

Preoperative versus Postoperative Paravertebral Catheters in Minimally Invasive Cardiac Surgery

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INTRODUCTION AND OBJECTIVES

Thoracic paravertebral catheters support postoperative pain control in minimally invasive cardiac procedures. Timing of placement varies across practices for a variety of reasons. While preoperative placement supports early analgesic control as well as uninhibited patient feedback, postoperative placement simplifies perioperative workflows. Additionally, current minimally invasive cardiac surgery pathways prioritize extubation in the operating room at the end of the procedure. This case series compares preoperative and postoperative placement in patients undergoing these minimally invasive cardiac procedures as they relate to timing of extubation, pain scores, and opioid requirements.

MATERIALS & METHODS

This case series includes adults undergoing minimally invasive cardiac procedures with paravertebral catheters placed before induction of anesthesia or after arrival to the intensive care unit. All patients received the same procedure and local anesthetic regimen beginning with thoracic paravertebral single-orifice catheters, placed unilaterally between T3/T4, T4/ T5, or T5/T6. The injected solution consisted of 20 milliliters of 0.25% bupivacaine with epinephrine at a 1:200,000 concentration. All catheters were connected to an electronic infusion pump with an intermittent bolus regimen that ranged from 12-15 milliliters. All catheter infusions were initiated in the intensive care unit, regardless of placement timing. The primary outcome is time to extubation measured in minutes. Secondary outcomes include cumulative opioid use measured in morphine milligram equivalents and numeric rating scale pain scores during the first 24 hours.

This study was conducted under Cedars-Sinai Medical Center institutional review board approval number IRB STUDY00002166. This scientific abstract contains no patient identifiable information; therefore, patient informed consent was not required per institutional policy.

RESULTS

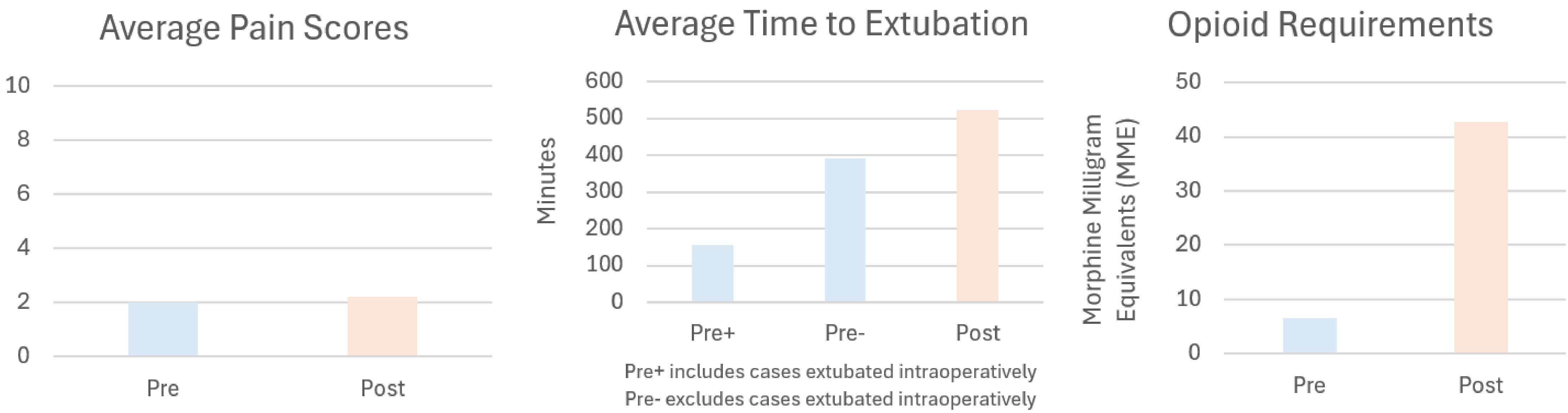
The case series included five patients with preoperative paravertebral catheters and five with postoperative catheters, aged 62 to 77 years. Extubation timing was shorter in the preoperative group. Excluding patients extubated in the operating room, the mean time to extubation was 392 minutes for preoperative catheters and 523 minutes for postoperative catheters. Of note, three of five preoperative patients were extubated in the operating room, giving a mean time to extubation of 156.8 minutes when included. Pain scores were similar between groups, with a mean numeric rating scale of 2.0 out of 10 for preoperative catheters and 2.2 out of 10 for postoperative catheters. Opioid requirements also differed substantially, with mean cumulative morphine milligram equivalents (MME) over 24 hours of 6.5 for preoperative catheters and 42.75 for postoperative catheters. All catheters were confirmed with chest radiography on postoperative day one. This series shows a trend toward earlier extubation and lower opioid requirements in the preoperative catheter group, with no clinical difference in pain scores.

Table 1. Comparison of Perioperative Outcomes by Paravertebral Catheter Placement Timing

TIMING	CASE	CXR	PAIN	TtE	OPIOIDS
PRE	MIDCAB	T4/5	7.00	0	20
PRE	MIDCAB	T3/4	0.00	0	0
PRE	MVR	T4/5	0.00	492	0
PRE	MIDCAB	T4/5	3.00	0	12.5
PRE	MVR	T4/5	0.00	292	0
POST	MVR	T4/5	0.00	512	37.5
POST	MVR	T4/5	3.00	509	0
POST	AVR	T4/5	2.00	723	30
POST	MVR	T5/6	5.00	385	77.5

MIDCAB = Minimally Invasive Coronary Artery Bypass; MVR = Mitral Valve Replacement; AVR = Aortic Valve Replacement; CXR = Chest X-Ray; TtE = Time to Extubation (in minutes); PAIN = Pain score on postoperative day one, measured on a numeric rating scale from 0 to 10; OPIOIDS = Cumulative opioid requirement measured in morphine milligram equivalents (MME)

Figures. Comparison of Postoperative Recovery Metrics by Catheter Placement Timing



LIMITATIONS

- This series includes ten patients. Small sample sizes lack statistical power to prove causation.
- Retrospective data collection relies on consistent nursing documentation.
- Nonstandard criteria for as needed opioids impact data accuracy.

DISCUSSION

Preoperative paravertebral catheter placement is associated with shorter extubation times and lower opioid requirements compared with postoperative placement. Pain scores remain similar between groups. These findings may support an association between preoperative placement and improved early recovery metrics in minimally invasive cardiac surgery. Preoperative placement tends to better support adherence to anticoagulation guidelines, as placement occurs prior to cardiopulmonary bypass and systemic heparinization. Delayed block placement increases opioid use and contributes to later extubations. Additional studies with larger cohorts and prospective design are needed to determine whether preoperative placement offers a reproducible clinical benefit.

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