

## Atypical chest pain caused by spontaneous pneumomediastinum

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**Section:** Chest imaging

**Area of Interest:** Education Cardiac Thorax Oesophagus

**Procedure:** Diagnostic procedure

**Imaging Technique:** Digital radiography

**Imaging Technique:** CT

**Imaging Technique:** Conventional radiography

**Imaging Technique:** Fluoroscopy

**Special Focus:** Acute Case Type: Clinical Cases

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**Patient:** 17 years, male

### Clinical History:

A 17-year-old male patient with no past medical history presented with a 24-hour history chest pain radiating to the anterior aspect of the neck. Physical examination revealed normal vital signs. Swelling and crepitus involving the bilateral anterolateral aspects of the neck and the submandibular fossae were noted.

### Imaging Findings:

A chest X-ray, in addition to pneumomediastinum and pneumopericardium, revealed supraclavicular, para-tracheal and infrahyoid emphysema. A computed tomography of the thorax showed pneumopericardium with air dissecting from the diaphragm crus through the posterior, middle, anterior and superior mediastinum. There was also diffuse bilateral supra-clavicular, pre-tracheal, carotid, posterior cervical, retro-pharyngeal space and bilateral axillary surgical emphysema. No parenchymal lung disease was detected. A water soluble contrast fluoroscopic examination of the oesophagus revealed no evidence of extravasation or leak of contrast.

### Discussion:

#### Background:

Spontaneous pneumomediastinum is the presence of air within mediastinum structures. The condition is considered rare with a reported incidence of 1/42, 000 of admissions [1]. Spontaneous pneumomediastinum has been recognised at least since 1819 but it was Hamman who initially reported a case series in 1937 and revisited the disease in 1939 [1-3]. Physiopathology is related to alveolar rupture and gas dissection through the bronchovascular fascia followed by pulmonary interstitial dissemination to the mediastinum as described by Macklin in 1939 [4].

#### Clinical Perspective:

Chest pain, the predominant presenting feature affecting 55% of patients, is typically retrosternal and may have a pleuritic character. Dyspnoea, cough and neck pain occur in 40%, 32%, and 17% of patients, respectively [5, 6]. Subcutaneous emphysema may complicate 60% of cases [7, 8]. Hamman's sign, a crunching, rasping sound, synchronous with systole may be present in 50% of patients [3, 8]. The disease can be either primary or secondary to trauma. Other triggers include coughing, balloon inflation, aviation, vomiting, and oesophageal rupture [9, 10, 11, 12]. The role of cocaine has also been described [13]. In the paediatric cohort, acute asthma exacerbation [7, 14]

and lower respiratory tract infections are the predominant causes [7, 14-16]. In 21% of cases no cause is found [17].

#### Radiological Perspective:

Radiologically, a number of signs such as the Naclerio's V sign, V sign at confluence of brachiocephalic veins and ring-around-the-artery sign can be observed as lucent streaks of gas outline mediastinal structures [18]. Additional signs include tubular artery, double bronchial wall and haystack signs. Other abnormalities such as pneumothorax, pleural effusion (which may indicate oesophageal rupture), and signs of chronic lung disease may be noted. Computed tomography is usually not indicated unless in patients with underlying lung disease. Contrast oesophagography is helpful if oesophageal rupture is suspected as a cause.

#### Outcome:

The management of uncomplicated spontaneous pneumomediastinum is conservative and includes analgesia, rest, oxygen, and avoidance of manoeuvres that increase pulmonary pressure. Although evidence is limited, air travel is usually permitted two weeks after radiographic resolution. In cases with complications such as pneumothorax, management should target the specific complication. The natural history of the disease is benign. Although approximately 5% of cases may recur, the outcome is favourable [19].

#### Take Home Message:

Spontaneous pneumomediastinum is a rare, generally benign cause of chest pain.

Radiologically, streaks of air are observed outlining mediastinal structures.

In one fifth of cases no trigger is identified.

**Differential Diagnosis List:** Primary spontaneous pneumomediastinum, Medial pneumothorax, Pneumopericardium, Pneumoperitoneum

**Final Diagnosis:** Primary spontaneous pneumomediastinum

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**Figure 1**

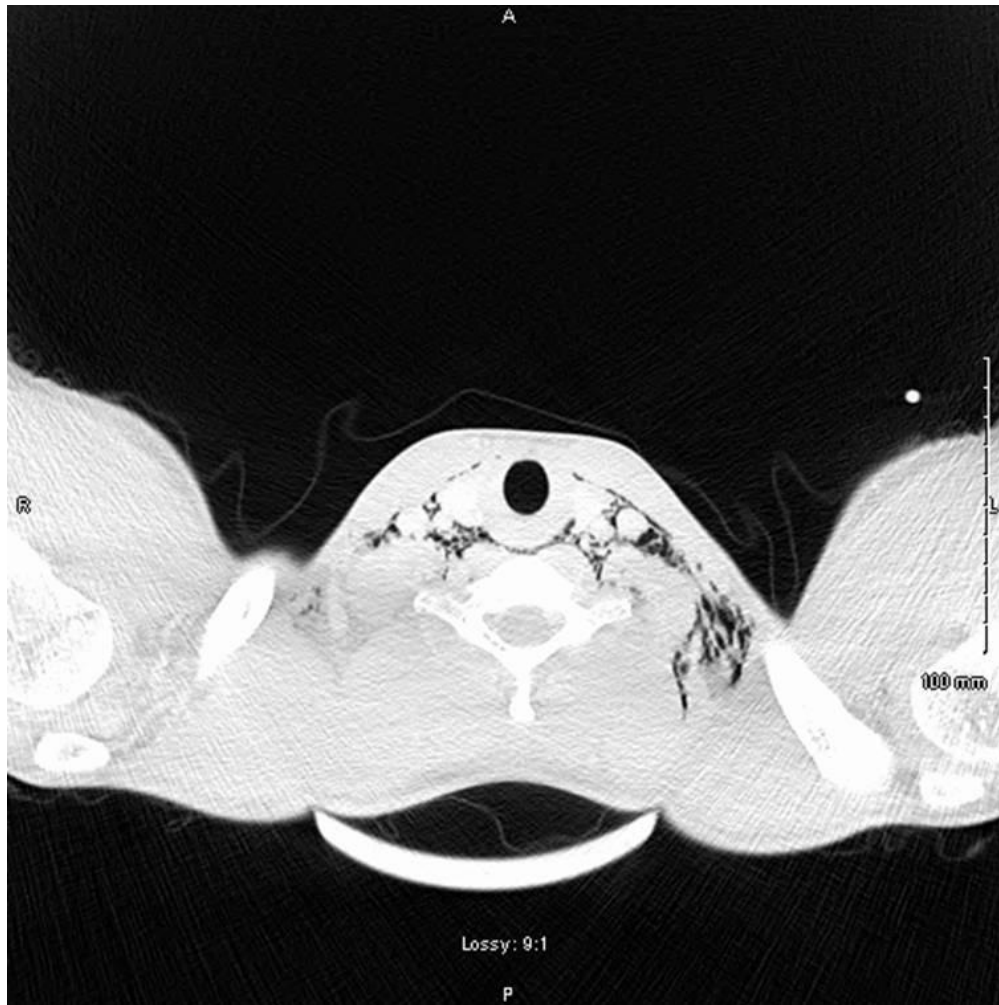
a



**Description:** A plain chest x-ray showing pneumomediastinum, pneumopericardium, supraclavicular, axillary and neck surgical emphysema. **Origin:** University Hospital Limerick, Ireland

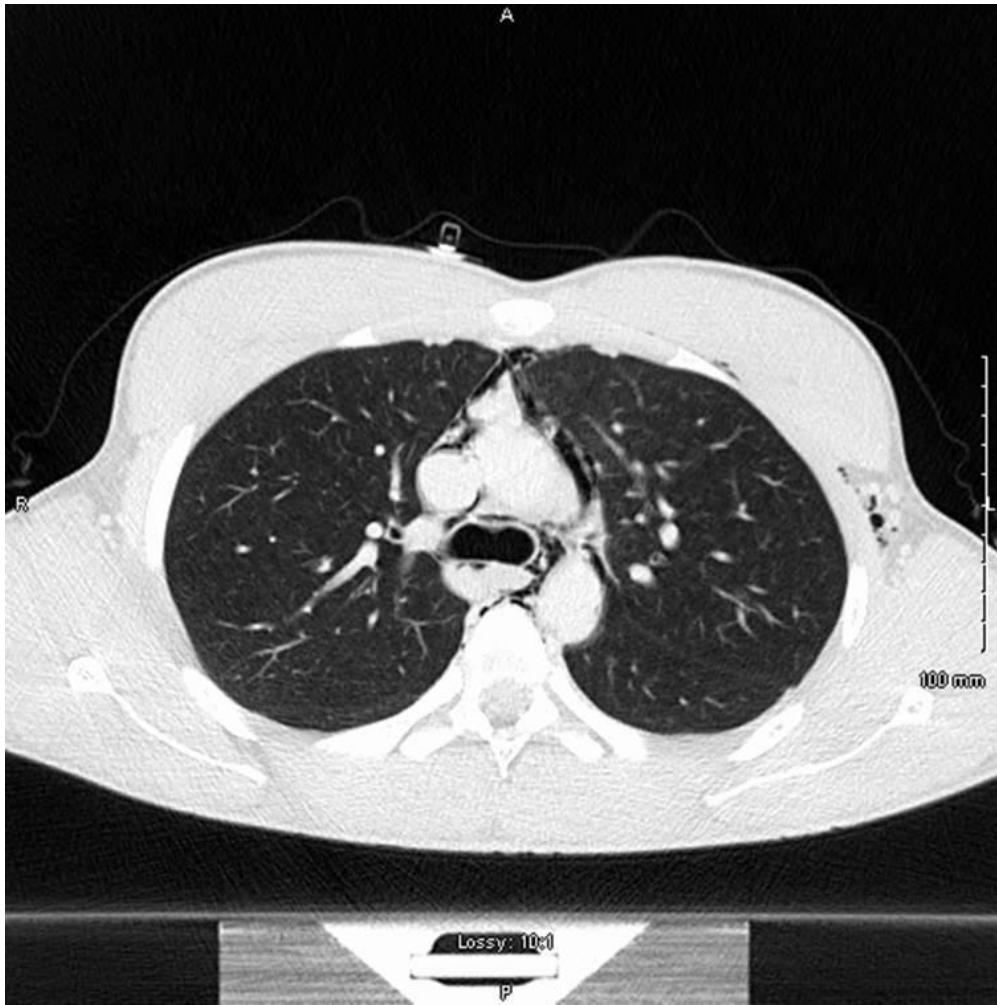
**Figure 2**

a



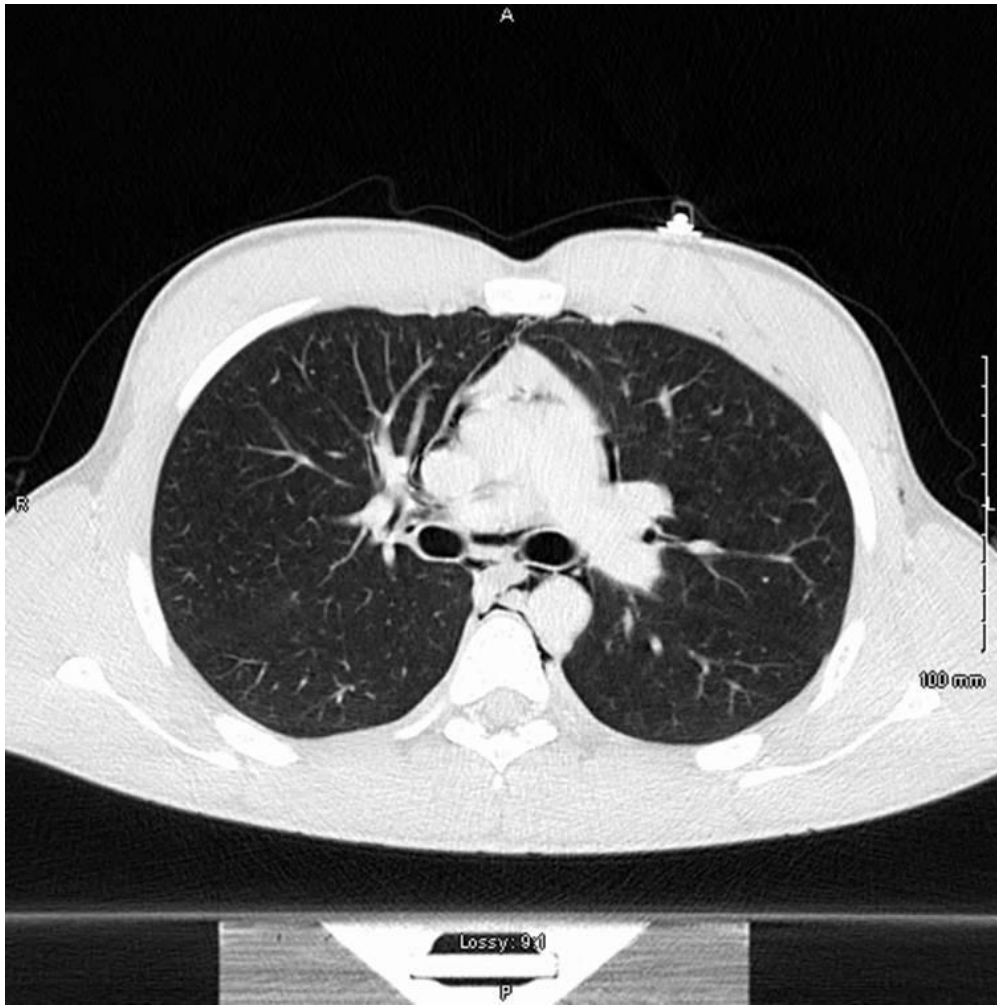
**Description:** Axial computed tomographic image of the neck. There is diffuse supraclavicular, axillary, pre-tracheal and carotid surgical emphysema. **Origin:** University Hospital Limerick, Ireland

**b**



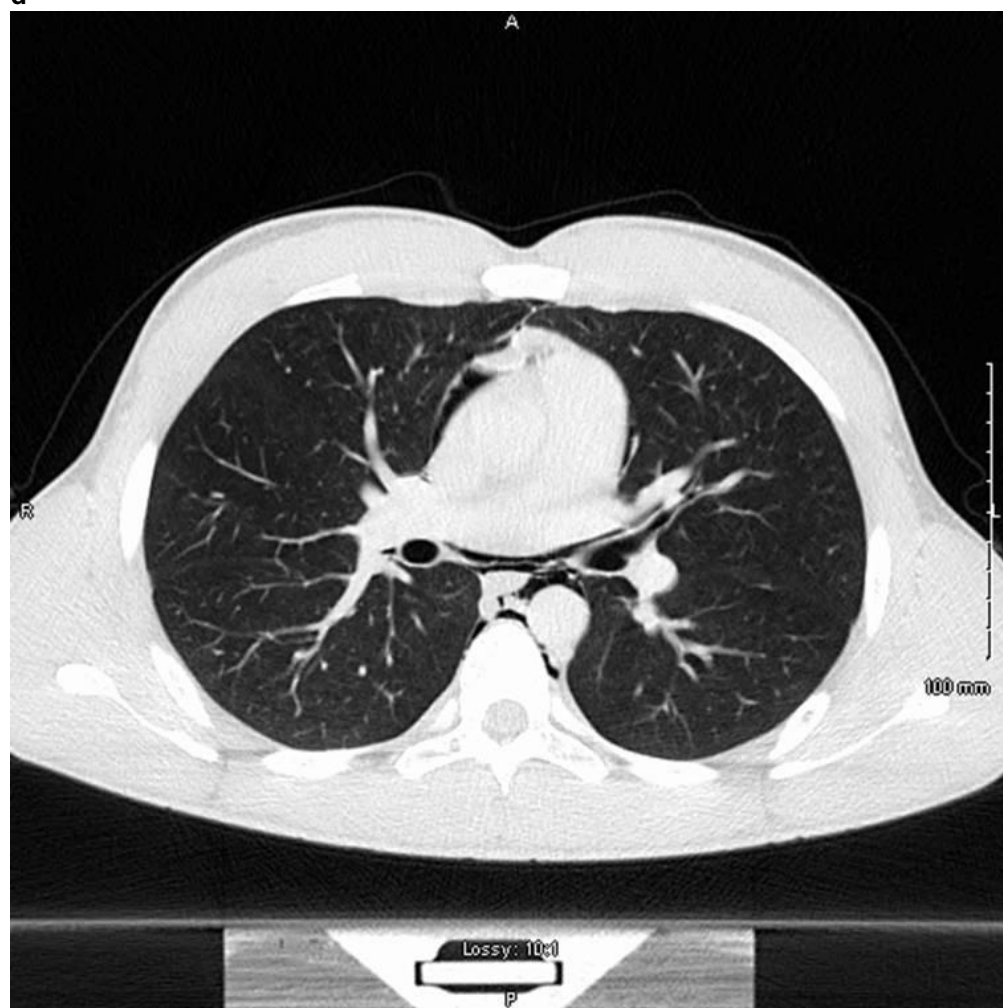
**Description:** Axial computed tomographic image of the thorax showing pneumomediastinum and pneumopericardium with axillary and pretracheal surgical emphysema. **Origin:** University Hospital Limerick, Ireland

C



**Description:** Axial computed tomographic image of the thorax showing pneumomediastinum and pneumopericardium. **Origin:** University Hospital Limerick, Ireland

d



**Description:** Axial computed tomographic image of the thorax showing pneumomediastinum and pneumopericardium. **Origin:** University Hospital Limerick, Ireland



**Figure 3**

a



**Description:** A fluoroscopic water soluble contrast swallow scan showing no evidence of extravasation of contrast indicating no oesophageal tear or rupture. **Origin:** University Hospital Limerick, Ireland

**b**



**Description:** A fluoroscopic water soluble contrast swallow scan showing no evidence of extravasation of contrast indicating no oesophageal tear or rupture. **Origin:** University Hospital Limerick, Ireland

**c**



**Description:** A fluoroscopic water soluble contrast swallow scan showing no evidence of extravasation of contrast indicating no oesophageal tear or rupture. **Origin:** University Hospital Limerick, Ireland

d



**Description:** A fluoroscopic water soluble contrast swallow scan showing no evidence of extravasation of contrast indicating no oesophageal tear or rupture. **Origin:** University Hospital Limerick, Ireland