

I'm Swelling Up: An Extensive Post-Traumatic Sub-cutaneous Emphysema

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Abstract

A former smoker 85-year-old man with a history of emphysematous COPD was admitted to hospital with a mild COPD exacerbation. He also reported a costal trauma 48 hours before. The following day the patient began to complain that he was "swelling up"; a physical examination was performed without findings at the time.

Within two days of admission and after a fit of coughing, the patient experienced a large and fast increase of volume of soft tissue on the face, neck, chest and upper extremities, with crackling to the touch. Chest CT was performed in which fractures in several ribs and significant subcutaneous emphysema, pneumomediastinum and a small pneumothorax were observed. A drainage tube was placed with full resolution of emphysema and the patient was discharged two weeks later, without further treatment.

This case report shows how a good physical examination can help to diagnose a serious condition in advance. As such, this paper should be of interest to a broad readership including those interested in respiratory medicine, thoracic surgery or general internal medicine.

Introduction

Sub-cutaneous emphysema is a complication that is associated to invasive surgical procedures, or more infrequently to some other medical conditions. In most cases it causes only minimal symptoms and it is a self-limited condition, and therefore it is treated conservatively.

However, it can be a severe complication, producing respiratory or even cardio circulatory obstruction. In this clinical case subcutaneous emphysema was not present at the time of admission, making diagnosis more difficult and probably worsening evolution.

Clinical Case

A 85-year-old man, former smoker and with a history of chronic obstructive pulmonary disease was admitted to hospital with high fever and greenish expectoration, symptoms consistent with COPD exacerbation.

He had tachypnea to 28 breaths per minute without chest indrawing, baseline oxygen saturation of 88%, and scattered rhonchi in both hemithorax. He also reported a history of costal trauma after an accidental fall in the bathroom of his home 48 hours before admission; the patient complained of left side chest pain, but he had not consulted in any medical services. In the initial blood count intense leukocytosis was observed. In the chest radiograph pneumonic infiltrates were not visualized and no other radiographic abnormalities were reported.

His medical history included hypertension, dyslipidemia, and benign prostatic hypertrophy. He had also suffered pulmonary tuberculosis in his youth, apparently treated and resolved. He smoked 40 cigarettes a day for more than sixty years. His usual treatment consisted of bronchodilators, statin, diuretics and other anti-

hypertensives. The patient had been admitted three years before to the same hospital due to a first episode of moderate COPD exacerbation. On that occasion the COPD diagnosis was made and a thorax CT was performed showing some areas of paraseptal emphysema in apexes and a granuloma in the inferior lobe of right lung.

The patient was admitted to hospital and received treatment with levofloxacin and bronchodilators, with improvement of his breathlessness and coughing, and disappearance of the fever. However, the day after admission the patient began to complain that he felt he was "swelling up". At the time, no relevant findings were observed at physical examination and his vital signs were stable, so no other tests were performed.

Within two days of admission and after a fit of coughing, the patient experienced a large and fast increase of volume of soft tissue on the face, neck, chest and upper extremities, with crackling to the touch (Figure 1). Chest CT was performed in which fractures in the 8th, 9th and 10th left ribs and significant subcutaneous emphysema (Figure 2, yellow arrows) could be seen.

He also had pneumomediastinum and a small pneumothorax (Figure 2). There was a progressive respiratory impairment that made necessary urgent intervention.

Assessed by the Chest Surgery Department, a drainage tube was placed for eight days with full resolution of pneumothorax and almost complete reduction of subcutaneous emphysema (Figure 3). Rib fractures did not require surgical approach.



Figure 1: Patient in the first moments after the onset of complication: subcutaneous emphysema in the face, neck and chest. It is striking the eyelid swelling that hardly allows to seeing his eyes.

The patient was discharged two weeks later, without further surgical treatment. He did require home oxygen therapy in spite of adequate bronchodilator therapy.

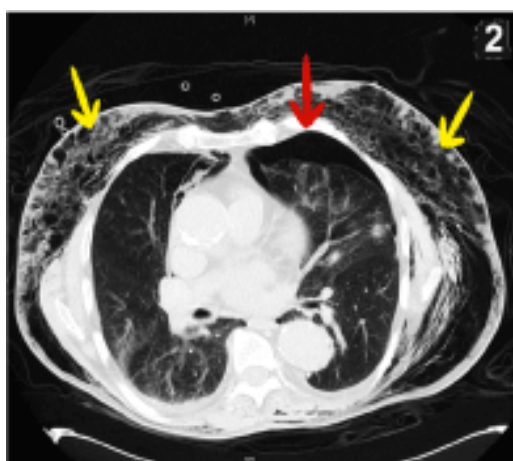


Figure 2: Chest CT: left ribs fractures and significant subcutaneous emphysema (yellow arrows), pneumomediastinum and small size pneumothorax (red arrow).



Figure 3: Patient two weeks later: full resolution of pneumothorax and almost complete reduction of subcutaneous emphysema.

Discussion

Pneumothorax and sub-cutaneous emphysema are relatively common in chest traumas, especially if rib fractures are present. The development of subcutaneous emphysema is a demonstrated risk factor associated with the presence of pneumothorax, even when initially pneumothorax is not seen [1,2].

Pneumomediastinum could be developed after a sudden rupture of distended alveoli due to compression by chest trauma; in which air travels from the alveoli to the surrounding interstitial space [3,4]. This process is known as "Macklin effect" and was first described by the Macklin brothers in 1944 [5].

Several complications have been reported in extensive subcutaneous emphysemas. Some represent only aesthetic problems; such is the case of periorbital tumefaction, although in some cases it can lead to visual problems [6]. Cervical involvement may produce dysphonia and even dyspnea by compression of the upper airway [7]. Also, some cases have been reported of pacemaker dysfunction related to subcutaneous emphysema with chest wall involvement [8]. Probably the most serious complications that have been described are massive chest compression with acute respiratory failure and cardiac pseudo-tamponade, in this case related to pneumomediastinum and pneumopericardium respectively [9-11].

Chest radiograph is an insensitive test for detecting post-traumatic pneumothoraces, thus being the reason why in many cases thorax computed tomography is needed to rule out pulmonary complications [12].

Pleural drainage could be performed as an emergency procedure and it is the treatment of choice when the origin of subcutaneous

emphysema is a pneumothorax [13]. If mediastinal emphysema or circulatory failure are present a cervical mediastinotomy should be performed [14,15]. Some cases of massive subcutaneous emphysema that were treated with subcutaneous drains have been reported [16,17] and even Vacuum-Assisted Closure Therapy (VAC) has been used with clinical success and without major complications [18].

Conclusion

Sub-cutaneous emphysema is an uncommon but not exceptional condition that needs to be diagnosed early in order to ensure an appropriate treatment and to avoid complications that may become severe. This clinical condition should be ruled out in all chest trauma which produce a pneumothorax; chest CT scan is the test of choice. In most cases, a chest tube placed in the pneumothorax is enough to solve the problem.

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