Indian Journal of Clinical Anaesthesia 2022;9(1):60–65

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical Anaesthesia

Journal homepage: www.ijca.in

Original Research Article

Study of the effects of dexmedetomidine on hemodynamic parameters and extubation quality in patients undergoing ENT surgery under general anaesthesia

Anjali Kumar[1,*], **Smita Lele**[1]

[1] *Dept. of Anesthesiology, Lokmanya Tilak Medical College, Mumbai, Maharashtra, India*

ARTICLE INFO

Article history:
Received 09-09-2021
Accepted 14-10-2021
Available online 12-02-2022

Keywords:
Dexmedetomidine
Extubation
ENT

ABSTRACT

Background and Aims: In ENT surgeries most of the cases are done under general anaesthesia and should be extubated smoothly. If a patient is lightly anesthetised, tracheal and laryngeal irritation can stimulate reflex responses during extubation like bucking, gagging, breath holding, laryngospasm, pulmonary oedema. Alpha 2-Adrenergic agonists are used for their sympatholytic, sedative, anaesthetic sparing and haemodynamic stabilizing properties. We aimed to study the extubation quality and hemodynamic parameters of dexmedetomidine undergoing ENT surgeries under general anaesthesia.

Materials and Method: This observational study included 100 patients undergoing ENT surgery under general anaesthesia, between 18 to 60yrs. Patients were divided into group P (n=50) and group PD (n=50). A standard general anaesthesia technique according to the Ent operation theatre protocol were followed for all patients. For maintenance group P received inj.Propofol 4mg/kg/hr and group PD received inj. Propofol 4mg/kg/hr and inj. Dexmedetomidine infusion 0.5ug/kg/hr as a standard protocol. Respective infusions were stopped at the start of skin closure. Heart rate, systolic blood pressure and diastolic blood pressure were recorded at the time of extubation and at 1,3,5. minutes till 30 minutes after extubation. Quality of extubation was evaluated using 5-point rating scale (extubation quality score) at extubation.

Result: The mean heart rate in the group P was 92/min while in the group PD was 75/min. The mean systolic blood pressure in the group P was 116mmhg while in the group PD was 108mmhg. The mean diastolic blood pressure in the group P was 85mmhg and 67mmhg in group PD (P<0.001). 11 patients of group p got extubation quality score of 2 while 41 cases of group PD got a score of 2(P<0.001).

Conclusion: Inj. Dexmedetomidine provides stable hemodynamic parameters during extubation and provides better extubation quality score.

1. Introduction

Tracheal extubation is the discontinuation of an artificial airway when the indication for its placement no longer exists.

In ENT operation theatre, most of the patients undergoing surgical procedures require general anaesthesia with endotracheal intubation and after the procedure the patients should be extubated without any complications.

If a patient is lightly anesthetised, tracheal and laryngeal irritation can stimulate reflex responses during extubation. Complications of extubation (e.g., bucking, gagging caused by involuntarily resisting positive pressure ventilation in a patient with an endotracheal tube in place, breath holding, laryngospasm, pulmonary oedema) might occur. The most common cause of upper airway obstruction immediately after extubation is laryngospasm. Stimulation of various sites, from the nasal mucosa to the diaphragm, can evoke laryngospasm. Smooth extubation requires the absence of straining movement, coughing, breath holding,

* *Corresponding author*.
E-mail address: anjalishokeen5@gmail.com (A. Kumar).

https://doi.org/10.18231/j.ijca.2022.013

and laryngospasm. Hypertension and tachycardia can be associated with tracheal intubation and extubation.[1]

This transitory rise in pulse rate and blood pressure are probably of little consequence in ASA grade I or II patients but are a matter of concern in patients with cardiovascular diseases like hypertension and coronary artery diseases, because this may lead to complications like angina, myocardial infarction and left ventricular failure due to severe increase in myocardial oxygen demand. Sudden increase in arterial pressure may lead to increase in both cerebral blood flow and intracranial pressure which may result in either herniation of brain contents or decrease in cerebral perfusion pressure, leading to cerebral ischemia, similarly rise in intraocular pressure may be hazardous in patientsoperated for glaucoma. Such stress responses may induce postoperative haemorrhage and potentially fatal cervical hematoma after thyroid surgery.[2] Thus, in order to attenuate these responses, many agents have been studied successfully like fentanyl, lignocaine, and remifentanil. We conducted this study to see the attenuation of extubation response with inj. Dexmedetomidine.

Dexmedetomidine is a highly selective α2-adrenoreceptor agonist that induces sedation and analgesia. It does not affect respiration. Administered after induction, dexmedetomidine reduces the prevalence of emergence agitation. It also reduces arterial blood pressure (BP) and heart rate (HR) according to dose and decreases the hemodynamic and plasma catecholamine responses to intubation and extubation in ophthalmic and vascular surgeries.[1]

Opioid analgesia prevents haemodynamic responses to awakening and extubation but may result in respiratory depression and high carbon dioxide tension with subsequent increase in the intracranial pressure. A2-Adrenergic agonists are used for their sympatholytic, sedative, anaesthetic sparing and haemodynamic stabilizing properties. Dexmedetomidine has shown analgesic effects without significant respiratory depression.[3]

Hence, we conducted this study to evaluate the effect of inj. dexmedetomidine on hemodynamic response and extubation quality score.

2. Materials and Methods

This prospective observational study was conducted in ENT operation theatre of our institution.100 patients were included using convenient consecutive consenting sampling.

Assuming prevalence of expected effect of Inj. dexmedetomidine on hemodynamic parameters during extubation in ENT surgery patients as 60%, sample size will be calculated using formula: n=4xpxqxN/4xpxq+e^2(N-1)

Where,

N = reference population = 540

Reference population calculation: As per our hospital records, approximately 30 patients are posted for elective ENT surgeries per month.

Hence, in total study duration of 18 months, total reference population will be:

N = 30 × 18 = 540 cases

p = prevalence = 60%,

q = (100 – p) = 40%

e = precision (15 % of p) = 9

So, using the above formula,

n= (4×60×40×540)/((4×60×40)+9^2 (540-1))

n=51,84,000/53,259 = 97.3

Hence sample size calculated for the present study is, n = 98

We increased the sample to 100 for better calculations.

We included patients from 18 to 60yrs belonging to ASA I and II and weighing 60-70kgs coming for elective ENT procedures requiring general anaesthesia with intubation.

Patients on medication with effects on heart rate, pregnant and lactating patients, patients with history of sleep apnoea, patients undergoing emergency procedures were excluded from the study. Written valid informed consent was taken from the respective patients. Patients were thoroughly evaluated for fitness for general anaesthesia. All baseline investigations and relevant referrals were checked.

A standard general anaesthesia technique according to the Ent operation theatre protocol were followed. Starvation status and fitness of the patient was checked.

Standard monitors like pulse oximeter, cardio scope and Non-invasive blood pressure were attached. Baseline parameters of heart rate, blood pressure, and oxygen saturation was checked and noted. Patient was prepared by securing intravenous cannula before induction. Patient was preoxygenated with 100%oxygen. Premedication with inj. Glycopyrrolate, inj. Midazolam, inj. Fentanyl was given. Induction was done with inj. thiopentone till loss of eyelash reflex or inj. propofol till loss of consciousness. Ventilation was checked and inj. Vecuronium bromide intravenous given. Endotracheal tube of appropriate size was inserted by experienced anaesthesiologist. After securing of endotracheal tube, end tidal carbon dioxide (ETCO2) were connected.

For maintenance these patients received either inj. Propofol 4mg/kg/hr or inj. Propofol 4mg/kg/hr and inj. Dexmedetomidine infusion 0.5ug/kg/hr as a standard protocol.

The respective infusion was stopped at the start of skin closure.

At the end of the procedure residual neuromuscular blockade was reversed with inj. Glycopyrrolate and inj. Neostigmine. Thorough oropharyngeal suctioning was done and trachea extubated with good air blast. Heart rate, systolic blood pressure and diastolic blood pressure were recorded at the time of extubation and at 1,3,5. . . minutes

till 30 minutes after extubation. Quality of extubation was evaluated using 5-point rating scale (extubation quality score) at extubation.

5-point rating scale:

1. No coughing
2. Smooth extubation, minimal coughing
3. Moderate coughing (3-4 times)
4. Severe coughing (5-10 times), straining
5. Post extubation laryngospasm (coughing >10times)

Following adverse events were also noted for each patient:

1. Hypotension –decrease in blood pressure of more than 30% from Baseline
2. Bradycardia-heart rate of less than 60/min
3. Nausea and Vomiting

3. Result and Analysis

Data was entered into Microsoft Excel (Windows 7; Version 2007) and analysis was done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 22.0; SPSS Inc, Chicago). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical variables. Association between variables was analyzed by using Chi-Square test for categorical variables and unpaired t test for quantitative variables. Bar charts were used for visual representation of the analyzed data. Line Diagrams were used to show the trend of variables over time. Level of significance was set at 0.05.

Table 1: Association between gender and study group(N=100)

Gender	Group		P Value
	Propofol (n=50) n (%)	Propofol + Dexmedetomidine(n=50) n (%)	
Female	24 (48.0)	29 (58.0)	0.316
Male	26 (52.0)	21 (42.0)	

Chi-Square Test, P Value Not Significant

Table 1 shows demographic data of our study. It shows that 48% of females in the study received propofol as a maintenance agent while 58% females received propofol and dexmedetomidine both as maintenance agents. 52% males received only propofol and 42% male received both propofol and dexmedetomidine as maintenance agents. P value is not statistically significant. Data is comparable.

Table 2 shows age wise distribution of our study population. The mean age in the group receiving propofol as the maintenance agent was 40yrs while it was 33yrs in the group receiving both propofol and dexmedetomidine. It shows that the two study groups are comparable and the difference is statistically not significant.

Table 3 and shows the heart rate comparisons of the two study groups at the end of infusion, at reversal, at extubation and at different intervals postextubation. The mean heart rate at extubation in the group receiving propofol was 92/min while it was 75/min in the group receiving both propofol and dexmedetomidine as maintenance agents. Similarly, the mean heart rate in the propofol group at 15 minutes postextubation was 83/min while in the propofol and dexmedetomidine group it was 72/min. The p value of the comparative data is statistically significant.

Table 2: Association between age and study group (N=100)

Age (in Years)	Group		P Value
	Propofol (n=50) n (%)	Propofol + Dexmedetomidine(n=50) n (%)	
≤ 20	9 (18.0)	7 (14.0)	0.104
21-30	8 (16.0)	20 (40.0)	
31-40	9 (18.0)	10 (20.0)	
41-50	13 (26.0)	8 (16.0)	
51-60	11 (10.0)	5 (6.0)	
>60	0	0	

Chi-Square Test, P Value Not Significant

Table 4 shows the comparison in systolic blood pressure between the 2 study groups at the end of infusion, at reversal, at extubation and at different intervals postextubation. The mean systolic blood pressure at the end of infusion in the propofol group was 96mmhg while it was 98mmhg in the propofol and dexmedetomidine group. The p value is not statistically significant. At reversal the mean systolic blood pressure was 106mmhg in the propofol group while it was 103mmhg in the propofol and dexmedetomidine group. The p value is not statistically significant. The mean systolic blood pressure at extubation in the propofol group was 116mmhg while it was 108mmhg in the propofol and dexmedetomidine group. The p value is statistically significant at extubation and up to 30 minutes postextubation.

Table 5 shows the comparison of diastolic blood pressure in the two study groups at the end of infusion, at reversal, at extubation and at different intervals postextubation. At extubation, the mean diastolic blood pressure in the propofol group was 89mmg while it was 73mmhg in the propofol and dexmedetomidine group. At 15minutes postextubation, the mean diastolic blood pressure was 85mmhg in the propofol group and 67mmhg in the propofol and dexmedetomidine group. The p value is statistically significant.

Table 6 shows the extubation quality score in the two study groups. It shows that the extubation quality score was 3 in35 cases in the propofol group and 9 cases in the propofol and dexmedetomidine group. The extubation quality score was 2 in 11 cases of the propofol group while it was 41 cases in the group receiving both propofol and dexmedetomidine. The p value is statistically significant.

Table 7 shows the association between the adverse effects in the 2 study groups. The occurrence of nausea was

Table 3: Comparison of heart rate between two study groups (N = 100)

Heart Rate (per minute)	Group		P Value
	Propofol (n=50) Mean (SD)	Propofol + Dexmedetomidine(n=50) Mean (SD)	
At the end of Infusion	74.42 (8.03)	69.16 (7.84)	0.001*
At Reversal	81.96 (7.50)	72.20 (7.92)	<0.001*
At Extubation	92.50 (7.87)	75.32 (8.41)	<0.001*
At 1 min	94.58 (7.35)	76.90 (7.95)	<0.001*
At 3 min	92.60 (5.93)	76.76 (7.57)	<0.001*
At 5 min	88.96 (6.20)	75.16 (7.60)	<0.001*
At 10 min	86.72 (5.72)	73.96 (7.75)	<0.001*
At 15 min	83.94 (5.68)	72.74 (7.76)	<0.001*
At 20 min	82.18 (5.69)	72.02 (7.68)	<0.001*
At 25 min	80.66 (5.98)	71.38 (7.53)	<0.001*
At 30 min	79.76 (6.50)	70.90 (7.76)	<0.001*

Unpaired t Test, P Value *Significant

Table 4: Comparison of SBP between two study groups (N = 100)

SBP (mmhg)	Group		P Value
	Propofol (n=50) Mean (SD)	Propofol + Dexmedetomidine(n=50) Mean (SD)	
At the end of Infusion	96.84 (5.66)	98.84 (9.36)	0.199
At Reversal	106.10 (5.65)	103.04 (9.70)	0.057
At Extubation	116.00 (5.28)	108.14 (10.22)	<0.001*
At 1 min	123.38 (5.79)	110.06 (9.60)	<0.001*
At 3 min	122.86 (6.37)	109.04 (9.06)	<0.001*
At 5 min	120.72 (6.53)	106.88 (9.04)	<0.001*
At 10 min	118.86 (6.44)	104.94 (9.90)	<0.001*
At 15 min	117.00 (6.78)	103.44 (9.91)	<0.001*
At 20 min	115.36 (6.57)	101.44 (11.32)	<0.001*
At 25 min	113.72 (6.59)	100.00 (12.07)	<0.001*
At 30 min	112.12 (6.88)	98.80 (12.82)	<0.001*

Unpaired t Test, P Value *Significant

Table 5: Comparison of DBP between two study groups (N = 100)

DBP (mm hg)	Group		P Value
	Propofol (n=50) Mean (SD)	Propofol + Dexmedetomidine(n=50) Mean (SD)	
At the end of Infusion	72.08 (6.18)	65.04 (7.29)	<0.001*
At Reversal	81.54 (5.82)	68.88 (7.70)	<0.001*
At Extubation	89.06 (6.39)	73.26 (7.49)	<0.001*
At 1 min	89.84 (5.76)	74.84 (7.89)	<0.001*
At 3 min	89.24 (6.02)	72.30 (8.12)	<0.001*
At 5 min	87.58 (6.12)	70.90 (8.47)	<0.001*
At 10 min	86.36 (6.00)	69.12 (8.75)	<0.001*
At 15 min	85.20 (6.07)	67.84 (8.67)	<0.001*
At 20 min	84.14 (6.15)	66.24 (9.09)	<0.001*
At 25 min	83.18 (6.17)	64.90 (9.36)	<0.001*
At 30 min	82.10 (6.29)	64.10 (9.75)	<0.001*

Unpaired t Test, P Value *Significant

Table 6: Association between extubation quality score and study group (N=100)

Extubation Quality Score	Group		P Value
	Propofol (n=50) n (%)	Propofol + Dexmedetomidine(n=50) n (%)	
1	0	0	
2	11 (22.0)	41 (82.0)	
3	35 (70.0)	9 (18.0)	<0.001*
4	4 (8.0)	0 (0.0)	
5	0	0	

Chi-Square Test, P Value *Significant

Table 7: Association between adverse effects and study group (N=100)

Adverse Effects	Group		P Value
	Propofol (n=50) n (%)	Propofol + Dexmedetomidine(n=50) n (%)	
Nausea	11 (22.0)	6 (12.0)	0.183
Vomiting	4 (8.0)	0 (0.0)	0.041*
Hypotension	0 (0.0)	5 (10.0)	0.022*
Bradycardia	0 (0.0)	11 (22.0)	<0.001*

Chi-Square Test, P Value *Significant

not significantly different in the 2 groups. Vomiting was noticed in 4 subjects of the propofol group while none in the propofol and dexmedetomidine group. Hypotension was noted in 5 of the subjects receiving propofol and dexmedetomidine and bradycardia was seen in 11 subjects while there was no episode of hypotension and bradycardia in the subjects receiving propofol.

4. Discussion

Extubation can be associated with several complications like coughing and respiratory and hemodynamic alterations. These changes are usually transient and well tolerated by most patients, but may be deleterious in certain subgroups of patients. Dexmedetomidine has been successfully used to attenuate the hemodynamic responses to tracheal intubation.[4] Based on its characteristics of sedation, hemodynamic stability, and lack of respiratory depression, along with its relatively short half-life and analgesic effects, our study was conducted to evaluate the effect of dexmedetomidine on hemodynamic responses during extubation, the quality of extubation and the prevalence of complications. Dexmedetomidine activates receptors in the medullary vasomotor centre, reducing norepinephrine turnover and decreasing central sympathetic outflow, resulting in alterations in sympathetic function and decreased HR and BP.[5]

In our study, the hemodynamic parameters in the propofol and dexmedetomidine group were significantly stable during extubation when compared to the propofol group. The mean heart rate at extubation in the group receiving propofol was 92/min while it was 75/min in the group receiving both propofol and dexmedetomidine as maintenance agents (p<0.001). In our study, we found out that the difference between the mean systolic blood pressure between the two groups were insignificant at the end of infusion and at the time of reversal but the difference was significant at extubation. Similar results were found in a study conducted by Turan G.[5] It was observed that Dexmedetomidine 0.5 mcg/kg administered 5 minutes before the end of surgery stabilized hemodynamics, allowed easy extubation, provided a more comfortable recovery and allowed early neurological examination following intracranial operations. Talke P[6] conducted a study in patients undergoing vascular surgery and found out that dexmedetomidine attenuated the increase in HR during emergence. Venn RM[7] found that Dexmedetomidine 2.5 mcg/kg followed by an infusion at the rate of 0.2-2.5 mcg/kg/hour reduced HR in the patients. Kim SH[8] observed that the heart rate and mean blood pressure were significantly lower in dexmedetomidine group as compared with normal saline group at 5 min after administration of dexmedetomidine, 1 min after extubation, and 20 min after arrival in PACU. In 2013, Kim SY[9] stated that the mean arterial pressure and heart rate were more stable in dexmedetomidine group than in placebo group during emergence. In some studies, initial hypertensive response has also been observed after a bolus of high dose of dexmedetomidine.[10]

In our study, 82% subjects in the propofol and dexmedetomidine group could be extubated smoothly with minimal coughing (Extubation Quality Score 2) when compared to the propofol group, where 70% subjects had moderate cough (Extubation Quality Score 3) (p<0.001). Similar results were found in a study conducted by Guler G.[11] It was observed that Dexmedetomidine 0.5 mcg/kg given as a single-dose bolus before tracheal extubation

attenuates airway-circulatory reflexes during extubation. Kim H[12] observed that the incidence of grade 2 and 3 cough reflex at the point of extubation was higher in the dexmedetomidine group and 53.1% in the remifentanil group.

The activation of α_2 adrenoceptors, imidazoline-preferring receptors, or both in the ventrolateral medulla and especially in the solitarius nucleus tract by dexmedetomidine causes bradycardia.[4] In our study, the incidence of bradycardia and hypotension was higher in the dexmedetomidine and propofol group than in the propofol group. Nausea was higher in the propofol group. In a study by Sadhasivam S,[13] similar results of a higher frequency of postoperative hypotension was reported when patient-controlled analgesia with dexmedetomidine was administered in children following spine surgery. However, a study by Karaasalan A[14] found a higher, though not statistically significant, prevalence of adverse events with the use of dexmedetomidine. Massad[15] conducted a study to see the effects of dexmedetomidine on post-operative nausea and vomiting after laparoscopic surgeries and they found out that the incidence of nausea and vomiting was significantly reduced in the group receiving dexmedetomidine.

In our study, none of the patients in either group developed respiratory depression, laryngospasm, bronchospasm, undue sedation or desaturation. A study by Ramsay[16] showed that dexmedetomidine used in morbidly obese patients does not induce respiratory depression at clinical doses although it improved quality of postoperative analgesia.

5. Conclusion

From our study, we observed that:

1. Inj Dexmedetomidine provides stable hemodynamic parameters during extubation.
2. Inj Dexmedetomidine provides better extubation quality score.

We conclude that dexmedetomidine is an excellent drug for stable hemodynamics during extubation as well as for good extubation quality.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

References

1. Aksu R, Akýn A, Bicer C, Esmaoglu A, Tosun Z, Boyacý A. Comparison of the effects of dexmedetomidine versus fentanyl on airway reflexes and hemodynamic responses to tracheal extubation during rhinoplasty: A double-blind, randomized, controlled study. *Curr Ther Res Clin Exp*. 2009;70(3):209–20.
2. Hartley M, Vaughan RS. Problems with tracheal extubation. *Br J Anaesth*. 1993;71:561–8.
3. Tanskanen PE, Kytta JV, Randell TT, Aantaa RE. Dexmedetomidine as an anesthetic adjuvant in patients undergoing intracranial tumor surgery: A double-blind, randomized and placebo-controlled study. *Br J Anaesth*. 2006;97:658–65.
4. Bindu B, Pasupuleti S, Gowd UP, Gorre V, Murthy RR, Laxmi MB, et al. A double blind randomized controlled trial to study the effect of dexmedetomidine on hemodynamic and recovery responses during tracheal extubation. *J Anaesthesiol Clin Pharmacol*. 2013;29(2):162–7.
5. Turan G, Ozgultekin A, Turan C, Dincer E, Yuksel G. Advantageous effects of dexmedetomidine on haemodynamic and recovery responses during extubation for intracranial surgery. *Eur J Anaesthesiol*. 2008;25(10):816–20.
6. Talke P, Chen R, Thomas B, Aggarwall A, Gottlieb A, Thorborg P. The hemodynamic and adrenergic effects of perioperative dexmedetomidine infusion after vascular surgery. *Anesth Analg*. 2000;90(4):834–9.
7. Venn RM, Grounds RM. Comparison between dexmedetomidine and propofol for sedation in the intensive care unit: Patient and clinician perceptions. *Br J Anaesth*. 2001;87(5):684–90.
8. Kim SH, Oh YJ, Park BW, Sim J, Choi YS. Effects of single-dose dexmedetomidine on the quality of recovery after modified radical mastectomy: a randomised controlled trial. *Minerva Anestesiol*. 2013;79(11):1248–58.
9. Lee JS, Choi SH, Kang YR, Kim Y, Shim YH. Efficacy of a single dose of dexmedetomidine for cough suppression during anesthetic emergence: a randomized controlled trial. *Can J Anaesth*. 2015;62(4):392–8.
10. Kallio A, Scheinin M, Koulu M. Effects of dexmedetomidine, a selective alpha 2-adrenoceptor agonist, on hemodynamic control mechanisms. *Clin Pharmacol Ther*. 1989;46(1):33–42.
11. Guler G, Akin A, Tosun Z, Eskitascoglu E, Mizrak A, Boyaci A. Single-dose dexmedetomidine attenuates airway and circulatory reflexes during extubation. *Acta Anaesthesiol Scand*. 2005;49(8):1088–91.
12. Kim H, Min KT, Lee JR, Ha SH, Lee WK, Seo JH. Comparison of Dexmedetomidine and Remifentanil on Airway Reflex and Hemodynamic Changes during Recovery after Craniotomy. *Yonsei Med J*. 2016;57(4):980–6.
13. Sadhasivam S, Boat A, Mahmoud M. Comparison of patient-controlled analgesia with and without dexmedetomidine following spine surgery in children. *J Clin Anesth*. 2009;21(7):493–501.
14. Karaaslan K, Yilmaz F, Gulcu N, Colak C, Sereflican M, Kocoglu H. Comparison of dexmedetomidine and midazolam for monitored anesthesia care combined with tramadol via patient-controlled analgesia in endoscopic nasal surgery: A prospective, randomized, double-blind, clinical study. *Curr Ther Res Clin Exp*. 2007;68:69–81.
15. Massad IM, Mohsen WA, Basha AS, Al-Zaben KR, Al-Mustafa MM, Alghanem SM. A balanced anesthesia with dexmedetomidine decreases postoperative nausea and vomiting after laparoscopic surgery. *Saudi Med J*. 2009;30(12):1537–41.
16. Ramsay MA. Bariatric surgery: The role of dexmedetomidine. *Semin Anesth Perioper Med Pain*. 2006;25(2):51–6.

Author biography

Anjali Kumar, PG https://orcid.org/0000-0003-0365-7465

Smita Lele, Professor

Cite this article: Kumar A, Lele S. Study of the effects of dexmedetomidine on hemodynamic parameters and extubation quality in patients undergoing ENT surgery under general anaesthesia. *Indian J Clin Anaesth* 2022;9(1):60-65.