Case Report

Severe subcutaneous emphysema and pneumomediastinum secondary to noninvasive ventilation support in status asthmaticus

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Abstract

A 12-year-old male with status asthmaticus developed subcutaneous emphysema and pneumomediastinum. He was transferred to our unit, where he received noninvasive ventilation (NIV).This respiratory support technique is not an absolute contraindication in these cases.After 2 h on NIV, he worsened sharply and the subcutaneous emphysema got bigger suddenly. He needed invasive ventilation for 5 days. Final outcome was satisfactory. This case illustrates that it is mandatory to keep a high level of vigilance when using NIV in patients with air leaks.

Keywords: Asthma, noninvasive ventilation, pneumomediastinum, subcutaneous emphysema

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Introduction

Subcutaneous emphysema is caused by increased intraaveolar or intrabronchiolar pressure with an extrapleural outflow of air. Pneumomediastinum is also due to increased intra-alveolar pressure, which can occur with barotrauma, coughing, or asthma exacerbation.[1] It is more common in children under 7 years.[2,3] During an asthma attack, the incidence is estimated at one in 20,000 patients.[4] There is some controversy about the application of NIV in cases of air leak. We describe the case of a patient with asthma and associated pneumomediastinum and subcutaneous emphysema who showed an abrupt worsening after starting with NIV.

Case Report

Male patient, 12-year-old, with a history of asthma from the age of 2 years. He was treated with inhaled corticosteroids and long-acting beta agonists, without maintenance therapy during the previous year. He was diagnosed with idiopathic thrombocytopenic purpura at the age of 11. He was admitted to a district hospital with moderate respiratory distress. He was treated with intravenous corticosteroids and nebulized salbutamol and ipratropium bromide. Respiratory distress worsened sharply; he had swelling and crepitus at his neck. Chest X-ray confirmed the presence of subcutaneous emphysema and pneumomediastinum [Figure 1]. He was admitted in the Pediatric Intensive Care Unit (PICU) and connected to NIV. Two hours after NIV initiation his clinical condition worsened abruptly; physical examination revealed neck enlargement of up to two inches thick which compromised airway patency, on auscultation he had a silent chest. Blood gas analysis showed very severe respiratory acidosis (pH 7.10,

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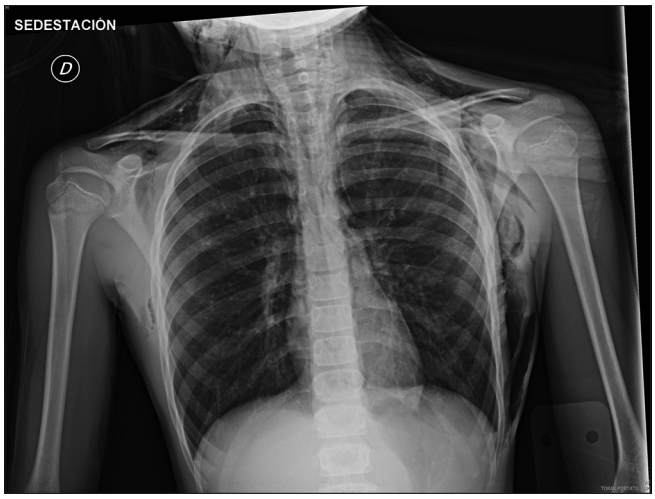

Figure 1: Chest X-ray examination showed pneumomediastinum and subcutaneous emphysema

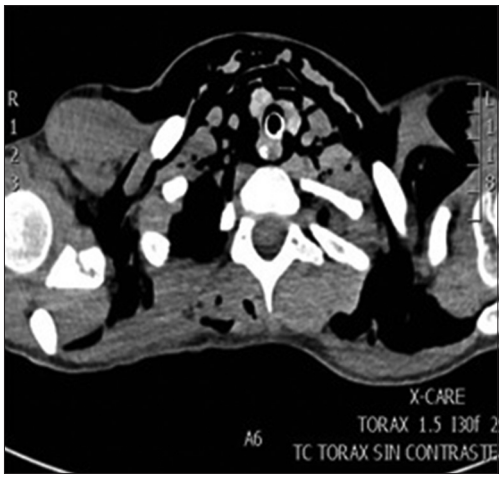

Figure 2: Computed tomography thorax of this patient demonstrating pneumomediastinum and subcutaneous emphysema blowing out of muscles and pneumomediastinum. The chest X-ray of Figure 1 is before the intubation, and the computed tomography scan is after the intubation

pCO_2 98.8 mmHg). Thorax X-ray and computed tomography (CT) scan showed the presence of subcutaneous emphysema dissecting the muscle compartments of cervical regions, supraclavicular, and costal wall and also showed a pneumomediastinum toward the minor fissure and around the bronchial structures [Figure 2]. The patient required invasive mechanical ventilation (IMV) for 5 days. At the beginning of IMV, he presented air-trapping, showing and intrinsic positive-end expiratory pressure of 5 mmHg. Volume-controlled ventilation was used for the first 4 days with a tidal volume of 6 ml/kg. The 5th day ventilation mode was changed to pressure support. Subcutaneous emphysema extended along his chest, abdominal wall and groins. After he was extubated, the outcome was satisfactory, but the signs of subcutaneous emphysema persisted a week after admission, with subsequent resolution.

Discussion

Subcutaneous emphysema and pneumomediastinum are rare complications of status asthmaticus. If they are present, we have to foresee a sharp deterioration of the patient as it happened in our case. The use of IMV in the asthmatic patient is very uncommon nowadays due to the frequent use of NIV. At present, <2% of patients who were admitted to intensive care for asthma exacerbation require IMV.[5] Our patient required IMV because the air leak compromised airway patency. Risk factors for barotrauma in this patient were acute respiratory distress, emphysema, severe asthma exacerbation, young age, and air-trapping. NIV could exacerbate air leak resulting in intense cervical subcutaneous emphysema which almost impeded ventilation (silent chest) probably due to compromised airway. It is mandatory to monitor closely patients with air leak (pneumomediastinum in our case) and NIV;[6] especially if it is associated with clinical deterioration or CO_2 retention. Literature to date describes an estimated incidence between 5% and 7% of pneumothorax or pneumomediastinum using NIV.[7-9] Controversy exists within the consideration of pneumomediastinum as an absolute contraindication in NIV.[10-14] Some authors[10-14] consider NIV as an absolute contraindication whereas others establish that it is a relative contraindication. Therefore, as our case illustrated it is essential to keep a high level of vigilance when using NIV in patients with air leak syndrome. It is necessary to detect changes in mental status or inability to maintain adequate ventilation and oxygenation as soon as possible.

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Conflicts of interest

There are no conflicts of interest.

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