Sonographic Detection of Spontaneous Pneumomediastinum

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Spontaneous pneumomediastinum is an uncommon benign disease that mainly affects young, tall, and thin male patients without evidence of trauma or other underlying pulmonary disease. It is a condition caused by an increase in intrathoracic pressure and air leaking from the trachea, bronchi, alveoli, or esophagus into the mediastinum. Although it is often a self-limiting disease, it requires admission to a hospital to exclude potentially severe underlying diseases.1 In healthy individuals, it has been related to vomiting, pregnancy, singing, physical efforts, cocaine or ecstasy (3,4-methylenedioxy-N-methylamphetamine) use, and scuba diving. Diagnosis of pneumomediastinum is generally performed by means of chest radiography, but in up to 30% of cases that may be not diagnostic, particularly in emergency settings,2,3 and computed tomography (CT) may be needed to confirm the diagnosis. We report a case of self-resolving spontaneous pneumomediastinum that was missed by chest radiography in which the diagnosis was suggested by neck sonography.

Case Report

A 17-year-old male patient came to the emergency department (ED) of Agostino Gemelli Hospital in the evening for acute onset of neck and throat pain after routine mild yoga exercises in the morning. The pain was mild but continuous and increased in intensity during head flexion and after swallowing. The patient denied recent accidental trauma or surgical procedures and did not have abdominal, thoracic, or dermatologic diseases. Moreover, he was not affected by asthma or vomiting and denied use of legal or illicit drugs. Physical examination of the abdomen, chest, and neck was unremarkable; in particular, he did not have a crunching sound in the upper chest wall or neck. Electrocardiography and specific serum marker screening did not show myocardial damage. Chest radiography was performed, which yielded normal results.
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For the persistence of pain after nonsteroidal anti-inflammatory drug treatment, a cervical sonographic examination was performed with a commercial ultrasound scanner (H21; Hitachi Medical Corporation, Tokyo, Japan) equipped with a 6- to 13-MHz linear probe. Sonography showed the unusual presence of vertical air or gas artifacts (comet tails) in the anterolateral cervical region arising before the carotid artery and constituting a partial acoustic barrier to visualization of deeper layers; no subcutaneous emphysema was detected (Figure 1). A diagnosis of pneumomediastinum was made and then confirmed in the ED by extended cervical region radiography and definitively documented by thoracic CT, which revealed only a little mediastinal involvement, excluding the presence of air in the pericardium and pleural and subcutaneous tissue (Figures 2 and 3). A gastroesophageal endoscopic study did not show parietal lesions. Spontaneous pneumomediastinum was diagnosed, and the patient was treated conservatively without pharmacologic therapy. He had complete resolution and was discharged after 4 days; no recurrences occurred after a follow-up of 1 year.

Discussion

Pneumomediastinum is a condition characterized by the presence of free air or gas in the mediastinum due to spontaneous, traumatic, or iatrogenic rupture of the airway or esophagus. It is an uncommon but insidious entity in the ED, typically occurring in healthy young male patients who often have a history of smoking or ecstasy or cocaine use; on the other hand, it may be occasionally caused by coughing, isometric exertion, pressurization, singing, scuba diving, and asthma. In young female patients, it may be also associated with delivery or alimentary disorders (bulimia and anorexia nervosa). Its presentation includes acute nonspecific epigastic or thoracic pain with or without dyspnea.

Figure 1. Transverse sonogram of the right cervical region showing typical vertical air comet tail artifacts obscuring the right common carotid artery between the internal jugular vein (IJV) laterally and the right thyroid lobe medially.

Figure 2. High-resolution CT of the lung performed without administration of a contrast medium: scout view. The presence of air along the soft tissues of the neck is clearly evident (arrows).

Figure 3. High-resolution CT of the lung (lung windows) clearly showing the presence of air between the anatomic structures of the mediastinum and the neck (arrows), consistent with the diagnosis of pneumomediastinum. Computed tomography also excluded the presence of pneumothorax.
The clinical course is generally benign, but potentially life-threatening complications, such as esophageal perforation, need to be excluded.2 For this reason, an accurate diagnosis is recommended for correct treatment and to avoid unnecessary investigations and interventions.1 Traditional radiologic imaging (chest radiography and CT) often provides satisfying evidence for the diagnosis,3 as recently documented by Chiang and Chou10 in an analogous case of spontaneous pneumomediastinum in a young male patient with a benign clinical course.

The role of sonography in primary assessment of patients in the ED is well established.11 Detection of pneumomediastinum and pneumopericardium by means of echocardiography has been described previously, with recognition of the “air gap sign” due to cyclic interference of air with the ultrasound beam.12 Moreover, Van Gelderen13 described the sonographic diagnosis of atypical pneumomediastinum in a neonate, noting the echogenic rim of air around the heart. In our case, we performed neck sonography, and the presence of sonographic artifacts was not affected by breathing or the heart cycle, as in the air gap sign. Moreover, our patient was not affected by pneumopericardium, and we did not perform echocardiography. To our knowledge, no case of pneumomediastinum identified by sonographic detection of deep cervical emphysema has been reported in the literature previously. Here we describe the echo pattern of pneumomediastinum and show the possibility of its early detection by bedside sonography even in mild cases missed by chest radiography. The great usefulness of a simple, noninvasive, and reliable symptom-directed diagnostic procedure such as bedside sonography in the ED is emphasized.

References