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Original Research Article

COMPARISON OF INTRATRACHEAL VS INTRAVENOUS DEXMEDETOMIDINE ADMINISTRATION ON RECOVERY FROM GENERAL ANAESTHESIA IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMISED OBSERVER BLINDED STUDY

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ABSTRACT

Background: Endotracheal tube causes laryngeal irritation including coughing, bucking and cardiovascular stimulation on emergence from general anesthesia and the incidence varies from 36% to 96% of cases. **Objective:** to compare intratracheal vs intravenous dexmedetomidine administration before tracheal extubation on recovery profile from general anaesthesia in patients undergoing laparoscopic cholecystectomy. **Materials and Methods:** The present randomised, prospective and observer blinded study was conducted in the Department of Anaesthesia and Intensive Care at Government Medical College and Hospital, Chandigarh. After approval of protocol by Institutional Ethics Committee, Clinical Trial Registry India registration and written informed consent, patients scheduled for laparoscopic cholecystectomy under general anaesthesia were enrolled. **Result:** The time to awareness was more in Group DV (6.54±1.73 minutes) compared to Group DT (4.77±1.58 minutes) and the difference in time to awareness was statistically significant. The time to extubation was more in Group DV (8.08±2.08 minutes) compared to Group DT (6.19±1.67 minutes) and the difference in time to extubation was statistically significant. The HR and MBP did not increase significantly during extubation in both groups. The severity of pain in post-operative period as assessed by VAS was comparable in both groups. The level of sedation in post operative period as assessed by SRS was comparable in both groups. **Conclusion:** We can conclude that dexmedetomidine can be used either intratracheally or intravenously to reduce severity of emergence cough during extubation as both routes are safe and effective.

INTRODUCTION

Bucking and coughing frequently occur during extubation and may lead to negative pressure pulmonary oedema with an abrupt increase in intraocular, intrathoracic, intraabdominal, and intracranial pressure. This can increase the mortality and morbidity of the patient.

It also has been noted respiratory complications seen after tracheal extubation is higher when the patient is deeply anaesthetised regardless of the type of operation performed. However tracheal extubation under deep anaesthesia is recommended in some operations where avoiding the responses to extubation is thought to be beneficial.[1]

There are many theories describing sudden increase in heart rate (HR) and blood pressure (BP) during intubation and extubation such as surge of catecholamines released into blood, irritation of the airway, intense pain due to surgery and anxiety or confusion state following emergence from anaesthesia. Tracheal extubation can be associated with adverse airway and hemodynamic responses. Smooth extubation requires the absence of coughing, breath holding, straining, and laryngospasm.[2]

Coughing itself is usually not seen as a complication, because it is a physiological response to protect the airway from aspiration. However, coughing may increase heart rate, arterial pressure, intraocular & intracranial pressure. But sometimes ineffective or persistent coughing might be associated with complications such as laryngospasm. It may be reasonable to regard coughing as a complication if other complications, such as decrease in SpO2,

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laryngospasm or airway obstruction, are associated with coughing.[3]

Though these changes are transitory, sometimes they can be of major concern for an anaesthesiologist. Over the period various strategies have been reported to attenuate the intubation response such as intratracheal local anaesthetic instillation,[4] intravenous dexmedetomidine intravenous lignocaine, Topical 0.75% ropivacaine which can be used for smoother extubation also.

Dexmedetomidine is one of the novel drugs which has been tried for smooth intubation and extubation. It is a potent and highly selective α-2 adrenoceptor agonist with sympatholytic, sedative, analgesic, amnestic, and anaesthetic sparing properties, without respiratory depression, making it a useful and safe drug during emergence from anaesthesia.

The efficacy and safety profile of intratracheal Dexmedetomidine application are not fully studied and the technique has not been specifically investigated. A study in laparoscopic bariatric surgeries shown single dose of iv dexmedetomidine 15 min before extubation helps in smooth extubation.[5] Recently one study shown the efficacy of intratracheal dexmedetomidine over intravenous dexmedetomidine in smooth extubation in gynaecological laparoscopic surgery.[6]

There are very limited reports comparing intratracheal vs intravenous dexmedetomidine administration on emergence from general anaesthesia. Hence, the present study is planned to compare intratracheal vs intravenous dexmedetomidine administration before tracheal extubation on recovery profile from general anaesthesia in patients undergoing laparoscopic cholecystectomy.

MATERIALS AND METHODS

The present randomised, prospective and observer blinded study was conducted in the Department of Anaesthesia and Intensive Care at Government Medical College and Hospital, Chandigarh. After approval of protocol by Institutional Ethics Committee (GMCH/IEC/2019/151 dated-17/12/2019), Clinical Trial Registry India registration (CTRI/2020/02/023282) and written informed consent, patients scheduled for laparoscopic cholecystectomy under general anaesthesia were enrolled.

Inclusion Criteria

1. Patients of age between 18-60 years
2. American Society of Anaesthesiologists (ASA) physical status I-II
3. Patients undergoing laparoscopic cholecystectomy requiring endotracheal intubation under general anaesthesia

Exclusion Criteria

4. Patients with Body Mass Index (BMI) > 35 kg/m^2
5. Patients with increased risk regurgitation and aspiration of gastric content
6. Patients who were allergic to study drug
7. Patients with cardiovascular disorders
8. Patients with respiratory disorders
9. Patients with hepatic or renal insufficiency
10. Pregnant and lactating women

Preparation of the patient:

Patients were evaluated preoperatively on the day prior to surgery. General physical examination and systemic examination was conducted to assess the fitness for the proposed surgical procedure under general anaesthesia. Written informed consent was taken from all the patients enrolled for the study.

Preoperative airway evaluation was performed by using Airway Difficulty Score (ADS) in all the patients. Routine investigations (renal function tests [RFT], Liver function test [LFT}, haemogram, international normalised ratio [INR], and blood sugar) were done in all the patients. Patients were premedicated with tablet alprazolam 0.25 mg and ranitidine 150 mg PO, night before surgery and 6.30 AM on the day of surgery and were kept fasting during this time.

Grouping of the patients:

A total of 52 patients undergoing elective laparoscopic cholecystectomy surgery were randomly allocated to two groups of 26 patients each using computer generated random number table and the allotted number was secured in a coded opaque sealed envelope. An anaesthetist prepared and administered the drug according to the group allocation, dexmedetomidine 0.5 µg/kg in 20 ml saline intravenously (DV); or dexmedetomidine 0.5 µg/kg in 1 ml intratracheally (DT). Total body weight of patients was taken into consideration to calculate the dose of dexmedetomidine. A second anaesthetist who was blinded to the group allocation was available to record data as an independent observer. The patients were blinded to the mode of administration of dexmedetomidine and allocated to one of following two groups:

Group DV: Dexmedetomidine administered intravenously 15 min prior to extubation.

Group DT: Dexmedetomidine administered intratracheally 15 min prior to extubation.

Conduct of Anaesthesia:

On arrival in the operation room (OR), standard monitors were applied and baseline parameters that include HR, continuous electrocardiogram (ECG), non-invasive blood pressure (NIBP), SpO_2 and EtCO2 (S/5 Aespire®, GE Healthcare Helsinki, Finland) were recorded before induction of anaesthesia. An intravenous line was started; all patients were pre-medicated with glycopyrrolate 0.2 mg, midazolam 0.04 mg/kg intravenously, 5 mins before induction. After preoxygenation for three minutes, anaesthesia was induced using morphine 0.1 mg/kg and propofol 1.0 to 2.5 mg/kg. After checking for ability to achieve adequate mask ventilation, vecuronium 0.1 mg/kg was used to facilitate muscle relaxation.

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Endotracheal intubation was carried out with appropriate sized endotracheal tube attached with a 5 F.G infant feeding tube secured at its distal tip with sterile silk to the ETT one cm above the cuff, with the end hole of the feeding tube free from obstruction. The feeding tube was then wound around the ETT snugly and the upper part of the feeding tube is secured again with silk thread the upper part of the ETT, at the 22 or 24 cm mark of the ETT. The tube cuff was inflated to the optimum intracuff pressure of 25 cmH2O using a handheld pressure gauge (VBM Medizintechnik GmbH, Germany). ETT placement was confirmed by capnography. Bilateral air entry was checked and tube was fixed at appropriate position. The patient was maintained with oxygen (40%), nitrous oxide and isoflurane. Mechanical ventilation was adjusted to maintain an end-tidal carbon dioxide ($EtCO_2$) pressure of 30-35 mm Hg.

Thirty minutes before the end of the surgery, ondansetron 0.1 mg/kg was administered in order to prevent postoperative nausea and vomiting (PONV). According to the group allocation of group either dexmedetomidine 0.5 µg/kg in 20 ml saline intravenously (DV); or dexmedetomidine 0.5 µg/kg in 1 ml intratracheally (DT) was administered. Rest of the management was at the discretion of the attending anaesthesiologists.

An anaesthesiologist, who was blinded to the randomisation, had performed the remaining anaesthetic recovery processes and collected all the data.

Following parameter were recorded on the attached proforma: the duration of anaesthesia and operation, the time to awareness (from the end of the surgery to follow verbal command), the time to extubation (from the end of the surgery to extubation), and cough scorer[6]

Haemodynamic parameters (SBP, DBP, MBP and HR) values were recorded 5 min before anaesthesia (T0), immediately after the administration of dexmedetomidine (Dex) (T1), 5 min after the administration of Dex (T2), 10 min after the administration of Dex (T3), at the end of surgery (T4), at the point of awareness (T5), immediately after the extubation (T6), 2 min after extubation (T7), 5 min after extubation (T8), 15 min after extubation (T9) and 30 min after extubation (T10). $EtCO_2$, SpO_2 values were recorded at T1, T2, T3 and T4. Subsequently, postoperative pain scores (using the visual analogue scale (VAS)) nausea/vomiting and the Steward recovery score (SRS)[51] were assessed at T8, T9 and T10.

Statistical Analysis

The sample size was calculated with the help of power analysis, on the basis to detect a difference in the cough score from previous study. Assuming confidence interval of 95% and a power of 80%, The mean cough score in the intravenous administration of dexmedetomidine group was 2.2 with S.D of (0.8) and 30% reduction in response in other group was considered as significant, with effect size of 0.82; sample size of 24 subjects per group was calculated. For attrition it was decided to include 26 subjects per group.

Discrete categorical data was presented as n (%); Continuous data was written as either in the form of its mean and standard deviation or in the form of its median and interquartile range, as per the requirement. All the statistical tests were two-sided and was performed at a significance level of α=0.05. Analysis was conducted using IBM SPSS STATISTICS (version 22.0).

RESULTS

Sixty-one patients were assessed for eligibility in the study. Nine patients were not included, among which 5 patients did not meet the inclusion criteria, two of them did not give consent, two of them could not be included as the surgery got postponed. So, it left us with 52 patients for randomization (Group DV –26 patients, and Group DT – 26 patients) and statistical analysis was done with 52 patients (Consort diagram [Figure 1]). Group DV received Injection Dexmedetomidine 0.5 meq/kg intravenously 15 minutes before extubation and Group DT received Injection Dexmedetomidine 0.5 meq/kg intratracheally 15 minutes before extubation.

Demographic Data: Both the groups were comparable with respect to the demographic profiles.

Table 1: Demographics Characteristics [Mean ±¬¬ SD or number (%)]

	Group DT(n=26)	Group DV(n=26)	p value
Age (yrs)	41.69±10.38	40.69±8.51	0.706
Sex (F/M)	20/6 (76.9/23.1%)	21/5 (80.8/19.2%)	0.734
ASA (I/II)	16/10 (61.5/38.5%)	17/9 (65.4/34.6%)	0.773
Weight (kg)	69.23±8.45	67.08±9.10	0.439
Height (cm)	156.19±8.29	157.62±6.65	0.381

Group DT = Dexmedetomidine administered intratracheally 15 min prior to extubation
Group DV = Dexmedetomidine administered intravenously 15 min prior to extubation

The mean age of patients was 41.69±10.38 years in Group DT and 40.69±8.51 years in Group DV. The difference between the groups was statistically insignificant (p > 0.05). (Table 1) In Group DT 76.9% patients were female and 23.1% were male, Group DV had 80.8% female patients and 19.2% male patients. The difference in the sex distribution between the groups was statistically insignificant (p

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> 0.05). ASA Grade – Group DT had 61.5% patients of Grade I and 38.5% patients of Grade II, in Group DV 65.4% patients were of Grade I and 34.6% patients were of Grade II. The difference between the two groups was not statistically significant (p > 0.05). The mean weight of patients in Group DT was 69.23±8.45 kg and 67.08±9.10 kg in Group DV. The difference in the mean weight in both the groups was statistically not significant (p > 0.05).

The mean height of patients in Group DT was 156.19±8.29 cm and 157.62±6.65 cm in Group DV. The difference in the height distribution between the groups was statistically insignificant (p > 0.05).

Table 2: Time [Mean ± SD]

	Group DT	Group DV	p value
Time to awareness (minutes)	4.77±1.58	6.54±1.73	<0.001
Time to extubation (minutes)	6.19±1.67	8.08±2.08	0.001

Time to awareness: The mean time to awareness in Group DT was 4.77±1.58 min, and in Group DV was 6.54±1.73 min. The difference in the mean time to awareness between the two groups was statistically significant (p < 0.05). (Table 2)

Time to extubation: The mean time to extubation in Group DT was 6.19±1.67 min, and in Group DV was 8.08±2.08 min. The difference in the mean time to extubation between the two groups was statistically significant (p < 0.05). (Table 2)

Severity of Cough during extubation

a) During extubation 38.5 % (10/26) patients in Group DT and 50.0% (7/26) patients in Group DV had no cough. 50.0 % (13/26) patients in Group DT and 26.9% (7/26) patients in Group DV had minimal cough. 11.54 % (3/26) patients in Group DT and 23.1% (6/26) patients in Group DV had moderate cough. No patients in Group DT and Group DV had severe cough. The difference between the two groups was statistically insignificant. (p > 0.05).

Table 3: Cough Score

Cough score	Group DT	Group DV
0	10 (38.5%)	13 (50.0%)
1	13 (50.0%)	7 (26.9%)
2	3 (11.54%)	6 (23.1%)
3	0	0
P value	0.203	

Cough score 0- No cough, Cough score 1- minimal (single) cough, Cough score 2- moderate (≤5) cough, Cough score 3- severe (>5) cough

Haemodynamic Variables

Heart Rate- The mean value of HR at baseline -T0, immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, at the point of awareness-T5, at the point of extubation-T6, 2 min after extubation-T7, 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 87.85±13.01, 86.62±12.99; 83.81±12.16, 81.27±10.83; 80.58±11.56, 77.00±11.95; 78.19±12.06, 73.12±12.50; 75.31±11.76, 74.46±10.75; 79.73±11.34, 80.12±11.74; 84.00±11.47, 85.04±12.15; 82.31±9.99, 83.08±11.73; 80.19±9.88, 80.92±11.64; 81.08±9.98, 80.12±11.92; 79.38±10.04, 79.12±11.38. The difference between the mean HR was statistically insignificant (p > 0.05) at all time intervals. (Table 4a, Figure 4a)

Table 4: Heart Rate [Mean ± SD]

Time	Group DT	Group DV	p value
T0	87.85±13.01	86.62±12.99	0.734
T1	83.81±12.16	81.27±10.83	0.431
T2	80.58±11.56	77.00±11.95	0.278
T3	78.19±12.06	73.12±12.50	0.142
T4	75.31±11.76	74.46±10.75	0.788
T5	79.73±11.34	80.12±11.74	0.905
T6	84.00±11.47	85.04±12.15	0.753
T7	82.31±9.99	83.08±11.73	0.800
T8	80.19±9.88	80.92±11.64	0.808
T9	81.08±9.98	80.12±11.92	0.754
T10	79.38±10.04	79.12±11.38	0.269

T0=Base line parameters, T1= immediately after the administration of Dex, T2=5 min after the administration of Dex, T3=10 min after the administration of Dex, T4= at the end of surgery, T5= at the point of awareness, T6= at the point of extubation, T7=2 min after extubation, T8=5 min after extubation, T9=15 min after extubation, T10=30 min after extubation.

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Systolic Blood Pressure- The mean values of SBP at baseline -T0, immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, at the point of awareness-T5, at the point of extubation-T6, 2 min after extubation-T7, 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 121.77±14.53, 121.58±12.36; 115.85±11.74, 112.58±10.37; 115.12±12.49, 109.62±9.42; 111.65±12.55, 101.15±9.89; 113.73±12.67, 103.27±8.42; 115.38±17.94, 109.19±11.12; 120.19±16.42, 113.96±11.61; 115.08±11.62, 112.23±8.94; 112.65±12.29, 109.12±8.51; 110.38±11.25, 108.62±9.33; 111.81±11.37, 110.27±8.07. The difference in the mean SBP between Group DT and Group DV was overall statistically insignificant ($p > 0.05$) except at time interval T3 and T4, it was statistically significant ($p < 0.05$).

Table 5: Systolic Blood Pressure [Mean ±SD]

Time	Group DT	Group DV	p value
T0	121.77±14.53	121.58±12.36	0.959
T1	115.85±11.74	112.58±10.37	0.292
T2	115.12±12.49	109.62±9.42	0.079
T3	111.65±12.55	104.15±9.89	0.021
T4	113.73±12.67	103.27±8.42	0.001
T5	115.38±17.94	109.19±11.12	0.141
T6	120.19±16.42	113.96±11.61	0.120
T7	115.08±11.62	112.23±8.94	0.327
T8	112.65±12.29	109.12±8.51	0.233
T9	110.38±11.25	108.62±9.33	0.540
T10	111.81±11.37	110.27±8.07	0.576

Diastolic Blood Pressure- The mean values of DBP at baseline -T0, immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, at the point of awareness-T5, at the point of extubation-T6, 2 min after extubation-T7, 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 77.15±10.98, 74.69±9.51; 72.81±11.36, 70.92±8.74; 72.15±10.84, 69.35±8.43; 69.96±11.31, 66.85±7.71; 70.23±10.67, 64.65±5.76; 72.00±11.73, 68.12±7.04; 74.58±12.07, 70.31±7.66; 72.58±9.30, 70.46±7.60; 71.19±10.48, 67.00±6.91; 68.69±8.94, 66.77±7.10; 70.31±9.88, 97.69±4.82. The difference in the mean DBP between Group DT and Group DV was overall statistically insignificant ($p > 0.05$) except at time interval T4, it was statistically significant ($p < 0.05$). (Table 6)

Table 6: Diastolic Blood Pressure [Mean ±SD]

Time	Group DT	Group DV	p value
T0	77.15±10.98	74.69±9.51	0.392
T1	72.81±11.36	70.92±8.74	0.505
T2	72.15±10.84	69.35±8.43	0.302
T3	69.96±11.31	66.85±7.71	0.251
T4	70.23±10.67	64.65±5.76	0.023
T5	72.00±11.73	68.12±7.04	0.154
T6	74.58±12.07	70.31±7.66	0.134
T7	72.58±9.30	70.46±7.60	0.373
T8	71.19±10.48	67.00±6.91	0.095
T9	68.69±8.94	66.77±7.10	0.394
T10	70.31±9.88	67.69±4.82	0.231

Mean Arterial Pressure- The mean values of MAP at baseline -T0, immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, at the point of awareness-T5, at the point of extubation-T6, 2 min after extubation-T7, 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 92.00±11.70, 90.58±9.63; 87.15±10.96, 85.46±8.72; 86.46±11.00, 83.69±8.68; 83.69±11.43, 79.69±8.33; 84.81±10.92, 78.00±6.38; 86.46±13.33, 82.19±8.47; 89.77±13.22, 85.58±9.60; 86.77±9.75, 84.62±8.04; 84.92±10.74, 81.62±7.87; 82.54±9.32, 81.15±7.87; 84.15±9.99, 82.23±5.55. The difference in the mean MAP between Group DT and Group DV was overall statistically insignificant ($p > 0.05$) except at time interval T4, it was statistically significant ($p < 0.05$). **Oxygen Saturation-** The mean values of SpO_2 at immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, in Group DT and Group DV were 98.54±1.14, 98.65±1.26; 98.96±1.04, 99.00±1.02; 99.08±0.94, 99.15±0.93; 99.35±0.80, 99.38±0.80. The difference in the mean SpO_2 between Group DT and Group DV was overall statistically insignificant ($p > 0.05$).

$ETCO_2$- The mean values of $ETCO_2$ at immediately after the administration of Dex-T1, 5 min after the administration of Dex-T2, 10 min after the administration of Dex-T3, at the end of surgery-T4, in Group DT and Group DV were 32.15±1.69,

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32.92±1.85; 32.23±1.77, 33.46±1.45; 32.19±1.90, 33.35±1.52; 32.88±1.68, 33.08±1.77. The difference in the mean $ETCO_2$ between Group DT and Group DV was overall statistically insignificant ($p > 0.05$) except at time interval T2, it was significant ($p < 0.05$).

Post-operative observations

Patients were followed up 30 minutes after surgery for assessing:

a) Analgesia use

19.2% of the patients in Group DT and 11.5% of patients in Group DV were required additional analgesics. The difference across the two groups was statistically insignificant ($p > 0.05$)

b) Steward Recovery Score

The mean values of SRS at 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 3.77±0.71, 3.73±0.53; 4.92±0.56, 4.77±0.59; 5.69±0.47, 5.85±0.37. The difference in the mean SRS between Group DT and Group DV was overall statistically insignificant ($p > 0.05$).

c) Visual Analogue Scale

The mean values of VAS at 5 min after extubation-T8, 15 min after extubation-T9, 30 min after extubation-T10 in Group DT and Group DV were 3.42±0.86, 3.92±0.80; 3.73±0.83, 3.73±0.67; 3.50±0.76, 3.62±0.70. The difference in the mean VAS between Group DT and Group DV was overall statistically insignificant ($p > 0.05$) except at T8 it was significant ($p < 0.05$).

d) Adverse events

Vomiting observed in one patient of Group DT and three patients of Group DV. The difference across the two groups was statistically insignificant ($p > 0.05$).

DISCUSSION

In the present study, the two groups were comparable with respect to patient demographics such as age, sex distribution, weight, height and ASA grading.

The result of our study showed that the coughing during extubation was reduced on administration of dexmedetomidine 15 minutes before extubation. Attenuation of cough reflex was comparable when dexmedetomidine was administered via intratracheal route or intravenous route though the time to awareness and time to extubation was higher in Group DV than in Group DT.

A meta-analysis in 2019 reviewed various clinical techniques to prevent cough at emergence from general anaesthesia. Two studies of dexmedetomidine infusion (0.5 mcg/kg bolus 30 minutes prior to planned tracheal extubation) were included in this meta-analysis showed significant reduction in emergence cough with pooled OR 0.133; 95% CI 0.053-0.337; NNT 2.21. They also determined that the administration of dexmedetomidine (0.5 mcg/kg) intravenously before extubation attenuates both the incidence and severity of airway and circulatory reflexes on emergence from general anaesthesia without prolonging recovery. However, authors concluded that cuff inflation with alkalinised lignocaine and topical lignocaine application were two most effective techniques.[7]

Our study results showed that both intratracheal and intravenous administration of dexmedetomidine 15 minutes prior to extubation reduces extent of coughing observed in patients after laparoscopic cholecystectomy. This result might be attributable to reduction of laryngeal nerve sensitivity and sympathetic activity during extubation after either intratracheal or intravenous administration of dexmedetomidine.[8]

Intratracheal application of dexmedetomidine provided stable haemodynamic effects and improved pain score of patients without any airway adverse events. These effects were similar to those observed following the intravenous administration of dexmedetomidine. Furthermore, quality of early recovery from general anaesthesia in terms of time to awareness and time to extubation was better when dexmedetomidine administered intratracheally as compared to intravenous administration. This result was statistically highly significant in our study ($p=0.001$).

Endotracheal tube causes laryngeal irritation leading to coughing, bucking and cardiovascular stimulation on emergence from general anaesthesia in approximately 36% to 96% of patients. In our study, the overall cough incidence at extubation was 55.76% (29/52 in both groups combined).

Wang F et al6 studied the effect of intratracheal dexmedetomidine administration on recovery from general anaesthesia in gynaecological laparoscopic surgery. They administered the dexmedetomidine intratracheally or intravenously at a dose of 0.5mcg/kg 15 minutes before extubation. In the study 53.33% (16/30) patients of intratracheal group and 60.0% (18/30) patients of intravenous group did not have any cough. In our study 38.5% (10/26) patients of intratracheal group and 50.0% (13/26) patients of intravenous group did not have any cough (cough score=0). Minimal cough (cough score=1) occurred in 40.0% (12/30) patients of intratracheal and 30.0% (9/30) patients of intravenous group in their study. In our study 50.0% (13/26) patients of intratracheal group and 26.9% (7/26) patients of intravenous group had minimal cough. Wang F et al study showed 6.66% (2/30) patients of intratracheal group and 10.0% (3/30) patients of intravenous group had moderate cough whereas our study showed 11.5% (3/26) patients of intratracheal group and 23.1% (6/26) patients of intravenous group had moderate cough (cough score=2) but as similar to Wang F et al study our study also not witnessed severe cough (cough score=3) in any of the patients.

The results from our study showed that intratracheal administration of dexmedetomidine provides early recovery from general anaesthesia when compared to intravenous route. In our study time to awareness and time to extubation were significantly lower in Group DT compared to Group DV and quality of extubation

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was comparable in both groups. Hence, for improving quality of early recovery from general anaesthesia, intratracheal route of administration of dexmedetomidine can be safe alternative to intravenous route.

Bindu B et al0 studied the effect of dexmedetomidine on haemodynamic and recovery responses during tracheal extubation. They administered 0.75mcg/kg of dexmedetomidine intravenously 15 minutes prior to extubation. They observed significant difference in HR and BP between study group and control group. They also observed that in study group 52.0% had bradycardia and 8.0% had hypotension but none required treatment. In our study there was no significant difference in HR and BP between Group DT and Group DV. Also, in our study none had bradycardia. This variance of results in both studies is attributed to different concentration of drug used.

The HR and BP values in Group DT and Group DV in Wang F et al study showed less dramatic variation compared to control group. These results are similar to the findings in our study. In their study two patients developed tachycardia and hypertension in Group DV and in Group DT three patients developed tachycardia and two patients developed hypertension. In our study no such adverse events were observed. This variance in results might be due to variation in position of patient, type and duration of surgery.

CONCLUSION

The present study showed that administration of dexmedetomidine via intratracheally or intravenously 15 minutes before end of surgery reduced the severity of cough during extubation without affecting the hemodynamics and steward recovery score in patients operated under general anaesthesia in laparoscopic cholecystectomy.

We therefore can conclude from our study that dexmedetomidine can be used either intratracheally or intravenously to reduce severity of emergence cough during extubation as both routes are safe and effective.

To confirm the findings of our study, more randomized controlled trials with adequate sample size are required. To confirm the efficacy of different routes and concentrations of dexmedetomidine in reducing extubation response more randomized controlled trials are required.

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