in serious cases with early diagnosis and appropriate treatment. In terms of blood pressure pneumomediastinum risk and possible complications, it may require close monitoring of the patient and invasive intervention when necessary (5). There is no accepted guideline for the follow-up of SPM cases, and therefore patient-based assessment is often performed. In this article, a three-year-old child who presented to the Pediatric Emergency Clinic with a cough complaint was presented, and the treatment and follow-up stages were shared, emphasizing that the diagnosis of SPM and subcutaneous emphysema should be kept in mind.

Case Report

A three-year-old girl presented to the Pediatric Emergency Clinic with a complaint of cough. It was learned from her medical history that her cough had been going on for three days and she had vomiting

twice. On physical examination, she had a fever of 38 º C and shortness of breath.The general condition of the patient was moderate. Lung sounds were decreased on the left side by auscultation in the respiratory examination and it was observed that there was a ronchus on the right side. Bilateral crepitation was detected in the examination between the chest and shoulder. Other system examinations were natural. Hemogram, C-reactive protein (CRP), ALT, AST, urea, bun, creatinine and electrolyte values were within normal limits. Subcutaneous emphysema and suspected pneumomediastinum were noted on the posteroanterior lung (PA) and lateral chest radiograph of the patient (Figure 1). Thorax computed tomography (CT) of the patient revealed free air densities in the mediastinum, subcutaneous emphysema areas extending from both axillary areas to the chest walls, minor pneumothorax on the left, and atelectatic appearance in the left lobe lower lobe posterobasal segment (Figure 2). The patient was hospitalized in the Pediatrics Intensive Care Unit (PICU) for the common follow-up of Pediatrics and Pediatric Surgery, with a preliminary diagnosis of pneumonia, SPM and subcutaneous emphysema for advanced follow-up and treatment. Considering the presence of esophageal rupture in etiology and compelling vomiting in its medical history; Ceftriaxone from 80 mg/kg, clarithromycin from 15 mg/kg, fluid treatment from 1500 cc/m2, salbutamol (4x2.5 mg) and oxygen treatments from 2 liters/minute were started. The state of emphysema was checked hourly by pediatric surgery. An increase in subcutaneous emphysema was observed on the PA radiograph taken at the 6th hour of follow-up (Figure 3), but since the patient's clinic was good, surgical intervention was not considered. Since improvement was observed in the patient's clinic, it was planned to take a daily X-ray. She was taken to the Pediatrics Service because the patient's general condition was good, there was no need for oxygen and there was a significant improvement in the PA radiograph. On the 4th day of his follow-up, he was discharged with healing.

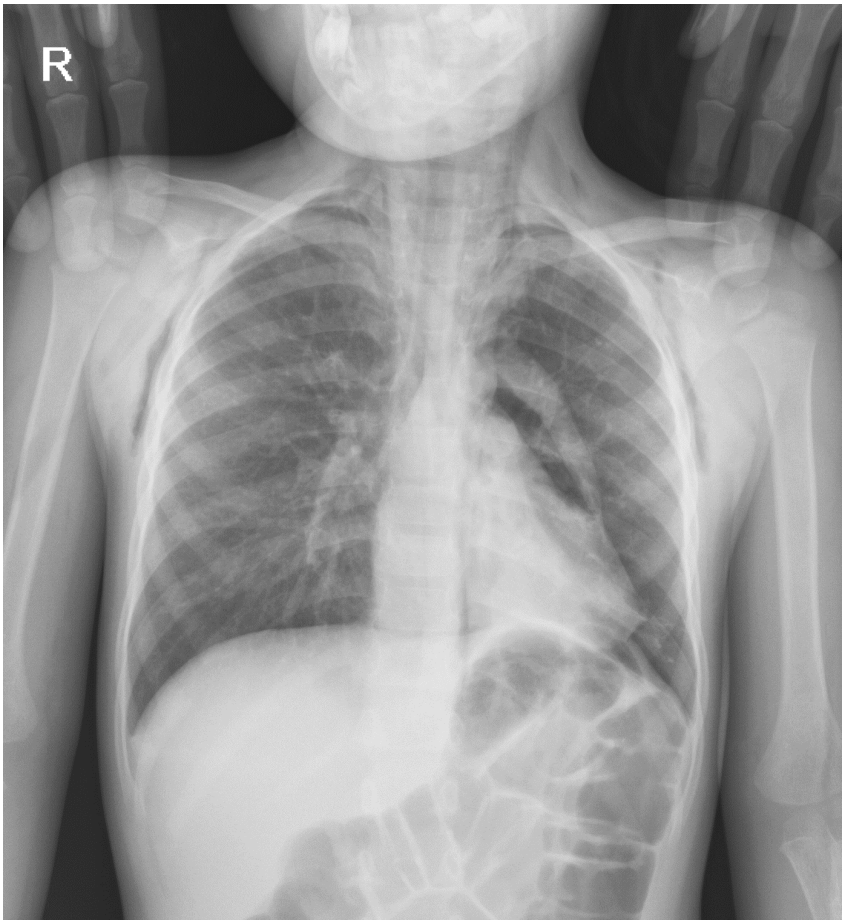

Fig1. *First chest X-ray of the patient*

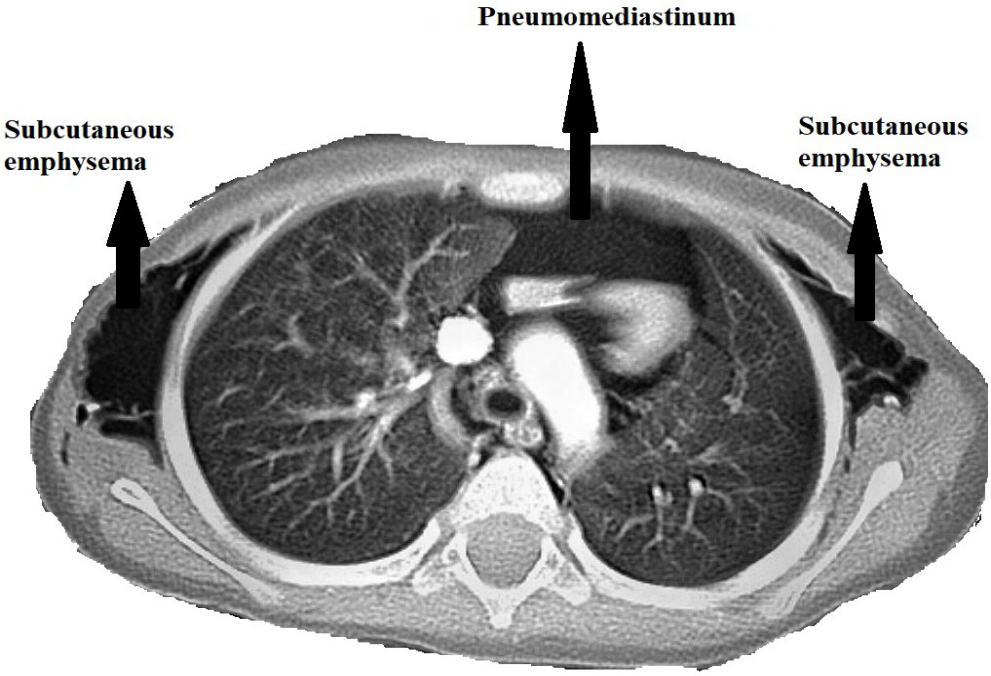

Fig2. *Computed thorax tomography of the patient*

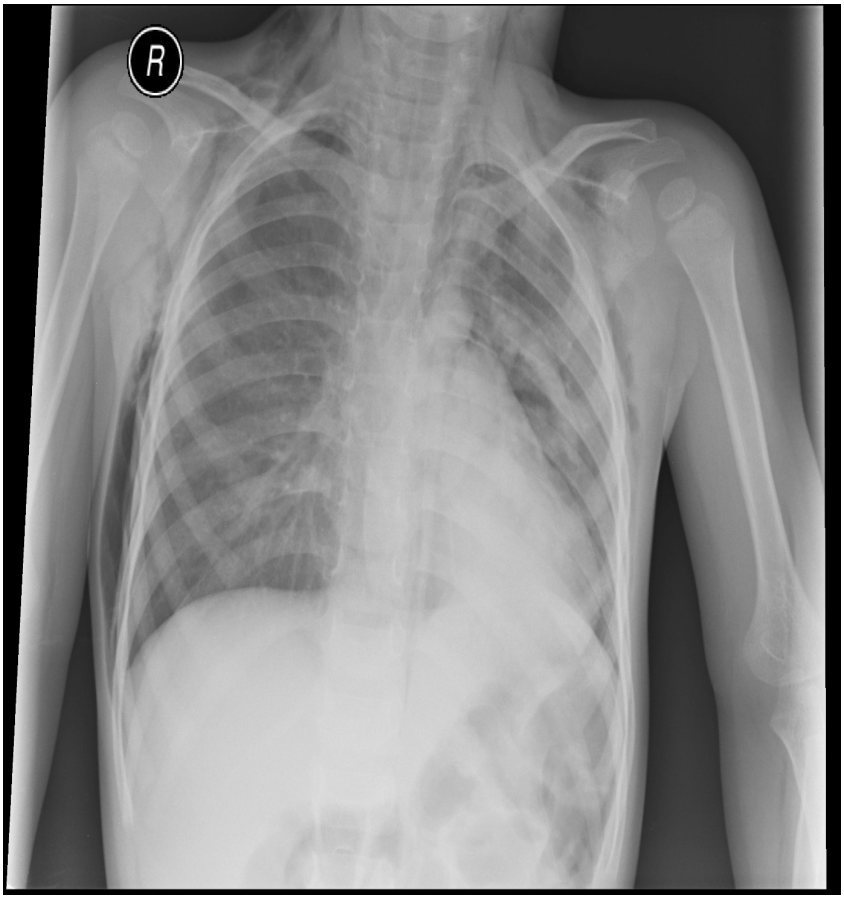

Fig3. *Second chest X-ray of the patient*

Discussion

Pneumomediastinum; It is divided into two groups as spontaneous and secondary pneumomediastinum. SPM usually occurs due to asthma, physical activities that increase chest pressure, cough, vomiting, sneezing, valsalva maneuver, and inhaler drug use. Secondary pneumomediastinum, on the other hand, occurs due to demonstrable causes such as trauma, esophageal perforation, infections and foreign body aspiration (5). Our patient had complaints of cough and vomiting, and our patient was diagnosed with SPM.

Mediastinum is associated with various anatomical structures such as the retropharyngeal region, the submandibular region, and the vascular bed in the neck. It is directly related to the retroperitoneal region through the periaortic and periesophageal areas. Starting from the mediastinum, the tissue plan extending through the sternocostal region of the diaphragm extends from the abdominal lateral areas to the pelvis. Therefore, the free air in the mediastinum can spread to all these areas where the mediastinum is related (6). Due to this anatomical connection, in our patient, retrosternal emphysema due to SPM, subcutaneous emphysema in the chest and neck region were observed together.

In spontaneous pneumomediastinum, subcutaneous emphysema pathogenesis is thought to occur as a result of the passage of air into the interstitial space and mediastinum due to rupture in the respiratory or digestive tract with increased intrathoracic pressure. In severe cases, pneumothorax may cause complications such as tension pneumothorax or pneumopericardium, causing airway obstruction and reduced venous return to the heart, leading to life-threatening shock pictures. In addition, mediastinitis that may develop in patients with esophageal rupture-associated mediastinal emphysema may be life-threatening (2,6). It is very interesting that in order to escape from the negative conditions of the prisons, it has also been reported that attempts are made to ensure that the detainees are referred to the hospital by tearing the mouth mucosa with the maneuver of valsalva, creating subcutaneous emphysema and pneumomediastinum (7). The clinical severity of pneumomediastinum is related to the amount of air escaping from the alveoli, whether it compresses the airways, the presence of pseudotamponad and accompanying pneumothorax. In patients who do not respond to conservative treatment and who have diffuse subcutaneous emphysema with respiratory failure and pneumothorax; skin-subcutaneous incisions, tube thoracostomy and subcutaneous drainage catheter can be applied. In our case, minimal pneumothorax was observed and tachycardia was present in the first hours of hospitalization. Surgical treatment was not required in the patient whose vital signs were stable with conservative treatment.

When symptoms are considered, patients apply for nonspecific reasons such as sudden onset chest pain, chest pressure sensation, shortness of breath, neck pain, dysphagia. PA and side chest X-ray, thorax CT and bronchoscopy can be used for diagnosis. The gold standard thorax for diagnosis is CT. The differential diagnosis includes esophageal perforation and pneumothorax. Diagnosis of pneumothorax can be excluded by PA radiography, esophageal perforation esophagography, and other possible comorbid pathologies by thorax CT. In our case, the diagnosis was made as a preliminary diagnosis with the findings of PA and chest X-ray, and the diagnosis was clarified by thorax CT. In all cases reported in the literature, chest radiographs were sufficient to establish the diagnosis, and the findings were reported as pneumomediastinum, retrosternal emphysema and subcutaneous amzifema in all patients (8).

Mediastinal and subcutaneous air resorption is provided in children within 5-7 days after appropriate treatment. In the treatment of SPM cases, the underlying problem and complications, if any, need to be treated; otherwise, conservative treatment is recommended in patients. However, in patients who did not respond to conservative treatment and who had diffuse subcutaneous emphysema with respiratory failure and pneumothorax; skin-subcutaneous incisions, tube thoracostomy and subcutaneous drainage catheter can be applied (5). In a study, “nitrogen washing theory” was proposed with continuous oxygen therapy, but no comment was made about its effectiveness (9). Our patient was followed up with 100% O2, salbutamol, hydration and prophylactic antibiotic therapy. She recovered without complications with conservative treatment. In pediatric cases, although there is no study on the use of prophylactic antibiotics in SPM case management, we think that prophylactic antibiotics should be given to prevent the development of mediastinitis.

Although spontaneous pneumomediastinum is very rare in the Pediatric Emergency Clinic, it is a situation that worries physicians because of the risk of developing serious complications. In addition, follow-up of patients is not standard since there is no current and valid guideline for the management of pediatric SPM cases. For this reason, it is recommended to evaluate on a patient basis. Considering the general condition, consciousness, vitalities and symptoms of the patient, follow-up should be performed in the inpatient service or PICU. Even though it is asymptomatic in terms of complications that may occur in patients, we believe that SPM cases should be followed up in the pediatric surgery clinic in terms of possible complications. Our patient was discharged after two days in the PICU and two days in the inpatient service, after recovery without complication with conservative treatment.

Conclusion

It should be remembered that SPM can be observed in patients admitted to the Pediatric Emergency Clinic with cough, vomiting and shortness of breath. We believe that patients diagnosed with SPM should be followed up in the Pediatric Surgery Clinic in terms of possible complications and that prophylactic antibiotics should be given to prevent the development of mediastinitis. In addition, if the patient's clinic is good when there is diffuse subcutaneous emphysema as in our case, surgical treatment should not be performed and subcutaneous air should be expected to be resorbed by closely monitoring with conservative treatment.

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