A Case of Unknown Cause of Subcutaneous Emphysema Presented by Generalized Edema

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Subcutaneous emphysema and pneumomediastinum are commonly derived from trauma or injury of respiratory or gastrointestinal tracts, but occasionally the origin of air was not determined at evaluation. We report on a case of severe subcutaneous emphysema detected using simple X-ray films in the emergency department, which extended to almost all of the bodies, with a review of the literature.

Key Words: Air, Origin, Pneumomediastinum

Introduction

Subcutaneous emphysema is defined as the presence of air in the subcutaneous tissues of the body. It can result from puncture of parts of the respiratory or gastrointestinal tracts, particularly in the chest and neck. The air may become trapped as a result of penetrating trauma or blunt trauma and subcutaneous emphysema can be caused by medical procedures and medical conditions. But, spontaneous subcutaneous emphysema when the cause is not clear used to be occasionally reported. Subcutaneous emphysema is not typically dangerous in itself, but we report a case, which showed remarkable X-ray finding accompanied severely extended physical finding at almost of the bodies in the emergency department1,2).

Case Report

A 54-year-old male patient was admitted to emergency department due to generalized edema. At 5-6 hours ago, above symptom was suddenly developed and accompanied by resting dyspnea and then progressively aggravated, but no other symptoms such as chest pain, abdominal pain, nausea and vomiting was developed.

He has been suffered from hypertension and myasthenia gravis, but no history of lung and heart diseases or recent trauma or injury at chest.

On physical examination, alert mentality and stable vital signs were showed, but, his face, eyelid, neck and upper chest was showed edematous, swollen like balloon, even to abdominal wall and thigh after taking off his clothes. The sound of crepitus was heard during touching his body and the breathing sound was slightly decreased on both lung fields.

After initial resuscitation, simple chest X-ray was taken, it showed large amount of subcutaneous emphysema on his neck extending to both axilla, chest wall and abdominal wall (Fig. 1).

The whole body computed tomography was taken to detect the range and cause of subcutaneous emphysema, it showed mediastinal emphysema around the heart, esophagus and aorta, and even neck and face, retroperitoneum, lower abdomen, pelvic cavity and both thigh circumferentially (Fig. 2).

The collar incisions at both infraclavicular areas were promptly done and squeezing the head and neck to downward, the abdomen and thorax to upward was done to remove the air beneath the skin out to the body.

The esophagogastroscopy and bronchoscopy did not find the detectable cause of any ulceration or perforation of the esophagus, upper gastrointestinal tract and the tracheobronchial tree.

We decided to observe the patient closely without further diagnostic tests and specific treatment because his condition was comfortable and vital signs were stable. Daily checked follow-up chest X-ray films during admission showed rapidly resolving status of soft tissue.
emphysemas and after then 1 week later he was improved and discharged after general treatment with some residual lesion, but long term follow-up chest X-ray films showed no visible residual lesions after discharge (Fig. 3).

**Discussion**

Subcutaneous emphysema is when gas or air is in the layer under the skin. Subcutaneous refers to the tissue beneath the skin, and emphysema refers to trapped air. It is sometimes called tissue emphysema, or Sub Q air. Since the air generally comes from the chest cavity, subcutaneous emphysema usually occurs on the chest, neck and face, where it is able to travel from the chest cavity along the fascia.

Subcutaneous emphysema has a characteristic crack-
ling feel to the touch, a sensation that has been described as similar to touching Rice Krispies; this sensation of air under the skin is known as subcutaneous crepitation.

Numerous etiologies of subcutaneous emphysema have been described. Subcutaneous emphysema can result from puncture of parts of the respiratory or gastrointestinal systems. Particularly in the chest and neck, air may become trapped as a result of penetrating trauma (e.g., gunshot wounds or stab wounds) or blunt trauma. Infection (e.g., gas gangrene) can cause gas to be trapped in the subcutaneous tissues. Subcutaneous emphysema can be caused by medical procedures and medical conditions that cause the pressure in the alveoli of the lung to be higher than that in the tissues outside of them.

Its most common causes are pneumothorax and a chest tube that has become occluded by a blood clot or fibrinous material. It can also occur spontaneously due to rupture of the alveoli with dramatic presentation. The term spontaneous subcutaneous emphysema is used when the cause is not clear.

Subcutaneous emphysema is not typically dangerous in itself, however it can be a symptom of very dangerous underlying conditions, such as pneumothorax. Although the underlying conditions require treatment, subcutaneous emphysema usually does not; small amounts of air are reabsorbed by the body. However, subcutaneous emphysema can be uncomfortable and may interfere with breathing, and is often treated by removing air from the tissues, for example by using large bore needles, skin incisions (collar incision) or subcutaneous catheterization.

Pneumomediastinum may be defined as the presence of free air or gas in the mediastinal structures. Air in the human body is usually confined to the respiratory or the gastrointestinal tract, but when the free air enters the mediastinum it’s termed as pneumomediastinum or mediastinal emphysema. It’s an uncommon, but important condition found in healthy young adults and children presenting with chest pain and shortness of breath, which may involve the neck, face, chest, abdomen, legs and arms. Pneumomediastinum commonly results from alveolar rupture, in which case air tracks along interstitial and vascular supporting tissues till it reaches the mediastinum.

Radiographically pneumomediastinum is manifested by lucent streaks or bubbles of gas in the mediastinal soft tissues outlining mediastinal structures, and mediastinal air between the heart and the diaphragm results in “continuous diaphragm sign” on the frontal chest radiograph.

In this case we can find the continuous air shadow along the diaphragm between the heart and the

Fig. 3. Serial follow-up chest X-ray films show rapidly resolving status of soft tissue emphysemas.
Sometimes increased intrathoracic pressure during cough and straining is known to precipitate the condition as noted in common respiratory infections, asthma, bronchitis, foreign body choking, parturition and volutrauma during mechanical ventilation.9-12)

It can occur with blunt thoracic trauma, esophageal rupture during vomiting or esophagoscopy, therapeutic bronchoscopy, acute lung injury due to Mendelson’s syndrome and mediastinitis by gas forming organisms and also reported in cases of pulmonary tuberculosis, pneumocystic carinii pneumonia and ecstasy abuse.4,13)

No preexisting cause may be apparent in some cases. In this case we could not find the detectable cause of any ulceration or perforation of the esophagus, upper gastrointestinal tract and the tracheobronchial tree by the esophagogastroscopy and bronchoscopy.

As in such there is no specific treatment of this condition apart from the fact that an incision, so called “collar incision” or catheters are placed in the skin at both infraclavicular areas in order to release the air confined in the chest cavity. In this case prompt collar incision and squeezing the air at both infraclavicular areas was done because of the severely extended lesion with the patient’s uncomfortable symptom. While not in severe cases, supplemental oxygen is only provided via masks to combat the shortness of breath as felt by the patient. But, in severe cases which can be massive and severely compromised the airway, negative pressure wound therapy as known as vacuum-assisted closure therapy is effective treatment modality and surgical repair is required for invasive method.2,7,9,14,15)

We would like to present this case of severe subcutaneous emphysema detected by simple X-ray films in the emergency department, because even though it is not typically dangerous in itself, but it shows remarkable simple X-ray film and also accompanied severely extended physical findings for the purpose of instructing students and young doctors.

REFERENCES