Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 12, 2024

Original research article

To determine the efficacy of dexmedetomidine, used intraoperatively as an adjunct, in attenuation of emergence agitation in oral and nasal surgeries while using desflurane for maintenance of general anaesthesia

[1]Karthik D, [2]Jayavel O.K, [3]Muhammad Yusuf Bilal S, [4]Mohamed Mubeen Sherif, [5]Dr. Ullas Mahesh

[1,3]Assistant Professor, Annaii Medical College and Hospital, Chennai, Tamil Nadu, India

[2]Assistant Professor, Stanley Medical College, Chennai, Tamil Nadu, India

[4]Assistant Professor, Professor, SLIMS, Pondicherry, Tamil Nadu, India

[5]Professor, Dhanalakshmi Srinivasan Medical College, Tamil Nadu, India

Corresponding Author:
Mohamed Mubeen Sherif

Abstract

Background: Patients undergoing oral and nasal surgeries are at high risk of developing emergence agitation. We hypothesised that a single dose of dexmedetomidine would reduce emergence agitation in adults during nasal or oral surgery.

Methods: This prospective, observational study was undertaken in the Department of Anaesthesiology and Critical Care, between January 2022 and December 2023 for a period of 2 years. All the relevant parameters were documented in a structured study proforma. Patients who are to undergo nasal and oral surgeries under GA were enrolled in the study. Anaesthesia was induced with Propofol 1.0-2.0 mg/kg, Fentanyl 1 mcg/kg and Vecuronium 0.1mg/kg for Endotracheal intubation. Anaesthesia was maintained with 50% Air-50% O2 and Desflurane with the MAC of 0.8-1%. These participants were divided into two groups. Group D received Dexmedetomidine @ 0.3mcg/kg/hour 5 minutes before induction and stopped at the time of reversal. Group C received NS @ 20ml/hour 5 minutes before induction and stopped at the time of reversal. Before giving premedication, patients were observed for basal heart rate (HR), basal Non-invasive blood pressure (NIBP) and Pulse oximetry (SpO2). Patients were observed intraoperatively for HR, NIBP, SpO2, etCO2, ECG at regular intervals and postoperatively for agitation by Richmond agitation sedation scale (RASS) and hemodynamic properties will be recorded at pre-induction level, induction, intubation, at the time of reversal, at the time of response to verbal command, at the time of extubation and 5 minutes post-extubation. Time to respond to verbal commands and time to extubation after discontinuation of inhalational agents will also be recorded.

Results: A total of 100 participants were included in the final analysis with 50(50%) were in group C and remaining 50(50%) were in group D. The mean age in group C was 41.46 ± 12.3 years, it was 41.22 ± 12.01 in group D. Among group C 32 (64%) participants were males, 18 (36%) participants were females. Among group D 26 (52%) participants were males, and 24 (48%) participants were females. The heart rate, mean systolic BP and mean diastolic BP significantly differed between two groups at different periods (P value <0.05). The total time period from the beginning of induction till the time of extubation after discontinuation of inhalational agents in group C was 6.34 ± 0.92 min, it was 8.58 ± 1.53 in group D. The mean time period to respond to verbal commands time after discontinuation of inhalational agents in group C was 7.29 ± 0.73 min, it was 10.58 ± 1.83 in group D. The difference in time periods between the groups was statistically significant (P value <0.001). The median Richmond Agitation Sedation Scale in group C was 0.50(IQR 0 to 1), it was 0(IQR-1 to 0) in the dexmedetomidine group. The difference between the two groups was statistically significant. (P value <0.001).

Conclusion: Single dose of dexmedetomidine is associated with better Hemodynamic stability, time to respond to verbal commands, time to extubation after switching off the inhalational agent and lesser emergence agitation in adults.

Keywords: Dexmedetomidine, emergence agitation, oral and nasal surgeries, general anaesthesia, hemodynamic stability

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 12, 2024

Introduction

Emergence agitation (EA) is a postanaesthetic phenomenon that develops in the early phase of general anaesthesia (GA) recovery and is characterized by agitation, confusion, disorientation, and possible violent behaviour [1, 2]. The agitation is observed more frequently in paediatric patients compared to the adults. The incidence in adults has been reported to be 3.7% to 22.2% [3], whereas, the incidence of EA in the paediatric patient is 43.2% [4].

In its hyperactive form, the phenomenon is characterized by a short-term impairment of consciousness, where the patient is awake, but with altered mental status, which may manifest as disorientation, hallucinations, confusion, restlessness and hyperactive physical behaviour that may be even violent and/or harmful. It lasts for about 5-15 min and occurs immediately in the process of emerging after general anaesthesia (GA) [2, 3].

While its pathogenesis remains unclear, previous studies reported that ENT (ear, nose, and throat) surgical procedures have a higher incidence of EA in both adults and children. Especially the nasal surgical patients admitted to the postanaesthetic care unit (PACU) have suffered EA more frequently than other surgical patients, possibly due to a sense of suffocation during emergence from anesthesia [1, 5]. It is believed that rapid recovery from inhalation anaesthetics with a relatively low blood/gas partition coefficient causes a higher incidence of EA [6]. Rapid emergence may create a dissociative state, and the patients awaken with altered cognition. Factors such as age, sex, type of surgery, duration of surgery, pre-operative anxiety and post-operative pain are implicated for the occurrence of EA [6].

Desflurane is an ether inhalational general anaesthetic agent, which is clear, non-flammable liquid with a "strong" odour at room temperature [7, 8]. Desflurane is preferred over other inhalational anaesthetic agents such as sevoflurane because of its property of prompt emergence from anaesthesia and speedy recovery of the cough reflex, especially in elderly patients [9]. These factors may lead to a dissociative state with altered cognitive perception, excitation, and agitation during recovery from anaesthesia which results in a higher incidence of EA [6, 9]. As seen in many previous studies Desflurane anaesthesia is known to be associated with worsened EA [6, 9].

Aims and Objectives

AIM: To determine the efficacy of dexmedetomidine in the prevention of EA after nasal or oral surgeries under GA in adults.

Objectives

1. To determine the difference in the RASS with and without the use of dexmedetomidine in oral and nasal surgeries under GA.
2. To compare the Hemodynamic stability between the groups.
3. To compare the time to respond to verbal commands between the groups.

To determine the difference in time to extubation after switching off inhalational agent between the groups.

Materials & Methods

Study Site: This is a prospective, observational study which was undertaken in the operation theatre, Department of Anaesthesiology and Critical Care in tertiary care centre, over a period of 2 years from January 2022 to December 2023 after obtaining Institutional Ethical Committee clearance and informed written consent from all patients.

Inclusion criteria

1. Age 20-60 years.
2. Both sexes.
3. ASA I and II.
4. Patients undergoing elective nasal and oral surgical procedure under GA.
5. Procedure duration of 60-240 minutes.

Exclusion criteria

1. Refusal by patient.
2. ASA III and more.
3. Patient on MAO inhibitors &Beta-adrenergic blocking drugs.
4. Suspected allergy to a2 adrenergic agonist or NSAIDS.
5. Patients with severe bradyarrhythmia secondary to AV block.
6. Ischemic heart disease and valvular heart disease.
7. Cognitive impairment.
8. Psychiatric illness.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 12, 2024

Results

A total of 100 people were included in the final analysis.

Table 1: Descriptive analysis of the study group in the study population (N=100)

Study group	Frequency	Percentages
Group C	50	50.00%
Group D	50	50.00%

Among the study population, 50(50%) were in group C, and the remaining 50(50%) were in group D. (Table 1 & Figure 1).

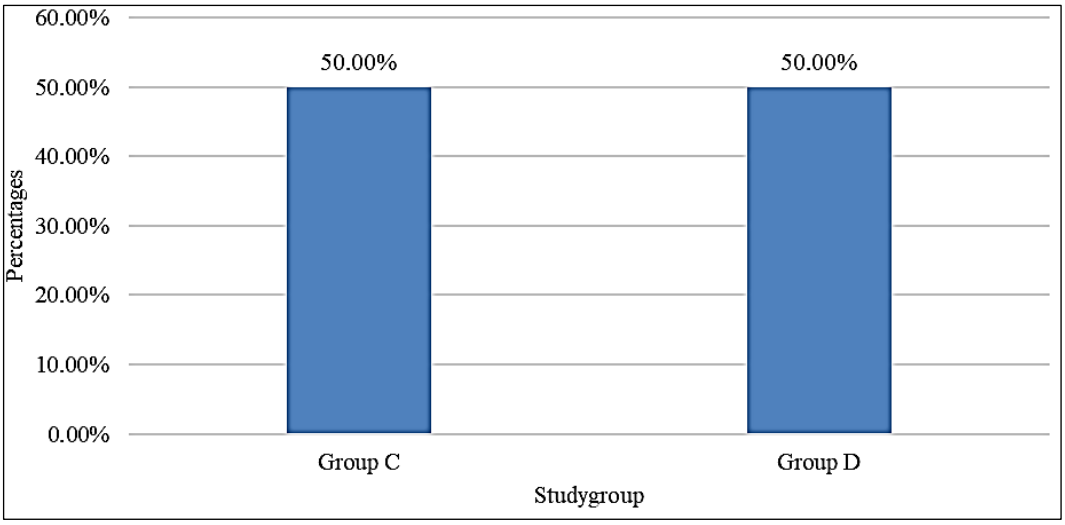

Fig 1: Bar chart of the study group in the study population (N=100)

Table 2: Comparison of mean age between study groups (N=100)

Parameter	Age (Mean± SD)	Mean difference	95% CI		P value
			Lower	Upper	
Group C (N=50)	41.46 ± 12.3	0.24	-4.58	5.06	0.922
Group D (N=50)	41.22 ± 12.01				

The mean age in group C was 41.46 ± 12.3 years, it was 41.22 ± 12.01 in group D. The difference in age between two groups was statistically not significant (P value 0.922) (Table 2).

Table 3: Comparison of gender between study group (N=100)

Gender	Study group		Chi square	P-value
	Group C (N=50)	Group D (N=50)		
Male	32 (64%)	26 (52%)	1.478	0.224
Female	18 (36%)	24 (48%)		

Among group C 32 (64%) participants were male, 18 (36%) participants were female. Among group D 26 (52%) participants were male and 24 (48%) participants were female. The difference in the proportion of gender between the two groups was statistically not significant (P value 0.224). (Table 3 & Figure 2)

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 12, 2024

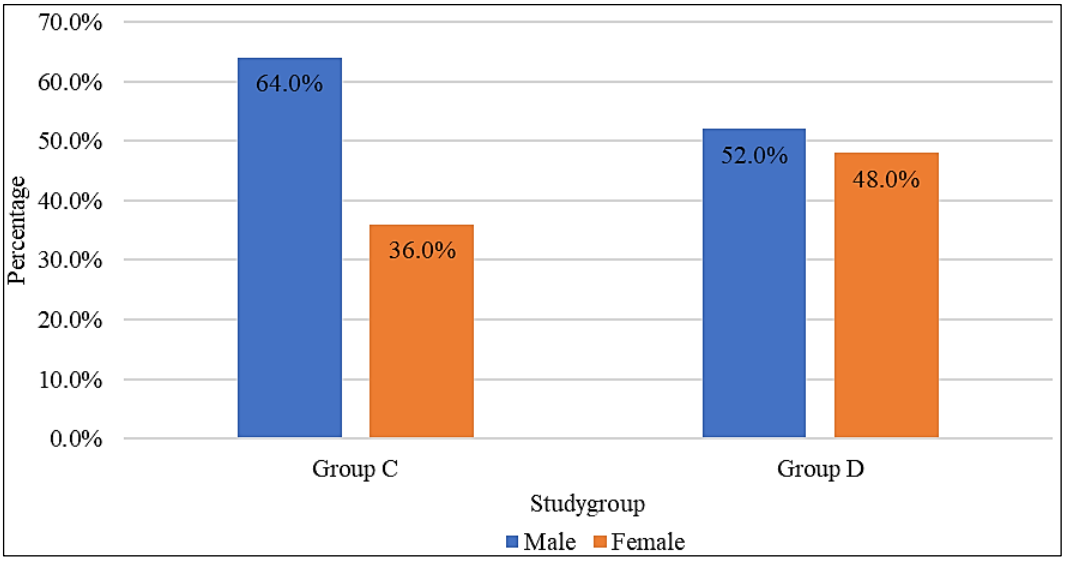

Fig 2: Cluster bar graph for comparison of gender between study group (N=100)

Discussion

During the perioperative period, EA is presented as an unstable state of mild restlessness and mental distress. EA in the PACU is a common complication, and in order to avoid serious consequences for the patient (e.g. physical injury, increased pain, haemorrhage, removal of catheters) may demand physical or chemical restraint. EA may be defined by hallucination, mild confusion and restlessness may lead to some serious adverse events, such as increase in blood pressure, injury to the surgical site and the patients themselves, bleeding, removal of drains or intravenous catheters, and self-extubation [2, 9, 11]. ENT surgery is normally linked with higher incidence of EA [10]. After nasal surgery, awake extubation is preferred because the airway is contaminated by blood, and the nasal airway is blocked with surgical packs. However, awake extubation may intensify EA [4].

For GA, some anaesthesiologists prefer due to its property of prompt emergence from anaesthesia and speedy recovery of the cough reflex, especially in elderly patients [14]. However, it is also reported that desflurane increases the incidence of EA in adults [9, 12]. Dexmedetomidine is a selective α 2-receptor agonist and has sympatholytic, analgesic, and sedative properties. Infusion of dexmedetomidine have known to reduce agitation from GA in children and adults [12, 13]. However, the data related to the effects of dexmedetomidine on reducing agitation from GA in adults are very limited. In this prospective observational study, we hypothesised that intraoperative use of dexmedetomidine until extubation would reduce emergence agitation in adult patients undergoing oronasal surgery. We aimed to study any decrease in EA, change in hemodynamic properties, time to respond to verbal commands and time to extubation when dexmedetomidine was used intraoperatively in conjunction with desflurane in patients undergoing oronasal surgeries.

In our study, a total of 100 participants were included in the final analysis with 50(50%) participants in group C(control) and remaining 50(50%) in group D (dexmedetomine). The mean age in group C was 41.46 ± 12.3 years, it was 41.22 ± 12.01 in group D. Among group C 32 (64%) participants were male, 18 (36%) participants were female. Among group D 26 (52%) participants were male and 24 (48%) participants were female. The mean weight in group C was 68.82 ± 12.39 kg, it was 66.84 ± 10.4 kg in group D. There was no statistically significant difference in the demographic characteristics between the two groups. (P value 0.389).

Conclusion

From this study, it is reasonable to conclude that according to the available data, intraoperative administration of dexmedetomidine statistically decreased the incidence of EA in patients undergoing nasal and oral surgeries under GA with desflurane. Dexmedetomidine significantly increased the time to extubation and time to respond to oral commands when compared with control groups. From the study, the inference can be drawn that Single-dose of dexmedetomidine is related with better hemodynamic stability and decreased EA along with a slight temporal increase to respond to verbal commands and time to extubation after switching off inhalational agent in adults.

References

1. Kim HJ, Kim DK, Kim HY, Kim JK, Choi SW. Risk factors of emergence agitation in adults undergoing general anesthesia for nasal surgery. Clin Exp Otorhinolaryngology. 2015;8(1):46-51.
2. Vlajkovic GP, Sindjelic RP. Emergence delirium in children: many questions, few answers. Anesth Analg. 2007;104(1):84-91.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 12, 2024

3. Munk L, Andersen G, Møller AM. Post-anaesthetic emergence delirium in adults: incidence, predictors and consequences. Acta Anaesthesiol Scand. 2016;60(8):1059-66.
4. 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(2):222-8.
5. Eckenhoff JE, Kneale DH, Dripps RD. The incidence and etiology of postanesthetic excitment. A clinical survey. Anesthesiol. 1961;22(5):667-73.
6. Lim BG, Lee IO, 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: A systematic review and meta-analysis. Medicine (Baltimore). 2016;95(38):e4927.
7. Kapoor MC, Vakamudi M. Desflurane-revisited. J Anaesthesiol Clin Pharmacol. 2012;28(1):92-100.
8. Natalini CC. Sevoflurane, desflurane and xenon new inhaled anesthetics in veterinary medicine. Cienc Rural. 2001;31:177-83.
9. Suzuki T, Kurazumi T, Ueda T, Nagata H, Yamada T, Kosugi S, *et al*. Desflurane anesthesia worsens emergence agitation in adult patients undergoing thyroid surgery compared to sevoflurane anesthesia. JA Clin Rep. 2017;3(1):36.
10. Yu D, Chai W, Sun X, Yao L. Emergence agitation in adults: risk factors in 2,000 patients. Can J Anaesth. 2010;57(9):843-8.
11. Lepousé C, Lautner CA, Liu L, Gomis P, Leon A. Emergence delirium in adults in the post-anaesthesia care unit. Br J Anaesth. 2006;96(6):747-53.
12. Garg A, Kamal M, Mohammed S, Singariya G, Chouhan DS, Biyani G. Efficacy of dexmedetomidine for prevention of emergence agitation in patients posted for nasal surgery under desflurane anaesthesia: A prospective double-blinded randomised controlled trial. Indian J Anaesth. 2018;62(7):524-30.
13. Kim J, Kim SY, Lee JH, Kang YR, Koo BN. Low-dose dexmedetomidine reduces emergence agitation after desflurane anaesthesia in children undergoing strabismus surgery. Yonsei Med J. 2014;55(2):508-16.
14. Jakobsson J. Desflurane: a clinical update of a third-generation inhaled anaesthetic. Acta Anaesthesiol Scand. 2012;56(4):420-32.