



CASE REPORT

EXPLORING SUBCUTANEOUS EMPHYSEMA: A CASE REPORT

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ABSTRACT

Subcutaneous emphysema (SE) refers to the escape of air into the subcutaneous tissue beneath the dermis. While generally benign and often requiring no specific treatment, extensive SE can lead to complications and become concerning for the patient. Commonly associated with procedures like chest tube insertion, pneumothorax, chronic obstructive pulmonary disease (COPD), and infections such as gas gangrene, the management of SE remains underreported in medical literature. We present a case of a 51-year-old male, a known COPD patient, who developed subcutaneous emphysema.

INTRODUCTION

Subcutaneous emphysema refers to the seepage of air in the subcutaneous space present underneath the dermis layer of the skin. Factors contributing to its development include surgical, traumatic, infections, or spontaneous etiologies. Ordinarily, it is due to iatrogenic cases involving thoracostomy, tracheal intubation, malfunction, or disruption of the ventilatory mechanism. Chest pain, dysphagia, sore throat, breathlessness along with wheezing are some of the significant manifestations with which the patient presents. Clinically, it is depicted as a protuberance of tissues beneath the skin, commonly seen over the face, neck, chest wall, abdomen, and bilateral upper as well as lower limbs. Palpation and auscultation of the affected area result in fine crepitations. Investigations employed for the same include chest radiography that shows a radiolucent area over the soft tissues and occasionally striations due to gas demarcating the fibers of the pectoral is major called the 'ginkgo leaf sign' along with a CT scan depicting dark spots due to air entrapment in the subcutaneous tissues⁸. Subcutaneous emphysema (SE) is generally a benign, self-limiting condition that is managed conservatively. However, extensive cases can be disfiguring and cause significant distress to the patient. In rare instances, SE may be associated with airway compromise and respiratory failure, particularly in vulnerable individuals. Management of the underlying cause should be considered initially as it will lead to the gradual

resolution of the subcutaneous emphysema. Numerous approaches that can be employed for the same involve the use of subcutaneous incisions, needles, drains, and catheters however the most effective being high-concentration oxygen allowing for nitrogen washout by decreasing the total tissue gas tension and thereby facilitating the absorption of gas from closed body surface.

CASE REPORT

A 51-year-old male presents with progressive shortness of breath, a five-day history of a productive cough, and acute onset chest pain. Vitals at the time of admission were as follows

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|------------------|-----------------------|
| Blood pressure | 130/80 mmHg |
| Heart rate | 128 beats per minute |
| SPO2 | 65% on room air |
| Respiratory rate | 26 breaths per minute |

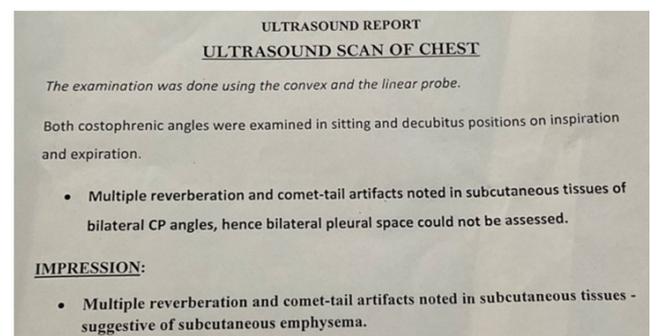
General examination revealed facial puffiness, swelling over the chest, abdomen, bilateral upper and lower limbs, and palpable crepitus. Chest auscultation shows bilateral crepitations and rhonchi. There were decreased breath sounds over the lower right lobe of the chest. Cardiovascular examination was normal with no raised JVP or gallop rhythm. Superficial palpation of the abdomen shows palpable

crepitations in all the quadrants. The patient was conscious and oriented and other neurological examinations were within normal limits. Chest radiography depicts scattering areas of radiolucency, that represent a fluffy appearance along the superficial borders of the thoracic and abdominal walls. It also shows bilateral pneumonic patches, emphysema, and right-sided pleural effusion. Chest USGs suggestive of multiple reverberation and comet-tail artifacts of subcutaneous tissues of bilateral costophrenic angles leaving an impression of subcutaneous emphysema along with CT chest reporting dark pockets in the subcutaneous layer indicative of air. The patient also had a 3-year-old history of pulmonary tuberculosis concerning which he took ATT.

He was a chronic smoker for 30 years which eventually made him diagnosed with COPD. The patient was admitted to an ICU due to respiratory deterioration where he was treated with IV steroids, supplemental oxygen, bronchodilators, IV antibiotics, incentive spirometry, and chest physiotherapy. The patient felt an overall improvement in his respiratory status after conservative and symptomatic management as per the protocols. There was a significant improvement in palpable crepitus and was discharged to a rehabilitation center for further follow-up.



Figure 1



DISCUSSION

Although subcutaneous emphysema (SE) is a non-lethal condition with a worldwide incidence ranging from 0.43% to 2.34%, it often raises significant concerns for the patients. SE occurs when air enters the subcutaneous layer of the chest wall, causing it to spread to the soft tissues of the face, neck, upper chest, and shoulders eventually leading to cosmetic deformities. While SE typically doesn't result in life-threatening complications, such as tension pneumomediastinum, pneumothorax, or pneumopericardium, it can still be distressing. The average age of patients presenting with SE is approximately 53 years, with a male predominance of 71% globally. Chest trauma, whether blunt or penetrating, is a major cause of SE, triggering air leakage into the skin of the chest wall and its subsequent dissemination throughout the body. In a case report by Beck and colleagues, SE was attributed to community-acquired pneumonia in a patient with a background of COPD. Other case reports have also identified iatrogenic causes and trauma as contributing factors. The pathophysiology of subcutaneous emphysema and pneumomediastinum involves broncho-alveolar rupture, where a weakened alveolar wall—often due to chronic lung conditions such as COPD—is damaged, typically following elevated intrathoracic pressure during exacerbations or severe coughing episodes. In our patient, the diagnosis was confirmed through the detection of thoracic palpable crepitus, which is a distinctive crackling sensation upon touch; swelling of the neck, chest wall, scalp, and abdomen; and the presence of air within the soft tissue, confirmed using a combination of chest radiography and thoracic computed tomography. SE does not usually require treatment; however, if a significant volume of

air accumulates, it can interfere with breathing and become intolerable for patients. In such cases, SE may progress to a state of “massive SE,” which can be quite uncomfortable and necessitates surgical intervention, including infraclavicular incisions or the placement of subcutaneous drains. Cervical mediastinotomy remains an alternative option in case these measures fail to alleviate increasing respiratory distress. For SE caused by pneumothorax, treatment typically involves the placement of a chest tube to remove and control the source of air entering the subcutaneous space. Since the focus of treatment is usually on addressing the underlying condition, cases of spontaneous SE often require little more than bed rest, pain management, and supplemental oxygen to help the body absorb the subcutaneous air more rapidly.

CONCLUSION

Subcutaneous emphysema, rarely though but can be a severe complication in patients with COPD manifesting due to the escape of air from the lungs or airways into the subcutaneous tissues, often because of alveolar rupture predisposed either by elevated intrathoracic pressure or trauma to the chest. The key strategies that can be employed for the prevention of the same in COPD patients are as follows; Ensuring strict control of COPD through bronchodilators, inhaled corticosteroids along with smoking cessation thereby declining the risk of exacerbations, avoiding aggressive mechanical ventilation, particularly PPV to prevent the development of air leaks and also monitoring at-risk patients with a history of pneumothorax, emphysema or previous episodes of SE. Since SE already remains a relatively rare occurrence in COPD patients, cautious management of the disorder, avoidance of predisposing factors in addition to early intervention can significantly decline its incidence and precipitate a better prognosis.

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