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Outcomes of Pigtail Catheter Removal in Trauma Patients with Variable Post Removal Chest X-ray Timing

Avni Joshi BA, Shane Jung BS, Mary Froehlich MD, Allison McNickle MD FACS

UMC UNIVERSITY MEDICAL CENTER | UMC TRAUMA

BACKGROUND

Injuries to the chest may result in air accumulation within the pleural cavity known as a pneumothorax. This results in collapse of the lung which may impair respiratory function. Traumatic pneumothorax is a frequent indication for chest tube placement, and small-bore 14 Fr pigtail catheters (PC) have become a suitable alternative to traditional large-bore chest tubes (28-40 Fr) [Fig. 1]. They provide similar rates of successful lung re-expansion and complication risks while offering advantages such as reduced pain at the insertion site and potentially shorter hospital utilization (Kulvatunyou 2014, Rasihashemi 2021). Despite their growing use, there is not a clear consensus on best practices for management after catheter removal. The lack of standardized guidelines leads to variability in care, unnecessary imaging, and delays in patient discharge.

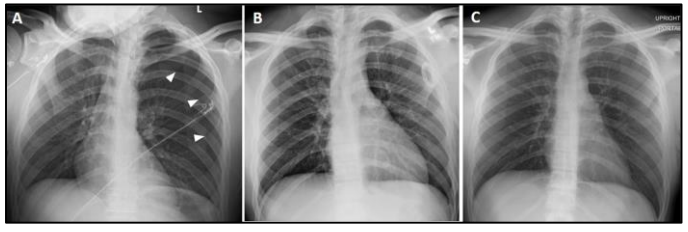


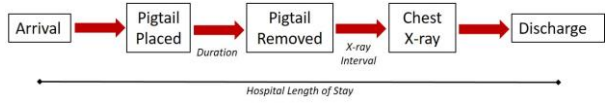
Figure 1 (A) Left pneumothorax (arrows) which resolved with a PC (B). X-ray at discharge (C).

PURPOSE

- Evaluate the duration of use and timing of removal of PC placed for pneumothorax.
- Determine if post-removal chest x-ray timing (less than 4, 4-6 or greater than 6 hours) affects length of stay and number of follow-up radiographs.
- Evaluate the frequency of recurrent pneumothorax and secondary intervention in patients who initially received a PC.

METHODS

Retrospective chart review was complete for 135 adult trauma patients managed with PCs for pneumothorax from 2019–2024 [IRB UMC-2022-407]. Non-trauma cases, large-bore tubes, hemothorax/effusion as primary indication, tubes placed at outside facilities or by interventional radiology, and protected populations were excluded. Data was collected on demographics, injury mechanism, rib fractures and associated injuries, post-removal imaging, pneumothorax recurrence, reinsertion or operative intervention, and XR intervals.



Primary outcomes were number of post-removal chest X-rays and hospital length of stay (hLOS). Secondary analysis examined differences by timing of post-removal imaging (<4, 4–6, >6 hours). Analysis was conducted using Chi-square tests for categorical data, and nonparametric tests for continuous data ($p < 0.05$).

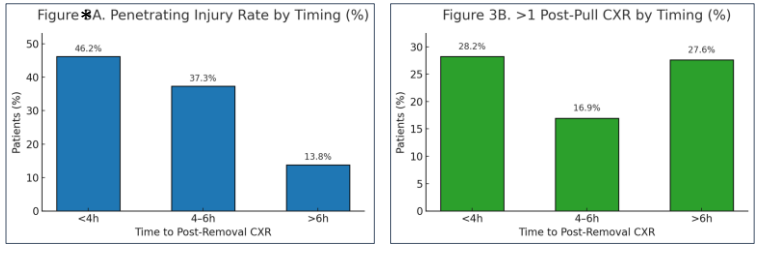


Figure 2 (A) Rates of penetrating injury were higher in the <4 hour group (p=0.018). (B) Multiple X-rays were obtained at a similar rate (p=0.338)

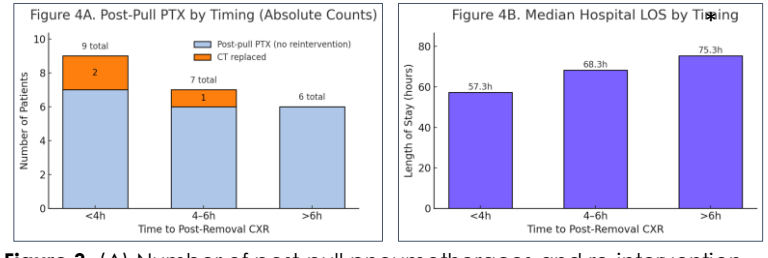


Figure 3 (A) Number of post-pull pneumothoraces and re-intervention. (B) Hospital LOS (p=0.036). * = significance (p<0.05)

RESULTS

- Demographics: median age 38 years, 110 (81.5%) males.
- 127 (94.1%) had a post-pull x-ray with 29 (21.5%) having multiple.
- Post-pull pneumothorax occurred in 22 (17.3%), with 3 (2.2%) requiring tube replacement and 3 (2.2%) requiring surgery.
- 39 patients had post-pull x-rays at less than 4 hours, 59 at 4-6 hours and 29 at greater than 6 hours.
- No differences were observed between groups in rates of post-pull pneumothorax or re-intervention. [Figure 2].
- hLOS was greater in the >6 hour group [Figure 3].
- The subset with rib fractures had a significantly longer time to PC placement and longer hLOS.
- Stabbings had a significantly shorter time to PC placement, shorter XR interval and less post-pull pneumothoraces.

CONCLUSIONS

- The interval to post PC removal imaging did not correlated to pneumothorax recurrence, tube reinsertion, or number of radiographs, although it had some relation to hLOS.
- Presence of rib fractures or a stabbing mechanism may represent patients that have a different specific clinical trajectory

REFERENCES

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