Case 9783

Idiopathic spontaneous pneumomediastinum
Published on 18.03.2012

DOI: 10.1594/EURORAD/CASE.9783
ISSN: 1563-4086
Section: Chest imaging
Area of Interest: Anatomy Bones Education
Procedure: Complications
Procedure: Diagnostic procedure
Procedure: Imaging sequences
Procedure: Biopsy
Imaging Technique: CT
Imaging Technique: Conventional radiography
Special Focus: Acute Blood Dissection Case Type:
Clinical Cases
Authors: Capozzi Rodolfo G, Lucas Antonio I, Gilligan N
Patient: 9 years, female

Clinical History:
A 9 year-old previously healthy female patient presented with right ear pain and odynophagia, ipsilateral parotid swelling of sudden onset with no history of trauma, coughing or straining.

On clinical examination subcutaneous emphysema was confirmed in right temporoparietal region, neck and upper chest with good air entry in both lungs.

Imaging Findings:
Air in the retropharyngeal soft tissue and perilaryngeal and subcutaneous tissue was noted in the thoracic outlet. Submandibular soft tissue was enlarged. The body of the hyoid was moved forward (Fig. 1).
The chest radiograph showed interstitial air juxta hilar between the left main pulmonary artery and the mediastinal pleura and subcutaneous emphysema in the soft tissues of the neck (Fig. 2, 3).
Neck CT showed dissection of the different compartments due to the presence of interstitial air, with no evidence of rupture of organs (Fig. 4 - 7).
Chest CT revealed air dissecting supraaortic and subaortic mediastinal structures. Subcutaneous emphysema was noted in the presternal region without concomittant pneumothorax (Fig. 8, to 13).
Skull CT was normal except for presence of gas in subcutaneous tissue of the right frontotemporoparietal area without associated bone lesions (Fig. 14).

Discussion:
Spontaneous pneumomediastinum is characterized by the presence of air in the mediastinum in a patient without known underlying cause and is benign and self-limited. The first report was made by Hamman in 1939 [4, 6]. The incidence is unknown.
The mediastinum is connected to the submandibular space, retropharyngeal space, neck vessels, gastrointestinal tract, retroperitoneum (through periesophageal and periaortic fascial) and pelvis through the flank [5, 6]. The retropharyngeal space and prevertebral space communicate with the mediastinum neck. The prevertebral space continues down to the coccyx [7].
The pathophysiology of the mechanism consists of 3 steps: the terminal alveoli rupture, the air dissection along the
peribronchovascular sheaths and the extent of interstitial emphysema in the mediastinum (Macklin effect) [6]. The alveolar rupture is a sudden increase in intraalveolar pressure, associated with cough or valsala, exceeding the pressure in the pulmonary vasculature, releasing the air produced by interstitial emphysema, peribronchovascular sheaths dissected and interlobar septa. On the pressure gradient, the air can produce progress to pneumomediastinum or hilum to the periphery and produce pulmonary subpleural bullae and pneumothorax. The rupture of the alveoli in the pleural space can cause pneumothorax with no evidence of mediastinal emphysema. Finally, it can extend into the subcutaneous tissues of the chest wall and anterior cervical region, following the fascial planes and into the spinal canal [1].

The main symptoms are chest pain and dyspnoea [1], odynophagia [8], cough, nausea, vomiting [3] secondary to the dissection of tissues over the air or compression [9]. Retrosternal chest pain worsens with movement or breathing. Dysphagia and dysphonia are present if the air dissects retropharyngeal or perilyrgeal spaces [10]. Hamman's sign (pericardial crunch synchronous with the heart) is not pathognomonic [11].

Treatment is conservative. Pneumomediastinum evolves smoothly and resolves in 3 to 15 days without sequelae. No fatalities have been reported. In 32% of cases it may be complicated by pneumothorax [2, 3, 4, 8, 9, 11, 12]. Spontaneous pneumomediastinum is rare in children. A high index of suspicion is necessary in young patients with chest pain and signs of subcutaneous emphysema. A chest and lateral neck radiograph are initial tools for the initial diagnosis and should be supplemented by chest CT to rule out underlying lung disease or other causes of secondary pneumomediastinum and assess its extent.

Supportive therapy and clinical observation is sufficient in most cases as pneumomediastinum is self-limited (Fig. 15, 16).

**Differential Diagnosis List:**
- Idiopathic spontaneous pneumomediastinum
- Secondary pneumomediastinum
- Cardiac ischaemia
- Pericarditis
- Pneumothorax
- Mallory-Weiss syndrome
- Boerhaave syndrome
- Asthma in children
- Respiratory infections

**Final Diagnosis:** Idiopathic spontaneous pneumomediastinum

**References:**


Description: Air in the retropharyngeal soft tissue and perilaryngeal and subcutaneous tissue are introduced into the thoracic outlet. Submandibular soft tissue shows augmentation. The body of the hyoid is moved forward. Origin: Capozzi R, Servicio de Radiología, Clínica del Oeste, Pehuajó, Argentina
Description: Interstitial air is displayed in the region of the left lung juxtahilar between the left main pulmonary artery and the mediastinal pleura. Subcutaneous emphysema is shown in the soft tissues of the neck. Origin: Capozzi R, Servicio de Radiología, Clínica del Oeste, Pehuajó Argentina
Description: Interstitial air in the region of the left lung juxtahilar between the left main pulmonary artery and the mediastinal pleura. Origin: Capozzi R, Servicio de Radiología, Clínica del Oeste, Pehuajó Argentina
Description: Follow-up radiograph is normal after 2 weeks. Origin: Lucas A, Capozzi R, Department of Radiology, Clínica del Oeste, Pehuajó, Argentina.
Description: Dissection of the different compartments due to the interstitial air, with no evidence of rupture of organs (parotid and masticator space right retropharyngeal, prevertebral, anterior cervical visceral space and deep cervical space). Origin: Capozzi R, CEDIP Pehuajó, Argentina
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Figure 9

Description: Air is dissecting supra-aortic and subaortic mediastinal structures. The presternal subcutaneous emphysema is noted without associated pneumothorax. Origin: Capozzi R, CEDIP Pehuajó. Argentina
Figure 10

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Figure 11

Description: Air is dissecting supra-aortic and subaortic mediastinal structures. The presternal subcutaneous emphysema is noted without associated pneumothorax. Origin: Capozzi R, CEDIP Pehuajó, Argentina
Figure 12

Description: Air is dissecting supra-aortic and subaortic mediastinal structures. The presternal subcutaneous emphysema is noted without associated pneumothorax. Origin: Capozzi R, CEDIP Pehuajó, Argentina.
**Description:** Air is dissecting supra-aortic and subaortic mediastinal structures. The presternal subcutaneous emphysema is noted without associated pneumothorax. **Origin:** Capozzi R, CEDIP Pehuajó, Argentina
Description: The CT of the skull is normal except for presence of gas in subcutaneous tissue of the right frontotempo-parietal area, without associated bone lesions. Origin: Capozzi R, CEDIP Pehuajó, Argentina
Figure 15

Description: Follow-up chest CT is normal after two weeks. Origin: Capozzi R, CEDIP Pehuajó, Argentina
Figure 16

Description: Air is dissecting supra-aortic and subaortic mediastinal structures. The presternal subcutaneous emphysema is noted without associated pneumothorax. Origin: Capozzi R, CEDIP Pehuajó, Argentina