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Evaluation of Dexmedetomidine in Quality of Extubation Response in Smokers undergoing Surgeries under General Anaesthesia

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Abstract: ***Introduction: Smokers are one of the at-risk group of patients prone for developing complications during extubation. Objective: Evaluation of dexmedetomidine in quality of extubation response in smokers undergoing surgeries under general anaesthesia. Study design: Prospective randomized study. Method: Sixty patients of ASA physical status I and II were enrolled in the study and dividedinto2groupsof30each. Group A included 30 patients who received 0.5 µg/kg of dexmedetomidine in normal saline (Total volume 10 ml). Group B included 30 patients who received 0.75 µg/kg of dexmedetomidine in normal saline (Total volume 10 ml). Results: Both groups were comparable in terms of age, sex, ASA grade, smoking index, and duration of surgery (P>0.05). Intra-operative hemodynamic variables before start of infusion were comparable in both groups. In the present study, quality of extubation was significantly poorer in group A in comparison to group B (P=0.001). Conclusion: Dexmedetomidine with dose of 0.75 µg/kg is the best dose for attenuation of extubation response in current smoker patients undergoing major surgery.***

1. Introduction

Tracheal extubation is a critical step during emergence from general anaesthesia. It is not simply a reversal of the process of intubation because conditions are often less favourable than at the start of anaesthesia. At extubation, there is a transition from a controlled to an uncontrolled situation.1

In most patients, removal of the tracheal tube i. e., the process of extubation is uneventful. However, in a minority of cases, anatomical and/or physiological compromise can result in morbidity and mortality. These problems arise more frequently in patients who fall into the 'at-risk' group.2

Smokers are one of the at-risk group of patients prone for developing complications during extubation. Because of exaggerated upper airway reflexes in smokers, they are more prone for laryngospasm and other complications like hypoventilation, hypoxemia and reintubation during extubation.

Methods

Place of study: After obtaining ethical committee clearance study was conducted at Dr RPGMC Kangra at Tanda

Study subjects: Smokers undergoing surgery were assessed for the inclusion and exclusion criteria.

Study design: Prospective study.

Sample size: 60 (30 each)

Sample size was calculated using the formula n=2*{Z (1-α) +Z (1-β) /δ-δ0}2*s2 where n is the sample size, s is pool's standard deviation, δ is mean of group 1, δ0 is mean of group 2, Z (1-α) at confidence interval 95% is 1.96 and Z (1-β) at 20% is 0.8. Sample size calculated was 26 in each group, 30 was taken in each group in this study to account for drop outs. Power of study was kept at 80%, levels significance 5% at two tailed test.

Sampling method: Simple random sampling

Statistical tests:

SPSS version 21 program were used to enter data and statistical analysis. Continuous data were presented as Mean ±SD and comparison between two groups were performed using Student's t-test. A p value <0.05 was considered statistically significant.

Inclusion Criteria

- Patients (smokers) posted for surgery
- ASA grade II
- Hemodynamically stable
- BMI (18-5-24.5 kg/m^2)

Exclusion Criteria

- Refusal by the patient to participate in the study
- BMI>24.5kg/m2 or<18.5 kg/m2
- history of severe cardiovascular disease, renal disease, diabetes mellitus and cerebrovascular disease, known hypersensitivity to the study drug, difficult airway

The enrolled patients (current smoker patients) were allocated to one of the two groups by computer generated random number chart. Group A included 30 patients who received 0.5 µg/kg of dexmedetomidine in normal saline (Total volume 10 ml). Group B included 30 patients who received 0.75 µg/kg of dexmedetomidine in normal saline (Total volume 10 ml).

The anaesthetic procedure was explained to the patients enrolled for study and thereafter written consent was taken in the pre anaesthetic check-up clinic 24 hours before surgery. Before commencing the surgery, a case record form was filled for each patient in the preoperative room. All patients were kept nil orally for at least eight hours before the procedure. They were given premedication in the form of tablet alprazolam 0.5 mg and tablet ranitidine 150 mg at night before surgery and at 6: 00 am on the day of surgery.

Extubation time

Extubation time was noted and extubation quality was rated using extubation quality 5-point scale. Any incidence of

cough, laryngospasm, bronchospasm or desaturation were noted for a period of 15 min post extubation. Extubation quality has 5-point scale (1-No coughing, 2-Smooth extubation, minimal coughing, 3-Moderate coughing (3 or 4 times), 4-severe coughing (5 to10 times) and straining, 5-Poor extubation, very uncomfortable (laryngospasm and coughing >10 times).

Adverse effects
Any side effects in form of postoperative nausea, vomiting and bradycardia were noted.

Statistical analysis
Data were entered into Microsoft spreadsheet and analysed using SPSS v21.0 (IBM, USA). Chi square test was used to compare categorical variables. Quantitative variables between 2 groups were compared using independent t-test. P value<0.05 was considered significant.

2. Results

General characteristics
Table 1 shows general characteristics of the patients in both groups. Both groups were comparable in terms of age, sex, ASA grade, smoking index, and duration of surgery (P>0.05).

Table 1: General characteristics

	Group A (n=30)	Group B (n=30)	P Value
Age (Years)	50.57±6.36	48.13±5.43	0.117
BMI (Kg/m^2)	20.27±1.5	21.09±1.6	0.051
ASA Grade, *n* II	 30	 30	-
Smoking Index, n Mild (≤100) Moderate (101-300) Heavy (>300)	 0 30 0	 0 30 0	-
Duration of surgery (min)	61.67±8.74	61.71±7.47	1.000

Intra-operative hemodynamic variables before start of infusion
Intra-operative hemodynamic variables before start of infusion were comparable in both groups (Table 2).

Table 2: Intra-operative hemodynamic variables before start of infusion

	Group A (n=30)	Group B (n=30)	P Value
Heart rate	82.3±7.13	81.43±9.11	0.683
SBP (mmHg)	120.1±7.22	121.73±8.17	0.733
DBP (mmHg)	76.17±4.17	77.23±4.40	0.339
MAP (mmHg)	90.7±6.7	92.4±6.9	0.348
SPO_2 (%)	99.27±0.94	98.93±0.83	0.333

Quality of extubation
In the present study, quality of extubation was significantly poorer in group A in comparison to group B (P=0.001) (Table 3).

Table 3: Comparison of post-extubation quality of extubation

Quality of extubation score	Group A (n=30)	Group B (n=30)	P Value
1	5 (16.7%)	14 (46.7%)	0.001
2	8 (26.67%)	12 (40%)	
3	16 (53.3%)	4 (13.3%)	
4	1 (3.3%)	0	

Adverse effects
One patient in group A and two patients in group B had incidence of bradycardia.

3. Discussion

Anaesthesiologists are more concerned about the problems associated with intubation, extubation, recovery and emergence. The problems at extubation are as common as problems at intubation. Tracheal extubation is associated with a 10–30% increase in arterial pressure and heart rate lasting 5–15 minutes. Respiratory complications after tracheal extubation are three times more common than complications occurring during tracheal intubation and induction of anaesthesia (4.6% vs.12.6%).

Dexmedetomidine is a newly emerging drug which has been extensively studied for attenuation of both intubation and extubation response and has been shown to have sedative, analgesic and anaesthetic sparing effects.

In our study, quality of extubation was poorer in group A in comparison to group B. In a study of Aksu et al.4 compared the effects of dexmedetomidine (0.5 µg/kg) and fentanyl (1 µg/kg) in patients undergoing rhinoplasty and concluded that dexmedetomidine was more effective in attenuating airway reflex responses to tracheal extubation and maintaining haemodynamic stability compared to fentanyl but was associated with bradycardia in two patients out of 20 patients. Fan et al.5 concluded that dexmedetomidine in dose of 0.7 µg/kg was associated with a higher percentage of patients with a smooth extubation as compared to dexmedetomidine in dose of 0.5 µg/kg. Bindu et al.6 studied the effect of intravenous dexmedetomidine infusion 0.75 µg/kg given 15 min prior to extubation and concluded that it facilitates smooth extubation, but there was bradycardia in 13 patients out of 25 patients. Similar results were obtained in our study. The quality of extubation increased with increase in dose of dexmedetomidine.

Dexmedetomidine has been used in dose of 0.1 to 1 µg/kg/h. The reported incidence of hypotension and bradycardia in patients receiving dexmedetomidine for sedation commonly exceeds 50 %.7 The studies with higher infusion rates had more incidences of adverse effects like hypotension and bradycardia.8 The incidence of bradycardia was significantly higher in the patients who received premedication of dexmedetomidine both in normotensive and hypertensive groups as compared to midazolam, which was especially pronounced in the hypertensive patients. Bindu et al.6 and Aksu et al.6 found that dexmedetomidine (0.75 µg/kg) led to higher incidence of bradycardia. Similar results were obtained in our study where we found that with increase in infusion of dexmedetomidine from 0.5 µg/kg to

0.75 µg/kg the side effects also increased as compared to two patients in group B (0.75 µg/kg) and one patient in group A with dexmedetomidine 0.5 µg/kg.

4. Conclusion

Hence, we conclude that dexmedetomidine with dose of 0.75 µg/kg is the best dose for attenuation of extubation response in current smoker patients undergoing major surgery. We recommend further studies with a larger study population to authenticate our study for attenuation of extubation response in current smoker patients.

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