

# Difference in the incidence of malfunction of chest tube between lateral vs anterior approach according to the preceding CT examination among patients with traumatic hemopneumothorax : a retrospective multicenter cohort study

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## Introduction

The aim of this study was to evaluate the difference in the incidence of chest tube malfunction by lateral and anterior approaches in patients with traumatic hemopneumothorax with and without preceding CT examination.

We also evaluate the interaction effect of the presence of CT examination before insertion for the odds ratio of malfunction of lateral approach with those of anterior approach.

## Methods

### Design

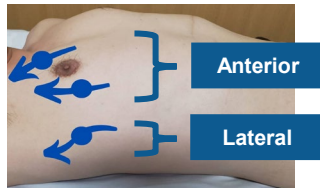
Doublecenter retrospective observational study

### Patients

Treated with chest tubes for traumatic hemopneumothorax from august 2012 to September 2021  
Divided into CT(+) or CT(-) groups according to the presence of CT examination before insertion.

### Outcome

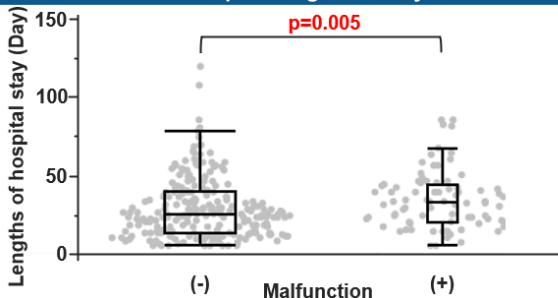
Incidence of malfunction of chest tube defined as when reinsertion is required.



## 2. Baseline characteristics

	All N=315	CT(+) N=233	CT(-) N=82
Age, yrs	54 (37-70)	53 (38-70)	55(37-72)
Sex, male, n (%)	243 (77)	181 (78)	62 (76)
BMI (kg/m <sup>2</sup> )	22.1 (19.8-24.8)	21.9 (19.6-24.6)	22.5 (20.0-25.2)
ISS	20 (13-29)	19 (13-29)	22 (14-29)
AIS of the thorax	3 (3-4)	3 (3-4)	3 (3-4)
Right side insertion, n (%)	178 (57)	132 (57)	46 (56)
Cooccurrence of rib fracture, n (%)	260 (83)	186 (80)	74 (90)
Hemodynamically unstable, n (%)	134 (43)	71 (31)	63 (77)
Needs of mechanical ventilation, n (%)	180 (57)	119 (49.4)	65 (79.3)
Trocar or aspiration catheter, trocar, n (%)	307 (98)	226 (97)	81 (99)
Approach, lateral, n (%)	195 (62)	143 (61)	52 (63)
Lengths of hospital stay, d	21 (10-35)	21 (9-34)	23.5 (12-37)
Mortality at hospital discharge, n (%)	25(8)	17 (7)	8 (10)

## 4. Association between the occurrence of malfunction and hospital lengths of stay



## Limitation

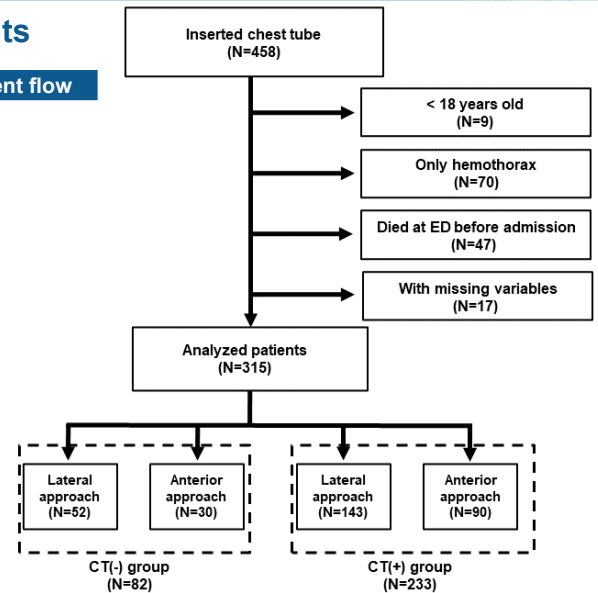
- Small sample size
- Retrospective, non-randomized.
- Potential unidentified confounding variables exist in CT(+) group.
- The choice of approach must take into account factors such as hemothorax volume and surgical indications as well as malfunction.

## Conclusion

The lateral approach showed statistically a significantly higher risk in patients without preceding CT.

## Results

### 1. Patient flow



### 3. Multivariate logistic regression analysis for malfunction

CT(+)	Adjusted OR (95% CI)	p
Approach, lateral (ref: anterior)	1.68 (0.84-3.39)	0.16
Age, yrs	1.00 (0.99-1.02)	0.74
Sex, female (ref: male)	1.23 (0.58-2.61)	0.62
BMI	0.96 (0.88-1.05)	0.42
AIS of the thorax	1.14 (0.73-1.77)	0.57
Hemodynamically unstable	0.41 (0.18-0.93)	0.034
Operator, staff (ref: residents)	0.54 (0.27-1.06)	0.08
Hemothorax	1.09 (0.53-2.25)	0.81
CT(-)		
Approach, lateral (ref: anterior)	4.94 (1.47-16.60)	0.006
Age, yrs	1.02 (0.99-1.05)	0.17
Sex, Women (ref: Men)	0.67 (0.17-2.62)	0.57
BMI	0.92 (0.80-1.07)	0.26
AIS of the thorax	1.48 (0.68-3.21)	0.32
Hemodynamically unstable	1.84 (0.49-6.84)	0.36
Operator, staff (ref: resident)	0.73 (0.19-2.88)	0.65
Hemothorax	4.57(0.83-25.20)	0.056

### 5. Interaction effect of the presence of CT before insertion

$P_{\text{interaction}} = 0.087$

## Discussion

- The lateral approach is potentially effective for drainage in the CT(+) group.
- The anterior approach is safer with a lower risk of malfunction in the CT(-) group.
- Malfunctions are likely to be associated with longer hospital stays. Therefore, strategies to prevent them are imperative.