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*Case report*

# Vomiting Induced Pneumomediastinum: A Case Report of a Rare Condition

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## ABSTRACT

*Pneumomediastinum is a condition characterized by the presence of free air in the mediastinum and is often a worrisome finding. It can occur spontaneously without any identifiable cause or it can be secondary to a rupture of a hollow organ or due to trauma. Clinical diagnosis is based on symptoms including; chest pain, subcutaneous emphysema, and dyspnea. The diagnosis is confirmed by radiography. On differential diagnosis, esophageal perforation should be considered first, and if suspected, a contrast esophagogram or CT scan should be performed. We present a case of spontaneous pneumomediastinum in a 20-year-old Tunisian male induced by vomiting without esophageal perforation or airway injury.*

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## INTRODUCTION

Pneumomediastinum (PM) is a condition characterized by the presence of free air in the mediastinum and is often a worrisome finding. It can occur spontaneously without any identifiable cause or it can be secondary to a rupture of a hollow organ or due to trauma. The latter, unlike spontaneous PM, is associated with an unfavorable prognosis such as in the case of Boerhaave syndrome. Forceful vomiting and retching causing esophageal rupture is an emergency and needs immediate surgical attention. However, vomiting-induced PM without organ perforation is a benign condition. In both cases, emesis is a common denominator often leading us to consider the worst possible diagnosis. Imaging studies are helpful to make a distinction between spontaneous PM and secondary PM. We present a case of spontaneous PM induced by vomiting without esophageal perforation or airway injury.

### *Case Report*

A 20-year-old male presented to the emergency department with intractable vomiting for 7 days and mild retrosternal pain. He had a background of peptic ulcer disease for 2 years with no other significant personal or family history. He was a non-smoker and did not have any recent thoracic trauma. On initial assessment, he was afebrile and showed signs of dehydration with sunken eyes and decreased skin turgor. He did not have any shortness of breath. He was normotensive with a blood pressure of 97/72 mmHg and a pulse rate of 78 bpm. He had a decreased urine output. Subcutaneous emphysema was noted in the neck and chest. The abdomen was mildly distended with a succussion splash was heard on palpation of the abdomen consistent with gastric outlet obstruction.

Blood tests revealed a normal white blood cell count at 8000/mm3 along with a C-reactive protein within the normal range. Serum creatinine and urea levels were increased at 373 µmol/l and 25 mmol/l respectively. Also, we identified hypokalaemia at 2.3 mmol/l and metabolic alkalosis. The results were explained by the prolonged vomiting. A chest X-ray revealed signs of pneumomediastinum and subcutaneous emphysema extending to the cervical region (Figure 1).

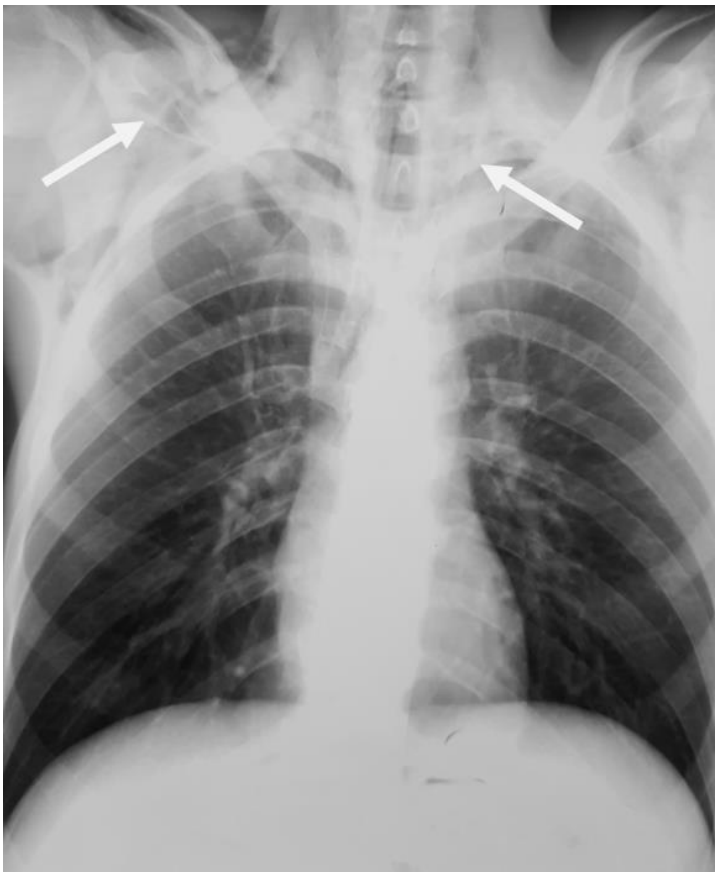

***Figure 1 Plain chest X-ray: arrows showing subcutaneous emphysema***

An enhanced computed tomography (CT) of the cervical, thoracic and abdominal regions with an oral soluble contrast agent showed an extensive PM and subcutaneous emphysema of the neck and thorax (Figure 2). There was no oral contrast extravasation around the esophagus and pleural effusion and pulmonary parenchymal lesion were absent.

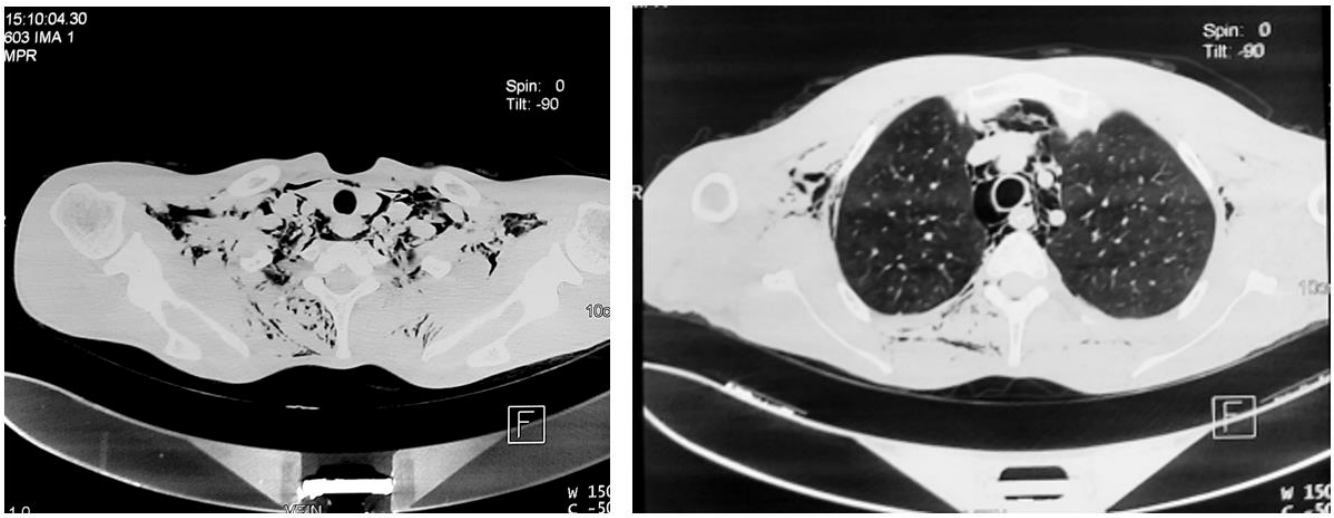


***Figure 1 CT scan images showing pneumomediastinum and subcutaneous emphysema***

After admission, intravenous fluids were started and the patient was kept nil by mouth. Proton pump inhibitors and anti-emetics were administered. Careful monitoring of the patient was undertaken and signs of mediastinitis were looked for. The patient remained apyretic during his stay with abatement of the vomiting. His renal function and electrolyte imbalances were corrected after appropriate rehydration. Liquid food was allowed on day 3 and the patient was discharged on day 7. An upper GI endoscopy was performed showing a stenosis of the pylorus with a distended stomach and balloon dilatation was indicated.

## DISCUSSION

Free air in the mediastinum is often a threatening sign especially if it is of secondary origin such as in trauma, infection, and injuries to the respiratory and digestive tract. Spontaneous PM was first described by Hammam in 1939 and is a rare entity with an incidence of up to 0.0095% [1]. The main symptom of spontaneous PM includes thoracic pain as described in our case(2). Other symptoms are dyspnea and coughing. Subcutaneous emphysema due to the spread of gas along fascial planes of the neck and thorax is often associated with PM.

Spontaneous PM often occurs after a trigger event reported to be around 30% - 60% in different studies [2,3]. These trigger events happen generally as a result of increasing intrathoracic pressure against a closed glottis such as in the Valsalva maneuver. Examples of these described in the literature are emesis, intense physical activity, intense coughing, labour, panic attacks, and playing wind instruments. The mechanism of spontaneous PM is not well understood. Authors have hypothesized that it occurs as a result of alveolar rupture consequential to high intra-alveolar pressure. The leaked air will travel along with the pulmonary interstitial space towards the mediastinum and subcutaneous spaces of the thorax and the neck [4]. Other authors have argued that vomiting-induced pneumomediastinum is a result of microscopic esophageal perforation allowed extravasation of air over a period of time, exacerbated by each episode of vomiting. Microscopic perforation would explain why contrast leak was not identified on imaging [5].

Diagnosis is often suspected on clinical examination with palpation of subcutaneous crepitus of the neck and thorax. Chest X-ray is a key investigation that confirms the presence of aberrant air in the mediastinum and in subcutaneous spaces as depicted in our case. The clinical presentation of spontaneous PM and Boerhaave syndrome shares some similarities and often poses a diagnostic dilemma in the few hours following admission. The clinical course of evolution of esophageal perforation is usually rapidly unfavorable unlike patients presenting PM due to vomiting. To rule out a secondary PM due to esophageal rupture, a CT contrast esophagogram are diagnostic tools of choice. As in our case, the absence of contrast medium extravasation in the CT has high sensitivity and negative predicting value for diagnosing esophageal perforations [6].

Other diagnostic procedures such as endoscopy have a low yield to detect esophageal or tracheobronchial rupture in spontaneous PM [7]. Nevertheless, in cases of emesis, it may help to find the underlying cause.

Treatment is usually conservative. It consists of bed rest and oxygen therapy. The use of antibiotics is controversial [2]. However, in cases where the diagnosis of spontaneous SP is not confident, esophageal perforation is suspected and the use of antibiotics seems appropriate [7]. Any maneuvers that increase the intrathoracic pressure should be avoided and in our case was dealt with anti-emetics. The underlying disease should be treated to prevent a recurrence. No cases of mediastinitis secondary to spontaneous PM have been reported [2].

## CONCLUSION

Spontaneous PM is uncommon and a benign condition. The lack of awareness of this condition and misleading clinical presentation, especially when provoked by emesis often misleads the diagnosis. Consequently, an enhanced CT scan with an oral contrast agent is the key exam to exclude esophageal rupture. Spontaneous PM has a good clinical outcome and most patients diagnosed with uncomplicated spontaneous PM can be managed conservatively. The underlying cause of vomiting must be addressed to reduce complications.

### *Disclaimer*

The article has not been previously presented or published and is not part of a thesis project.

### *Disclosure statement*

None to declare

***Competing interest***
There are no financial, personal, or professional conflicts of interest to declare.

***Ethics approval and consent for publication***
Personal data have been respected. The patients consented to the use of their personal data for the purpose of this case report.

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