

## **Association Between Chest Tube Removal, Risk of Pleural Effusion, and Opioid Usage**

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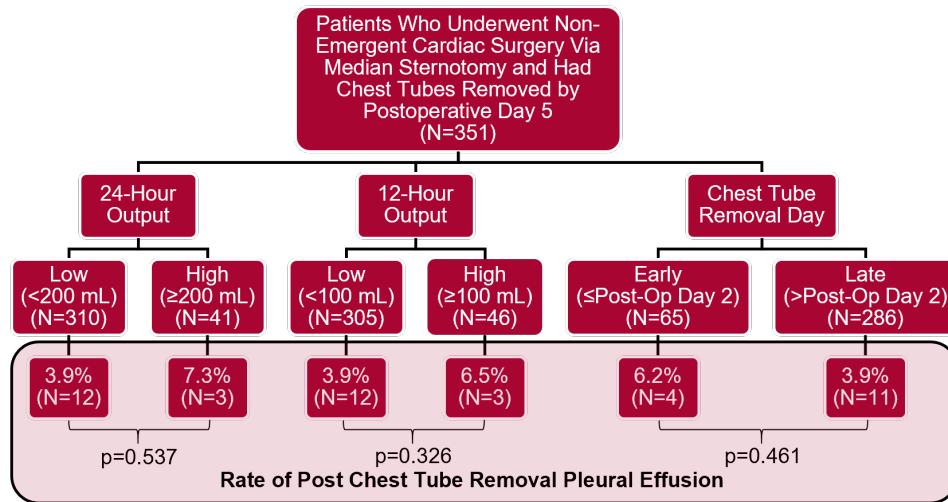
**Purpose** – There are no established guidelines regarding optimal timing of chest tube removal after cardiac surgery. This decision is often surgeon-specific, with commonly utilized criteria including drainage volume or time after surgery. We investigated the relationship between drainage volume, timing of chest tube removal, and risk of post-removal pleural effusion.

**Methods** – Single-center retrospective study of patients who underwent non-emergent cardiac surgery via median sternotomy at our institution. Subjects were grouped by volume of chest tube output in the 24-hours (High [ $\geq 200$  mL] vs. Low [ $< 200$  mL]) and 12-hours (High [ $\geq 100$  mL] vs Low [ $< 100$  mL]) immediately prior to chest tube removal and by day of chest tube removal (Early [ $\leq$  postoperative day 2] vs Late [ $>$  postoperative day 2]). Primary and secondary outcomes analyzed were incidence of pleural effusion requiring intervention following chest tube removal and opioid analgesic usage after chest tube removal, respectively. Bivariate and multivariate analyses were performed.

**Results** – A total of 351 patients were included. 15 patients developed post-removal pleural effusion. 24 and 12-hour chest tube output immediately preceding chest tube removal were not associated with post-removal pleural effusion formation ( $p=0.541$  and  $p=0.326$ , respectively). Postoperative day of chest tube removal was also not associated with pleural effusion formation ( $p=0.461$ ). Of the patients who developed post-removal pleural effusion, 67% (10/15) were female ( $p=0.010$ ) and 47% (7/15) had a history of endocarditis ( $p=0.015$ ). Early chest tube removal (on or before postoperative day 2) was associated with a significant decrease in opioid analgesic usage when compared to Late chest tube removal (113 morphine milligram equivalents vs 151 morphine milligram equivalents,  $p=0.007$ ) in patients without a history of IV drug use.

**Conclusions** - Chest tube output volume and removal day are not associated with an increased risk of post-removal pleural effusion. Chest tube removal is associated with a decrease in opioid use in some patients. Early removal of chest tubes following cardiac surgery might provide clinical benefit without associated increased risk of complications.

**Keywords** – Chest tube removal, pleural effusion, opioid usage, non-emergent cardiac surgery



<b>Median Perioperative Opioid Usage (Morphine Milligram Equivalents)</b>			
	Early Chest Tube Removal (≤Post-Op Day 2)	Late Chest Tube Removal (>Post-Op Day 2)	P-Value
All Patients	121.5	156.75	0.109
Patients with a History of IV Drug Use	140.25	170.5	0.293
Patients without a History of IV Drug Use	112.75	150.5	<b>0.007</b>

**Multiple Choice Question** – Based on our findings, which of the following factors is associated with an increased risk of developing post-removal pleural effusion?

- Chest tube removal timing
- 24-hour chest tube volume output
- 12-hour chest tube volume output
- Gender**

Correct answer: d. Gender

## References

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