

Images of Interest / Imagens de Interesse

## Spontaneous Pneumomediastinum

### *Pneumomediastino Espontâneo*

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#### Abstract

Spontaneous pneumomediastinum is a rare and usually self-limited condition characterized by the presence of free air in the mediastinum without any apparent cause. We present a case of spontaneous pneumomediastinum in a 17-year-old patient who presented in the emergency department with chest and neck pain, dysphagia, and dyspnea. Characteristic imaging findings of pneumomediastinum were documented on chest and neck radiographs and computed tomography. Radiologists must be acquainted with this usually benign entity of pneumomediastinum and should be familiarized with its imaging aspects.

#### Keywords

Spontaneous pneumomediastinum;  
Radiograph; Computed tomography.

#### Resumo

O pneumomediastino espontâneo é uma entidade rara e habitualmente auto-limitada, caracterizada pela presença de ar livre no mediastino sem causa evidente. Apresentamos um caso de pneumomediastino espontâneo num doente de 17 anos, que se apresentou no serviço de urgência com um quadro clínico de toracalgia, cervicalgia, disfagia e dispneia. Achados imagiológicos característicos de pneumomediastino foram documentados nas radiografias e tomografia computadorizada de tórax e pescoço. É fundamental que os radiologistas conheçam esta entidade habitualmente benigna de pneumomediastino e que estejam familiarizados com os principais sinais radiológicos.

#### Palavras-chave

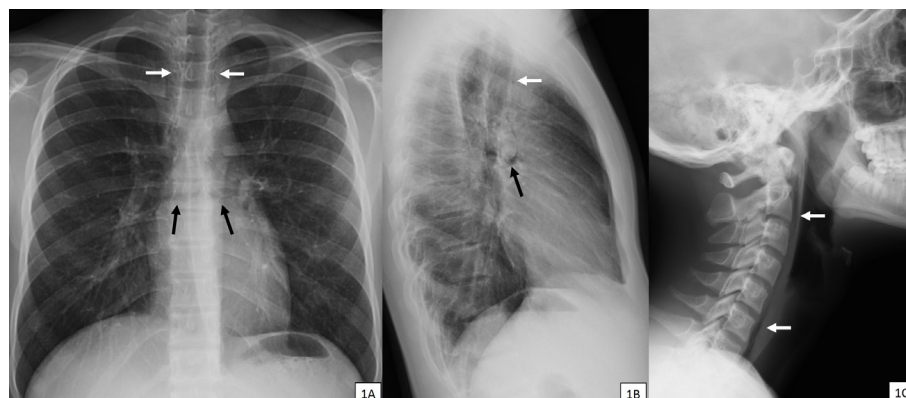
Pneumomediastino espontâneo; Radiografia;  
Tomografia computadorizada.

A 17-year-old male patient presented to the emergency department with a one-day history of chest and neck pain, dysphagia, and dyspnea. He was a tobacco and cannabis smoker. The patient was afebrile, eupneic and hemodynamically stable. Laboratory tests revealed C-reactive protein elevation (1.06 mg/dL; reference value < 0.5 mg/dL). Chest radiographs showed findings in keeping with pneumomediastinum and lateral neck radiograph revealed prevertebral emphysema (figure 1). Neck and chest computed tomography (CT) scan confirmed the pneumomediastinum (figures 2 and 3) and revealed soft tissue emphysema in the neck (figure 2). The diagnosis of spontaneous pneumomediastinum (SPM) was made.

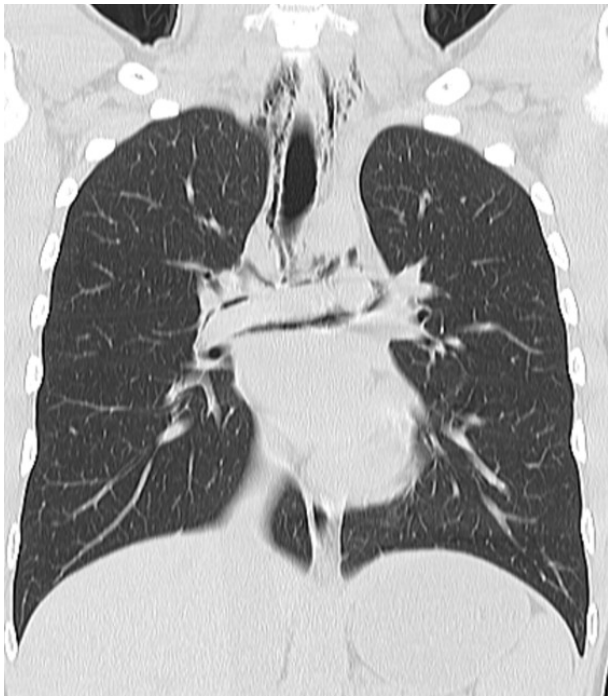
The patient was hospitalized and managed with bed rest, analgesics, and high-flow oxygen therapy. He clinically improved in the following days and was discharged from the hospital. Follow-up radiographs showed resolution of the pneumomediastinum.

Pneumomediastinum is defined by the presence of free air in the mediastinum. It can be spontaneous/SPM, if a cause cannot be determined, or secondary, if a cause is identified (e.g. trauma, esophageal perforation).

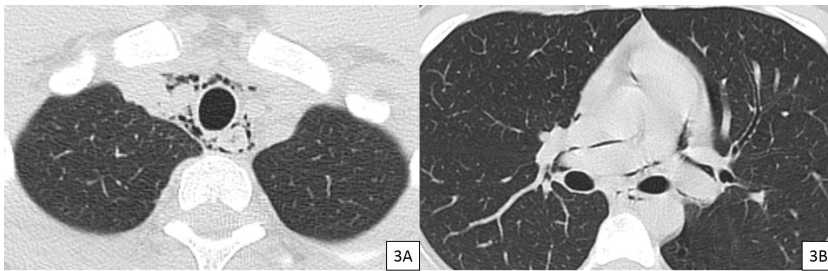
SPM is a rare, usually benign and self-limited condition which primarily affects young adults, with a male predilection.<sup>1</sup> Several precipitating or predisposing risk factors, including athletic activity, drug use, violent coughing, vomiting, and labor, have been associated with SPM.<sup>1-4</sup>



**Figure 1** – Posteroanterior (1A) and lateral (1B) chest radiographs reveal gas bubbles surrounding the trachea (white arrows) and lucent streaks outlining the pulmonary arteries (black arrows). Lateral neck radiograph (1C) shows prevertebral emphysema (white arrows).



**Figure 2** – Coronal chest CT scan image reveals soft tissue emphysema in the neck and free gas in the mediastinum surrounding the trachea and the main pulmonary arteries.



**Figure 3** – Axial chest CT scan images reveal free gas in the mediastinum surrounding the trachea, supra-aortic vessels, esophagus (3A) and pulmonary arteries (3B).

interstitial spaces, which can result in alveolar rupture with air leakage into the interstitium, gas dissection through the bronchovascular fascia and dissemination into the lower pressure mediastinum (Macklin effect).<sup>5</sup> Once in the mediastinum, the air decompresses into the neck, subcutaneous tissues, and potentially the retroperitoneum. If the mediastinal pressure rises abruptly, pneumothorax may occur.

A high level of clinical suspicion is required. Imaging diagnostic workup usually includes chest radiograph, often followed by chest CT, while excluding serious causes of pneumomediastinum, based on the presentation; contrast esophagography may be performed, if esophageal perforation is suspected.

Posteroanterior chest radiograph findings include: radiolucent lines or gas bubbles surrounding mediastinal structures such as the aorta, trachea (figure 1) or thymus; classic radiologic signs such as “continuous diaphragm sign”, “ring-around-the-artery sign” and “Naclerios V sign”.<sup>6</sup> Lateral chest radiographs are more sensitive for detecting pneumomediastinum, through the identification of pneumopericardium or lucent streaks outlining mediastinal structures like the aorta, pulmonary arteries (figure 1), trachea and proximal bronchi.<sup>6</sup> However, CT is more sensitive for detecting free air in the mediastinum and soft tissues than chest radiographs (figures 2 and 3).

We believe that the risk factor of our patient was smoking cannabis. The occurrence of SPM associated with inhalation of psychoactive substances such as cocaine and marijuana has been described; pulmonary barotrauma can be induced by deep inhalation of the psychoactive drug followed by the Valsalva maneuver.<sup>3</sup>

Signs and symptoms of SPM include chest pain, dyspnea, subcutaneous emphysema, persistent cough, cervical pain, dysphagia, Hamman’s sign, among others.<sup>1</sup> Leukocytosis and C-reactive protein elevation may occur.

SPM is proposed to occur due to the production of a pressure gradient between the intra-alveolar and lung

SPM can frequently be managed conservatively with bed rest, analgesics, and oxygen therapy. Patients should be hospitalized for clinical monitoring. Follow-up chest radiograph should be performed within 12 to 24 hours to detect any progression of the pneumomediastinum or complications such as tension pneumothorax. Chest radiograph usually returns to normal within a week. Although the outcome is usually favorable, SPM may recur in approximately 5% of cases.<sup>2</sup>

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#### **Ethical disclosures / Divulgações Éticas**

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Confidentiality of data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

Confidencialidade dos dados: Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação dos dados de doentes.

Protection of human and animal subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Proteção de pessoas e animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial.

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