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IMPACT OF HIGH SPINAL ANESTHESIA IN PEDIATRIC CONGENITAL HEART SURGERY ON FAST-TRACK RECOVERY

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Introduction

High spinal anesthesia (HSA) has been utilized in pediatric congenital heart surgery¹; however, there is limited research investigating its impact on fast-track recovery. In our academic institution, HSA technique in combination with general anesthesia (GA) has been historically used in pediatric patients undergoing congenital heart surgery with the aim of faster recovery. We hypothesized that HSA combined with GA leads to more frequent extubations in the operating room, shorter extubation time, and a shorter length of stay (LOS) in the intensive care unit (ICU) and the hospital in pediatric congenital heart surgery, as compared to those with GA alone without any additional neuraxial blocks.

Materials and Methods

For this retrospective review, after obtaining institutional review board approval (HAWK IRB ID: 201911151 – Anesthesia Department Umbrella Project), we queried our institutional electronic health record database spanning a decade (November 1, 2010, and December 31, 2020) (Epic Systems, Verona, WI, USA) and additionally the Society of Thoracic Surgeons database. Pediatric patients aged less than 18 years classified as Risk Adjustment for Congenital Heart Surgery-1 (RACHS-1) Class 3 or less undergoing congenital heart surgeries were included for this study. The cases were divided into two groups: those who received HSA in combination with GA (HSA group) and those with GA alone without any additional neuraxial blocks (GA group). The 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. Propensity scores were determined using SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp). The error allowance for matches was set to 0.15. Covariates included age, gender, weight, RACHS-1 score, surgical time, use of cardiopulmonary bypass and bypass time were used to construct the model. Baseline demographics and covariates were compared before and after propensity score matching. The groups were compared using the Mann-Whitney U-test for continuous variables, and dichotomous variables were analyzed using the chi-square test. A P value <0.05 was considered statistically

significant. Odds ratios (OR) were calculated along with 95% confidence interval (CI) for outcome variables such as extubation in the operating room and extubation within 6 hours.

Results/Case Report

Out of the 1188 pediatric cardiac surgery cases that were performed during the study period, 629 cases were eligible for this study. Propensity score-matching yielded a total of 197 pairs of pediatric patients undergoing congenital heart surgery. The rates of extubation in the operating room and within 6 hours were significantly higher in the HSA group compared to the GA group (63.8% vs. 44.1%, $P<0.0001$; 83% vs. 62%, $P<0.0001$, respectively). The length of stay (LOS) in the ICU and the hospital were significantly shorter in the HSA group compared to the GA group (17.8 vs. 26.3 hours, $P<0.0001$; 5.5 vs. 7.9 days, $P<0.0001$, respectively).

The postoperative opioid requirement in the first 24 hours was significantly lower in the HSA group. The opioid requirement in the second 24 hours was not significantly different between groups. The maximum and average FLACC pain scores were significantly greater in the HSA group in the first 24 hours possibly due to a lower proportion of patients in the GA group being extubated and evaluated for pain. In the second 24 hours, maximal and average pain scores were not significantly different between groups. Complications related to HSA, such as intractable hypotension and epidural hematoma, were not observed in the HSA group.

Discussion

Fast-track extubation is gaining great interest in pediatric congenital heart surgery because of the potential benefits of early extubation²⁻⁵. 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.

References

- 1) Peterson KL, DeCampi WM, Pike NA, Robbins RC, Reitz BA. A report of two hundred twenty cases of regional anesthesia in pediatric cardiac surgery. *Anesth Analg.* 2000;90:1014-9
- 2) Hanada S, Kurosawa A, Randall B, Van Der Horst T, Ueda K. Impact of high spinal anesthesia technique on fast-track strategy in cardiac surgery: retrospective study. *Reg Anesth Pain Med.* 2019
- 3) Elmiro GS, Souza AH, Loyola SO, Prudente ML, Kushida CL, Carvalho JOS, et al. Spinal Anesthesia Increases the Frequency of Extubation in the Operating Room and Decreases the Time of Mechanical Ventilation after Cardiac Surgery. *Braz J Cardiovasc Surg.* 2021;36:32-8
- 4) Harris KC, Holowachuk S, Pitfield S, Sanatani S, Froese N, Potts JE, et al. Should early extubation be the goal for children after congenital cardiac surgery? *J Thorac Cardiovasc Surg.* 2014;148:2642-7
- 5) Mertin S, Sawatzky JA, Diehl-Jones WL, Lee TW. Total spinal anesthesia for cardiac surgery: does it make a difference in patient outcomes? *Dynamics.* 2009;20:18-24

Disclosures

No

Tables / Images

