

Efficacy Of Dexmedetomidine For Prevention Of Emergence Agitation In Post Cardiac Surgery Patients

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Abstract

Background and Aim: Emergent agitation (EA), which is one of the most common and untreatable postoperative sequelae, occurs most frequently in patients having heart surgery while under isoflurane anesthesia. Dexmedetomidine, a common (2)-adrenoceptor agonist used in cardiac surgery, offers the finest sedation, reduces preoperative anxiety, and facilitates a smooth induction of anesthesia. Our goal was to evaluate dexmedetomidine's efficiency in reducing emergence agitation in heart surgery patients.

Study Design: Comparative study

Place and Duration: This study was conducted at lady reading hospital Peshawar and the duration of this study was from February 2019 to September 2019.

Methods: Total 110 patients of both genders had age 25-70 years were included. Patients were included in this study after getting informed written consent. Patients were equally divided in two groups. 55 patients of group I received dexmedetomidine 0.5 mcg/kg over 15 min followed by 0.1 mcg/kg/h under isoflurane **anesthesia** and 55 cases of group II received placebo. Results of the two groups were contrasted in terms of emerging agitation prevention. We used SPSS 24.0 to analyze all data.

Results: Patients mean age in group I was 55.9 ± 7.41 years with mean BMI 25.2 ± 4.35 kg/m² and in group II mean age was 53.5 ± 4.75 years with mean BMI 24.9 ± 13.87 kg/m². There were 31 (56.4%) males and 24 (43.6%) females in group I and in group II 33 (60%) males and 22 (40%) females. Mean systolic and diastolic BP in group I was 111.6 ± 18.7 mmHg and 70.3 ± 14.2 mmHg and in group II 109.4 ± 21.11 mmHg and 68.9 ± 19.5 mmHg was systolic and diastolic BP. There was no any significant difference observed in surgery time among both groups >0.05 . Mean heart rate in group I was 66.3 ± 4.72 and in group II mean heart rate was 89.6 ± 8.68 . Frequency of EA in group II was higher found in 20 (36.4%) cases as compared to group in 7 (12.7%) significantly with $p < 0.005$.

Conclusion: We concluded in this study that use of dexmedetomidine in patients of post cardiac surgery was effective and useful to prevent emergence agitation. Compared to other medications, dexmedetomidine is a great option for preventing EA.

Keywords: EA, Cardiac Surgery, Isoflurane anesthesia

INTRODUCTION

Emergence agitation is a disorder that manifests in the first few hours following anesthesia and is marked by excitement, restlessness, confusion, and other unusual behaviors including sobbing, shouting, kicking, being unable

to be comforted, and refusing to comply (EA). The frequency of eczema following sevoflurane anesthesia in children can range anywhere from 10 to 80 percent, according to the research that has been published [1,2]. One of the hazards associated with EA is self-harm, combined with delays in leaving the PACU, more effort for medical personnel, angry parents, and higher overall expenditures.

If you are experiencing EA, it may raise your risk of physical damage and lead to activities that are not acceptable following surgery. Medication may be required to treat it, despite the fact that it only lasts for a relatively short time. a number of pharmaceuticals, including ketamine, propofol, clonidine, opioids, and others, have proved effective in halting the progression of EA. Many of these medications, on the other hand, might cause unpleasant side effects including nausea and vomiting, in addition to the possibility of extending sleepiness following anesthesia. Although it does not produce significant respiratory depression, dexmedetomidine does elicit sedative, hypnotic, and anxiolytic effects because it acts on 2-adrenergic receptors [3,]. It has been put to use on a large scale to reduce the incidence of EA in children [4]. The effectiveness of dexmedetomidine in preventing EA in adults following nasal surgery has been demonstrated in a limited number of trials; nonetheless, the results of those research are encouraging. [6]

Although a number of medications, including melatonin, dexmedetomidine, midazolam, propofol, and fentanyl, as well as fentanyl, have been investigated in studies to minimize the incidence of EA, the most effective preventative treatment is still unknown. With sedative, anxiolytic, sympatholytic, or analgesic-sparing characteristics, dexmedetomidine is indeed a selective (2)-adrenoceptor agonist. It also generates minimal impairment of the respiratory function in comparison to other drugs that have been investigated [7,8]. Many clinical studies that have been conducted to investigate whether or not dexmedetomidine is useful in preventing EA have utilized a wide array of dose and administration techniques. In this particular study, we aimed to find out whether or not dexmedetomidine was associated with an increased risk of EA.

MATERIALS AND METHODS

This comparative study was conducted at lady reading hospital Peshawar and the duration of this study was from February 2019 to September 2019, and comprised of 110 patients. Patients <25 years of, patients with renal failure and those did not provide any written consent were excluded. Included patients were age 25-70 years. Patients were equally divided in two groups. 55 patients of group I received dexmedetomidine 0.5 mcg/kg over 15 min followed by 0.1 mcg/kg/h under isoflurane anesthesia and 55 cases of group II received placebo. The day before their surgeries, each patient underwent a comprehensive evaluation. Standard monitoring was performed in the operating room by recording parameters such as noninvasive blood pressure (NIBP), ECG, peripheral oxygen saturation (SpO₂), and BIS electrodes. All patients had two intravenous (IV) access points set up; one for IV fluids and one for infusion of the study medication.

A blinded observer checked on patients for things like bradycardia, tachycardia, hypotension, hypertension, and residual sedation on the Ramsay sedation scale, as well as for things like nausea, vomiting, and the need for analgesia. At the request of the patient, a rescue analgesic (intramuscular diclofenac sodium 75 mg) was given in the PACU.

Our study's major outcome measure was the rate of EA with dexmedetomidine; other outcomes included the need for additional anesthetic agents (desflurane), hemodynamic stability, speed of recovery from general anesthesia, degree of sedation after surgery, pain relief needed, and adverse events.

RESULTS

Patients mean age in group I was 55.9±7.41 years with mean BMI 25.2±4.35 kg/m² and in group II mean age was 53.5±4.75 years with mean BMI 24.9±13.87 kg/m². There were 31 (56.4%) males and 24 (43.6%) females in group I and in group II 33 (60%) males and 22 (40%) females. Mean systolic and diastolic BP in group I was 111.6±18.7 mmHg and 70.3±14.2 mmHg and in group II 109.4±21.11 mmHg and 68.9±19.5 mmHg was systolic and diastolic BP. (table 1)

Table-1: Patients included details

| Variables | Group I | Group II |
|-------------------------------|--------------|-------------|
| Mean age (years) | 55.9±7.41 | 53.5±4.75 |
| Mean BMI (kg/m ²) | 25.2±4.35 | 24.9±13.87 |
| Gender | | |
| Male | 31 (56.4%) | 33 (60%) |
| Female | 24 (43.6%) | 22 (40%) |
| Mean systolic BP (mmHg) | 111.6 ± 18.7 | 109.4±21.11 |
| Mean Diastolic BP (mmHg) | 70.3± 14.2 | 68.9±19.5 |

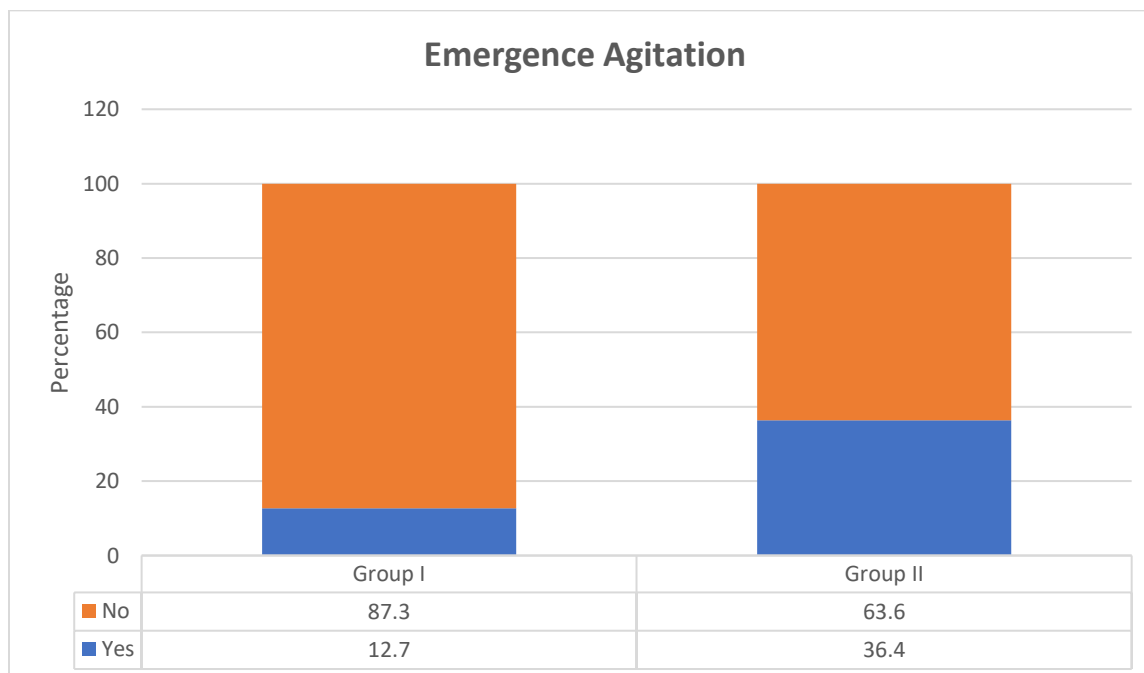
There was no any significant difference observed in surgery time among both groups >0.05. Mean heart rate in group I was 66.3 ±4.72 and in group II mean heart rate was 89.6±8.68 bpm. Mean arterial pressure in group I was 85.8±6.37 mmHg and in group II was 66.3 ±4.72. (table 2)

Table 1: The fundamental characteristics of the groups as a starting point

| Variables | Dexmedetomidine | Placebo |
|-----------------------|-----------------|------------|
| Mean heart rate (bpm) | 66.3 ±4.72 | 89.6±8.68 |
| Mean MAP (mmHg) | 85.8±6.37 | 66.3 ±4.72 |

With a significant difference of $p < 0.005$, the frequency of EA in group II was greater in 20 (36.4%) patients than in group I in 7 (12.7%) instances. (Figure 1)

Figure-1: Comparison of EM among both groups



DISCUSSION

According to the findings of our research, an intraoperative infusion of dexmedetomidine (0.5 mcg/kg over 15 minutes, followed by 0.1 mcg/kg/h while the patient is under the influence of isoflurane) may help lower the risk of EA

developing after cardiac surgery. In addition to lowering the amount of desflurane that was required, this resulted in more stable hemodynamics throughout the surgical procedure and extubation. On the other hand, it was associated with lengthier stays in the hospital, continuous sedation following extubation, and an increased risk of problems. In current study 110 cardiac patients were presented. There were majority males 58.2% and 41.8% females in our study. Mean age of the included cases was 40.3 ± 8.57 years. Results were in line with the previous studies. [9,10] EA is the postoperative complication of isoflurane that affects cardiac surgery patients the most commonly. There are several drugs that have been used to treat EA, but it is unclear which is most efficient.

Dexmedetomidine's efficacy was compared to that of a placebo inside a variety of prior published trials [11,12]. This meta-analysis indicated that the administration of dexmedetomidine in the nose or veins considerably reduces the incidence of EA when compared with the administration of saline. These findings are consistent with the studies that were conducted. Subgroup trials using a variety of dosages and methodologies have demonstrated that dexmedetomidine is superior to saline for preventing EA. This was the case when comparing the two drugs. The current trial was unable to determine the ideal dose of dexmedetomidine to prevent EA, however the lowest amount possible can be taken into account depending on the patients' physical condition and the kind of operation in order to minimize any negative effects. To determine the ideal dose of dexmedetomidine for treating EA, further comparative prospective studies are necessary. [13,14]

Recent research has demonstrated that administration of dexmedetomidine can reduce the onset of emerging agitation in children [15] and postoperative delirium in patients who have undergone heart surgery [16]. The fact that dexmedetomidine is a highly selective 2-receptor agonist [17] contributes to the sedative qualities of this drug. It is also probable that it will have an effect on presynaptic noradrenergic transmission, which may have the effect of reducing the potential triggering aspects of delirium [18]. Analgesia can also be induced with the use of dexmedetomidine; however, in contrast to morphine, it does not result in a significant reduction in respiratory drive [19]. It has the ability to lower the usage of opioids and protect against hypoxia that is caused by hypoventilation in the post-operative period. Both of these factors contribute to a reduced risk of delirium. Dexmedetomidine's sedative effects, on the other hand, could have a negative impact on a patient's ability to recover after surgery if the drug is given in addition to other medications.

CONCLUSION

We concluded in this study that use of dexmedetomidine in patients of post cardiac surgery was effective and useful to prevent emergence agitation. Compared to other medications, dexmedetomidine is a great option for preventing EA.

REFERENCE

1. Lim BG, Lee O, Ahn H, Lee DK, Won YJ, Kim HJ, et al. Comparison of the incidence of emergence agitation and emergence times between desflurane and sevoflurane anesthesia in children. *Medicine*. 2016;95: e4927.
2. Dahmani S, Stany I, Brasher C, Lejeune C, Bruneau B, Wood C, et al. Pharmacological prevention of sevoflurane and desflurane related emergence agitation in children: A meta-analysis of published studies. *Br J Anaesth*. 2010; 104:216–23.
3. Soliman R, Alshehri A. Effect of dexmedetomidine on emergence agitation in children undergoing adenotonsillectomy under sevoflurane anesthesia: A randomised controlled study. *Egypt J Anaesth*. 2015; 31:283–9.
4. Ni J, Wei J, Yao Y, Jiang X, Luo L, Luo D. Effect of dexmedetomidine on preventing postoperative agitation in children: A meta-Analysis. *PLoS One*. 2015;10: e0128450.
5. Kim SY, Kim JM, Lee JH, Song BM, Koo BN. Efficacy of intraoperative dexmedetomidine infusion on emergence agitation and quality of recovery after nasal surgery. *Br J Anaesth*. 2013; 111:222–8.
6. Vljakovic G, Sindjelic R. Emergence delirium in children: many questions, few answers. *Anesth Analg*. (2007) 104:84–91. 10.1213/01.ane.0000250914. 91881.a8
7. M. Sobieszczanska-Malek, T. Zielinski, W. Piotrowski, J. Korewicki, and O. Of Polkard-Hf, "Prognostic value of pulmonary hemodynamic parameters in cardiac transplant candidates," *Cardiology Journal*, vol. 21, no. 5, pp. 532–538, 2014.
8. L. Benck, E. P. Kransdorf, D. A. Emerson et al., "Recipient and surgical factors trigger severe primary graft dysfunction after heart transplant," *The Journal of Heart and Lung Transplantation*, vol. 40, no. 9, pp. 970–980, 2021.

9. Yang X, Hu Z, Peng F, Chen G, Zhou Y, Yang Q, Yang X, Wang M. Effects of Dexmedetomidine on Emergence Agitation and Recovery Quality Among Children Undergoing Surgery Under General Anesthesia: A Meta-Analysis of Randomized Controlled Trials. *Front Pediatr.* 2020 Nov 13; 8:580226.
10. B. Krishnamoorthy, V. Mehta, W. Critchley, P. Callan, S. Shaw, and R. Venkateswaran, "Financial implications of using extracorporeal membrane oxygenation following heart transplantation," *Interactive Cardiovascular and Thoracic Surgery*, vol. 32, no. 4, pp. 625–631, 2021.
11. Zhang C, Hu J, Liu X, Yan J. Effects of intravenous dexmedetomidine on emergence agitation in children under sevoflurane anesthesia: a meta-analysis of randomized controlled trials. *PLoS ONE.* (2014) 9: e99718. 10.1371/journal.pone.0099718
12. Cho H, Yoon H, Jin H, Hwang S. Efficacy of dexmedetomidine for perioperative morbidities in pediatric tonsillectomy: a metaanalysis. *Laryngoscope.* (2018) 128:E184–E93. 10.1002/lary.26888
13. Li Yuan, Wenrui Ma, Jie Cui, Junjiang Liu, Zhaohua Yang, Shouguo Yang, Hongqiang Zhang, Fanshun Wang, Huan Liu, Chunsheng Wang, Xiaoning Sun, "Mildly Elevated Pulmonary Artery Systolic Pressure is Associated with Extracorporeal Membrane Oxygenation Support after Heart Transplantation", *Journal of Cardiac Surgery*, vol. 2023, Article ID 8877476, 7 pages, 2023.
14. M. Pozzi, C. Bottin, X. Armoiry et al., "Extracorporeal life support for primary graft dysfunction after heart transplantation," *Interactive Cardiovascular and Thoracic Surgery*, vol. 27, no. 5, pp. 778–784, 2018.
15. Nishikawa K, Nakayama M, Omote K, Namiki A. Recovery characteristics and post-operative delirium after long-duration laparoscope-assisted surgery in elderly patients: propofol-based vs. sevoflurane-based anesthesia. *Acta Anaesthesiol Scand.* 2004;48(2):162–8.
16. Maldonado JR, Wysong A, van der Starre PJ, Block T, Miller C, Reitz BA. Dexmedetomidine and the reduction of postoperative delirium after cardiac surgery. *Psychosomatics.* 2009;50(3):206–17.
17. Gerlach AT, Murphy CV, Dasta JF. An updated focused review of dexmedetomidine in adults. *Ann Pharmacother.* 2009;43(12):2064–74.
18. Nakamura J, Uchimura N, Yamada S, Nakazawa Y. Does plasma free-3-methoxy-4-hydroxyphenyl(ethylene)glycol increase in the delirious state? A comparison of the effects of mianserin and haloperidol on delirium. *Int Clin Psychopharmacol.* 1997;12(3):147–52.
19. Le Guen M, Liu N, Tounou F, Auge M, Tuil O, Chazot T, et al. Dexmedetomidine reduces propofol and remifentanyl requirements during bispectral index-guided closed-loop anesthesia: a double-blind, placebo-controlled trial. *Anesth Analg.* 2014;118(5):946–55.