

Impact of High Spinal Anesthesia in Pediatric Congenital Heart Surgery on Fast-Track Recovery: A Propensity Score-Matched Retrospective Comparative Study

Aravinthasamy Sivamurugan, **Nada Sadek**, Rakesh Sondekoppam, Alex Rier, Sudhakar Subramani, Srinivasan Rajagopal, Yatish Ranganath, Arun Singhal, Satoshi Hanada

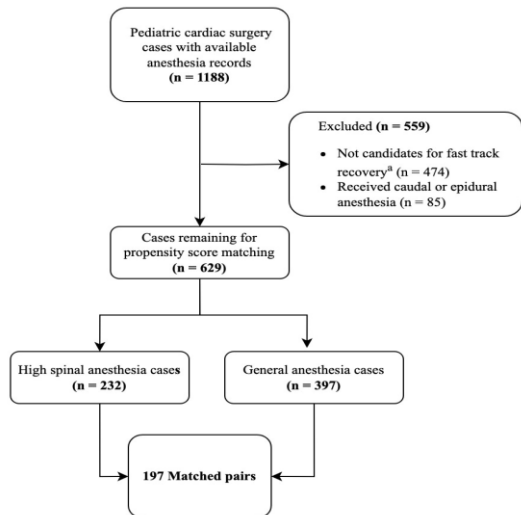
INTRODUCTION

- Fast-track cardiac surgery is gaining interest in pediatric cardiac surgery because of significant benefits of early extubation to the patients and health systems.
- High spinal anesthesia (HSA), while historically have been utilized in pediatric heart surgery, its impact on fast-track recovery profile has not been evaluated.
- We hypothesized that “in patients who have received HSA in combination with GA, the recovery characteristics such as extubation time, length of hospital (LOS) and ICU stay (ICU) will be different in comparison to those receiving GA alone.”

METHODS

- We queried our EHR and the Society of Thoracic Surgeons database (Nov 2010 till Dec 2020)
- Pediatric patients < 18 years classified as Risk Adjustment for Congenital Heart Surgery-1 (RACHS-1) Class 3 or less undergoing congenital heart surgeries were included.
- The cases were divided into two groups: pts who received HSA in combination with GA (HSA group) and those with GA alone without any additional neuraxial blocks (GA group).
- Primary outcome was extubation rate in the operating room.
- Secondary outcomes included extubation rates within 6 hours after ICU admission, length of hospital stay (LOS), length of stay in the intensive care unit (ICU), postoperative opioid consumption, pain scores and incidence of complications related to HSA.
- To account for patient characteristics, patients in the HSA and GA groups were matched at a 1:1 ratio using propensity score matching (error allowance: 0.15).
- The groups were compared using the Mann-Whitney U-test for continuous variables and chi-square test for dichotomous variables.
- A P value <0.05 was considered statistically significant.

RESULTS



Our results show that the patients receiving High Spinal Anesthesia were more likely to be **extubated** in the operating room and **had decreased length of ICU and hospital stay**

Percentage of Patients Requiring Intubation over One Week Postoperatively

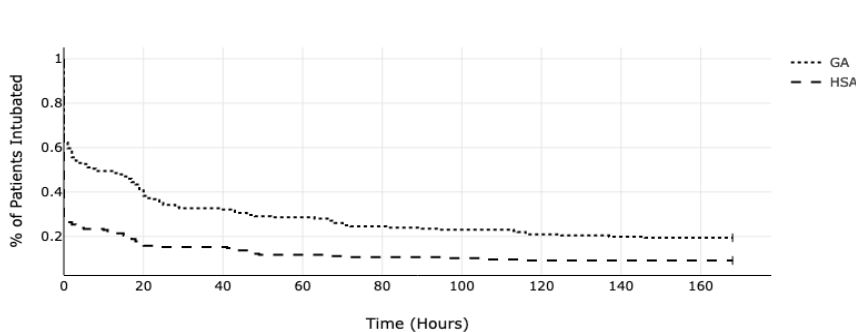


Table 3

Successful fast-track extubation, discharge from intensive care unit and hospital

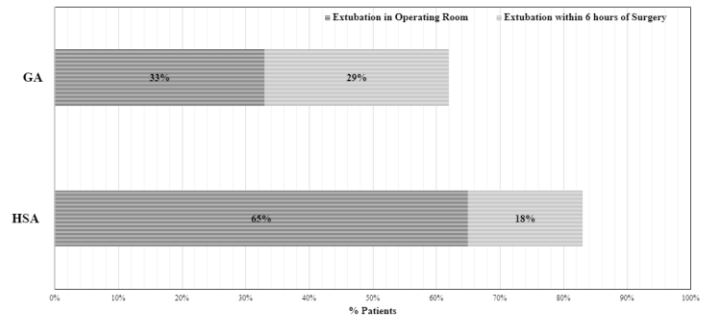
	High spinal anesthesia (n = 197)	General anesthesia (n = 197)	Odds ratio (95% CI)	P
Extubation in the operating room	129 (65%)	66 (33%)	3.82 (2.5, 5.8)	<0.0001
Extubation within 6 hours	163 (83%)	122 (62%)	2.95 (1.85, 4.71)	<0.0001
Intensive care unit LOS, days	5.1 (5.1)	8.0 (14.4)	-	<0.0001
Hospital LOS, days	5.0 (7.1)	9.2 (22.1)	-	<0.0001

Data are median (IQR), n (%). P values and odds ratios with 95% confidence intervals were generated with generalized linear mixed modeling. LOS, length of stay

Baseline and perioperative data

Variables	After matching		P
	High spinal anesthesia (n = 197)	General anesthesia (n = 197)	
Baseline data			
Age, years	3.9 ± 4.4	3.4 ± 4.8	0.312
Weight, kilograms	18.3 ± 17.8	16.1 ± 18.9	0.493
Male sex	112 (56.9%)	101 (51.3%)	0.266
Surgical Characteristics			
RACHS-1 Score ^a	2 (2-3)	2 (2-3)	0.307
RACHS-1 score 1	28	19	
RACHS-1 score 2	129	118	
RACHS-1 score 3	38	45	
RACHS-1 score 4	-	-	
Uncategorized ^b	-	-	
Surgical time, minutes	237 ± 105	269 ± 112	0.143
Requiring cardiac bypass	156 (79.2%)	148 (75.1%)	0.337
Bypass time, minutes	103 ± 65	95 ± 60	0.336

% OF PATIENTS EXTUBATED IN OR AND WITHIN 6 HOURS OF SURGERY



DISCUSSION

- Our study provides preliminary evidence on the impact and benefits of HSA on fast-track recovery following pediatric congenital heart surgery.
- Our results show that the patients in the HSA group were more likely to be extubated in the operating room and spent less time on postoperative mechanical ventilation in addition to having a decreased stay in the ICU and hospital overall.
- Future prospective well designed randomized clinical trials are warranted to verify these outcomes.