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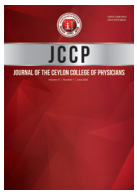

Case Report

Spontaneous subcutaneous emphysema following Influenza A virus infection in a young man: A case report

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ABSTRACT

Spontaneous subcutaneous emphysema (SSE) is an uncommon condition characterised by the presence of air within the subcutaneous tissues in the absence of trauma or surgical intervention. It usually results from alveolar rupture due to elevated intra-alveolar pressure. We report a previously healthy 16-year-old man who presented with fever, cough, and sudden-onset diffuse chest pain during an influenza-like illness. Clinical examination revealed palpable crepitus over the neck and upper chest. Chest radiography and contrast-enhanced computed tomography demonstrated extensive cervical and thoracic subcutaneous emphysema, associated with a pneumomediastinum, in the absence of an underlying structural lung disease. Reverse transcriptase polymerase chain reaction (RT-PCR) testing of a throat swab confirmed Influenza A H1N1 infection. The patient was treated conservatively with oseltamivir, supplemental oxygen, analgesia, and close observation, resulting in complete clinical and radiological resolution within seven days.

This case highlights a rare manifestation of Influenza A infection in an adolescent. Severe coughing associated with influenza may markedly increase intra-alveolar pressure and precipitate alveolar rupture leading to pneumomediastinum and SSE. Although usually self-limiting, SSE may occasionally progress to serious complications including tension pneumothorax and airway compromise. Early recognition and appropriate imaging are therefore important for excluding life-threatening complications and guiding conservative management.

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Introduction

Subcutaneous emphysema (SE) occurs when air infiltrates the dermal layer of the skin. It can indicate the leakage of air into other body cavities, such as pneumomediastinum, pneumoperitoneum, or pneumoretroperitoneum. Air can spread to the head, neck, chest, and abdomen, connecting all anatomical planes depending on the pressure gradients.[1] When SE follows a surgical procedure or trauma, it is termed surgical emphysema. Spontaneous subcutaneous emphysema (SSE) is the presence of air within the subcutaneous tissues occurring in the absence of trauma, surgical procedures, or other iatrogenic causes. It commonly results from alveolar rupture secondary to sudden increases in intra-alveolar pressure, allowing air to dissect along fascial planes into the mediastinum and subcutaneous tissues.[2] This case report highlights a rare instance of SSE following influenza viral infection. Such an occurrence in adults is extremely rare, although well known to occur in children in the background of asthma.[3]

Case presentation

A 16-year-old previously healthy young man presented with a two-day history of fever with chills and cough followed by sudden onset of diffuse chest pain. There was associated soreness of the throat and loss of appetite. On the second day, the cough intensified, leading to acute, diffuse chest pain and neck discomfort, without sweating, nausea, or vomiting. There was no chest trauma reported. He had no history of bronchial asthma or other chronic lung disease.

The patient was febrile (101 ˚F), without respiratory distress, with a respiratory rate of 16/min and pulse oximetry of 98% on room air. SSE was evidenced with widespread palpable crepitus in the neck and upper chest, more pronounced posteriorly. Air entry was equal bilaterally with occasional coarse crepitations and extensive rhonchi throughout the lungs. Pulse rate was 84/min and blood pressure was 120/80 mmHg. He had no neck lumps, including a goitre or lymphadenopathy. The rest of the systemic examination was normal.

Initial investigations revealed a normal full blood count with a white blood cell count of 7.6 $\times$ 10^9/L, haemoglobin of 14.9 g/dL, and platelet count of 298 $\times$ 10^9/L. C-reactive protein was elevated at 31 mg/L. Renal and liver function tests were within normal limits. Reverse transcriptase polymerase chain reaction (RT-PCR) testing of a throat swab was positive for Influenza A H1N1, while COVID-19 PCR and Mycoplasma IgM antibodies were negative. Blood and sputum cultures showed no bacterial growth. The postero-anterior (PA) chest and anteroposterior (AP) neck radiography (figure 1A & B) confirmed SSE. The flexible endoscopic assessment demonstrated normal vocal cords with symmetrical movements in the absence of stenosis, ulcers, tears or growths within the upper aerodigestive regions. CT imaging demonstrated associated pneumomediastinum, which was not clearly appreciable on the initial chest radiograph (Figure 1C). There were no pulmonary bullae, pneumatocoeles or pneumothoraces, and the lung parenchyma was normal.

The patient received supplemental oxygen therapy with close clinical observation. Oxygen therapy was administered to enhance the resorption of extra-alveolar air by increasing the nitrogen diffusion gradient, a strategy commonly used in the conservative management of pneumomediastinum and subcutaneous emphysema. Oseltamivir 75 mg b.d. was given for 5 days. Empirical oral co-amoxiclav and clarithromycin were initiated initially because of concern for a possible secondary bacterial lower respiratory tract infection in the setting of persistent cough and elevated inflammatory markers, although subsequent microbiological investigations were negative. The SSE resolved spontaneously, and the patient was discharged from inpatient care on the seventh day of admission. He was reviewed as an outpatient with resolved symptoms and clinical subcutaneous emphysema, with unremarkable repeat radiography at 1 month.

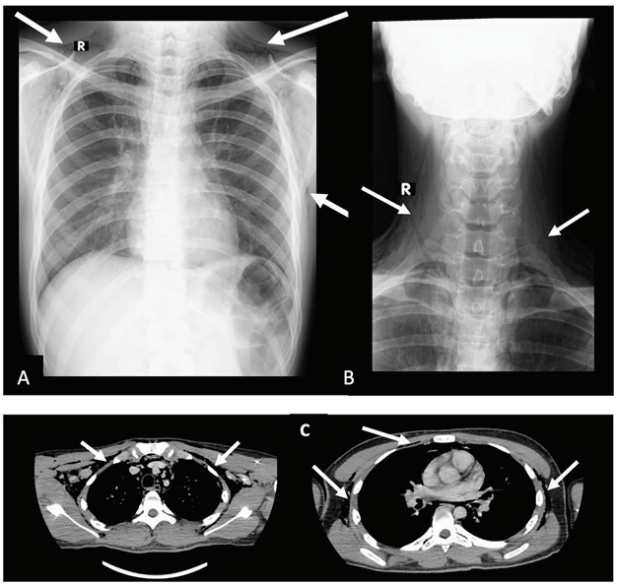

Figure 1. (A) Chest radiograph demonstrating cervical and thoracic subcutaneous emphysema (white arrows). (B) Neck radiograph showing extensive cervical soft tissue emphysema. (C) Contrast-enhanced CT chest demonstrating subcutaneous emphysema involving the cervical and thoracic fascial planes with associated pneumomediastinum (white arrows).

Discussion

SE can result from surgical procedures, trauma, or infections, or occur spontaneously. Trauma may be either penetrating or blunt affecting the chest, resulting in rib fractures, tracheal or oesophageal ruptures, and sinus injuries.[1] Trauma to the airway mucosa during endotracheal intubation, malfunctioning ventilator circuits, the Valsalva manoeuvre, and overinflation of the endotracheal tube cuff are recognised as iatrogenic causes of SE. Further, SSE can arise from processes that acutely raise alveolar pressure, such as labour or excessive coughing in conditions like asthma or cannabis use. It involves the presence of air in the subcutaneous tissue, often accompanied by pneumomediastinum, in which air is present in the mediastinum.[2]

SSE with influenza infection in adults, as in our patient, is rare. Few cases of pneumomediastinum in children during the H1N1 pandemic were reported.[3] H1N1 viral infection typically presents with fever, cough, sore throat, rhinorrhoea, arthralgia, and myalgia. Luis et al described a 60-year-old male presenting with chest pain and neck fullness with a positivity for Influenza A H1N1. The pneumomediastinum and SSE were resolved subsequently with antiviral and supportive therapy.[4] Influenza B can also present as spontaneous pneumomediastinum and SE.[4,5]

The pathophysiology remains the same in most cases, despite numerous causes of SSE. In our patient, repeated bouts of severe coughing associated with Influenza A infection were the most likely precipitating factor for alveolar rupture. Vigorous coughing can acutely elevate intra-alveolar pressure and promote air leakage into the pulmonary interstitium via the Macklin effect, whereby air dissects along bronchovascular sheaths toward the mediastinum before extending into subcutaneous tissues. The absence of trauma, underlying structural lung disease, pneumothorax, or previous pulmonary pathology supports influenza-associated cough as the probable mechanism.[1,2]

SSE usually presents with sudden-onset, painless soft-tissue swelling, mainly involving the upper chest, neck, face, and periorbital area. Additional symptoms may include a painful sore throat, neck stiffness, difficulty swallowing, shortness of breath, wheezing, and abdominal distension. Periorbital oedema can also lead to visual disturbances. In more severe cases, patients may experience cutaneous tension, hoarseness, and even pneumoperitoneum, which can rarely lead to compartment syndrome. Physical examination shows crepitus on palpation. In this case, the patient presented with diffuse chest pain and crepitus on palpation without respiratory compromise.[2]

Soft tissue imaging of the neck and chest using radiography and CT scans can detect the presence of air within facial layers. These imaging techniques are crucial for excluding serious conditions such as pneumothorax, air embolism, and cardiac tamponade. CT scans are particularly effective in confirming the diagnosis due to their high sensitivity.[1]

This case is clinically significant as it illustrates that influenza A infection, a common and often underestimated respiratory illness, can precipitate a serious and potentially life-threatening complication in otherwise healthy young individuals without pre-existing lung disease. Heightened awareness of this rare association among clinicians is essential to ensure timely diagnosis, appropriate investigation, and prompt management to prevent progression to fatal complications such as tension pneumothorax or airway compromise.[6,7]

Spontaneous resolution of SSE typically occurs within 2 to 10 days for most cases. Administration of supplemental oxygen may accelerate reabsorption of extra-alveolar air by increasing the nitrogen diffusion gradient between the trapped air collection and the alveolar space.[8] Complications such as tension pneumothorax and air embolism pose serious risks and require immediate medical attention. There have been instances of vision loss linked to orbital involvement and to tracheal compression when the retropharyngeal space is affected.[1]

Conclusion

SSE associated with Influenza A infection is an uncommon but important clinical entity. Severe coughing during an influenza infection may precipitate alveolar rupture leading to pneumomediastinum and tracking of air into subcutaneous tissues. Although the condition is often self-limiting, careful clinical and radiological evaluation is essential to exclude potentially life-threatening complications such as pneumothorax, airway compromise, and tension pneumomediastinum. Conservative management including observation, treatment of the underlying viral infection, and supplemental oxygen usually results in complete recovery.

Author declaration

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Conflicts of Interest

The authors declare no conflicts of interest.

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Criteria for Authorship

All authors were involved in clinical care of the patient. The manuscript was composed and edited by all authors under the supervision of Silva S.

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