

Enhanced Recovery after Pediatric Congenital Heart Repair with Erector Spinae Plane Blockade: An Ongoing Prospective, Randomized Controlled Trial

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Background

- Children who undergo congenital heart repair are at high risk for morbidity¹
- Prolonged postoperative intubation is associated with high mortality, long ICU stays, long hospital stays, and increased risk of pneumonia²
- Bilateral ESPB catheters have been described as safe and effective regional anesthesia during cardiac surgery³
- Given the potential opioid sparing benefits of ESPB catheters, we report the preliminary findings of an ongoing prospective, randomized controlled trial examining bilateral ESPB compared to standard of care

Methods

- Inclusion criteria:** patients age 0-21 years old undergoing the following congenital heart surgeries: atrial septal defect (ASD) repair, ventricular septal defect (VSD) repair, anomalous aortic origin of a coronary artery (AAOCA) repair, or left ventricular or right ventricular outflow (LV/AR) repairs
- Exclusion criteria:** patients weighing <5kg, patients who were clinically unstable or requiring emergent surgery, patients with pre-existing kidney or liver insufficiency, and peri-operative arrest
- Intervention:** Patients in the treatment group received bilateral T7 ESPB catheters, with lidocaine 0.25% 1.5 mg/kg (max 20mL) through each catheter prior to surgery, followed by alternating-side lidocaine boluses every 2 hours postoperatively
- Pain Regimen:** Both groups received standardized post-operative pain management: acetaminophen 15 mg/kg q6hr, ketorolac 0.5 mg/kg q6hr for 6 doses, and PRN parenteral morphine, oral ibuprofen, and oral oxycodone.
- Outcomes measured:**
 - CVICU length of stay
 - Time to extubation
 - Total opioid consumption through POD5
 - Reported pain

Figures

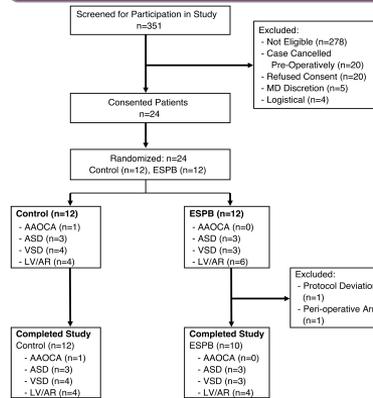


Fig 1. Enrollment diagram. Patients randomized via stratified permuted block randomization.

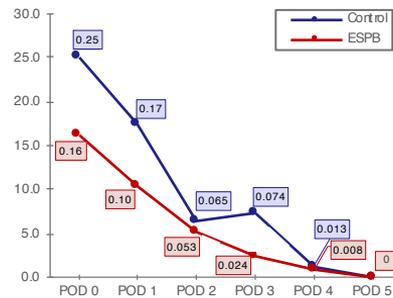


Fig 2. Total daily average opioid consumption as measured by morphine equivalents per kg body weight

	ESPB (n=10)	Control (n=12)
AGE (months)		
Average (Range)	107.9 (32 – 229)	100.3 (2 – 237)
SEX		
Male	9 (90%)	3 (25%)
Female	1 (10%)	9 (75%)
RACE / ETHNICITY		
White	30%	50%
Hispanic	40%	8.3%
Asian	10%	33.3%
Black	10%	0%
Other	10%	8.3%
PROCEDURE		
Avg Duration (hrs)	3.0	3.3
Avg CPB Time (min)	69.7	82.1

Table 1: Participant Characteristics

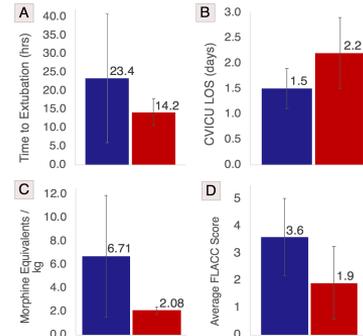


Fig 3. A) Average time to extubation. B) Average CVICU LOS. C) Average total morphine consumption/kg bodyweight. D) Average FLACC score over 36 hrs post-operatively.

Results

- To date, 22 congenital cardiac patients, ages 2 months to 21 years have been included in the study
- Average time to extubation was 23.4hrs (± 17.4) in control versus 14.2 (± 3.6) hrs in ESPB
- Average CVICU length of stay was 1.5 (± 0.4) days in controls versus 2.2 (± 0.7) days in ESPB
- Total opioid consumption (morphine equivalents per weight in kg) was 6.71 (± 5.19) in controls versus 2.08 (± 0.31) in ESPB
- Average FLACC score in the 36 hours following surgery was 3.6 (± 1.4) in controls, and 1.9 (± 1.3) in ESPB
- No adverse events were recorded in either group

Discussion

- To our knowledge, this is the first prospective trial examining ESPB during pediatric congenital cardiac repair
- Time to extubation, total opioid consumption, and reported pain are lower in ESPB patients, though not yet at the level of statistical significance
- Recruitment and data collection are ongoing to a projected 80 enrolled participants
- Further investigations include analysis of inflammatory biomarkers at various timepoints to determine if treatment with ESPB reduces inflammation compared to controls
- Given the increasing use of regional anesthesia during cardiac surgery, this study may yield important findings to help guide clinical indications for ESPB during pediatric heart repair

References

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- Agarwal HS, et al. Postoperative complications and association with outcomes in pediatric cardiac surgery. *J Thorac Cardiovasc Surg* 2014;148:609-616 e601.
- Caruso, T. J., Lawrence, K., & Tsui, B. C. (2019). Regional anesthesia for cardiac surgery. *Curr Opin in Anesth*, 32(5), 674-682.