Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Pediatric Cardiac Anesthesia

The Effect of Analgesia in Fast Track Pediatric Cardiac Patient

Mohammad Makbul Hossain[1*], Sabarin Ahamed[2], Khalifa Mahmud Tarik[3], Md. Yousuf Hira[4], Partha Shekhar Roy[5]

[1]Associate Professor & Head, Department of Pediatric Cardiac Anesthesia & ICU, Bangladesh, Shishu Hospital and Institute, Bangladesh
[2]Medical Officer, Gynae and Obs, Shaheed Suhrawardy Medical college Hospital, Bangladesh
[3]Senior Consultant, Cardiac Surgery, Bangladesh Shishu Hospital and Institute, Bangladesh
[4]Resident Medical Officer, Cardiac Surgery, Bangladesh Shishu Hospital and Institute, Bangladesh
[5]Register Cardiac Anesthesia, Bangladesh Shishu Hospital and Institute, Bangladesh

DOI: 10.36347/sjams.2022.v10i12.064 | **Received:** 02.10.2022 | **Accepted:** 15.11.2022 | **Published:** 26.12.2022

***Corresponding author:** Mohammad Makbul Hossain
Associate Professor & Head, Department of Pediatric Cardiac Anesthesia & ICU, Bangladesh, Shishu Hospital and Institute, Bangladesh

Abstract **Original Research Article**

Background: Rapid tracheal extubation after cardiac surgery is not novel. "Fast-track management" has gained popularity in recent years, and the provision of cost-effective treatment is now included in with other factors as a means of assessing the success of various surgical *procedures.* ***Objective:*** In this study our main goal is to evaluate the effect of Analgesia in fast track pediatric cardiac patient. ***Method:*** This retrospective study was done at Bangladesh Shishu Hospital and Institute, Bangladesh, from January 2021 to January 2022. A total of 100 patients considered suitable for fast-track care were selected prior to surgery. The criteria for the selection of fast-track patients included low- risk cardiac surgery and the absence of other associated complex defects, either a weight over 10 kg or at least 6 months of age, the absence of complex non-cardiac issues and no significant history of repeat chest infections or obstructive airway disease. ***Results:*** during the study, mean age group was 5.7 years, followed by 55 cases were male, mean weight was 15.5 kg. 50% had a trial septal defect followed by 15% Ventricular septal defect, 11% Partial anomalous pulmonary, 9% congenital sabaortic stenosis, 10% had Atrioventricular septal defect. While reviewing post-operative faces pain score in day-1, 15% had no hurts followed by 60% had hurts a little bit, 10% had hurts more, 5% had hurts even more, 5% had hurts whole lot, 5% had hurts worst In day-2 25% had no hurts, 50% had hurts a bit, 12% had hurts a little more, 6% had hurts even more. In day-3 40% had no hurts, 40% had hurts a little bit, 20% had hurts little more. However, in day-4 15% had hurts little bit and 10% had hurts little more. In addition, 90% of the patients had between excellent and satisfactory analgesia. Moreover, 48% had vomiting and 2% had itching. ***Conclusion:*** The treatment of congenital heart disease after surgery is projected to become more reliant on "fast-track" care as the healthcare system evolves to accommodate its patients' needs. We believe that an effective analgesic regimen is crucial to the success of the whole expedited procedure.

Keywords: Analgesia, fast track anesthesia, cardiac condition.

INTRODUCTION

Admitted infants and children to the ICU need to have both their core condition treated and their body functions (fluid balance, calorie intake, and temperature management) maintained for the best chance for recovery. Supplemental therapies include analgesia, sedation, and muscular relaxation when medically necessary. Although this trio is foundational to classical anesthesia, in paediatric intensive care it is administered for far longer periods of time, and at much lower doses than are necessary for surgery, and with quite different aims in mind. This highlights issues that are unique to the medications themselves. Pharmacokinetic and medication response variations are two examples [1-4].

Moreover, early tracheal extubation after cardiac surgery is not a new concept. In recent years, 'fast-track management' has become increasingly popular [5, 6], with the delivery of cost-efficient care considered as an additional variable when measuring and comparing surgical outcomes.

In this study our main goal is to evaluate the effect of Analgesia in fast track pediatric cardiac patient.

OBJECTIVE

- To assess the effect of Analgesia in fast track pediatric cardiac patient.

METHODOLOGY

After approval from our institutional review board, we performed a retrospective review of the records of patients who had been admitted to the fast-track program during a 12-month period, between January 2021 and January 2022.

A total of 100 patients considered suitable for fast-track care were selected prior to surgery. The criteria for the selection of fast-track patients included low-risk cardiac surgery and the absence of other associated complex defects, either a weight over 10 kg or at least 6 months of age, the absence of complex non-cardiac issues and no significant history of repeat chest infections or obstructive airway disease. All fast-track patients were planned to be the first case of the day on the surgical list. The trained clinical nurse specialist who would be looking after the child in the immediate postoperative period met the family and child preoperatively and discussed the fast-track process.

RESULTS

Table-1 shows baseline characteristics of study group where mean age group was 5.7 years, followed by 55 cases were male, mean weight was 15.5 kg, mean surgical duration was 180 min, mean ICU stay was 4.1 h and hospital stay was 3 days. The following table is given below:

Table-1: Baseline characteristics of study

Variable	Median
Age group	5.7 years
Male/female	55/45
Weight	15.5 kg
Surgical duration	180 min
ICU stay	4.1 h
Hospital stay	3 days

Table-2 shows distribution of the patients according to diagnosis where 50% had Atrial septal defect followed by 15% Ventricular septal defect, 11% Partial anomalous pulmonary, 9% Congenital sabaortic stenosis, 10% had Atrioventricular septal defect. The following table is given below:

Table-2: Distribution of the patients according to diagnosis

Diagnosis	%
Atrial septal defect	50%
Ventricular septal defect	15%
Partial anomalous pulmonary	11%
Congenital sabaortic stenosis	9%
Atrioventricular septal defect	10%
Other congenital anomalies	3%
Bidirectional Gelnn procedures	2%
Pulmonary stenosis	1%

Table-3 shows post-operative pain status according to Faces Pain Scale where in day-1 15% had no hurts followed 60% had hurts a little bit, 10% had hurts more, 5% had hurts even more, 5% had hurts whole lot, 5% had hurts worst In day-2 25% had no hurts, 50% had hurts a bit, 12% had hurts a little more, 6% had hurts even more. In day-3 40% had no hurts, 40% had hurts a little bit, 20% had hurts little more. However, in day-4 15% had hurts little bit and 10% had hurts little more. The following table is given below:

Table-3: Post-operative pain score

Day-1	
No Hurt	15%
Hurts little bit	60%
Hurts Little more	10%
Hurts Even more	5%
Hurts Whole Lot	5%
Hurts Worst	5%
Day-2	
No Hurt	25%
Hurts little bit	50%
Hurts Little more	12%
Hurts Even more	6%
Hurts Whole Lot	4%
Hurts Worst	
Day-3	
No Hurt	40%
Hurts little bit	40%
Hurts Little more	20%
Hurts Even more	5%
Hurts Whole Lot	
Hurts Worst	
Day-4	
No Hurt	
Hurts little bit	15%
Hurts Little more	10%
Hurts Even more	
Hurts Whole Lot	
Hurts Worst	

Pain scores post-surgery. 0: no pain, 1–3: mild pain, 4–7: moderate pain, 8–10: severe pain.

Figure-1 shows quality of analgesia where 90% of the patients had between excellent and satisfactory analgesia, only 5% complained of chest drain pain, this was observed exclusively during the first 24 h postoperatively, except in one patient where the chest drains remained in until day 4. The following figure is given below:

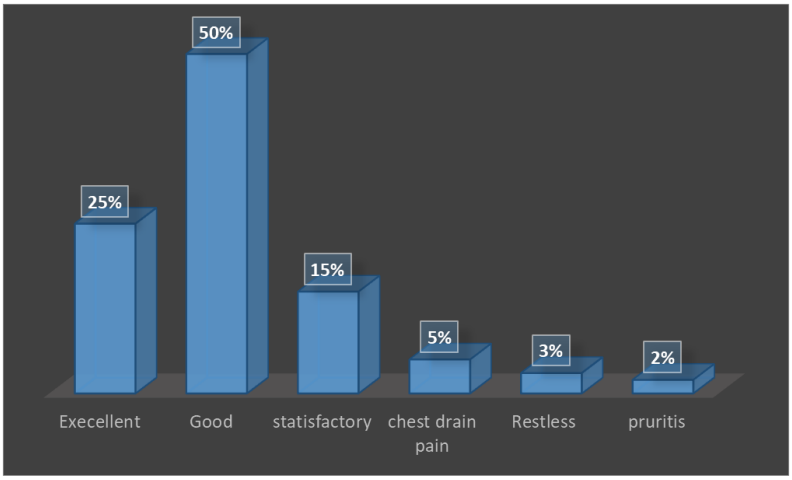

Figure-1: Quality of analgesia

Figure-2 shows adverse outcome where 48% had vomiting and 2% had itching. The following figure is given below in detail:

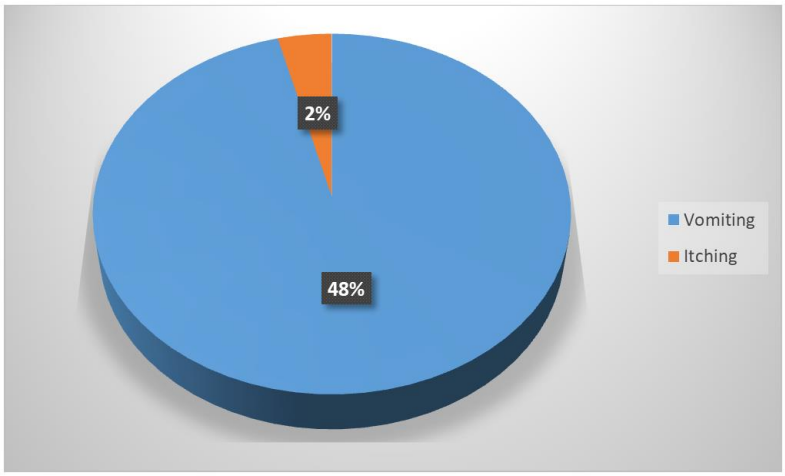

Figure-2: Adverse Outcome

DISCUSSION

There were no cases of respiratory depression or other serious complications related to the analgesic regimen in our study. The main adverse effect recorded was a high incidence of vomiting (48%) and small percentage of itching (2%). Studies have shown that POV is twice as frequent amongst children with an incidence between 13% and 42% [6, 7]. The high incidence of nausea and vomiting is a focus of ongoing quality improvement in the unit. In accordance with APA (Association of Paediatric Anaesthetists of Great Britain) guidelines, currently, we routinely administer a combination intravenous antiemetic therapy of ondansetron and dexamethasone [8].

A recent study analysed 10 000 children who received morphine NCA(Nurse-controlled analgesia) also concluded that the main side effects were PONV (25%), itching (9.4%) and respiratory depression (4.5%). The incidence of serious life-threatening events was 0.4%, and this was higher in neonates (2.5%) [9] our study did not include neonates. Another recent, large prospective audit of paediatric opioid infusions reported the incidence of severe clinical incidents to be 1:10 000. Twenty-eight grade 2 incidents were reported (harm but with full recovery) (1:383), of which half were respiratory depression. The authors in this audit also concluded that avoidable factors were identified and these included pump programming and prescription errors, the use of concurrent sedatives or opiods by different routes and overgenerous dosing in infants [10].

The limitations of our study include the retrospective nature of the analysis, the imperfect protocol structure and that we only had complete data from those who were specifically followed up by the pain team.

Neonates and small children are often unable to communicate their level of discomfort and pain. Pain management in this group of patients often goes unrecognised and is given little attention. We believe

that effective pain management by a specialised pain team is an essential component of the fast-track process.

Referral to the acute pain team is our standard of care, and we feel that good-quality analgesia can be achieved by daily reviews by the pain team, as described for the patients in this study.

In the early experience of CPB in children, the use of high-dose opioid techniques was the basis for anaesthesia, with continuance of this strategy during the postoperative period. This was believed to modulate the stress response and improve outcomes.

Gruber *et al.,* concluded that a large-dose fentanyl technique was not an important determinant of outcome, nor did it prevent a hormonal or metabolic stress response in infants undergoing cardiac surgery [11]. However, in the era of modern CPB techniques, such protective strategies are no longer required. Recent studies have not validated a link between stress hormone levels and clinical outcomes, even in high-risk infants [11, 12]. Some authors advocate the use of regional analgesia and general anaesthesia to facilitate early extubation [13]. We have obtained very good results for our patients using routine general anaesthesia, moderate doses of intra-operative fentanyl, a multimodal analgesia technique and routine follow-up of patients by a specialised pain team.

It should also be noted that the definition in literature of 'early extubation', which is a fundamental part of a fast-track approach to cardiac surgery, is not consistent and poorly defined. Generally, the term 'early extubation' is used when the endotracheal tube is removed within 6–8 h after the surgery. However, early extubation has been associated with extubation in the operating room and as late as 24 h following surgery [14]. In our series, extubation time (maximum ventilation time 8 h) was consistent with the definition of 'early extubation'.

There are many benefits to a fast-track approach to cardiac surgery. These include reduction in ventilator- associated infections; reduced risks associated with unplanned extubations, decreased risk of other nosocomial infections, increased patient and parent satisfaction and reduced financial costs [15, 16]. Barash *et al.,* claimed psychological benefits of early extubation and decreased pulmonary complications and duration of intensive care stay.

With changing healthcare delivery, 'fast-track' care is likely to play an increasingly important role in the management of congenital cardiac surgery. An adequate analgesic regimen contributes to favourable outcomes, which we consider an essential component of the entire fast-track process.

CONCLUSION

The treatment of congenital heart disease after surgery is projected to become more reliant on "fast-track" care as the healthcare system evolves to accommodate its patients' needs. We believe that an effective analgesic regimen is crucial to the success of the whole expedited procedure.

REFERENCES

1. Lake, C. L. (2002). Fast tracking in paediatric cardiac anaesthesia: an update. *Annals of Cardiac Anaesthesia*, *5*(2), 203-208.
2. Laussen, P. C., & Roth, S. J. (2003). Fast tracking: efficiently and safely moving patients through the intensive care unit. *Progress in Pediatric cardiology*, *18*(2), 149-158.
3. Metin, K., Celik, M., & Oto, O. (2005). Fast-track anesthesia in cardiac surgery for noncomplex congenital cardiac anomalies. *Pediatrics and Neonatology*, *5*, 2.
4. Kloth, R. L., & Baum, V. C. (2002). Very early extubation in children after cardiac surgery. *Critical care medicine*, *30*(4), 787-791.
5. Howard, F., Brown, K. L., Garside, V., Walker, I., & Elliott, M. J. (2010). Fast-track paediatric cardiac surgery: the feasibility and benefits of a protocol for uncomplicated cases. *European journal of cardio-thoracic surgery*, *37*(1), 193-196.
6. Lerman, J. (1992). Surgical and patient factors involved in postoperative nausea and vomiting. *British Journal of Anaesthesia*, *69*, 24S-24S.
7. Rose, J. B., & Watcha, M. F. (1999). Postoperative nausea and vomiting in paediatric patients. *British journal of anaesthesia*, *83*(1), 104-117.
8. Carr, A. S., Courtman, S., Holtby, H., Morton, N., Jacobson, S., Brennan, L., ... & Pope, J. (2009). The Association of Paediatric Anaesthetists of Great Britain & Ireland. *Guidelines on the prevention of postoperative vomiting in children. Spring*, 1-35.
9. Howard, R. F., LLOYD-THOMAS, A. D. R. I. A. N., Thomas, M., GLYN WILLIAMS, D., Saul, R., Bruce, E., & Peters, J. (2010). Nurse-controlled analgesia (NCA) following major surgery in 10 000 patients in a children's hospital. *Pediatric Anesthesia*, *20*(2), 126-134.
10. Morton, N. S., & Errera, A. (2010). APA national audit of pediatric opioid infusions. *Pediatric Anesthesia*, *20*(2), 119-125.
11. Gruber, E. M., Laussen, P. C., Casta, A., Zimmerman, A. A., Zurakowski, D., Reid, R., ... & Hansen, D. D. (2001). Stress response in infants undergoing cardiac surgery: a randomized study of fentanyl bolus, fentanyl infusion, and fentanyl-midazolam infusion. *Anesthesia & Analgesia*, *92*(4), 882-890.
12. Steven, J. M., & McGowan Jr, F. X. (2000). Neuraxial blockade for pediatric cardiac surgery:

lessons yet to be learned. *Anesthesia & Analgesia*, *90*(5), 1011-1013.

13. Hammer, G. B., Ngo, K., & Macario, A. (2000). A retrospective examination of regional plus general anesthesia in children undergoing open heart surgery. *Anesthesia & Analgesia*, *90*(5), 1020-1024.
14. Mittnacht, A. J., & Hollinger, I. (2010). Fast-tracking in pediatric cardiac surgery-the current standing. *Annals of cardiac anaesthesia*, *13*(2), 92-101.
15. Heinle, J. S., Diaz, L. K., & Fox, L. S. (1997). Early extubation after cardiac operations in neonates and young infants. *The Journal of thoracic and cardiovascular surgery*, *114*(3), 413-418.
16. Kloth, R. L., & Baum, V. C. (2002). Very early extubation in children after cardiac surgery. *Critical care medicine*, *30*(4), 787-791.