Risk factors of late traumatic pneumothorax by blunt trauma

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It is commonly known that late traumatic pneumothorax (LTP) often occurs after the initial traumatic pneumothorax by blunt trauma. This study examines the risk factors of LTP. We reviewed 58 patients with 61 traumatic pneumothoraxes who were treated in Yokohama Rosai Hospital during the period from November 1, 2006 through December 31, 2012. We divided these cases into an LTP group and non-LTP group and statistically compared the patient and clinical backgrounds. The term "lung cyst" used in this report included traumatic pulmonary pseudocyst and bullous emphysema. Ten lung cysts (16.4%) were detected by chest CT on the pneumothorax side. LTP was observed in 7 traumatic pneumothoraxes (11.5%). Univariate and multivariate analyses revealed that the lung cyst was an independent risk factor for LTP. A close follow-up is required after the initial traumatic pneumothorax by blunt trauma, when a lung cyst is detected.

Table 1 Patient Characteristics.

A total of 58 patients with 61 traumatic pneumothoraxes	
Age (years)	54.5 (12-89)
Male (%)	45 (77.6)
Side (%)	
Right	29 (50.0)
Left	26 (44.8)
Bilateral	3 (5.2)
Smoking (%)	33 (56.9)
Undergoing chest radiograph (%)	58 (100)
Undergoing chest CT (%)	57 (98.2)
Complication related to injury	
Rib fracture	40
Lung contusion	14
Flail chest	3
Hemothorax	4
Organ injury	10
Treatment for each severity of pneumothorax: Observation/TV/Trocar	
I	19/0/10
II	0/9/16
III	0/1/6
Duration until the disappearance of air leakage (days)	
I	0.4 (0-1)] P<0.01[a]
II	2.7 (0-8)
III	2.0 (0-5)
Presence of lung cyst[b] (%)	10[c] (16.4)
LTP (%)	7[c] (11.5)

CT: computed tomography
TV: thoracic vent
LTP: late traumatic pneumothorax
[a] Turkey test revealed that the mean duration until disappearance of the air leak is significantly different between I and II pneumothorax cases.
[b] A lung cyst is defined as all lung cystic lesions found by CT, including bullous emphysema and traumatic pulmonary pseudocyst.
[c] The observed number among 61 traumatic pneumothoraxes.

Table 2 Comparison between LTP and Non-LTP.

	LTP	Non-LTP	p-value
Number of patients (pneumothoraxes)	7 (7)	51 (54)	
Age (years)	52.6 (20-83)	54.8 (12-89)	0.80
Male (%)	6 (85.7)	39 (76.5)	0.58
Side (%)			
Right	5 (71.4)	24 (47.1)	
Left	2 (28.6)	24 (47.1)	
Both	0 (0)	3 (5.9)	0.45
Smoking (%)	6 (85.7)	27 (52.9)	0.11
Severity			
I	3 (43)	23 (45)	
II	2 (29)	23 (45)	
III	2 (29)	5 (10)	0.33
Initial therapy (%)			
Observation	2 (28.6)	17 (31.5)	
TV	1 (14.3)	9 (16.7)	
Trocar	4 (57.1)	28 (51.8)	0.978
Presence of lung cyst (%)	5 (71.4)	5 (9.3)	0.00028*)
Rib fracture (%)	5 (71.4)	38 (70.4)	0.70
Lung contusion (%)	1 (14.3)	13 (24.1)	0.92
Hemothorax (%)	0 (0)	4 (7.4)	0.95
Flail chest (%)	0 (0)	3 (5.6)	0.77
Positive pressure ventilation (%)	1 (14.3)	8 (15.7)	0.65

LTP: late traumatic pneumothorax
TV: thoracic vent
*) Multivariate analysis (Logistic regression analysis):
Presence of lung cyst:
Odds ratio, 18.5; 95% confidence interval, 2.8-122.1; p=0.0054
Other explanatory variables: age (≤50 or ≥51), smoking (+/−), severity (I/II/III), sex (male/female), positive pressure ventilation (+/−).

Table 3 Comparison between LTP and Non-LTP Among Cases Undergoing Chest Tube Drainage for Traumatic Pneumothorax.

	LTP	Non-LTP	p-value
Number of patients (pneumothoraxes)	5 (5)	37 (37)	
Age (years)	43.2 (20-61)	59.7 (12-89)	0.071
Male (%)	5 (100)	29 (78.4)	0.58
Sides (%)			
Right	4 (80)	19 (51.4)	
Left	1 (20)	17 (45.9)	
Both	0 (0)	1 (2.7)	0.48
Smoking (%)	5 (100)	22 (59.5)	0.22
Severity (%)			
I	1 (20)	9 (24.3)	
II	2 (40)	23 (62.2)	
III	2 (40)	5 (13.5)	0.32
Initial therapy (%)			
TV	1 (20)	9 (24.3)	
Trocar	4 (80)	28 (75.7)	0.73
Duration of initial drainage (days)	3.6 (1-8)	4.2 (1-11)	0.59
Duration until the disappearance of air leakage (days)	2.4 (0-8)	2 (0-7)	0.79
Recurrence interval from last drainage (days)	8.6 (1-44)		
Presence of lung cyst (%)	4 (80)	5 (13.5)	0.0048*)
Rib fracture (%)	3 (60)	25 (67.6)	0.87
Lung contusion (%)	1 (20)	10 (27)	0.84
Hemothorax (%)	0 (0)	4 (10.8)	0.97
Flail chest (%)	0 (0)	3 (8.1)	0.79
Positive pressure ventilation (%)	1 (20)	6 (16.2)	0.67

LTP: late traumatic pneumothorax
TV: thoracic vent
*) Multivariate analysis (Logistic regression analysis):
Presence of lung cyst
Odds ratio, 25.6; 95% confidence interval, 1.1-142.3; p=0.046
Other explanatory variables: age (≤50 or ≥51), smoking (+/−), severity (I/II/III), sex (male/female), positive pressure ventilation (+/−).

Table 4 Therapy for LTP.

LTP (n=7)	
Severity of LTP (%)	
II	4 (57.1)
III	3 (42.9)
Treatment of LTP	
Cured by drainage only	5 (71.4)
Cured by drainage and sequential operation	2 (28.6)[a]
Duration until disappearance of air leakage (days)	0 (0)[b]
Duration of drainage (days)	5.8 (3-12)

LTP: late traumatic pneumothorax
[a] The bullectomies were conducted for the two cases because of continuous air leakage and repeat episodes of LTP, respectively.
[b] The air leak disappeared within 24 hours after starting chest tube drainage in all cases except one, for which surgery was performed because of continuous air leakage.