Spontaneous Pneumomediastinum in Children is Not Associated with Esophageal Perforation

Kevin Roby, M.S.[1], Catherine Barkach, M.S.[1], Diane Studzinski, B.S.[2], Nathan Novotny, M.D., FACS[1,2], FAAP, Begum Akay, M.D.[1,2], Pavan Brahmamdam, M.D., M.S.[1,2]

[1] Oakland University William Beaumont School of Medicine
[2] Department of Surgery, Beaumont Health

OAKLAND UNIVERSITY WILLIAM BEAUMONT

Introduction

Spontaneous pneumomediastinum (SPM) is defined as air within the mediastinum that is not associated with trauma.

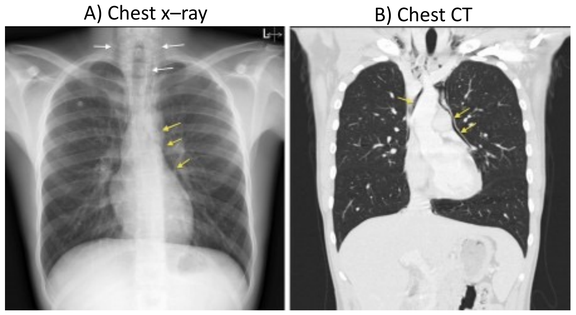
- Macklin effect- alveolar rupture leads to air dissection along the bronchovascular sheaths, leading to pulmonary interstitial emphysema that spreads to the mediastinum [1].
- Most commonly, young males presenting with chest pain, subcutaneous emphysema, dyspnea or neck pain [2]. Associated with asthma and mild respiratory infections [3,4]. Can be incited by coughing and smoking. Often, no trigger is identified [3,5,6].
- Diagnosed by chest radiography or chest computerized topography (CT) [7]. Sometimes invasive procedures like esophagography is done.
- Patients are either: 1) Discharged with conservative instructions and sometimes antibiotics or, 2) admitted as an inpatient with further workup. Outpatient follow-up has shown resolution of SPM in most cases [9].

There is a relatively high utilization of esophageal investigative techniques despite a low risk of esophageal or tracheal injury.

We hypothesize that SPM is a self-limited disease that does not require intensive investigation or routine admission and that it is not associated with esophageal injury.

Image 1. Pneumomediastinum

A) Chest x–ray B) Chest CT



http://www.svuhradiology.ie/case-study/pneumomediastinum-cxr-and-ct/

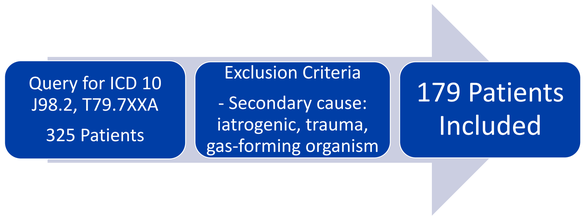
Aims and Objectives

We performed a retrospective study to describe the workup and outcomes of SPM in children.

We aim to describe treatment patterns, clinical outcomes and risk of esophageal injury due to SPM.

Methods

- Retrospective review of patients aged birth through 21 years old presenting at Beaumont Health System (five hospital sites) from January 2009 to November 2019.
- Patients identified using ICD codes for interstitial emphysema and traumatic subcutaneous emphysema.
- Demographics, presenting symptoms, medical history, diagnostic tests, interventions, procedures, and outcomes were obtained.
- Data analyzed with GraphPad Prism v9.1.2 and Excel.



Results

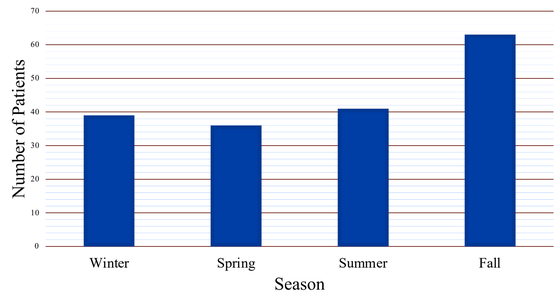
Table 1. Demographics of SPM

Demographics	n (%)
No. of patients	179
Patient Sex	
Male	118 (65.9%)
Female	61 (34.1%)
Age (years) Mean ± SD	14.13 ± 5.46
Race	
White or Caucasian	106 (59.2%)
Black or African American	33 (18.4%)
Asian	5 (2.8%)
Other	18 (10.1%)
Past Medical History	
Asthma	59 (33%)
ADD/ADHD	14 (7.8%)
Anxiety	10 (5.6%)
Pneumonia	9 (5.0%)
Pneumomediastinum	1 (0.6%)
Pneumothorax	0 (0%)
History of Smoking	
Yes	34 (19%)
No	145 (81.0%)

Table 2. Presenting symptoms and physical exam findings

Characteristic	n (%)
No. of patients	179
Presenting Symptom	
Chest pain	106 (59.2%)
Cough	81 (45.3%)
Shortness of breath	78 (43.6%)
Vomiting	40 (22.3%)
Neck pain	35 (19.6%)
Fever	24 (13.4%)
Difficulty Swallowing	14 (7.8%)
Physical Exam Finding	
Adventitious lung sounds	53 (29.6%)
Subcutaneous emphysema	39 (21.8%)
Tachycardia	28 (15.6%)
Respiratory distress	15 (8.4%)
Chest wall tenderness	9 (5.0%)

Figure 1. Season of presentation.



Winter: December–February, Spring: March–May, Summer: June–August, Fall: September–November

Table 3. Diagnostic imaging for SPM

Imaging Modality	n (%)
No. of patients	179
X-ray	
Chest x-ray	173 (96.6%)
Neck soft tissue x-ray	30 (16.8%)
Abdomen x-ray	7 (3.9%)
Computed tomography (CT)	
Chest CT	59 (33%)
Neck CT	20 (11.2%)
Abdomen CT	4 (2.2%)
Other	
Esophagram	46 (25.7%)
Abdomen ultrasound	6 (3.4%)

Table 4. In–hospital management of SPM

Management	n (%)
No. of patients	179
Inpatient	131 (67.6%)
Outpatient	48 (32.4%)
Oxygen	89 (49.7%)
Nasal canula	66 (36.9%)
Non–rebreather mask	31 (17.3%)
Ventilator	1 (0.6%)
Medications	
Analgesic	96 (53.6%)
Breathing treatments	77 (43%)
Antibiotics	66 (36.9%)
Non–inhaled steroids	60 (33.5%)
Other	
ECG	77 (43.0%)
TTE	10 (5.6%)
Intubation	1 (0.6%)

Table 5. Outcomes and follow-up imaging of SPM

Outcomes	
Length of Stay (Days)	
Mean ± SD	1.66 days ± 1.55
Median (95% CI)	1.14 days (0.92, 1.37)
Obtained follow-up imaging	57 (31.8%)
Follow-up imaging modality	
Chest x-ray	56 (98.2%)
Chest CT	1 (1.8%)
Results of imaging	
Resolution	47 (82.5%)
Improved	9 (15.8%)
No change	1 (1.8%)

Conclusions

- SPM most commonly presents in teenage males; 33% of whom have a history of asthma
- Chest pain, cough, dyspnea were the most common presenting symptoms
- No esophageal injuries were identified on esophagram
- Nearly all patients had improvement or resolution of imaging

In our series, SPM was not associated with esophageal perforation and patients did not require specific intervention findings on follow up. We recommend avoiding CT scans and esophagrams unless there is discrete concern about the esophagus from the history. Admissions for SPM should be based on symptomatology and patient status, rather than the presence of SPM alone.

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