



EFFORTS FOR EXCELLENCE – ON TABLE EXTUBATION IN PAEDIATRIC PATIENTS OF SURGICAL LIGATION FOR PATENT DUCTUS ARTERIOSUS.

Anaesthesiology

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ABSTRACT

Patent ductus arteriosus (PDA) is a persistent fetal communication from main pulmonary artery to the descending aorta. It is a common acyanotic congenital heart disease.[ACHD] The incidence 1 in 2500 live full term births and contribute 10% of all congenital heart defects of ACHD. Indication to treat PDA patient is development of severe pulmonary hypertension. Treatment is either device closure in cath lab or surgical ligation. Many patients who are not suitable for device closure are treated surgically through thoracotomy approach. Surgical procedure require invasive monitoring with arterial and cvp lines and overnight ventilation make these patients prone for infections, increased intensive care unit stay with many complications and increased costings as well. In our retrospective observational study we studied benefits of ultrafast tracking in surgical ligation of PDA patients. We used minimal invasive or semi invasive monitoring and on table extubation in this paediatric patients. **Conclusion-** The single centre retrospective study of ultrafast tracking in PDA ligation patients has given successful recovery and early discharge from hospital. This method has been proved cost effective and without any untoward complications making this paediatric cardiothoracic surgery very safe, cost effective.

KEYWORDS

Ultrafast-tracking, safety and cost effectivity, surgical ligation of PDA.

Aim & objective of Our Study

To study the benefits of ultrafast tracking of patients in surgical ligation of Patent ductus arteriosus with on table extubation, and without invasive monitoring.

MATERIAL & METHOD

For all surgical paediatric patients Standard NBM protocol is followed.

After ethical committee approval, This study was conducted at MGM Medical College and MCRI, Chatrapati Sambhajnagar (Aurangabad). MH.

Premedication given with injection Glycopyrolate (5mcg/kg) IV and injection Midazolam (0.05mg/kg) IV 5-10 min before taking in OT. All patients induced without institutes protocol as follows-
IV Induction -with inj. Fentanyl (1mcg/kg) inj. Ketamine (2mg/kg) , Inj. Vecuron 0.1mg/kg

Maintenance is done with O₂, air and Sevoflurane 2%, increased at ligation up to 6%- maximum 1min. to achieve hypotension to facilitate ligation.

Intravenous fluid with 0.45% DNS at 2ml/kg/hr.

Standard non invasive monitoring like ECG, NIBP, ET CO₂, temperature monitoring, Urinary catheterization [semi invasive monitoring] done in every patient.

Inclusion Criteria

1 day to 18 yrs.

Exclusion Criteria

1. Genetic syndrome
2. Pre-op ventilator
3. Spine deformity
4. Biventricular dysfunction

Extubation Criteria

1. Fully awake, Good respiratory efforts, [6-8 ml/kg TV]
2. Minimal drains
3. Spo₂ 95% - 100% with fio₂ - 50%

Reversal with inj. neostigmine 50mcg/kg inj. Glyco 10 mcg/kg and inj. ondansetron 0.1mg/kg iv

Analgesia-Multimodal

In every patient, we had given preemptive multi-modal analgesia as per following protocol.

Inj. Paracetamol 15mg/kg iv stat before surgical incision then & TDS and postoperatively Diclofenac suppositories. [2mg/kg] BD

Intercostal nerve block and local skin infiltration with inj. bupivacaine 0.5 diluted [2mg/kg max.]

Post-op infusion of dexmedetomidine drip @ 0.2 mcg/kg/hr, max 0.5mcg/kg/hr. in every patient.

Drains removed next day morning and patient shifted out of ICU in evening.

Patients discharged from ward on 3rd or 4th day of surgery if feasible.

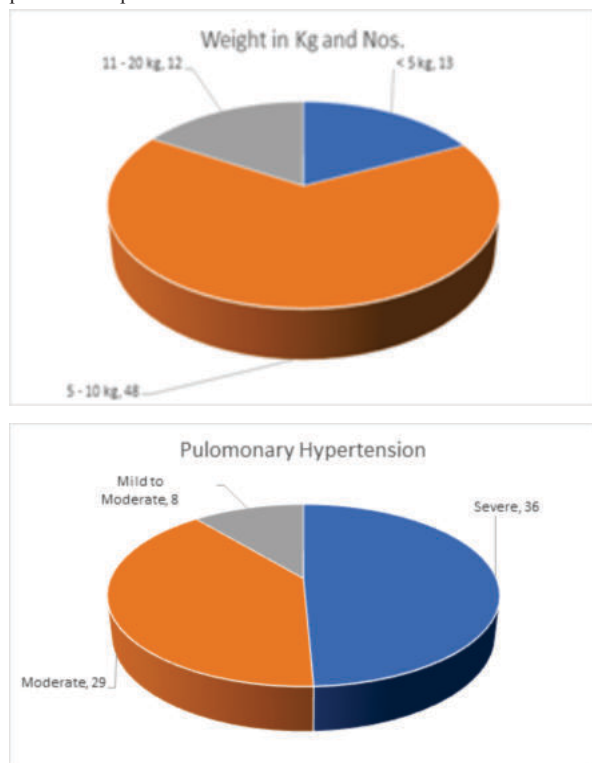
RESULTS

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	73	0.10	11.00	1.8945	2.61289
Total stay	73	4.00	6.00	4.1233	.40638
Duration of SX	73	45.00	245.00	136.6164	36.15001
Extubation time	73	8.00	15.00	11.3151	2.33260
Stay in ICU	73	1.00	2.50	1.7740	0.38225
Drain	73	0.00	10.00	1.0959	3.14539

In our study total 73 patients were enrolled. Out of 73 patients 34 were male and 39 were female. Age group wise distribution is as follows- 0-6 month = 22 patients, 13-36 month = 22, 4 yr - 10 yrs = 8, 11 yrs = 3 patients.

Mean duration of surgery was 136.6 min. All patients extubated on table after average of 11.3 min post surgery. They had average stay in ICU of 1.77 day only. Average hospital stay for these patients is only 4.12 days. As the results were promising and beneficial we conducted same protocol in every patient rather than doing conventional protocols, so we couldn't have control group, so we conducted observational study rather than comparative study. No patient required re extubation. Patients were comfortable with the routine multimodal analgesics as

mentioned above. We started oral liquids after hrs of extubation which improved patients cooperation. We measured Pain score with VAS as per institutes protocol.



DISCUSSION

"In this era of cost containment any technique that allows maximal use of resources without jeopardizing patients safety is welcome." [1] Barash et al.,

Keeping the same aim, we rather using conventional protocols of putting all invasive lines and overnight ventilation for post PDA ligation, used very simple protocols.

Ultrafasttracking means extubation within 2 hrs, but here it implies extubation on table without taking invasive lines and minimal post op ICU stay.

In our study, extubation in all cases was successful without morbidity and mortality and decrease in length of ICU stay and hospital stay as well.

In Indian scenario, paying capacity of many patients is extremely poor, in such patients cost cutting is very crucial and beneficial for patient as well as hospital resources [2].

As it's a thoracotomy procedure, surgeons put ICD as protocol to avoid pneumothorax, though the drains were nil or up to 10 ml only. In view of drain in situ the length of stay increases and we can not do it as day care procedure, but definitely ultra fast tracking in PDA patients is feasible and successful as in other cardiac surgeries. [3]

R.K. Garg et al. done on table extubation in 1000 paediatric cardiac patients and successfully accomplished in over 85%. They had taken all simple and complex cardiac procedures in study group. They concluded that in developing countries for resource sparing benefit and clinical benefits this treatment model can be considered. We followed the same type of protocols and moreover we did this treatment plan in simple kind of cardiac surgery like PDA Ligation. [4]

M. Hoda et al. did retrospective study on 82 patients in higher age group paediatric patients [6/7 years]. 80% WAS SUCCESSFULLY ACCOMPLISHED the treatment, while one needed intubation. Total PICU stay was 1.7 days which was similar to our study result. They concluded, on table extubation is feasible and safe. [5]

T. Fukunish et al. did retrospective study in 359 patients and they concluded that extubation on table is feasible with low rate of re

intubation. [6] Zeena Makhija et al. did comparative study between on table extubation and extubation in PICU later. They didn't find any significant advantages of on table extubation. [7] Jing Xu and et al. concluded ultra fast tracking anaesthesia shows stable haemodynamics with shorter ICU stay and hospital stay. [8]

Torsten Baehner et al. did retrospective study and showed less than 2 years patient has more ICU stay than older age group patients. [9]

Kloth et al. concluded that very early extubation is feasible but advantages of early and delayed extubation was unclear. [10]

Though Kloth et al. and Garg et al. both quoted that this mode of treatment should be acceptable by all team members like Cardiac surgeons, intensivists and OT nurses. As, on table extubation will take time and OT turn over of number of cases may get affected.

F. Tirotta et al. did three year study of immediate extubation and concluded that early extubation is depend on various factors including patient age and size, duration of CPB, use of anaesthetic drugs and amount of blood loss. [11] But in our study, it's a simple step of ligation of PDA with controlled hypotension. Hypotension can be achieved with sevoflurane, small doses of propofol or required inj. Nitroglycerine. We maintained Blood pressure of 60/70 mm of HG systolic and slowly BP achieved to normal values successfully.

John Varghese et al. studied immediate extubation in neonatal paediatric cardiac surgeries and concluded benefits regarding ICU stay and cost. [12]

CONCLUSION

The single centre retrospective study of ultrafast tracking in PDA ligation patients has given successful recovery and early discharge from hospital. This method has been proved cost effective and without any untoward complications making cardiothoracic surgery very safe, cost effective.

Conflict of Interest- Nil declared.

Source of Funding - Nil.

REFERENCES

- Barash PG, Lescovich F, Katz JD, Talner NS, Stansel HC Jr. Early extubation following pediatric cardiothoracic operation: A viable alternative. *Ann Thorac Surg* 1980;29:228-33. [PUBMED]
- Garg R, Rao S, John C, Reddy C, Hegde R, Murthy K, et al. Extubation in the operating room after cardiac surgery in children: A prospective observational study with multidisciplinary coordinated approach. *J Cardiothorac Vasc Anesth* 2014;28:479-87.
- Taware M, Sonkusale M, Deshpande R. Ultra-fast-tracking in cardiac anaesthesia "Our Experience" in a rural setup. *J Datta Meghe Inst Med Sci Univ* 2017;12:110-4.
- Garg, Rajnish, et al. "Extubation in the operating room after cardiac surgery in children: a prospective observational study with multidisciplinary coordinated approach." *Journal of cardiothoracic and vascular anesthesia* 28.3 (2014): 479-487.
- Hoda, Mehar, et al. "On-table Extubation after Open Heart Surgery in Children: An Experience from a Tertiary Care Hospital in a Developing Country." *Congenital Heart Disease* 11.1 (2016): 58-62.
- Fukunishi, Takuma, et al. "Early extubation in the operating room after congenital open-heart surgery." *International Heart Journal* 59.1 (2018): 94-98.
- Makhija, Zeena, Amit Kumar, and Mahesh Bhatt. "Effect of on-table extubation after congenital heart surgery on outcomes in a developing country." *Journal of Cardiothoracic Surgery*. Vol. 10. No. 1. BioMed Central, 2015.
- Xu, Jing, et al. "Benefits of ultra-fast-track anesthesia for children with congenital heart disease undergoing cardiac surgery." *BMC pediatrics* 19 (2019): 1-5.
- Baehner, Torsten, et al. "Effects of on-table extubation after pediatric cardiac surgery." *Journal of Clinical Medicine* 11.17 (2022): 5186.
- Kloth, Robin L., and Victor C. Baum. "Very early extubation in children after cardiac surgery." *Critical care medicine* 30.4 (2002): 787-791.
- Tirotta, Christopher F., et al. "Three-year experience with immediate extubation in pediatric patients after congenital cardiac surgery." *Journal of Cardiothoracic Surgery* 15.1 (2020): 1-11.
- Varghese J, Kutty S, Abdullah I, Hall S, Shostrom V, Hammel JM. Preoperative and Intraoperative Predictive Factors of Immediate Extubation After Neonatal Cardiac Surgery. *Ann Thorac Surg*. 2016 Nov;102(5):1588-1595. doi: 10.1016/j.athoracsurg.2016.04.030. Epub 2016 Jun 18. PMID: 27324528.