Spontaneous Pneumomediastinum and Subcutaneous Emphysema after Jogging: Successful Resolution with Conservative Treatment

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Spontaneous pneumomediastinum (SPM) with subcutaneous emphysema is rare. The diagnosis is made by physical examination and radiography. We present a 22-year-old man who experienced chest tightness and crepitus over his neck and anterior upper chest after jogging for 40 minutes. Pneumomediastinum and subcutaneous emphysema were diagnosed on radiography and computed tomography. He was treated conservatively with intravenous hydration, oxygen, and bronchodilators, and his symptoms/signs improved 3 days after admission. Invasive procedures are usually not necessary in these patients, unless ominous symptoms/signs such as dysphagia, hoarseness and pneumothorax persist. Generally, conservative therapy leads to spontaneous recovery without the need for invasive diagnostic tests or surgical treatment.

Key words: spontaneous pneumomediastinum, subcutaneous emphysema, jogging

Introduction

Pneumomediastinum is defined as the presence of free air in the mediastinum. Cases are categorized into spontaneous pneumomediastinum and secondary pneumomediastinum. Spontaneous pneumomediastinum is diagnosed if patients have nontraumatic mediastinal free air without intrathoracic etiology. A possible mechanism of spontaneous pneumomediastinum after running has been reported⁹. A sudden increase in intrathoracic pressure results in increased intraalveolar pressure, which culminates in alveolar rupture with leakage of air throughout the interstitium and then toward the mediastinum. Secondary pneumomediastinum occurs after thoracic events, such as blunt or penetrating trauma to the chest or intrathoracic disease, and may have a poor prognosis if not diagnosed immediately. Spontaneous pneumomediastinum is usually self-limited with conservative treatment.

Case Report

A 22-year-old man presented to the emergency department with chest tightness and a crinkly sensation over his neck and anterior upper chest after jogging for 40 minutes. On arrival, he was ambulatory and had a temperature of 37.6°C, heart rate of 102 beats/min, respiratory rate of 22 breaths/min, blood pressure of 122/76 mmHg, and an O₂ saturation of 98% on room air. The
electrocardiogram showed sinus tachycardia. The cardiac enzyme values were as follows: creatine kinase 70 μg/L; 1.2 ng/mL; and troponin-I 0.03 ng/mL. Results of a complete blood count were white blood cells 8600/mL, hemoglobin 13.2 g/dL, and platelets 186×10³/mL. He denied trauma or penetrating events. Physical examination of the head, ears, eyes, nose, throat, abdomen, and extremities showed no abnormalities. There were no other predisposing factors except for intense physical activity during jogging. He had no history of smoking, asthma, or illicit drug use. A cardiology evaluation was performed to exclude cardiac events. Examination of the chest illustrated crepitus, which was synchronous with the heart beat. His chest radiograph showed free air in the neck, supraclavicular area and mediastinum (Fig. 1). Computed tomography of the chest and neck showed air around the trachea, esophagus, and ascending aorta, extending into the neck, anterior chest wall, and connective tissue (Fig. 2). The

Fig. 1 Initial chest radiograph showing pneumomediastinum and subcutaneous emphysema

Fig. 2 Chest computed tomography confirms free air in the mediastinum
trachea, esophagus, lungs, and heart were normal with no evidence of pneumothorax. Endoscopic and bronchial examinations were not performed because his clinical condition was stationary. The patient was treated conservatively with intravenous hydration, oxygen, bronchodilators and monitoring of vital signs, and his symptoms/signs improved 3 days post-admission. Follow-up chest radiography showed that the pneumomediastinum and subcutaneous emphysema had nearly completely resolved (Fig. 3). He was discharged after 3 days of conservative treatment without any complications. No recurrence was noted after follow-up for one month.

**Discussion**

The incidence of SPM is relatively rare, with one study reporting only 1 case in 44,511 admissions to the emergency department\(^2\). Another report indicated that the incidence of SPM in children was 1:11,726 at an emergency department in central Taiwan\(^3\). However, the true incidence of SPM is unknown because the clinical and radiological presentation may be subtle.

The common clinical presentation of SPM involves chest pain (89%), dyspnea (67%), dysphagia (18%), and neck pain (11%)\(^4\). Pneumothorax was not observed in our patient. A retrospective review of 62 patients with SPM identified concomitant pneumothorax in 32% of patients. There may have been a high rate of pneumothorax in that study because of the high prevalence of preexisting lung disease and the advanced age of the patients\(^5\).

In this present case, the clinical picture revealed subcutaneous emphysema in the neck and chest wall with crepitus. In one report, the diagnosis of SPM was made by chest radiography alone\(^6\). In another report, 70% of 33 cases of

![Fig. 3 Follow-up chest radiograph illustrating resolution 3 days postadmission](image)
SPM were identified by chest radiography and the remaining 30% were discovered by chest CT scan\(^7\). Computed tomography scan of the chest can help establish the diagnosis when chest radiography is ambiguous for identification of SPM.

In a previous review, one of 18 patients with SPM experienced complications and received pneumomediastinum intervention\(^6\). Jogging-induced pneumomediastinum should be differentiated from other life-threatening conditions such as esophageal rupture or bronchial perforation. It is important to differentiate between SPM and secondary pneumomediastinum, such as Boerhaave syndrome. Secondary pneumomediastinum is associated with traumatic chest injury or intrathoracic disease, and there may be a high incidence of pneumothorax and a poor outcome if not diagnosed immediately.

In our patient, SPM and subcutaneous emphysema were rare sequelae after jogging. The possible pathophysiology in this present case may be the development of increased intrathoracic pressure during jogging\(^1\).

In the initial management of this patient, a decision had to be made between emergency diagnostic tests and conservative therapy. Yellin et al. reported that for a healthy patient with free air in the mediastinum but no pneumothorax, conservative treatment and observation are adequate, and invasive diagnostic tests and surgical intervention are not needed\(^8\). In this present case, conservative treatment was selected. Antibiotics were not necessary as there was no significant infection. Emergency endoscopic procedures and surgical intervention should be considered if there are dynamic changes in a patient’s clinical condition. Fortunately, our patient’s clinical course and radiography resolved 3 days after admission. Recurrence of spontaneous pneumomediastinum has been reported\(^9\), but no recurrence was noted in this patient after follow-up for one month.

In conclusion, this is a case of SPM that developed dramatically after jogging. This case illustrates that SPM is a benign process with successful resolution after conservative treatment without invasive procedures.

References

自發性縱膈腔氣胸與皮下氣腫：
經保守療法成功緩解一個個案報告

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自發性縱隔腔氣胸與皮下氣腫是少見的，診斷上是靠理學檢查及影像學檢查。除非臨床症狀持續惡化例如：吞嚥困難、聲音沙啞、和氣胸才考慮作侵襲性的檢查及治療。一般而言，保守療法即可復原。我們報告一個22歲男性經40分鐘晨跑後導致自發性縱隔腔氣胸與皮下氣腫經由保守療法並避免不需要的侵襲性檢查或手術，而達到成功的復原。

關鍵詞：自發性縱隔腔氣胸，皮下氣腫，晨跑