Understanding Primary Spontaneous Pneumothorax Management and Outcomes in Children: A Retrospective Case Series

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Introduction

- Primary spontaneous pneumothorax (PSP) is air in the pleural space in patients without underlying lung disease.[1]
- Management of PSP varies widely including in:
  - Rate and route of oxygen administration[2]
  - Use of suction[3]
  - Size of tube thoracostomies[4,5]
- Emerging evidence that conservative management (analgesia and oxygen use) for PSP is non-inferior.[6]
- Conservative management decreases hospital length of stay and adverse events.[6]
- No existing case series from the US.
- Limited data on management and outcomes of pediatric patients.

Objectives

1. Describe characteristics and outcomes of patients with PSP
2. Determine safety of translating the recommendation for conservative management to the pediatric population

Methods

- Detailed chart review of eligible patients determined by ICD-10 codes for pneumothorax.
- **Inclusion Criteria:** Patients with PSP between 2014 and 2021 presenting to CCHMC ED.
- **Exclusion Criteria:** Secondary pneumothorax, developed pneumothorax while inpatient or management was performed at outside facility.
- Performed descriptive statistics to summarize patient characteristics.

Results

. **Figure 1. Overview of cases reviewed through manual chart review**

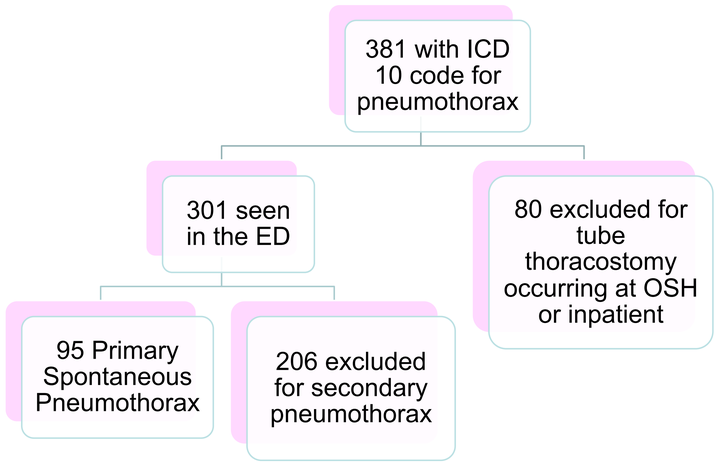

Table 1. Summary characteristics of patients with first encounter for PSP (N=95)

Patient Characteristics	N (%)
Presentation	
Age in years (mean, range)	16.3, 8-20
Age less than 10 years	1 (1)
Male	83 (87)
Pneumothorax laterality on CXR	
Right	30 (32)
Left	61 (64)
Bilateral	4 (4)
Pneumothorax size	
Small	69 (73)
Large	19 (20)
No size description	7 (7)
Triage Vitals (mean, range)	
Heart rate	89, 51-150
Respiratory rate	20, 10-36
Pulse oximetry	99, 92-100
Systolic blood pressure	125, 89-175
Diastolic blood pressure	75, 43-106

- Chief complaint included: chest pain (n=79, 83%), dyspnea (n=4, 4%), shoulder, arm or back pain (n=6, 6%), cough (n=2, 2%), foreign body sensation (n=1, 1%), chest palpitations (n=1, 1%), abdominal pain (n=1, 1%) and incidental pneumothorax found on x-ray of spine (n=1, 1%).

Results

Management	
Received oxygen	82 (86%)
Tube thoracostomy	48 (50%)
Small bore	33 (69%)
Large bore	14 (29%)
Size not documented	1 (2%)
Discharged home from ED	7 (7%)
Admitted	
Admitted after tube thoracostomy or planned placement	39 (44%)
Admitted for observation	40 (45%)
Converted from observation to tube thoracostomy	9 (10%)
Length of stay for admission (mean hours, range)	
Tube thoracostomy	118, 12-407
No tube thoracostomy	16.7, 7-32
Chest CT Scan	19 (20%)
VATS	22 (23%)
Follow-up	
Patients with ≥ 1 recurrence	29 (31%)
Follow-up x-ray in 8 weeks	71 (75%)

- 95% (n=18) of patients with large pneumothorax had tube thoracostomy compared to 39% (n=27) of those with small pneumothorax.
- No patients had tension physiology.
- Recurrence rate was 31% (n=29), 38 % in those who underwent tube thoracostomy and 23% in those who did not.
- Of the 4 patients who returned to ED in 8 weeks for enlarging pneumothorax, none had concern for tension physiology at time of re-presentation.

Conclusions

- Significant variation in the management of PSP regarding oxygen administration, procedural intervention, and disposition with a resultant wide range in mean LOS.
- Lower rate of recurrence and shorter LOS for patients who did not undergo tube thoracostomy.
- Lack of tension physiology with recent evidence that tension physiology is not physiologically possible in a spontaneously breathing patients supports observational management.[7]
- No standardized way to measure pneumothorax size on CXR limits standardization of care.
- Next steps must focus on reliable methods to measure pneumothorax size and development of evidence-driven consensus guidelines.

Sources:
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