Respiratory Medicine CME 4 (2011) 181–183

Contents lists available at ScienceDirect

Respiratory Medicine CME

journal homepage: www.elsevier.com/locate/rmedc

Case Report

Spontaneous pneumomediastinum revisited

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ARTICLE INFO

Article history:
Received 5 March 2011
Accepted 24 March 2011

Keywords:
Pneumomediastinum
Subcutaneous emphysema
Mediastinal emphysema
Dyspnea
Chest pain

ABSTRACT

Spontaneous pneumomediastinum is defined as free air within the mediastinum, not associated with trauma. Causes include exercise, drugs, asthma, vomiting, difficult labour and Valsalva maneuvers. It's a rare, usually benign and self-limited condition, more prevalent in young males. The triad of thoracic pain, dyspnoea and subcutaneous emphysema is typical.

We report a case of a 23 year old man presenting to the emergency room complaining of odynophagia, thoracic pain and neck swelling. He had fever and productive purulent cough in the previous week. He had no abnormal findings but subcutaneous emphysema. We found a pneumomediastinum without pneumothorax, treated conservatively with complete resolution.

Although frightening, this condition usually has good prognosis without specific treatment, other than avoidance of the cause.

1. Introduction

Pneumomediastinum, or mediastinal emphysema, was first described by Laennec in 1819 as the presence of air in the mediastinum due to traumatic injury.[1] It can be divided in spontaneous or secondary (to blunt thoracic trauma, endobronchial or esophageal procedures, head and neck surgery, hollow organ perforation). Spontaneous pneumomediastinum is a rare condition, first described by Hamman in 1939.[2] It is more frequent in males on 2nd-4th decades of life, and generally benign in its course. True incidence is not known, since first reports underestimated the number of cases due to overspecific criteria,[3] and to unawareness of the condition[3,4]; the reviewed series report an incidence of 1:7000–1:45000 hospital admissions.[3–9] Also rare is the occurrence in newborns, were it tends to be loculated.[10]

The potential sources of mediastinal air can be intrathoracic (trachea and major bronchi, esophagus, lung, pleural space) or extrathoracic (head, neck, peritoneum).[11]

There is some confusion in literature in distinguishing predisposing and precipitating factors; the first are previous conditions that favor pneumomediastinum (e.g. asthma, interstitial and other lung diseases, tobacco, inhaled drug use, corticosteroids, inhalation of irritants) while the latter are events closely linked to the development of the condition, and are generally due to an increase in intrathoracic pressure (emesis, cough, asthma exacerbation, defecation, physical exercise, labor, upper airway infection, neonate respiratory distress syndrome, inhaled drug use)[5–7,12,13]; inhaled drug use can be considered as both, either due to continuous or occasional abuse.[14] Rare etiologies include spirometry, balloon filling, wind instruments and convulsions.

Pathophysiology is based in the Macklin effect– alveolar rupture due to an increase in intrathoracic pressure, followed by air dissection through the bronchovascular sheath into the mediastinum.[15] Air can also dissect through other serous structures and subcutaneous tissue.

A classical clinical triad has been described and consists of thoracic pain (usually retrosternal and pleuritic in nature), subcutaneous emphysema and dyspnea. Other symptoms include cough, fever, dysphonia, odynophagia and dysphagia. The most common finding is subcutaneous emphysema; the Hamman sign (detected in 10–20% of cases) is pathognomonic and characterized by systolic crackles in the left sternal border, best heard in left lateral decubitus.[1,6] The sound is described as rubbing balloons, and sometimes is detectable by the patient.[13]

The differential diagnosis should be centered in potentially severe conditions associated with precordial pain, such as acute coronary syndrome, pericarditis, pneumothorax, pulmonary embolism, tracheobronchial tree rupture and Boerhaave's syndrome (esophageal rupture).

Chest radiography is the standard diagnostic procedure, showing a double line outlining the mediastinum. Various radiographic signs have been described.[11] When not apparent on radiography, diagnosis can be confirmed by chest CT.[2,7,11] Oral contrast study or bronchoscopy should be performed if esophageal and

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doi:10.1016/j.rmedc.2011.03.005

tracheobronchial tree rupture is suspected. Leukocytosis and/or neutrophilia are common, sometimes associated with low grade fever.[6–9,13]

Once confirmed the diagnosis, patient should be admitted for monitoring and treatment: avoidance of the trigger factor, oxygen and bed rest.[5,15] Some authors advocate antibiotic prophylaxis for mediastinitis.[7,14] A chest tube is recommended in case of pneumothorax and/or hypertensive pneumomediastinum.[7] Recurrence of pneumomediastinum is very rare.[4–9]

Complications are rare unless hypertensive pneumomediastinum develops, where cardiac and large vessel compression decreases the venous blood return leading to hemodynamic and respiratory compromise.[1] Mediastinitis is also a serious complication and morbidity and mortality are related to coexisting illness; e.g. in Boerhaave syndrome mortality can be as high as 50–70%.[1] There are no reports of mortality directly related to spontaneous pneumomediastinum.

2. Case report

A 23 year old Caucasian man presented to the emergency department complaining of fever, cough with purulent sputum production and odynophagia in the previous week; one day before it was associated with dyspnea, thoracic pain and enlargement of the neck with soft consistency on palpation. One month earlier he had been submitted to an appendectomy, with no reported complications. There was no history of trauma, although he reported eating soft chicken bones occasionally.

On admission he was afebrile, had normal hemodynamic parameters and showed no signs of respiratory distress. Cervical inspection revealed enlargement of the anterior region and crepitation was heard on palpation of that region and supraclavicular fossa. Cardiac sounds were normal, and bilateral wheezing was heard on pulmonary auscultation. Laboratory tests (complete blood count, renal function and electrolytes) and arterial blood gases were unremarkable. Chest radiography (Fig. 1) revealed mediastinal enlargement with a transparent outline of the large vessels and left cardiac margin. Chest CT was performed (Fig. 2), which confirmed the existence of pneumomediastinum with further dissection of air into the neck; pneumothorax, parenchymal and/or pleural abnormalities were excluded. Upper digestive contrast study excluded esophageal perforation.

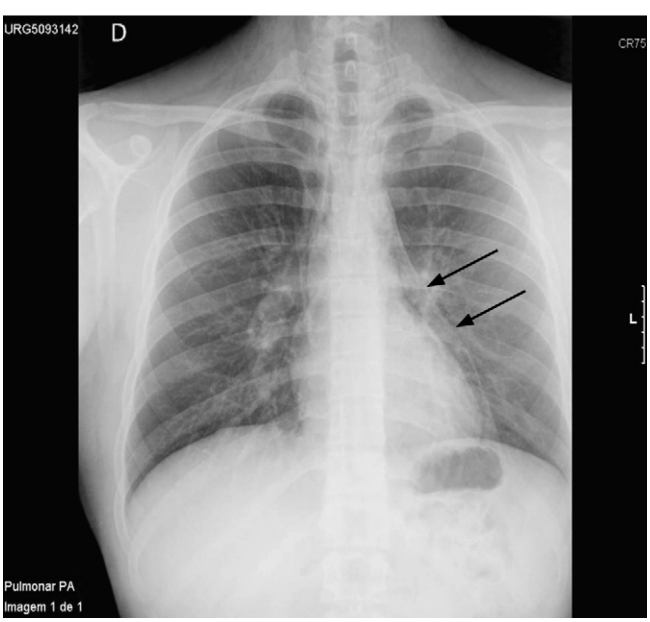

Fig. 1. Chest x-ray showing a double line around the cardiac silhouette (arrows).

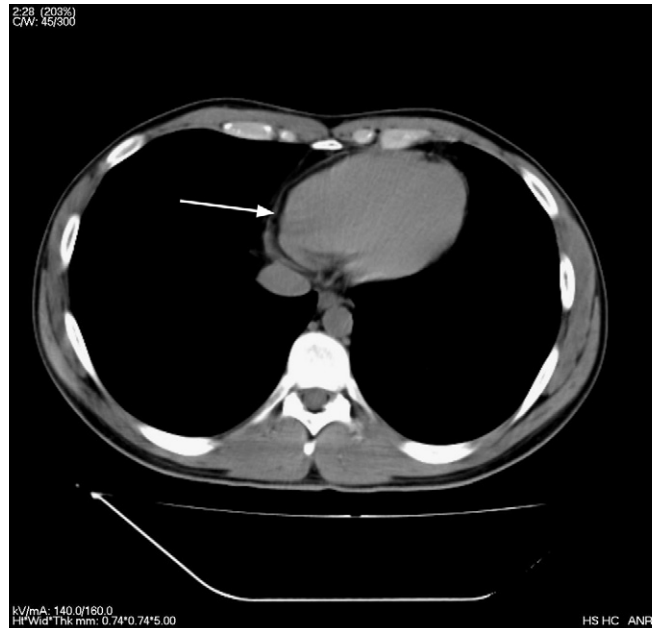

Fig. 2. Chest CT scan revealing air in the mediastinum (arrow).

He was admitted and treated with oxygen, laxatives and cough suppressant. He also received seven days of antibiotic for tracheobronchitis. At 3rd day of hospitalization, chest radiography showed resolution of pneumomediastinum.

Out-patient follow-up did not document recurrence.

3. Discussion

Yellin[4] defined spontaneous pneumomediastinum as a non-traumatic presence of air in the mediastinum in a patient with no known underlying pulmonary disease, but it is generally accepted that it can occur with pulmonary disease, this being a predisposing condition. There's consensus that secondary pneumomediastinum is considered when there is an obvious cause or traumatic injury.

Although pneumomediastinum often presents with frightening symptoms (subcutaneous emphysema, dyspnea and chest pain) it is usually benign, requiring reassurance and simple therapeutic measures as oxygen and analgesics[1,2,5,6,13,16] and has a good outcome. Patients should be monitored for complications, which are rare.

In this case cough was assumed as the precipitating factor. Endotracheal intubation one month earlier might have been implicated, although no complications were reported in the post-op period and no local abnormalities were found. Furthermore, reported cases of pneumomediastinum secondary to intubation emerged in the immediate postoperative period.[13,17–21] There's no consensus on investigation of this entity, and clinical algorithms have been proposed.[1,5,9,22] Some authors point to the chest radiography as being sufficient and chest CT scan is only recommended in doubtful cases,[2] although it is considered gold standard in detecting mediastinal air. On the other hand, CT allows more accurate screening of parenchymal or pleural disease. Yellin et al[4] have suggested routine x-ray in young patients presenting with unexplained chest pain. Digestive tract involvement must be ruled out since it causes most severe complications. Endoscopy in the initial phase is unnecessary and may even worsen the clinical status.[2] In this case chest radiography and CT and gastrografin radiographic study were performed, due to the history of eating chicken bones.

Antibiotics are generally used when there is suspicion of mediastinitis and sometimes to prevent it.[14] In this case it was used as therapy for respiratory infection. Recurrent pneumomediastinum is rare and generally occurs when exposure to the trigger continues (drug abuse) or cannot be avoided (asthma).

4. Conclusions

Pneumomediastinum is a rare and generally benign condition. The chest radiography is usually sufficient to diagnose this condition, especially when associated with a compatible clinical and physical examination. Patients should be monitored to detect any complications, which are rare. Treatment consists of displacing the trigger, rest and administration of oxygen. Fasting, antibiotics or chest tube is reserved for specific etiologies and complications.

Conflict of interest

Authors report no conflicts of interest.

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