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Spontaneous Subcutaneous Emphysema and Pneumomediastinum in a Child with No Risk Factors: A Case Report

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Abstract

Spontaneous subcutaneous emphysema and pneumomediastinum in children without any predisposing factors is rarely described. We described the case of spontaneous pneumomediastinum and subcutaneous emphysema as a complication of persistent cough in a 3-year-old girl with no risk factors. The child was treated conservatively. Repeated chest X-ray after 5 days showed a complete reabsorption of gas in the neck and mediastinum.

Keywords: Subcutaneous Emphysema; Spontaneous Pneumomediastinum; Persistent-Cough; Children, Pediatric

Introduction

Spontaneous subcutaneous emphysema with pneumomediastinum is a rare condition in children. It is defined by the presence of air in the mediastinum, that leaks to subcutaneous spaces, not caused by trauma or iatrogenesis [1]. The exact mechanism underlying spontaneous pneumomediastinum and subcutaneous emphysema is not completely cleared, but it is believed to be related to increased intra-alveolar pressure leading to alveolar rupture [2,3]. Although some risk factors are known, this condition remains rare and underdiagnosed in pediatric settings with an estimated incidence between 1 in 800 and 1 in 42,000 emergency department (ED) presentations [1]. Chest x-rays (CXR) and chest computed tomography (CT) are useful tools to diagnose this condition [2]. Although this disease is typically benign, hospitalization and observation are common due to possible significant or life-threatening complications, such as tension pneumomediastinum or tension pneumothorax [4].

In literature, some cases of pneumomediastinum and subcutaneous emphysema in the pediatric population are described. These cases are more often secondary to asthma, adenotonsillectomy, trauma or foreign body aspiration [5-9]. In some cases subcutaneous emphysema can present as a complication of tracheal intubation [10]. Occasional cases were described as result from forced Valsalva's maneuver due to cough or vomit [11,12].

In this article, we describe the development of a spontaneous pneumomediastinum and subcutaneous emphysema in a child with no risk factors, as a consequence of a persistent cough.

Case Presentation

A 3-year-old Italian girl presented to our first-level emergency room with a dry cough of one-week duration and progressive dyspnea occurred a few hours before. She reported fever the previous week, but was afebrile when she arrived to our observation. She was born at 32 weeks of gestational age from a twin pregnancy. Her birth weight was 1700 g and she needed low-flow oxygen supplementation in the first days of life, but no

bronchopulmonary dysplasia occurred. She had no allergies nor a personal history of asthma. There was no history of trauma or surgical intervention nor history of foreign body aspiration. On presentation, her vital signs were as follows: heart rate 145 beats per minute, respiratory rate 55 breaths per minute, temperature 36.0°C, blood pressure 80/60 mmHg and oxygen saturation 89% on room air. Physical examination revealed tachypnoea with intercostal and jugular retractions. Chest auscultation revealed low air entry bilaterally, with wheezes and crepitation that were noticeable on both sides. After oxygen was administered via a nasal cannula, oxygen saturation increased to 93-94%. Full blood count was within normal limits and C-reactive protein was only mildly increased. In particular capillary blood gas measurements revealed mild respiratory acidosis (pH 7.32, pCO2 47.0 mmHg, and [HCO3-] 23,9 mmol/L) (Table 1). Chest X-ray showed presence of pneumomediastinum with subcutaneous emphysema in both right and left lateral neck areas with no pneumothorax and no evidence of foreign body aspiration (Figure 1).

Variable	Reference Ranges	On Admission
White Cell-Blood Count (per µl)	5,000-19,500	14,480
Hemoglobin (g/dl)	10.0-15.0	12.6
Hematocrit (%)	36.0-48.0	38.6
Platelet Count (Per µl)	150,000-400,000	3,34,000
pH	7.35-7.45	7.31
pCO2 (mmHg)	35.0-45.0	46.5
pO2 (mmHg)	35.0-50.0	45.6
Base Excess (mmol/liter)		-2.2
Bicarbonate (mmol/liter)	21.0-27.0	23.9
Sodium (mmol/liter)	135-145	143
Potassium (mmol/liter)	3.5-5.3	4.3
Chloride (mmol/liter)	98-106	104
Calcium (mmol/liter)	1.0-1.32	1.27
Glucose (mg/dl)	75-100	128
Lactic acid (mmol/liter)	0.5-2.2	1.5
C-Reactive Protein (mg/liter)	0-10	41.6
Procalcitonin (ng/ml)	<0.5	0.1

Table 1: Laboratory data.

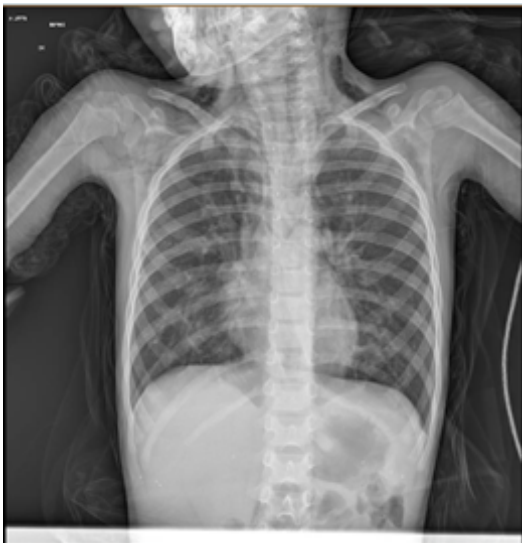

Figure 1: Pneumomediastinum and subcutaneous emphysema in the neck shown on chest X-ray.

The patient was admitted and received non-invasive monitoring and low-flow oxygen. Due to the persistence of dyspnea and the increasing respiratory effort, the girl was transferred to a third-level reference hospital, provided by a Pediatric Intensive Care Unit (PICU), if necessary. At the third-level reference hospital, non-invasive cardiorespiratory monitoring, analgesia, and low-flow oxygen via a face-mask had been provided. Over the next few days her respiratory pattern improved to normalize. After 5 days, a chest X-ray showed a complete reabsorption of gas in the neck and mediastinum. The patient was discharged at day 6, stable on spontaneous breathing. Skin prick tests for usual inhalants performed after discharge were all negative.

Discussion

Spontaneous pneumomediastinum with subcutaneous emphysema is a rare condition, especially in children. Some cases were described primarily in older children and adolescents, more often secondary to asthma, adenotonsillectomy, trauma or foreign body aspiration [5-9]. In some cases subcutaneous emphysema can present as a complication of tracheal intubation [10]. Occasional cases were described as result from forced Valsalva's maneuver due to cough or vomit [11,12]. Chest pain and dyspnea are the most common initial symptoms. Head and neck manifestations are secondary to pneumomediastinum, but they can represent the first warning of presence of pneumomediastinum, caused by air accumulation subsequently disseminating along the fascia to the cervical region. Radiologic findings are gold-standard to detect spontaneous pneumomediastinum with subcutaneous emphysema

[2]. Chest radiography may not always be sufficient to recognize the presence of spontaneous pneumomediastinum. Therefore, in some cases, chest CT is necessary to provide confirmation of the diagnosis [2]. Spontaneous pneumomediastinum with subcutaneous emphysema has generally a benign and self-limiting course, and the usual treatment is bed rest, analgesics, and oxygen therapy. In fact, breathing pure oxygen could reduce the partial pressure of nitrogen in the subcutaneous air, allowing acceleration of its resorption.

In our clinical case, there were no predisposing factors and no history of trauma. The only mechanism underlying the onset of spontaneous pneumomediastinum with subsequent subcutaneous emphysema was the persistent cough, that is a condition quite common among pediatric patients. We described a possible rare complication of cough that is important to detect. In fact, despite the usual good prognosis, significant or life-threatening complications, such as tension pneumomediastinum or tension pneumothorax, may occur requiring invasive measures [4]. The incidence of these complications is very low, and they have only been reported in a few case reports [13], but physicians should keep them in mind, especially while treating patients receiving high-flow or invasive ventilation that can worsen these conditions.

Conclusions

In conclusion, spontaneous pneumomediastinum with subcutaneous emphysema is a rare and normally benign disease with a good prognosis in children. Cough-related pneumomediastinum should be suspected in pediatric patients who develop sudden dyspnea after a persistent cough, even in absence of known risk factors for this condition.

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Conflicts of Interest: The authors declare no conflicts of interest.

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