ORIGINAL RESEARCH

Comparing Dexmedetomidine versus Clonidine for Improved Quality of Emergence from General Anaesthesia: A Randomised Controlled Study

[1]Dr. Rahul Kumar, [2]Dr. Sangeeta Bansal Agrawal

[1]Assistant Professor, [2]Professor and Head of Department, Department of Anaesthesia, Index Medical College, Hospital and Research Centre, Indore, Madhya Pradesh, India

Corresponding Author: Dr.Rahul Kumar
Assistant Professor, Department of Anaesthesia, Index Medical College, Hospital and Research Centre, Indore, Madhya Pradesh, India
Email: Rahuldocnmc7@gmail.com

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ABSTRACT

Background: General anesthesia combined with controlled breathing and endotracheal intubation is a commonly used anesthetic technique. The present study compared Dexmedetomidine and Clonidine for improved quality of emergence from general anaesthesia. **Materials & Methods:**90 patients of either sexwere divided into groups I, II, and III. Group I got an intravenous (i.v.) injection of dexmedetomidine (1 µg/kg), group II received a clonidine injection (3 µg/kg), and group III received a placebo (normal saline) via a syringe pump over a 10-minute period. Before, during, and after extubation, the following parameters were noted: hemodynamic parameters, cough, agitation, shivering, time to extubation, sedation, visual analogue score (VAS), and postoperative nausea and vomiting (PONV) scores.**Results:**BMI (kg/m2) 18.5- 24.9 was seen in 24, 25 and 27 and 25-29.9 in 6, 5 and 3 patients in group I, II and III respectively. ASA grading I was seen in 12, 13 and 14, grade II in 11, 13 and 13 and III in 7, 4 and 3 in group I, II and III respectively. The difference was non-significant (P< 0.05). Fentanyl consumption (g) was 107.3, 105.4 and 136.2, time to extubation was 19.1, 19.3 and 20.6, duration of surgery (min.) was 121.3, 125.7 and 127.4 and duration of anaesthesia (min.) was 135.6, 135.2 and 136.8 in group I, II and III respectively. The difference was non- significant (P>0.05). Adverse outcome was bradycardia in 3, 2 and 0 and hypotension in 4, 9 and 0 in group I, II and III respectively. The difference was significant (P< 0.05).**Conclusion:** In patients undergoing elective laparotomies, dexmedetomidine (1 µg/kg) and clonidine (3µg/kg) given over 10 minutes prior to extubation are similarly efficacious in increasing the quality of emergence from GA without postponing recovery and with stable hemodynamics.

Keywords: General anesthesia, Fentanyl, dexmedetomidine

INTRODUCTION

Worldwide, general anaesthesia combined with controlled breathing and endotracheal intubation is a commonly used anaesthetic technique.[1]

This type of anaesthesia is safer than ever thanks to the development of contemporary medications, cutting-edge monitoring, and a better understanding of body physiology. Nonetheless, there are still a number of issues that require attention. Coughing and anxiousness are common aftereffects of tracheal extubation after GA.[2]

All of these occurrences are undesirable and could result in anything from minor pain for the patient to major issues.[3] Patients who are particularly vulnerable to a rise in intracranial pressure (ICP). There may be a higher risk for

intraocular pressure (IOP) and abrupt changes in blood pressure.[4,5]

Additionally, coughing can cause desaturation, laryngospasm, and in rare cases, negative pressure pulmonary oedema. Opioids, lidocaine, ketamine, and dexmedetomidine are among the medications that have been studied for the prevention or treatment of these side effects. Dexmedetomidine and clonidine are centrally acting selective α-2 agonists with sedative, analgesic, sympatholytic, and antishivering effects.[6,7]

In adult patients undergoing elective surgery under general endotracheal tube anaesthesia (GETA), Aouad MT et al.[8] showed that intravenously administered dexmedetomidine 1 μg/kg was highly successful in suppressing cough, agitation, hypertension, tachycardia, and shivering. According to an analysis of over 2500 paediatric patients by Yang X et al.[9], dexmedetomidine dramatically decreased the incidence of emerging agitation by 70%. Additionally, patients who got dexmedetomidine had a longer emergence time than those who received a placebo.

AIM & OBJECTIVES

The present study compared Dexmedetomidine and Clonidine for improved quality of emergence from general anaesthesia.

MATERIALS & METHODS

The current hospital-based prospective randomized, double- blinded controlled interventional study was conducted in the Department of General Anaesthesiaat Index Medical College, Hospital and Research Centre, Indore, Madhya Pradesh, India. The study was approved by the Institutional Ethical Committeeand after registering in the Clinical Trials Registry-India. All gave their informed written consent to participate in the study. The period of study was from March 2022 to August 2023.

The study was included 90 patients of both genders, ages 18 to 60 years, who had American Society of Anaesthesiologists (ASA) grades I–III and were scheduled for elective laparotomies.

Inclusion Criteria

- Patients to give written informed consent.
- Patientsaged between 18-60 years.
- Patients with ASA grade I-III, undergoing elective laparotomies with an estimated surgery time of 1 to 4 hours.
- Available for follow-up.

Exclusion Criteria

- Patients having a history of pre-existing uncontrolled hypertension, coronary artery disease, heart blocks, renal dysfunction, hepatic dysfunction, cerebral insufficiency, rhinorrhoea, coagulation abnormalities, recurrent sinus surgery and allergy to study drugs were excluded from the study.
- Uncooperative patients or patients who did not give consent and unable to attend follow-up

All patients were divided into groups I, II, and III at random. Ten minutes before the expected completion of operation, group I got an intravenous (i.v.) injection of dexmedetomidine (1 μg/kg), group II received a clonidine injection (3 μg/kg), and group III received a placebo (normal saline) via a syringe pump over a 10-minute period. Before, during, and after extubation, the following parameters were noted: hemodynamic parameters, cough, agitation, shivering, time to extubation, sedation, visual analogue score (VAS), and postoperative nausea and vomiting (PONV) scores. Additionally noted was the frequency of consequences (bradycardia, hypotension, etc.).

Statistical Analysis

Results thus obtained were subjected to statistical analysis. SPSS version 22.0 was used to examine the data once it was entered into Microsoft Excel. Using the Chi-square test, all qualitative data were compared after being expressed as percentages. Every continuous quantitative variable was represented as mean ± SD, and Analysis of Variance (ANOVA) was used to compare them. The p-value was considered statistically significant if it was less than 0.05.

RESULTS

Table 1: Gender wise distribution of the patients (N=90)

Gender	Group I (N=30)	Group II(N=30)	Group III (N=30)	P value
Male	16 (53.33%)	14(46.67%)	13 (43.33%)	0.732
Female	14 (46.67%)	16(53.33%)	17 (56.67%)	

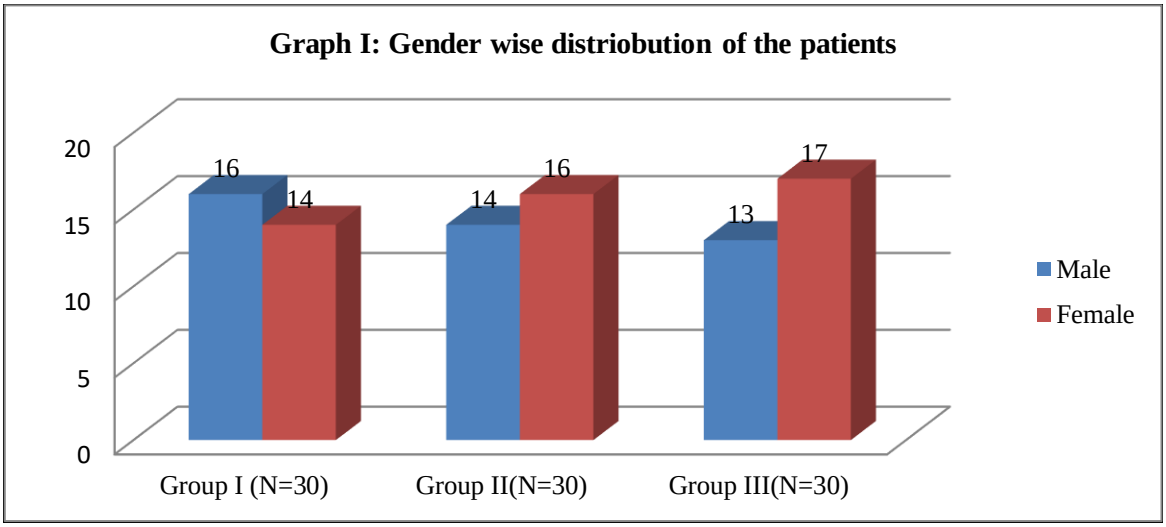

Table 2: Demographic dataof patients (N=90)

Parameters	Variables	Group I (N=30)	Group II (N=30)	Group III (N=30)	P value
BMI (kg/m2)	18.5- 24.9	24	25	27	0.547
	25-29.9	6	5	3	
ASA grading	I	12	13	14	0.62
	II	11	13	13	
	III	7	4	3	

BMI: Basal metabolic index; ASA: American society of anaesthesiologists

Table 2, shows that BMI (kg/m2) 18.5-24.9 was seen in 24, 25, and 27 patients in groups I, II, and III, respectively. BMI (kg/m2) 25-29.9 in 6, 5, and 3 patients in groups I, II, and III, respectively. ASA grading: I was seen in 12, 13, and 14; grade II in 11, 13, and 13; and III in 7, 4, and 3 in groups I, II, and III, respectively. The difference was non-significant (P < 0.05).

Table 3: Comparison of Sedation score

Time interval	Group I (N=30)	Group II (N=30)	Group III (N=30)	P value
0-5 min	NA	NA	NA	
10 min	3 (3-3.5)	4 (4-4)	2.5 (2.25-2.75)	0.85
15 min	3 (3-3)	2.5 (2-3)	2 (2-2)	0.01
20 min	3 (2.5-3)	3 (2-3)	2 (2-2)	<0.001
25 min	3 (2-3)	2 (2-3)	2 (2-2)	<0.001
30min	3 (2-3)	2 (2-2)	2 (2-2)	<0.001
45min	3 (2-3)	2 (2-2)	2 (2-2)	<0.001
60min	3 (2-3)	2 (2-2)	2 (2-2)	<0.001

P <0.05 (Significant), NA: Not assessed as patient was not extubated

Table 3 shows that there was a significant difference (p-value < 0.001) in the level of postoperative sedation (Ramsay sedation score) between the placebo and both study groups.

Table 4:Clinical characteristics

Variables	Group I	Group II	Group III	P value
Fentanyl consumption (µg)	107.3±20.27	105.4±4.75	136.2±14.25	0.05
Time to extubation(hours)	19.1±5.76	19.3±5.05	20.6±4.65	0.92
Duration of Surgery (min.)	121.3±23.05	125.7±20.2	127.4±22.05	0.13
Duration of anaesthesia (min.)	135.6±25.01	135.2±17.93	136.8±19.50	0.27

Table 4, graph II shows that fentanyl consumption (g) was 107.3, 105.4 and 136.2, time to extubation was 19.1, 19.3 and 20.6 hour respectively, duration of surgery (min.) was 121.3, 125.7 and 127.4 and

duration of anaesthesia (min.) was 135.6, 135.2 and 136.8 in group I, II and III respectively. The difference wasnon- significant (P>0.05).

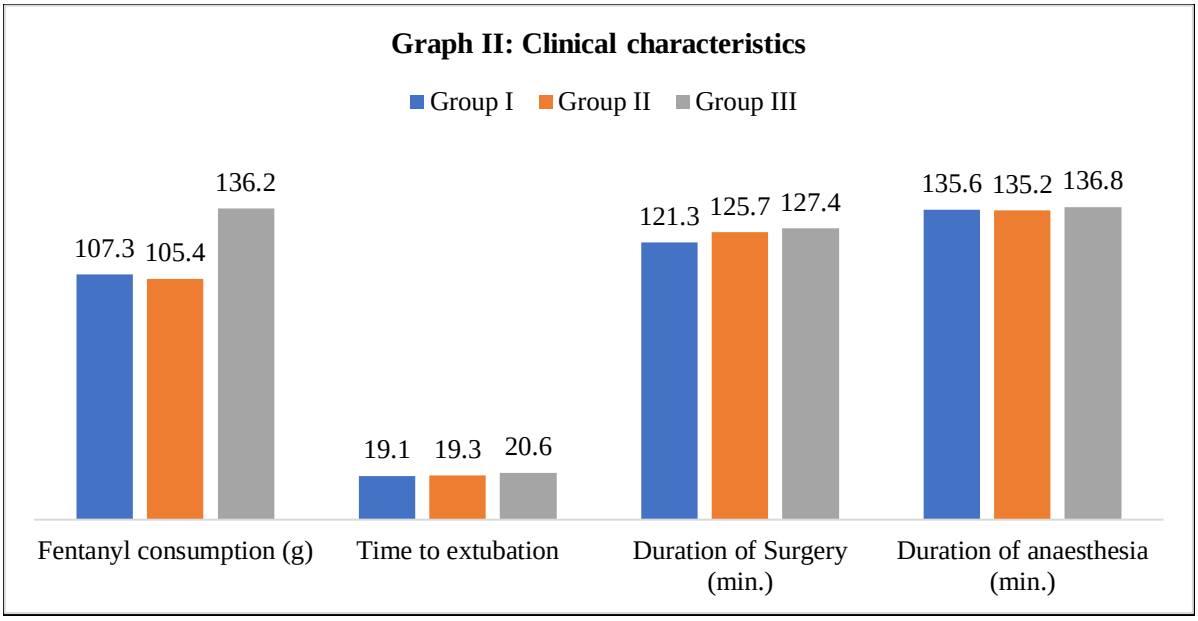

Table 5: Adverse outcome

Adverse outcome	Group I (N=30)	Group II (N=30)	Group III (N=30)	P value
Bradycardia	3 (10%)	2 (6.67%)	0	0.14
Hypotension	4 (13.33%)	9 (30%)	0	0.05

Table 5 shows that adverse outcome was bradycardia in 3, 2 and 0 and hypotension in 4, 9 and 0 in group I, II and III respectively. The difference was significant (P< 0.05).

DISCUSSION

Extubation of the trachea upon emergence from General Anaesthesia (GA) is often accompanied by potentially dangerous events, like coughing, hypertension, tachycardia, and agitation.The centrally acting α-2 agonist, dexmedetomidine, has been evaluated to attenuate the emergence/extubation response.[10]

The present study compared Dexmedetomidine and Clonidine for improved quality of emergence from general anaesthesia.

We found that BMI (kg/m2) 18.5- 24.9 was seen in 24, 25 and 27 and 25-29.9 in 6, 5 and 3 patients in group I, II and III respectively. ASA grading I was seen in 12, 13 and 14, grade II in 11, 13 and 13 and III in 7, 4 and 3 in group I, II and III respectively. In a study by Bediet al.[11], a total of 105 patients were included, with 53 males and 52 females. There was no difference in the demographic characteristics, such as age, gender, and Body Mass Index (BMI), amongst the three groups. Haemodynamic parameters (Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP)) were significantly lower in patients of group D and group C compared to the placebo group at 5, 10, 10, and 15 minutes, respectively, after the beginning of drug infusion.The quality of emergence from GA can b e improved without delaying recovery and with st able haemodynamics in patients undergoing electi ve laparotomies by administering dexmedetomidi ne (1 µg/kg) and clonidine (3 µg/kg) over 10 minu tes prior to extubation.

We found that fentanyl consumption (g) was 107.3, 105.4 and 136.2, time to extubation (hours) was 19.1, 19.3 and 20.6, duration of surgery (min.) was 121.3, 125.7 and 127.4 and duration of anaesthesia (min.)was 135.6, 135.2 and 136.8 in group I, II and III respectively. Lee JS et al.[12]concluded that the addition of dexmedetomidine 0.5 mcg/kg i.v. during emergence was effective in attenuating coughing and haemodynamic changes after thyroid surgery with a sample size of 142 in Gangnam hospital, Korea.

We found that adverse outcome was bradycardia in 3, 2 and 0 and hypotension in 4, 9 and 0 in

group I, II and III respectively. Vankayalapati SD et al.[13], however, demonstrated a statistically significant difference in HR, SBP, DBP, and MAP from three minutes of drug injection onwards in patients who received i.v.dexmedetomidine and clonidine in a study with a sample size of 90 in Mallareddy Medical College, Hyderabad.

LIMITATION OF THE STUDY

The shortcoming of the study is the small sample size, and determining the cost advantage of clonidine over dexmedetomidine may be aided by research employing a non-inferiority trial design.

CONCLUSION

Authors found that in patients undergoing elective laparotomies, dexmedetomidine (1 μg/kg) and clonidine (3μg/kg) given over 10 minutes prior to extubation are similarly efficacious in increasing the quality of emergence from GA without postponing recovery and with stable hemodynamics.Dexmedetomidine provides better haemodynamic stability in comparison to clonidine.

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