

# Effect of single dose dexmedetomidine given prior to extubation-on-extubation conditions in adult patients following general anaesthesia

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## Abstract

**Background:** Usually haemodynamic and respiratory changes are associated with extubation. Emergence of haemodynamically stable is caused by dexmedetomidine administration. **Aim:** The present study evaluated the cough incidence at extubation following single dose dexmedetomidine administration before extubation. **Materials and Methods:** 50 patients aged 18-85 years who belonged to American Society of Anaesthesiologists physical status class I-II of both the sexes who underwent elective surgeries were included in the present prospective randomised study. Group A received 0.75 µg/mL dexmedetomidine and consisted of 25 patients and Group B patients received normal saline and consisted of 25 patients. **Results:** In both groups, the cough incidence was comparable (65.4% in group A and 62.5% in group B). Group A showed lesser mean arterial pressure when compared to Group B and it was comparable between the groups. Significant difference was not observed in heart rate, post-operative nausea, shivering, vomiting and sedation scores between the groups ( $p > 0.05$ ). **Conclusion:** After extubation, enhanced hemodynamics at predefined time points were caused by dexmedetomidine infusion at 0.75 mcg/kg prior to extubation and it did not affect cough severity.

**Keywords:** Haemodynamic responses, extubation.

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## INTRODUCTION

Varying degree of airway responses and cardiovascular responses were associated with extubation and intubation which finally results in haemodynamic instability,<sup>1</sup> bronchospasm, arrhythmias and coughing. In patients without comorbidities, the responses of extubation are of less importance. Surgical bleeding can happen due to coughing and is considered a critical event during

emergency from general anaesthesia and could be life threatening who are at risk of complications i.e. intracranial or intraocular pressure increase.<sup>2</sup> In immediate post-extubation phase, a sudden change in blood pressure and intra cerebral space occupying lesions (ICSOL) leads to increase in intracranial pressure (ICP) and reduction in cerebral perfusion pressure (CPP) which finally leads to intracranial bleeding.<sup>3</sup> Coughing can also dislodge tympanic membrane grafts in ear surgeries, hence, smooth tracheal extubation is compulsory. Some patients also develop airway related complications from emerging from general anaesthesia. Thus, cough, agitation, hypertension, shivering and tachycardia can be controlled by administering dexmedetomidine 1µg/mL at post-surgery phase and it provides excellent quality of emergence from general anaesthesia. Dexmedetomidine administration 0.75 µg/mL was hypothesised to decrease the cough occurrence and emergence at extubation. The present study evaluated the cough incidence at extubation following single dose dexmedetomidine administration before

extubation. At predefined time points, this study also evaluated the heart rate, blood pressure during extubation, sedation scores, post-operative nausea, vomiting and shivering.

**MATERIALS AND METHODS**

50 patients aged 18-85 years who belonged to American Society of Anaesthesiologists physical status class I-II of both the sexes who underwent elective surgeries were included in the present prospective randomised study. It was approved by Institution of ethical committee. Written informed consent form was obtained from all the patients in the study.

Exclusion criteria was patients suffering from mental problems, pregnant patients, obese patients i.e. BMI>30, allergic to dexmedetomidine and patients with upper respiratory tract infection. Patients were divided into two groups randomly and randomisation result was kept sealed in an envelope and the study personnel who was blinded to the patient assessment was revealed to prepare the assigned drug. Group A received 0.75 µg/mL dexmedetomidine and consisted of 25 patients and Group B patients received normal saline and consisted of 25 patients. Midazolam 2 mg IV and glycopyrrolate 0.2 mg IV was administered to all patients as premedication. Pulse oximetry, electrocardiogram, blood pressure were tests which were conducted on all patients on arrival into operating room. To all patients, fentanyl 2 µg/mL was administered. Doses of Propofol 2 mg/kg were administered to patients post pre-oxygenation till there was loss of verbal commands. For females (internal diameter 7 mm), males (internal

diameter 8 mm), intubation using endotracheal tubes after 3 mins of mask ventilation following 0.5 mg/kg atracurium. End tidal carbon dioxide levels at 30-35 mm Hg was maintained to achieve tidal volume of 8 mL/kg ideal body weight. Mean arterial pressure and heart rate within 20% of baseline intraoperatively was maintained by administering isoflurane 1-1.5 MAC and intermittently atracurium was administered for muscle relaxation. Anaesthesia, isoflurane, oxygen and air was maintained. 0.75 µg/mL dexmedetomidine was administered half an hour before end of surgery over 10 mins in group A and in group B, normal saline was administered. Intravenously, 1 g of paracetamol and 0.1 mg/kg ondansetron were administered. Isoflurane was turned off at end of surgery and 6L/min 100% oxygen was administered till extubation. 0.05 mg/kg neostigmine and 0.01 mg/kg glycopyrrolate were administered for neuro muscular blockers reversing once satisfactory efforts were detected. The patient was called gently and continuously to open his eyes. In response to verbal stimuli, the patient opened his eyes and regained normal respiration, the study subjects were extubated. Post-surgery, the patients were shifted to post-anaesthetic care. 100-200 mL IV fluid bolus followed by 3 mg epinephrine or 50 µg/mL phenylephrine boluses was administered to manage blood pressure drop. 0.6 mg IV atropine was administered if heart rate dropped less than 50/min. Before and after extubation, cough score was recorded. At predefined time points, systolic, diastolic, mean blood pressure, heart rate were noted. Using Ramsay sedation scale, levels of sedation was assessed. Shivering, post-operative vomiting and nausea were noted.

**Table 1:** Cough, post-operative nausea and vomiting and shivering grades.

Grading	Cough
0	No cough
1	Mild cough
2	Moderate > 1cough lasting less than 5 secs
3	Severe, sustained cough
Grading	Post-operative nausea and vomiting
0	Absent
1	Mild nausea
2	Severe nausea
3	Vomiting
Grading	Shivering
0	No Shivering
1	Mild, fasciculation's of face or neck
2	Moderate, visible tremor in more than 1 muscle
3	Severe, muscular activity in whole body.

Using Students T test, cough score, mean arterial blood pressure, heart rate, sedation scores were comparable. Shivering, nausea and vomiting post operatively was analysed based on chi square test. For statistical analysis, IBM SPSS statistics 20 was used.

## RESULTS

**Table 2:** Cough score post operatively

Study Subjects	Grade -0	Grade- 1	P Value
Group A	65.4%	34.6%	1
Group B	62.5%	37.5%	

**Table 3:** Comparison of mean arterial pressure.

	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	85.71	10.29	86.28	12.82	0.711
T0	91.28	18.00	98.25	12.58	0.117
3 mins	97.85	15.57	107.82	10.67	0.419
6 mins	104.11	10.94	99.99	11.56	0.214
TE	98.74	8.38	100.7	12.40	0.942
3 mins	88.17	8.46	99.49	10.67	0.022

**Table 4:** Comparison of heart rate.

	Group A		Group B		P value
	Mean	SD	Mean	SD	
Baseline	78.38	10.11	83.92	16.64	0.627
T0	68.54	5.78	76.19	10.10	0.028
3 mins	70.77	5.01	84.39	15.38	0.015
6 mins	73.85	10.66	89.75	19.26	0.100
TE	88.59	19.24	100.00	19.51	0.300
3 mins	83.89	16.47	95.2	14.46	0.168

**Table 5:** Comparison of PONV and sedation.

PONV	0-2 hour			P value	0-1 hour		
	0	1	2		0	1	P value
Group A	11.86%	76.28%	11.86%	0.011	11.86%	88.14%	0.441
Group B	0.0%	29.5%	70.5%		0.0%	100%	
PO Sedation	At extubation				30 mins after extubation		
	0	1	2	P value	0	1	P value
Group A	22.74%	65.4%	11.86%	0.333	65.4%	34.6%	0.059
Group B	53.6%	35.7%	10.7%		100%	0.0%	

**Table 6:** Shivering

Study Subjects	Grade -0	Grade- 1	P Value
Group A	100 %	0.0%	0.088
Group B	64.4%	35.6%	

## DISCUSSION

Adverse airway responses and hemodynamic responses accompany general anaesthesia followed by extubation.<sup>4</sup> When extubation is administered at light levels of sedation or anaesthesia, on laryngeal or tracheal stimulation initiates reflux responses. Absence of straining, coughing, breath holding and laryngospasm are resulted due to smooth extubation<sup>1</sup>. The patients to regain consciousness and to be hemodynamically stable, preserved airway reflexes, pain free and breathing adequately need a good recovery from anaesthesia. Airway patency loss, inadequate ventilator drive and aspiration are caused by inadequate anaesthesia recovery. At end of surgery, atelectasis is caused by coughing with tracheal tube.<sup>5</sup> Stress responses to laryngoscopy is reduced by

dexmedetomidine which is having a half-life of about 6 minutes. In adults and children, smooth anaesthesia emergence by agitation attenuating, cough and haemodynamic changes is provided by dexmedetomidine infusions. These infusions also cause increase in blood pressure, heart rate, cough reflex suppression, less respiratory depression, carbon dioxide responsiveness along with anaesthesia emergence. In Kim HJ *et al.*<sup>6</sup> and Guler G *et al.*<sup>7</sup> studies, hypnotics and opioids usage decreased coughing during emergence. In Kim YS *et al.*<sup>8</sup> study, application of topical local anaesthesia was used to decrease coughing during emergence. Instillation of intra-tracheal local anaesthesia, intracuff lidocaine was administered to attenuate hemodynamic and respiratory responses during extubation and it was reported by Lumb

AB *et al.*<sup>5</sup> study. Intravenous lignocaine, fentanyl, remifentanyl, esmolol, labetalol, diltiazem, prostaglandin-E1 and verapamil was administered to attenuate hemodynamic and respiratory responses during extubation as reported by Aouad MT *et al.*<sup>9</sup> study and Kothari D *et al.*<sup>10</sup> study. In geriatric age, high blood pressure can be resulted from cerebral vascular accidents. Arrhythmias are triggered by rapid pulse rate by Seo KH *et al.*<sup>11</sup> study. After extubation, stable hemodynamic maintenance was ensured and thus results in smooth emergence from anaesthesia. Following head and neck surgery and in un-ruptured cerebral aneurysm, it is important to avoid severe coughing and associated unstable haemodynamic changes. Seo KH *et al.*<sup>11</sup> reported that during recovery, changes in cardiac work tend to induce myocardial ischaemia and anaesthesia recovery results in increased catecholamine concentration followed by anaesthesia discontinuation which is increased by laryngeal stimulation during extubation. Kothari D, *et al.*<sup>10</sup> Jain V, *et al.*<sup>12</sup> Kim YS *et al.*<sup>8</sup> study reported that in sedation produced by dexmedetomidine is caused prominently by central stimulation of parasympathetic outflow and sympathetic outflow inhibition from the locus ceruleus in the brainstem. Liu ZX *et al.*<sup>13</sup> study reported that the anti-shivering effect of dexmedetomidine was mediated in the hypothalamus. Post-surgery, after anaesthesia administration, few may develop delirium, confusion or even cognitive dysfunction which was associated with increased risk of postoperative morbidity. Kim DJ<sup>14</sup> reported that in surgical patients, dexmedetomidine decreased RSAS score and thus resulted in emergence incidence agitation. Similar results to present study was observed in Sneha Suresh *et al.*<sup>15</sup> study. A larger sized population study needs to be conducted to yield more accurate results.

## CONCLUSION

After extubation, enhanced hemodynamic at predefined time points were caused by dexmedetomidine infusion at 0.75 mcg/kg prior to extubation and it did not affect cough severity.

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