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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.

A total of 58 patients with 61 traumatic pneumothoraxesLTPAge (years)54.5 (12.89)Male (%)45 (77.6)Male (%)45 (77.6)Side (%)45 (77.6)Right29 (50.0)Left26 (44.8)Bilateral3 (5.2)Smoking (%)33 (56.9)Undergoing chest ratiograph (%)38 (100)Undergoing chest ratiograph (%)57 (98.2)Complication related to injuryIRight reture40II2 (29)Lung contusion14II2 (29)Lung contusion14II0/9/16II0/9/16II0/9/16II0/9/16II0/9/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16II0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16III0/16 <th colspan="2" rowspan="2">Table 1         Patient Characteristics.           A total of 58 patients with 61 traumatic pneumothoraxes</th> <th colspan="3">Table 2 Comparison between/LT</th>	Table 1         Patient Characteristics.           A total of 58 patients with 61 traumatic pneumothoraxes		Table 2 Comparison between/LT		
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I     0.4 (0-1)     P<0.01 <sup>a</sup> Flail chest (%)     0 (0)       II     2.7 (0-8)     Positive pressure ventilation (%)     1 (14.3)       III     2.0 (0-5)     LTP: late traumatic pneumothorax       Presence of lung cyst <sup>b1</sup> (%)     10 <sup>a</sup> (16.4)     TV: thoracic vent	Π	0/1/6 /	Lung contusion (%)		
I     0.4 (0-1)     P<0.01 <sup>20</sup> Flail chest (%)     0 (0)       II     2.7 (0-8)     Positive pressure ventilation (%)     1 (14.3)       III     2.0 (0-5)     LTP: late traumatic pneumothorax       Presence of lung cyst <sup>b0</sup> (%)     10 <sup>2</sup> (16.4)     TV: thoracic vent	Duration until the disappearance of air leakage (days)		Hemothorax (%)	0 (0)	
II     2.7 (0-8)     Positive pressure ventilation (%)     1 (14.3)       III     2.0 (0-5)     LTP: late traumatic pneumothorax       Presence of lung cyst <sup>b1</sup> (%)     10 <sup>d</sup> (16.4)     TV: thoracic vent	I	0.4 (0.1) ] $B < 0.01 a$	Flail chest (%)		
III     2.0 (0-5)       Presence of lung cyst <sup>b</sup> (%)     10 <sup>2</sup> (16.4)       LTP. (%)     7 <sup>2</sup> (11.5)   TV: thoracic vent	π	2.7 (0-8)	Positive pressure ventilation (%)		
Presence of lung cyst <sup>(b)</sup> (%) $10^{\circ}$ (16.4) TV: thoracic vent	ш	2.0 (0-5)	TTP: lets traumatic provincitoray		
TTP (%) 74 (115)	Presence of lung cyst <sup>bl</sup> (%)	10 <sup>c)</sup> (16.4)	· - · ·		
	LTP (%)	7 <sup>cl</sup> (11.5)		n analysis).	

CT: computed tomography

TV: thoracic vent LTP; late traumatic pneumothorax

» Turkey test revealed that the mean duration until disappearance of the air

leak is significantly different between I and II pneumothorax cases.

<sup>10</sup> A lung cyst is defined as all lung cystic lesions found by CT, including bul-

lous emphysema and traumatic pulmonary pseudocyst.

4 The observed number among 61 traumatic pneumothoraxes.

	1		
	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
Maie (%)	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)	
Π	2 (29)	23 (45)	
Ш	2 (29)	5 (10)	0.33
Initial therapy (%)			
Observation	2 (28.6)	17 (31.5)	2
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

Other explanatory variables: age ( $\leq 50$  or  $\geq 51$ ), smoking (+/-), severity (I/II/III), sex

Presence of lung cyst:

Odds ratio, 18.5; 95% confidence interval, 2.8-122.1; p=0.0054

(male/female), positive pressure ventilation (+/-).

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Table 2 Comparison between/LTP and Non-LTP.

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0.95

0.77

0.65

4 (7.4)

3 (5.6)

8 (15.7)

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

1			LTP	Non-LTP	p-value
1		Number of patients (pneumothoraxes)	5 (5)	37 (37)	p-value
		Age (years)	43.2 (20-61)	57 (37) 59.7 (12-89)	0.071
		Male (%)	5 (100)	29 (78.4)	0.071
		Sides (%)	5 (100)	29 (70.4)	0.58
		Right	4 (80)	19 (51.4)	
		Left	1 (20)	15 (51.4) 17 (45.9)	
1	16 631	2 Both	0 (0)	17 (45.5)	0.40
ጉ	VI - a V	Smoking (%)	5 (100)		0.48
,	(h	Severity (%)	0 (100)	22 (59.5)	0.22
17 +	(1) (2) 注注 1) 龙艺	I	1 (20)	9 (24.3)	
11 17	+ 12	П	2 (40)	• •	
~71	14 4	Ш	2 (40)	23 (62.2) 5 (13.5)	0.90
0	1/2/2	Initial therapy (%)	2 (30)	0 (13.5)	0.32
		TV	1 (20)	9 (24.3)	
11 L	015	Trocar	4 (80)	9 (24.3) 28 (75.7)	0.70
いしし	12	Duration of initial drainage (days)	3.6 (1-8)	4.2 (1-11)	0.73
		Duration until the disappearance of air leakage (days)	2.4 (0-8)		0.59
t-LTP.		Recurrence interval from last drainage (days)	8.6 (1-44)	2 (0-7)	0.79
m-LTP	p-value	Presence of lung cyst (%)	4 (80)	5 (13.5)	0.0040+1
	- p 1000	Rib fracture (%)	3 (60)	25 (67.6)	0.0048*1
1 (54)		Lung contusion (%)	1 (20)	• •	0.87
8 (12-89)	0.80	Hemotherax (%)	0 (0)	10 (27) 4 (10 m	0.84
9 (76.5)	0.58	Flail chest (%)	0(0)	4 (10.8) 2 (9 1)	0.97
		Positive pressure ventilation (%)	1 (20)	3 (8.1) 6 (16.2)	0.79
4 (47.1)		LTP: late traumatic pneumothorax	7 (107)	0 (10.2)	0.67
4 (47.1) 7 (5 (1)	0.4E	TV: thoracic vent			
3 (5.9) 7 (5.9)	0.45	•) Multivariate analysis (Logistic regression analysis).			
7 (52.9)	0.11	Presence of lung cyst			
		Odds ratio, 25.6; 95% confidence interval, 1.1-142.3; $p=0.0$	40		
3 (45)		Other explanatory variables are ( $\leq 50$ or $\geq 51$ )			
3 (45) 5 (10)	A99	Other explanatory variables: age ( $\leq 50$ or $\geq 51$ ), smoking positive pressure ventilation (+/-).	(+/-), severity	(1/11/111), sex (m	ale/female
5 (10)	0.33				

Table 4Therapy for LTP.	
LTP $(n = 7)$	
Severity of LTP (%)	
П	_4 (57.1)
Ш	3 (42.9)
Treatment of LTP	
Cured by drainage only	5 (71.4)
Cured by drainage and sequential operation	2 (28 6)=)
Duration until disappearance of air leakage (days)	0 (0)6
Duration of drainage (days)	5.8 (3-12)
LTP: late traumatic pneumothorax	

\*) The bullectomies were conducted for the two cases because of continuous air leakage and repeat episodes of LTP, respectively. <sup>b)</sup> 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.

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