

Spontaneous Pneumomediastinum: Evaluation and Treatment

Keith D. Holmes, MD, and W. Frederick McGuirt, MD
Winston-Salem, North Carolina

Spontaneous pneumomediastinum may be defined as the presence of free air in the mediastinal structures without an apparent precipitating cause. Its occurrence approximates one case per 10,000 hospital admissions,¹ and thus it may not be familiar to many physicians. It most frequently occurs in young, healthy patients without serious underlying pulmonary disease. Although severe complications develop in some patients, the course of spontaneous pneumomediastinum is typically benign and self-limited.

Pneumomediastinum was first reported by Laennec² in 1819, when he described an entity termed *interlobular emphysema*, which consisted of free air in the tissues of the body. In 1927, Gordon³ described 127 cases of subcutaneous emphysema and dyspnea in women following childbirth. Spontaneous pneumomediastinum remained a poorly recognized problem, however, until 1939, when Hamman⁴ described a precordial crunching noise synchronous with the heart beat—Hamman's sign—in seven patients, and recognized that it was related to free air within the mediastinal compartment. Hamman's sign, or mediastinal crepitation, is accentuated during expiration, especially with the patient in the left lateral decubitus position. For a time Hamman's sign was believed to be pathognomonic for spontaneous pneumomediastinum; today, it is recognized as being more variable in occurrence.^{1,5} Classically, the signs of pneumomediastinum include Hamman's sign, subcutaneous emphysema, and pneumothorax, the most consistent of which is the subcutaneous emphysema.

The purpose of this paper is to review a clinical experience with spontaneous pneumomediastinum and to detail a reasonable course of evaluation and treatment.

Submitted, revised, July 3, 1990.

From the Department of Otolaryngology, The Bowman Gray School of Medicine of Wake Forest University, Winston-Salem, North Carolina. Requests for reprints should be addressed to Keith Holmes, MD, Department of Otolaryngology, Bowman Gray School of Medicine, 800 First St, Macon, GA 31201.

CLINICAL FINDINGS

Between 1984 and 1989, six documented cases of spontaneous pneumomediastinum were diagnosed and treated at the North Carolina Baptist Hospital. The ages of the four male and two female patients ranged from 11 months to 23 years, with a mean of 12.5 years (Table 1).

Four of the six patients (67%) had sharp substernal chest pain, which radiated into the neck. One patient complained of odynophagia in addition to her chest pain. Dyspnea and tachypnea were present in four patients, but none had cyanosis or significant respiratory compromise, and it is probable that anxiety and painful respiration significantly enhanced these complaints. None of the patients had pneumothorax, and only one had a positive Hamman's sign. Five of the six patients (83%) presented with prominent subcutaneous emphysema (Table 2).

Plain x-ray films showed mediastinal emphysema in all six patients (Figures 1 and 2). The one patient without subcutaneous emphysema had severe odynophagia. Meglumine (Gastrografin)-barium swallow studies performed in this patient yielded normal findings, but a soft tissue lateral neck film revealed prominent retropharyngeal air (Figure 3).

None of the patients had fever. One patient with a severe upper respiratory tract infection had a transient elevation in his white cell count, but the count returned to normal in 24 hours without antibiotic therapy. All six patients were admitted to the hospital for conservative

TABLE 1. PRECIPITATING EVENTS OF SPONTANEOUS PNEUMOMEDIASTINUM IN THIS SERIES OF SIX PATIENTS

Precipitating Event	Age (y)	Sex
Swimming	14	M
None identified	18	F
Asthma	3	M
Asthma	11 mo	F
None identified	16	M
Cough and upper respiratory tract infection	23	M

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Signs and Symptoms	Number
Subcutaneous emphysema	5
Chest pain	4
Dyspnea	4
Tachypnea	4
Hoarseness	1
Odynophagia	1
Hamman's sign	1

treatment and observation for 24 hours. No complications or progression of the disorder occurred.

DISCUSSION

Pneumomediastinum must be differentiated from other causes of chest pain. A careful history and thorough physical examination should be done to rule out the possibility of cardiac, pulmonary, musculoskeletal, or esoph-

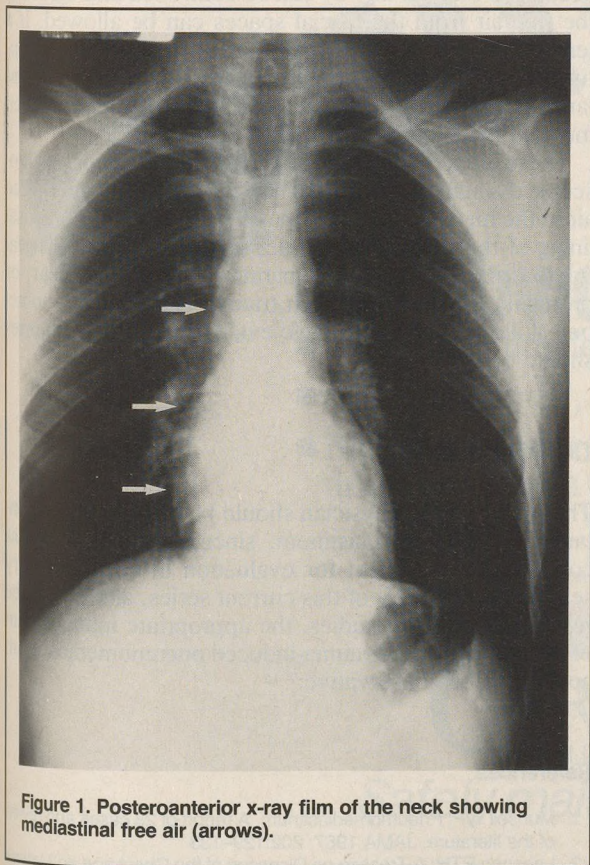


Figure 1. Posteroanterior x-ray film of the neck showing mediastinal free air (arrows).

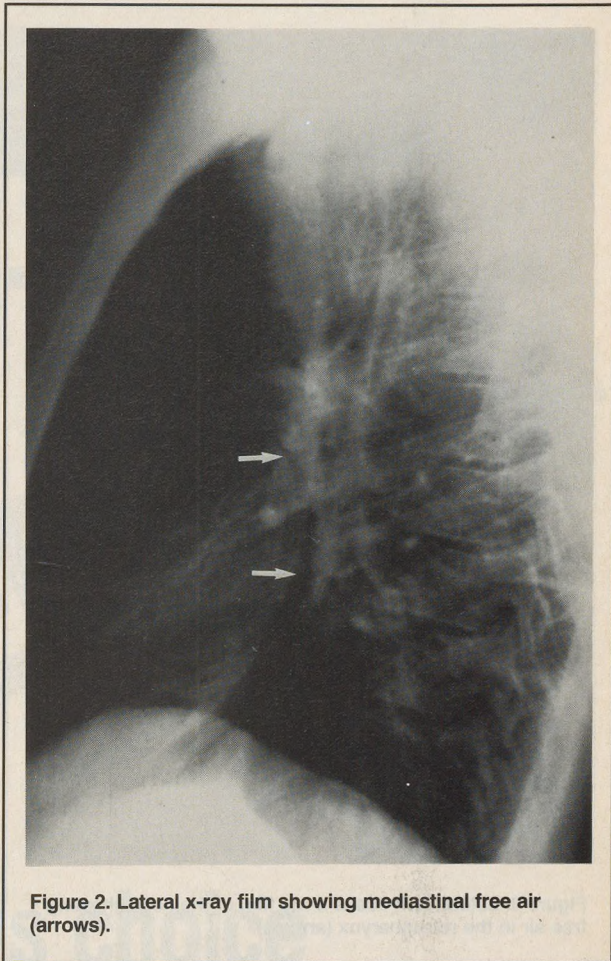


Figure 2. Lateral x-ray film showing mediastinal free air (arrows).

ageal disease that might be responsible for the clinical findings (Table 3). Any history of trauma should be elicited. Spontaneous pneumomediastinum has been associated with asthma, smoking of marijuana or cocaine, athletic competition, respiratory tract infection, parturition, emesis, and severe cough.^{1,5-15}

Typically, the most common symptom of pneumomediastinum is substernal chest pain, usually radiating to the neck, back, or shoulders. The pain is exacerbated by deep inspiration, coughing, or the supine position.

When the history and physical examination suggest spontaneous pneumomediastinum, confirmation of the diagnosis may be established by radiological evidence of mediastinal emphysema on plain chest films. Free air in the mediastinum appears as a thin line of radiolucency outlining the cardiac silhouette on the posteroanterior projection. The aorta and other posterior mediastinal structures are highlighted, and a well-defined lucency

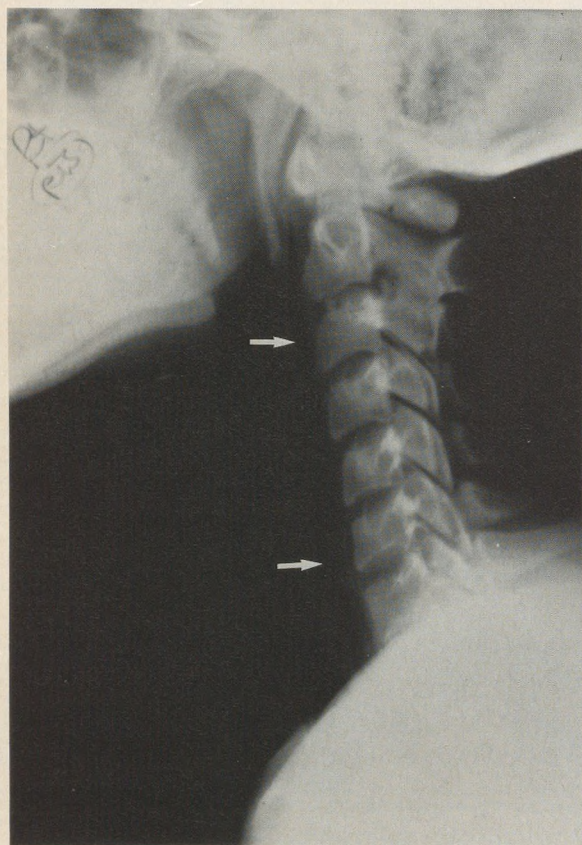


Figure 3. Lateral soft-tissue x-ray film of the neck showing free air in the retropharynx (arrows).

around the right pulmonary artery is seen, the "ring around the artery" sign. A meglumine-barium swallow study also should be performed to evaluate for possible esophageal tear if emesis or retching was the precipitating event. Otherwise, no additional diagnostic testing is required.

All patients with pneumomediastinum should be admitted to the hospital and observed for signs of serious complications such as tension pneumopericardium, pneumothorax, and mediastinitis. Supplemental oxygen may be given to enhance resorption of interstitial free air.⁶ Additional supportive care with analgesics and cough suppressants may reduce some of the discomfort and risk for worsening of the free mediastinal air. Follow-up chest x-ray examination within 12 to 24 hours is necessary to detect any progression or complications such as pneumothorax. If there has been no progression of the spon-

TABLE 3. DIFFERENTIAL DIAGNOSIS OF SPONTANEOUS PNEUMOMEDIASTINUM

Cardiac	Ischemic heart disease Pericarditis Congestive heart failure
Pulmonary	Pulmonary embolus Pneumothorax Pneumonia
Musculoskeletal	Costochondritis Degenerative joint disease
Esophageal	Spasm Reflux esophagitis Mallory-Weiss rupture

taneous pneumomediastinum by 24 hours and no evidence of mediastinitis has appeared, the patient may be discharged. If progression occurs, however, the patient may require chest tube placement if pneumothorax occurs, or tracheotomy if airway obstruction or compromise occurs, so that the airway can be controlled and egress of the free air from the fascial spaces can be allowed. If a temporally related history of trauma or esophageal rupture is present, however, the diagnosis is not truly spontaneous pneumomediastinum, and the treatment regimen must be modified accordingly.

These concomitant factors mandate thorough endoscopic evaluation of the patient's aerodigestive tract. Free air in the mediastinum may manifest a tear in the mucosal lining of the aerodigestive tract secondary to a laryngeal fracture, laryngotracheal separation, esophageal tear, or bronchial injury. When such trauma is suspected, someone skilled in the endoscopic evaluation of these injuries should be consulted.

CONCLUSIONS

The primary care physician should be familiar with spontaneous pneumomediastinum, since a patient with this condition may present for evaluation in an ambulatory setting. On the basis of this current series, along with the results of previous studies, the appropriate management of spontaneous non-trauma-induced pneumomediastinum appears to be conservative.⁷⁻¹⁵

References

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