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Incidence of pneumothorax and tube thoracostomy in thoracic traumas: an analysis of 30 cases

Abstract

Background: Thoracic trauma is a major cause of morbidity and mortality. Pneumothorax constitutes one of the life-threatening complications resulting from such injuries. Tube thoracostomy remains critical in managing pneumothorax.

Objective: To determine the incidence of pneumothorax and the rate of tube thoracostomy execution in patients presenting to the emergency department with thoracic trauma.

Methods: This retrospective, single-center study included 30 patients presenting with thoracic trauma to the Department of Emergency Medicine at Hatay Mustafa Kemal University Faculty of Medicine Hospital. The Non-Interventional Research Ethics Committee of Hatay Mustafa Kemal University granted ethical approval for the study (decision no. 74). Data parameters included age, sex, mechanism of injury, trauma classification (blunt or penetrating), presence of pneumothorax, and tube thoracostomy.

Results: The study population comprised 26 males (86.7%) and 4 females (13.3%), with a mean age of 43.8 ± 20.9 years. Blunt trauma accounted for 29 cases (96.7%), with motor vehicle accidents identified as the most prevalent mechanism of injury (43.3%). Pneumothorax was observed in 3 patients (10.0%). Tube thoracostomy was performed in 1 patient (3.3%).

Conclusion: In this case series, pneumothorax was observed in 10% of the cases. Tube thoracostomy was performed in patients with clinically significant pneumothorax.

Keywords: thoracic trauma, pneumothorax, tube thoracostomy, blunt trauma, penetrating trauma

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Introduction

Chest injuries are responsible for up to 25% of all trauma-related deaths.[1] Because the thoracic region contains the heart and lungs, injuries in this area can lead to adverse outcomes. Among the complications secondary to thoracic trauma, pneumothorax constitutes one of the most clinically significant.[2] Both blunt and penetrating mechanisms can induce pneumothorax. Rib fractures, parenchymal lacerations, and tracheobronchial injury represent the most prevalent etiologies of pneumothorax in blunt trauma.[3] Untreated pneumothorax can progress to tension pneumothorax, which is a fatal condition.[4]

Tube thoracostomy is the definitive treatment for most pneumothoraces requiring intervention. The procedure involves inserting a drain into the pleural space, restoring negative pleural pressure and facilitating pulmonary re-expansion.[5] The decision to perform tube thoracostomy is based on pneumothorax size and the patient's clinical status.[6] This study aimed to determine the incidence of pneumothorax and the rate of tube thoracostomy administration in a cohort comprising 30 patients with thoracic trauma.

Methods

This retrospective, observational, single-center study was conducted at the Department of Emergency Medicine of Hatay Mustafa Kemal University Faculty of Medicine Hospital. The study aimed to determine the incidence of pneumothorax and the rate of tube thoracostomy in patients presenting to the emergency department with thoracic trauma, and to describe the demographic characteristics and injury mechanisms of this population. The medical records of patients admitted to the emergency department with a primary or secondary diagnosis of thoracic trauma were reviewed retrospectively. Patients of all ages who presented with blunt or penetrating thoracic trauma were eligible for inclusion; no age restriction was applied, and the cohort therefore encompassed pediatric, adult, and geriatric patients. We excluded patients with incomplete medical records, in whom we could not reliably ascertain the study variables. After applying these criteria, the final study population comprised 30 patients.

For each patient, age (years), sex, mechanism of injury (motor vehicle accident, fall from standing height, fall from height, assault, animal attack, stab/puncture wound, or falling object injury), type of trauma (blunt or penetrating), presence of pneumothorax (yes/no), and performance of tube thoracostomy (yes/no) were extracted from the medical records. We diagnosed pneumothorax based on chest radiography and/or thoracic computed tomography (CT) findings, and treating physicians decided whether to perform tube thoracostomy based on pneumothorax size and the patient's clinical condition.

We summarized the data using descriptive statistics. We expressed continuous variables as mean ± standard deviation (SD) or median (range or interquartile range), depending on their distribution, and categorical variables as frequencies and percentages. We calculated the incidence of pneumothorax as the proportion of patients with pneumothorax in the overall cohort, and the tube thoracostomy rate for both the overall cohort and the pneumothorax subgroup. The study was conducted in accordance with the Declaration of Helsinki. The Non-Interventional Research Ethics Committee of Hatay Mustafa Kemal University granted ethical approval for the study (decision no. 74, 11th meeting, August 12, 2026).

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Results

Demographic characteristics

The mean age of the 30 patients enrolled in the study was 43.8 ± 20.9 years (median: 43.0; range: 12–81 years), and the cohort spanned pediatric, adult, and geriatric populations. The patient population included 26 males (86.7%) and 4 females (13.3%), for a male-to-female ratio of 6.5:1 (Table 1).

Table 1 Demographic Characteristics of the Study Population (n = 30)

Variable	n	%
Sex - Male	26	86.70%
Sex - Female	4	13.30%
Age (mean ± SD)	43.8 ± 20.9 years	-
Age (median, range)	43.0 (12–81)	-

Trauma mechanisms and types

Blunt trauma constituted the predominant classification of injury, accounting for 29 cases (96.7%). A single penetrating case secondary to a stab/puncture wound was recorded (3.3%). Motor vehicle accidents represented the most frequent etiology among blunt mechanisms (n = 13; 43.3%), followed by falls from standing height (n = 8; 26.7%), assault (n = 3; 10.0%), falls from height (n = 2; 6.7%), and animal attacks (n = 2; 6.7%). One case (3.3%) involved an injury caused by a falling object (Table 2).

Table 2 Distribution of Trauma Mechanisms (n = 30)

Trauma Mechanism	n	%
Traffic Accident	13	43.30%
Same-Level Fall	8	26.70%
Assault (Blunt)	3	10.00%
Fall from Height	2	6.70%
Animal Attack	2	6.70%
Sharp/Penetrating Instrument	1	3.30%
Foreign Body Falling on Patient	1	3.30%
Total	30	100%

Incidence of pneumothorax

Pneumothorax was identified in 3 of 30 patients, with an overall incidence of 10.0%. Among these three cases, one was secondary to penetrating trauma, while two resulted from blunt trauma. The two pneumothorax cases associated with blunt trauma were managed conservatively without tube thoracostomy insertion due to being clinically non-significant and radiologically minor.

Tube thoracostomy

Tube thoracostomy was performed in 1 of the 30 patients (3.3%). This single case involved a 28-year-old male who presented with a penetrating chest injury secondary to a stab/puncture wound and an associated pneumothorax requiring drainage. Among the three pneumothorax cases, tube thoracostomy was performed in 33.3% of patients. The remaining two pneumothorax cases were managed without tube thoracostomy because they were minor and clinically insignificant (Table 3).

Table 3 Summary of Key Clinical Outcomes (n = 30)

Outcome	n	% of Total
Blunt Trauma	29	96.70%
Penetrating Trauma	1	3.30%
Pneumothorax Identified	3	10.00%
No Pneumothorax	27	90.00%
Tube Thoracostomy Performed	1	3.30%
No Tube Thoracostomy	29	96.70%

Discussion

This study evaluated the incidence of pneumothorax and the rate of tube thoracostomy in 30 patients presenting to the emergency department with thoracic trauma. The main findings were as follows: (1) blunt trauma accounted for almost all presentations (96.7%), with motor vehicle accidents as the leading mechanism; (2) pneumothorax was identified in 10.0% of the patients; and (3) tube thoracostomy was required in 3.3% of the overall cohort and in one-third of the patients with pneumothorax. The only patient who underwent tube thoracostomy had a penetrating stab wound, whereas both pneumothoraces resulting from blunt trauma were managed conservatively.

The demographic profile of our cohort is largely consistent with the literature. The marked male predominance (86.7%) is comparable to that reported in large thoracic trauma series, including a 10-year analysis of 4205 patients from Turkey by Demirhan et al., in which 85% of the patients were male, and 66% had blunt injuries.[7] However, our patients' mean age (43.8 years) was higher than that in Demirhan et al.'s series (36.2 years),[7] which may reflect the considerable proportion of older patients in our cohort injured by falls from standing height. Males are frequently overrepresented in trauma populations because of greater participation in high-risk occupations, greater involvement in physical altercations, and higher rates of motor vehicle accidents.[8] Nevertheless, the broad age range of our patients (12–81 years) shows that thoracic trauma is not limited to a specific demographic group and that emergency physicians must be prepared to manage it across the entire lifespan.

Motor vehicle accidents were the leading mechanism of injury (43.3%), in line with global road safety data and with a previous large Turkish series, in which traffic accidents were the most common cause of chest trauma.[7,9] Falls from standing height were the second most common mechanism (26.7%). Although such falls are considered low-energy injuries, they are mainly seen in older patients, in whom even minor chest trauma can have serious consequences. Bulger et al. showed that, in elderly patients with rib fractures, each additional fractured rib increased mortality by 19% and the risk of pneumonia by 27%,[10] and Sirmali et al. similarly reported that morbidity and mortality after traumatic rib fractures increased with the number of fractured ribs and recommended intensive care unit admission for elderly patients with six or more fractured ribs.[11] Therefore, the low-energy nature of a fall should not lead to underestimating thoracic injury in older patients.

The 10.0% pneumothorax rate observed in our series is lower than the rates reported in studies of severely injured patients, who constitute the study populations of many published series; for example, Pape et

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al. evaluated only blunt polytrauma patients with an Injury Severity Score of 18 or higher.[12] In a population-based study of major trauma, Di Bartolomeo et al. reported that pneumothorax can be expected in approximately one in five severely traumatized patients.[13] Several factors may explain the lower rate in our study. First, our cohort consisted almost entirely of blunt trauma and included a considerable proportion of low-energy mechanisms, such as falls from standing height. Second, the detected incidence of pneumothorax depends strongly on the imaging modality used. A substantial proportion of traumatic pneumothoraces are not visible on supine chest radiography and are detected only on CT, the so-called occult pneumothorax.[14] In a meta-analysis by Alrajhi et al., bedside ultrasonography had a sensitivity of 90.9% for pneumothorax, compared with 50.2% for supine chest radiography.[15] Because CT was not performed in all patients and ultrasonography was not systematically recorded, we may have missed some small or occult pneumothoraces, and the true incidence in our population may be higher.

Tube thoracostomy was performed in only one patient (3.3%), who had penetrating trauma. Most patients with penetrating chest trauma can be managed non-operatively, mainly with tube thoracostomy, and acute surgical exploration is required in only approximately 5–15% of cases.[16,17] Current Advanced Trauma Life Support (ATLS) recommendations likewise consider tube thoracostomy the standard treatment for clinically significant traumatic pneumothorax.[18] Our management of the penetrating case is therefore consistent with established practice.

In contrast, the two patients with blunt trauma-related pneumothorax were managed without tube thoracostomy because their pneumothoraces were small and clinically insignificant. Growing evidence supports this selective approach. The Eastern Association for the Surgery of Trauma (EAST) practice management guidelines state that occult pneumothorax may be observed in stable patients, regardless of positive-pressure ventilation.[19] In a prospective multicenter study, Moore et al. (AAST) demonstrated that most blunt traumatic occult pneumothoraces could be managed with observation, and only 6% of observed patients subsequently required tube thoracostomy.[20] The OPTICC multicenter randomized trial further suggested that occult pneumothoraces may be cautiously observed in stable patients undergoing short-term positive-pressure ventilation when prompt rescue drainage is immediately available. However, one-quarter of the observed patients ultimately failed observation.[21] More recently, Bou Zein Eddine et al. reported that pneumothoraces measuring 35 mm or less on CT can be safely observed in both blunt and penetrating chest trauma, with only 9% of stable patients failing initial observation.[22] Although the size thresholds used in pneumothorax guidelines, namely an apex-to-cupola distance of less than 3 cm in the American College of Chest Physicians consensus statement and a rim of less than 2 cm at the level of the hilum in the British Thoracic Society guideline, were developed for spontaneous pneumothorax,[6,23] these trauma-specific data confirm that conservative management is appropriate for hemodynamically stable patients with small traumatic pneumothoraces, as was the case in our series.

Current practice is also moving toward less invasive drainage when intervention is needed. In a randomized trial, Kulvatunyou et al. found that 14-French pigtail catheters were as effective as 28-French chest tubes in uncomplicated traumatic pneumothorax and caused less insertion-site pain.[24] Inaba et al. showed that larger (36–40 French) chest tubes offered no advantage over smaller (28–32 French) tubes in trauma patients.[25] These data suggest that both the indication for and the drainage technique should be individualized according to the patient's clinical condition and the size of the pneumothorax.

From a clinical perspective, our findings emphasize that although pneumothorax was relatively uncommon and most cases did not require invasive intervention, a meticulous thoracic evaluation remains essential in every patient with chest trauma, irrespective of the mechanism of injury. Untreated pneumothorax can progress to tension pneumothorax, which is a life-threatening condition;[4] therefore, patients managed conservatively should be closely observed with serial clinical assessment and repeat imaging, particularly if positive-pressure ventilation or transfer is required.

This study has several limitations. First, the small sample size and the single-center retrospective design limit the generalizability of the findings and precluded inferential statistical analysis. Second, the study relied on medical records, and the data were therefore subject to the accuracy and completeness of documentation. Third, only one patient had penetrating trauma, so no meaningful comparison between blunt and penetrating mechanisms could be made. Fourth, the imaging modality was not standardized, which may have led to underestimating occult pneumothorax. Finally, associated thoracic injuries (such as rib fractures, hemothorax, and pulmonary contusion, which is frequently complicated by pneumonia and acute respiratory distress syndrome[26]), injury severity scores, and clinical outcomes (such as length of hospital stay, failure of conservative management, and complications) were not evaluated. Larger prospective multicenter studies are needed to define better the incidence of traumatic pneumothorax and the predictors of tube thoracostomy in emergency department populations.

Conclusion

In this series of 30 patients with predominantly blunt thoracic trauma, pneumothorax was identified in 10.0% of cases, and tube thoracostomy was required in only 3.3%, exclusively in a patient with penetrating injury. Small blunt traumatic pneumothoraces were managed conservatively, supporting a selective approach to tube thoracostomy based on the patient's clinical status and pneumothorax size.

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None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

References

1. Richter T, Ragaller M. Ventilation in chest trauma. *J Emerg Trauma Shock*. 2011;4(2):251–259.
2. Molnar TF. Thoracic trauma: which chest tube when and where? *Thorac Surg Clin*. 2017;27(1):13–23.
3. Karmy-Jones R, Jurkovich GJ. Blunt chest trauma. *Curr Probl Surg*. 2004;41(3):211–380.
4. Roberts DJ, Leigh-Smith S, Faris PD, et al. Clinical presentation of patients with tension pneumothorax: a systematic review. *Ann Surg*. 2015;261(6):1068–1078.
5. Venuta F, Diso D, Anile M, et al. Chest tubes: generalities. *Thorac Surg Clin*. 2017;27(1):1–5.
6. Baumann MH, Strange C, Heffner JE, et al. Management of spontaneous pneumothorax: an American College of Chest Physicians Delphi consensus statement. *Chest*. 2001;119(2):590–602.
7. Demirhan R, Onan B, Oz K, et al. Comprehensive analysis of 4205 patients with chest trauma: a 10-year experience. *Interact Cardiovasc Thorac Surg*. 2009;9(3):450–453.

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8. Søreide K. Epidemiology of major trauma. *Br J Surg.* 2009;96(7):697–698.
9. World Health Organization. Global Status Report on Road Safety 2023. Geneva: WHO; 2023.
10. Bulger EM, Arneson MA, Mock CN, et al. Rib fractures in the elderly. *J Trauma.* 2000;48(6):1040–1046.
11. Sirmali M, Türüt H, Topçu S, et al. A comprehensive analysis of traumatic rib fractures: morbidity, mortality and management. *Eur J Cardiothorac Surg.* 2003;24(1):133–138.
12. Pape HC, Remmers D, Rice J, et al. Appraisal of early evaluation of blunt chest trauma: development of a standardized scoring system for initial clinical decision making. *J Trauma.* 2000;49(3):496–504.
13. Di Bartolomeo S, Sanson G, Nardi G, et al. A population-based study on pneumothorax in severely traumatized patients. *J Trauma*. 2001;51(4):677–682.
14. Ball CG, Kirkpatrick AW, Feliciano DV. The occult pneumothorax: what have we learned? *Can J Surg.* 2009;52(5):E173–E179.
15. Alrajhi K, Woo MY, Vaillancourt C. Test characteristics of ultrasonography for the detection of pneumothorax: a systematic review and meta-analysis. *Chest.* 2012;141(3):703–708.
16. Karmy-Jones R, Namias N, Coimbra R, et al. Western Trauma Association critical decisions in trauma: penetrating chest trauma. *J Trauma Acute Care Surg*. 2014;77(6):994–1002.
17. Meredith JW, Hoth JJ. Thoracic trauma: when and how to intervene. *Surg Clin North Am*. 2007;87(1):95–118.
18. American College of Surgeons Committee on Trauma. Advanced Trauma Life Support (ATLS) Student Course Manual. 11th ed. Chicago, IL: American College of Surgeons; 2025.
19. Mowery NT, Gunter OL, Collier BR, et al. Practice management guidelines for management of hemothorax and occult pneumothorax. *J Trauma.* 2011;70(2):510–518.
20. Moore FO, Goslar PW, Coimbra R, et al. Blunt traumatic occult pneumothorax: is observation safe? Results of a prospective, AAST multicenter study. *J Trauma.* 2011;70(5):1019–1025.
21. Clements TW, Sirois M, Parry N, et al. OPTICC: a multicentre trial of occult pneumothoraces subjected to mechanical ventilation: the final report. *Am J Surg.* 2021;221(6):1252–1258.
22. Bou Zein Eddine S, Boyle KA, Dodgion CM, et al. Observing pneumothoraces: the 35-millimeter rule is safe for both blunt and penetrating chest trauma. *J Trauma Acute Care Surg.* 2019;86(4):557–564.
23. MacDuff A, Arnold A, Harvey J; BTS Pleural Disease Guideline Group. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. *Thorax*. 2010;65(Suppl 2):ii18–ii31.
24. Kulvatunyou N, Erickson L, Vijayasekaran A, et al. Randomized clinical trial of pigtail catheter versus chest tube in injured patients with uncomplicated traumatic pneumothorax. *Br J Surg*. 2014;101(2):17–22.
25. Inaba K, Lustenberger T, Recinos G, et al. Does size matter? A prospective analysis of 28–32 versus 36–40 French chest tube size in trauma. *J Trauma Acute Care Surg.* 2012;72(2):422–427.
26. Cohn SM. Pulmonary contusion: review of the clinical entity. *J Trauma*. 1997;42(5):973–979.

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