Two Pneumothoraces After Pediatric Paravertebral Catheter Placement with Divergent Clinical Courses

Grace Washney, BS.[1] Taylor Duffy, BS and Mihaela Visoiu, MD[2]

[1]University of Pittsburgh School of Medicine, Pittsburgh, PA
[2]Department of Pediatric Anesthesiology and Perioperative Medicine, Children's Hospital of Pittsburgh, University of Pittsburgh Medical Center, Pittsburgh, PA

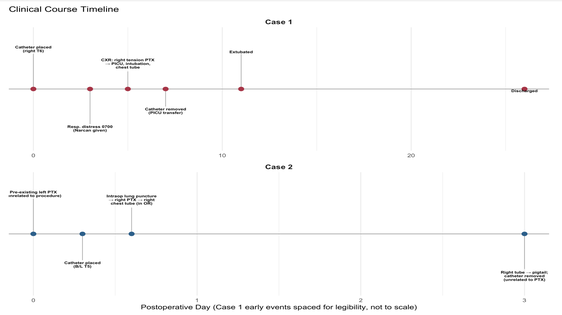
INTRODUCTION

- Paravertebral catheters provide analgesia comparable to neuraxial techniques
- Avoid side effects like hypotension, urinary retention, vomiting
- True incidence/complications are incompletely characterized- only one dedicated pediatric safety series to date (Vecchione et al.)
- Pneumothorax: recognized but poorly described, may present delayed or silently.

METHODS

- Retrospective case series: 2 pediatric patients, bilateral catheter placement
- UPMC CHP 2010-2026
- **Outcomes:**
  - IV morphine equivalent, ropivacaine, ketamine consumption (weight-normalized); pneumothorax symptoms, management changes

Figure 1: Clinical Course Timeline



Case 1: *catheter placed, followed within POD0–1 by respiratory distress, right tension pneumothorax, PICU transfer, catheter removal; extubated POD3, discharged POD26.*
Case 2: *pre-existing left PTX (unrelated); intraop lung puncture caused right PTX, managed immediately with chest tube in OR; tube exchanged for pigtail and catheter removed POD3, unrelated to PTX. Case 1 spacing for clarity only, not to scale.*

CASE 1

- 22-month-old male, 10.85 kg, ASA 2
  - Gastric pull-up
- Indication: right-sided PVB catheter for postoperative analgesia
- Right T6: paravertebral **catheter** placed (1 attempt, depth 2cm). Left T8: single-shot paravertebral **injection** (1 attempt, depth 3cm).
- Needle: Touhy 18G, 50mm. Catheter: 20G, placed right T6 only (skin depth 6cm)

Clinical course

- POD1 0700: found in respiratory distress- given Narcan for presumed oversedation
- Stat CXR= right-sided pneumothorax →Emergent PICU transfer, intubation (3.5 cuffed ETT); right pigtail chest tube placed
- Stable overnight, intubated and sedated

Diagnosis

- Large right-sided tension pneumothorax with mediastinal shift identified

Management

- Right pigtail chest tube placed; lung re-expanded
- PRBC + FFP given (low Hct, elevated INR)
- Catheter was removed on POD1 at time of PICU transfer, after pneumothorax was found
- Extubated POD3, discharged POD26

CASE 2

- 14-year-old male, 57.6 kg, ASA 2
  - Nuss procedure
- Indication: bilateral PVB catheters for postoperative analgesia
- Classic (landmark-based), sedation, B/L at T5 (3 attempts right, 1 attempt left, 4 total)
- Needle: Touhy 18G, 100mm (R depth 5cm, L depth 4cm); Catheter: 20G B/L, 10cm depth

Clinical course

- Patient presented with pre-existing left pneumothorax
- Inadvertent lung puncture during paravertebral block placement which caused a right-sided pneumothorax.
- Right chest tube placed intraoperatively; exchanged for pigtail catheter on POD3.

Diagnosis

- Left pneumothorax: pre-existing, unrelated to procedure.
- Right pneumothorax: intraoperative, caused by inadvertent lung puncture during block placement- confirmed on intraoperative CXR (Figure 2)

Management

- Right chest tube placed intraoperatively for procedure-related pneumothorax.
- Catheter was not removed as a result of pneumothorax, removed on POD3

RESULTS

Table 1: Case Comparison

	Case 1	Case 2
Age	22 months	14 years
Weight	10.85 kg	57.6 kg
Procedure	Gastric pull-up	Nuss procedure
Anesthesia at placement	Pt already under General	Sedation
Approach	Ultrasound-guided	Landmark-based, classic
Needle/Level	Touhy 18G / 20G catheter, 50mm / Right T6: catheter placed (1 attempt, depth 2cm). Left T8: single-shot injection (1 attempt, depth 3cm)	18G Touhy, 100mm; B/L T5; right depth 5cm, left depth 4cm; 20G catheter 10cm skin depth bilaterally
Attempts	2	3 right/ 1 left (4 total)
Presentation	POD1 AM: agitation, pinpoint pupils (Narcan given) → right tension pneumothorax with mediastinal shift (CXR)	Pre-existing left pneumothorax (unrelated); intraoperative right pneumothorax from lung puncture during placement (CXR-confirmed)
Management	Catheter removed at PICU transfer, after pneumothorax found; intubation, right pigtail chest tube, PRBC/FFP	Right chest tube placed intraop, exchanged for pigtail POD3. Left PTX managed expectantly.
Course	Extubated POD3, discharged POD26	Extubated postop, discharged POD6

Table 2: Postoperative Medication Consumption

	Case 1	Case 2
IV ME (mg/kg)	1.02	--
Ropivacaine (mL/kg)	0.461	0.087
Ketamine (mg/kg)	1.84	--

DISCUSSION

- Paravertebral space lies close to the pleura - injury can occur regardless of technique
- Case 1: delayed presentation despite ultrasound guidance suggests visualization does not eliminate the risk of a slow-developing pneumothorax
- Case 2: prompt intraoperative recognition and immediate chest tube placement show injury can be managed without delay when caught early — unlike Case 1, where it only became apparent once it progressed.

- **Pneumothorax is a recognized complication of paravertebral catheter placement**
- **Careful needle visualization/depth control is important with ultrasound guidance**
- **Suspect pneumothorax if respiratory status changes after placement**

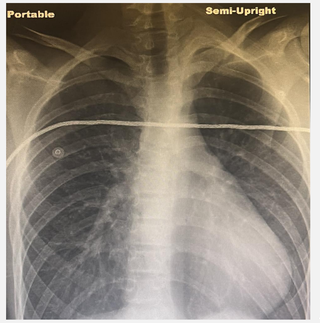


Figure 2: Intraoperative CXR, Case 2
Intraoperative chest X-ray demonstrating a small right-sided pneumothorax without mediastinal shift or tension physiology, resulting from inadvertent lung puncture during bilateral paravertebral catheter placement. A chest tube was placed intraoperatively for this finding.

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