

Is routine chest X-Ray necessary after thorax tube removal?

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Cite this article as: Dal İ, Ece B. Is routine chest X-Ray necessary after thorax tube removal? *Kastamonu Med J.* 2025;5(1):1-3.

Received: 10.08.2024

Accepted: 25.09.2024

Published: 04.03.2025

ABSTRACT

Aims: The aim of our study was to investigate whether routine control chest radiography is necessary after chest tube removal.

Methods: The study was conducted on patients with chest tube insertion at Kastamonu Training and Research Hospital. It was designed as a retrospective and descriptive study. Patients who had a chest tube inserted between the ages of 18 and 90, from 2017 and 2022, were included in the study. In the patients included in the study, abnormal findings observed in the control X-Ray after the chest tube removal, repeated X-Ray and computed tomography images, additional hospitalization periods, and additional medical procedures, if any, were determined. The findings obtained were discussed in light of the current literature and the necessity of control X-Ray application.

Results: A total of 351 patients who had chest tubes inserted during the specified dates were evaluated. 177 patients [126 men (71.1%), 51 women (28.9%)] were included in the study. Repeat X-Rays were required in 18 (10.1%) patients. Additional CT was required in only 3 (1.7%) patients. Of the 177 patients included, 160 (90.4%) did not require additional hospitalization. Additional hospitalization and clinical follow-up were performed in 17 patients. None of the 177 patients required additional intervention.

Conclusion: Our study showed that routine control X-Rays are not necessary after chest tube removal. We recommend that control X-Rays be reserved for symptomatic patients only.

Keywords: Pneumothorax, X-Ray, chest tube

INTRODUCTION

Thorax tubes are frequently used in the treatment of pneumothorax and pleural effusion. Chest tubes are also used after lung and heart surgeries. The thorax tube is located in the pleural cavity, between the visceral pleura and parietal pleura. Some abnormal X-Ray findings may be observed after the chest tubes are removed. The most common of these is newly developed pneumothorax. Newly developing pleural effusion is not a common finding. It can often be observed on a control chest radiograph due to residual pleural fluid that was present before the tube was removed. There is a lot of information in the literature about when a chest tube should be inserted,¹ but there is little information about when a chest tube should be removed.²

Newly developed pneumothorax observed on control chest radiography is often caused by air entering the thorax when the chest tube is removed. More rarely, it may be observed due to early removal of the chest tube before lung healing is completed. It may not always be easy to distinguish these two clinical presentations. Therefore, in patients with pneumothorax on control chest radiography, repeated X-Rays, CT scans, and prolonged hospitalization are often required.

There are studies showing that such close follow-up may not be necessary in the asymptomatic patient group. This is because most of the time, after multiple radiological imaging and prolonged hospitalization, patients are discharged without any additional medical procedures.³⁻⁵ The aim of our study was to investigate whether routine control chest radiography is necessary after chest tube removal.

METHODS

The study was conducted on patients with chest tube insertion at Kastamonu Training and Research Hospital. It was designed as a retrospective and descriptive study. Before the study began, approval was received from the Kastamonu Training and Research Hospital Clinical Researches Ethics Committee (Date: 27.07.2022, Decision No: 2022-KAEK-59). Radiological data and clinical data of the patients were obtained from the hospital database. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Patients who had a chest tube inserted between the ages of 18 and 90 during 2017 and 2022 were included in the study.

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Patients whose control X-Ray images were not available in the system, patients who were referred, patients who died, patients whose clinical and radiological data were missing, patients with COVID-19 infection, pregnant patients, and patients whose chest tube could not be removed for any reason were excluded from the study. In the patients included in the study, abnormal findings observed in the control X-Ray after the chest tube removal, repeated X-Ray and computed tomography images, additional hospitalization periods, and additional medical procedures, if any, were determined. The findings obtained were discussed in light of the current literature and the necessity of control X-Ray application.

RESULTS

A total of 351 patients who had chest tubes inserted during the specified dates were evaluated. Of these, 174 patients were found not to meet the inclusion criteria. Among them, 84 patients were transferred to another hospital, 37 patients died, 19 patients had missing data, 16 patients did not have a control X-Ray, 15 patients were under the age of 18, two patients were over 90 years old, and one patient was excluded from the study because a permanent pezzet drain was performed.

A total of 177 patients [126 men (71.1%), 51 women (28.9%)] were included in the study. The mean age was 56.7±19.4 years. The average drainage time was 6.7±4.6 days. Among the indications for tube thoracostomy insertion, the most common were pneumothorax (45.2%), hemothorax (11.9%), pleural effusion (11.9%), and pneumothorax with hemothorax (11.9%).

There were no abnormal X-Ray findings in 95 (53.7%) of the 177 patients. Eighty-two (46.3%) patients had abnormal X-Ray findings. The most common abnormal X-Ray findings were pleural effusion in 40 (48.8%) and pneumothorax in 20 (24.4%). Only 3 (1.7%) of 177 patients were symptomatic. No additional X-Rays were required for 159 (89.8%) of the 177 patients included. Repeat X-Rays were required in 18 (10.1%) patients. Additional CT was required in only 3 (1.7%) patients.

Of the 177 patients included, 160 (90.4%) did not require additional hospitalization. Additional hospitalization and clinical follow-up were performed in 17 patients. None of the 177 patients required additional intervention.

DISCUSSION

In Worede et al.'s⁶ study of 200 cases published in 2022, 1 patient required repeat tube thoracostomy. In our study, no re-tube insertion was performed in 177 patients.

In the study by Zukowski et al.,³ 433 patients who had chest tubes removed were evaluated. It was reported that 33.2% of patients who had chest tubes removed had abnormal findings. All 13 patients who underwent re-insertion of chest tubes and 10 patients who were readmitted were symptomatic. Although reinsertion of a chest tube was not required in our study, new-onset dyspnea and chest pain were detected in 3 patients after chest tube removal. In these 3 patients, additional CT was requested after the control X-Ray. However, all 3 patients were discharged after clinical follow-up without the need for additional intervention.

When comparing control X-Ray application after chest tube removal with clinical observation without X-Ray, it was determined that the clinical observation strategy reduced

hospitalization costs and was cost-effective in 99.5% of cases.⁴ In the study by Goodman et al.,⁷ instead of routine X-Rays in patients with chest tubes, X-Rays were recommended for selected patients. This study showed that hospital costs were reduced if routine X-Rays were avoided.

In the study by McGrath et al.,⁸ 263 patients who had chest tubes removed were evaluated. Two of these patients had a chest tube inserted again. Both patients were reported to be symptomatic, and the decision to intervene was made based on symptoms.

Our study is consistent with the current literature.⁹⁻¹¹ Moreover, similar results have been reported even in patients who had chest tubes inserted for different reasons, such as esophagectomy.¹² Regardless of the etiology, follow-up chest X-Ray should be performed selectively in specific patients.

Limitations

Our study has some limitations. The fact that it is a retrospective and single-center study and the lack of comparison groups in this descriptive study are limiting factors. Additionally, referrals to external hospitals and missing data may have affected the results.

CONCLUSION

Our study showed that routine control X-Rays are not necessary after chest tube removal. We recommend that control X-Rays be reserved for symptomatic patients only.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Kastamonu Training and Research Hospital Clinical Researches Ethics Committee (Date: 27.07.2022, Decision No: 2022-KAEK-59).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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