

Outpatient drainage for patients with spontaneous pneumothorax over 50 years of age

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ABSTRACT

Introduction: The British Thoracic Society has reported a lower success rate for aspiration of spontaneous pneumothorax in patients over 50 years of age. Outpatient drainage therapy is used to manage spontaneous pneumothorax at some institutions. We examined the effect of age on outpatient drainage therapy outcomes. **Materials and Methods:** We reviewed the records of 68 patients who underwent outpatient drainage therapy with a thoracic vent between December 2012 and April 2015, which included 11 patients over 50 years of age. Indications for outpatient drainage therapy included pneumothorax with no circulatory or respiratory failure and no pleural effusion. **Results:** Of the 11 patients over 50 years of age, 5 had chronic obstructive pulmonary disease (COPD), one had interstitial pneumonia, one had a history of pulmonary tuberculosis, and one has lung tumors (LTs). Among the 57 younger patients, 2 patients had COPD, and one had LTs. Unexpected hospital admission occurred in 2 patients over 50 years of age and one patient aged 50 years or less ($P = 0.0658$, Fisher's exact test). Six of the 11 patients over 50 years of age underwent surgery for prolonged air leakage, compared to 8 of the 57 younger patients ($P = 0.00695$, Fisher's exact test). **Conclusions:** Outpatient drainage therapy is useful for patients with spontaneous pneumothorax over 50 years of age, because outpatient drainage therapy alone was successful in 4 of 11 patients and admission for drainage was avoided in 9 of 11 patients. However, prolonged air leakage occurs more frequently in this age group.

KEY WORDS: Age factors, drainage, outpatient, pneumothorax

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INTRODUCTION

Depending on size and symptom severity, the initial treatment for spontaneous pneumothorax may consist of drainage, aspiration, or observation.^[1] In patients with a small pneumothorax, aspiration is sometimes attempted. If aspiration is unsuccessful, drainage is performed. The British Thoracic Society has reported that patients over 50 years of age have a lower success rate for the aspiration of spontaneous pneumothorax because such patients often have a significant smoking history or underlying lung disease.^[1]

Outpatient drainage therapy is used to manage spontaneous pneumothorax at some institutions to prevent immediate hospital admission for the purpose of drainage.^[2-6] Drainage devices such as the Thoracic Vent, Thoracic Egg, or Heimlich valve enable continuous chest drainage therapy without hospital admission. In general, the indication for outpatient drainage therapy is mild pneumothorax without pleural effusion.

In this study, we examined the influence of age on outpatient drainage therapy outcomes for spontaneous pneumothorax, which has not been previously reported.

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MATERIALS AND METHODS

We reviewed the records of 68 patients who underwent outpatient drainage therapy with a Thoracic Vent® (UreSil, Skokie, IL, USA) between December 2012 and April 2015. There were 11 patients over 50 years of age. The institutional review board approved this study on April 15, 2013 (Project Approval No. 2013-05).

Indications for outpatient drainage therapy included pneumothorax with no circulatory or respiratory failure and no pleural effusion. Patients with severe pneumothorax were excluded because of the possibility of reexpansion pulmonary edema. Patients with pleural effusion were excluded because the thoracic vent has only a small chamber for drainage output.

The indications for surgical treatment were as follows: (1) Recurrent pneumothorax, (2) persistent air leak, or (3) patient preference for surgery to prevent recurrent pneumothorax. Details on the management of outpatient drainage therapy using the thoracic vent have been described previously.^[3]

The primary purpose of outpatient drainage therapy for pneumothorax is to avoid emergent admission and allow for patients to perform normal daily activities during drainage. We defined outpatient drainage therapy as successful if immediate admission was avoided and there was no unexpected admission during drainage therapy.

All statistical analyses were performed with EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan), a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria).^[7] More precisely, it is a modified version of the R commander designed to add statistical functions frequently used in biostatistics. We used Fisher's exact test for comparisons between two groups, and the Mann-Whitney U-test to compare drainage duration. We considered $P < 0.05$ to indicate statistical significance.

RESULTS

Patient characteristics are summarized in Table 1. Of the 11 patients over 50 years of age, five had chronic obstructive pulmonary disease (COPD), one had interstitial pneumonia (IP), one had a history of pulmonary tuberculosis, and one has lung tumors (LTs). Among the 57 patients aged 50 years or less, two patients had COPD, and one had LTs. The rate of secondary pneumothorax was significantly higher in patients over 50 years of age ($P < 0.001$, Fisher's exact test).

Outcomes of outpatient drainage therapy are shown in Table 2. Unexpected hospital admission occurred in two patients (18%) over 50 years of age, and one patient (1.7%) aged 50 years or less. In other words, 9 of 11 patients

over 50 years of age (82%) and 56 of 57 patients aged 50 years or less (98.3%) were successfully treated by outpatient drainage therapy. One patient over 50 years of age was admitted unexpectedly due to worsening IP after outpatient drainage was initiated. The remaining two patients, one patient over 50 years of age and one patient aged 50 years or less, were admitted due to significant air leaks that required conventional intercostal tube drainage. The rate of unexpected hospital admission was higher in patients over 50 years of age, but this difference was not statistically significant ($P = 0.0658$, Fisher's exact test).

Six of the 11 patients (55%) over 50 years of age underwent surgery for prolonged air leakage, compared to 8 of the 57 younger patients (14%) ($P = 0.007$, Fisher's exact test). Patients over 50 years of age required surgery for prolonged air leakage more frequently. Among patients over 50 years of age who did not undergo surgery, the mean duration of drainage was 7 days, compared to 5 days among those aged 50 years, or less ($P = 0.0438$, Mann-Whitney U-test) [Table 3].

Characteristics of the patients over 50 years are shown in Table 4. One patient had a history of previous pneumothorax, and one patient had taken 30 mg of prednisolone. Two patients (patients one and six) were admitted unexpectedly. Patient one was admitted two days after starting outpatient treatment due to significant air leaks. He underwent thoracoscopic bullectomy and was discharged without any adverse events. Patient six was admitted the day after the initiation of drainage due to

Table 1: Patient characteristics

	Age >50 years	Age ≤50 years	P (Fisher's exact test)
Number of patients	11	57	
Gender (male/female)	9/2	43/14	1
Age, years, range (mean)	56-80 (65.6)	15-50 (28)	
Laterality (right/left)	4/7	27/30	0.748
Secondary pneumothorax	8	3	0.0000032
Underlying disease			
Lung tumor	1	1	
Pulmonary emphysema	5	2	
Interstitial pneumonia	1	0	
Tuberculosis	1	0	

Table 2: Outpatient drainage therapy outcomes

	Age >50 years (n=11)	Age ≤50 years (n=57)	P (Fisher's exact test)
Unexpected hospital admission (n)	2	1	0.0658
Surgery for prolonged air leakage (n)	6	8	0.00695

Table 3: Duration of drainage in nonsurgical cases

	Age >50 years (n=5)	Age ≤50 years (n=34)
Mean (days)	7	5
Range (days)	4-11	2-12

Table 4: Characteristics of the patients over 50 years of age

Patient	Age (years)	Gender	Laterality	Smoking history (pack-years)	Underlying disease	History of pneumothorax	Bulla present on CT	Steroid therapy	Unexpected admission	Surgery for prolonged air leak	Duration of drainage (days)
1	56	Male	Right	54	PE	No	Yes	No	Yes	Yes	6
2	58	Male	Left	28.5	PE	No	Yes	No	No	Yes	5
3	63	Male	Left	72	PE	No	Yes	No	No	Yes	13
4	66	Male	Right	115	PE	No	Yes	No	No	Yes	7
5	72	Male	Left	54	PE	No	N/A*	No	No	No	4
6	63	Male	Left	30	IP	No	Yes	Yes	Yes	No	11
7	80	Female	Left	0	LT	No	No	No	No	No	6
8	66	Female	Left	1.5	TB	No	Yes	No	No	Yes	9
9	69	Male	Right	0		No	Yes	No	No	No	6
10	56	Male	Left	0		Yes	Yes	No	No	No	6
11	73	Male	Right	0.2		No	Yes	No	No	Yes	12

*CT was not performed. CT: Computed tomography, PE: Pulmonary emphysema, IP: Interstitial pneumonia, LT: Lung tumor, TB: Tuberculosis

worsening IP, which resolved with steroid pulse therapy. Pneumothorax also resolved without surgery.

DISCUSSION

Outpatient drainage therapy is used to manage spontaneous pneumothorax at some institutions because it has the advantage of not requiring hospital admission. In addition, since outpatient drainage therapy also has economic advantages, it may be desirable to use outpatient drainage therapy in more patients.^[3]

The British Thoracic Society has reported a lower success rate for aspiration of spontaneous pneumothorax in patients over 50 years of age since older patients often have a significant smoking history or underlying lung disease.^[1] In other words, patients with pneumothorax over 50 years of age more frequently require continuous chest drainage, but this can be achieved on an outpatient basis in most cases.

In our case series, two patients over 50 years were admitted unexpectedly after starting outpatient drainage therapy. One had a significant air leak. The Thoracic Vent drainage tube diameter was 13 Fr (4.3 mm), which is thinner than the tube used for conventional intercostal drainage. If the air leak volume was greater than the capacity of the thoracic vent, admission for drainage is unavoidable. The other patient was admitted due to worsening of underlying IP. Since patients with pneumothorax over 50 years frequently have underlying pulmonary disease, unexpected admission due to the underlying pulmonary disease may occur more frequently. On the other hand, 9 of 11 patients (82%) avoided admission for drainage. A thoracic vent can help patients avoid immediate hospitalization; they can engage in their normal activities including work. Patients who need surgery can also engage in their normal activities until hospitalization for surgery. For many patients over 50 years of age, outpatient drainage therapy is advantageous.

Karasaki *et al.* reported the usefulness of outpatient treatment for primary spontaneous pneumothorax.^[2] The age range in their study was 13–50 years. Patients older than 50 years were excluded as candidates for outpatient drainage treatment based on a previous report. However,

our data show that outpatient drainage treatment can be safely performed in patients older than 50 years. In terms of avoiding hospitalization, outpatient drainage treatment is advantageous and indicated for patients with pneumothorax over 50 years of age.

In our study, surgery for prolonged air leakage was required more frequently in patients over 50 years of age undergoing outpatient drainage, similar to results with conventional chest drainage.^[8] However, outpatient drainage therapy enables physicians to decide whether surgery is indicated while the patient is being treated on an outpatient basis, which is another advantage of outpatient drainage therapy.

In 4 of 11 patients (36%), outpatient drainage therapy alone successfully treated the pneumothorax. However, the duration of drainage was longer in patients over 50 years of age. This may be due to the presence of underlying pulmonary disease.

CONCLUSIONS

Outpatient drainage therapy is useful for patients with spontaneous pneumothorax over 50 years of age because outpatient drainage therapy alone was successful in 4 of 11 patients (36%) and admission for drainage was avoided in 9 of 11 patients (82%). However, care must be taken because prolonged air leakage is more common and the duration of drainage is longer in this age group compared to younger age groups.

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Conflicts of interest

There are no conflicts of interest.

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