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Original Research Paper

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COMPARISON OF NTG VS DEXMEDETOMIDINE FOR CONTROL OF HAEMODYNAMIC RESPONSE IN PATIENTS DURING EMERGENCE FROM ANAESTHESIA AND EXTUBATION FOLLOWING LAPAROSCOPY

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ABSTRACT Endotracheal intubation as well as extubation are associated with various cardiovascular and airway responses leading to increase in heart rate (tachycardia), hypertension (HTN), cardiac arrhythmias, myocardial ischemia (MI), coughing, agitation, bronchospasm, increased bleeding, raised intracranial tension etc. Pneumoperitoneum creation in laparoscopic surgeries, leads to adverse changes in various systems of human body including cardiovascular, respiratory and acid base balance system. Various factors which leads to haemodynamic changes in patient are release of catecholamine, carbon di-oxide absorption, vasopressin release and position of the patient. NTG generate NO (Nitric oxide) which causes vasodilatation in vascular smooth muscle leading to decrease in blood pressure. It also relaxes the respiratory tract smooth muscle and hence it is preferred by anaesthesiologist to prevent laryngospasm. Dexmedetomidine is an 2-adrenoreceptor agonist used to facilitate the extubation after surgeries. Dexmedetomidine used in the intraoperative period causes decrease in serum catecholamine levels by 90%, which in turn blunts the haemodynamic response to laryngoscopy, tracheal intubation, pneumo-peritoneum and extubation. So we did the comparative study between IV dexmedetomidine and IV NTG on hemodynamic response during extubation in laparoscopic surgeries. To study and compare the effect of intravenous nitro-glycerine (NTG) with dexmedetomidine in patients undergoing laparoscopic surgery and during recovery in terms of haemodynamic response during tracheal extubation, airway reflexes during tracheal extubation by using extubation quality score, sedation by using Ramsay Sedation Scale & side effects of drug. 60 patients of ASA grade 1 and 2 undergoing laparoscopic surgery were divided into two groups of thirty each. GROUP D (n=30) will receive Dexmedetomidine infusion at the rate of 0.75 mics/kg over 10 minutes and GROUP N (n=30) will receive NTG infusion at the rate of 2 mics/kg over 10 minutes .patients were assessed on the basis of ramsay sedation scale , extubation quality scale and vas scale every 1, 3, 5, 10 and 15 minutes. When both the groups were compared it was found out there was statistically significant difference in dexmedetomidine group as compared to NTG in terms of decrease in HR , BP, SBP , DBP, MAP , extubation quality score , ramsay sedation scale, and VAS scale .there was no overall complication in both groups. In conclusion, the Dexmedetomidine at a dose of 0.75μg/kg body weight as compared to NTG (2 μg/kg body weight)when administered as infusion over 10 minutes, before tracheal extubation attenuates the airway reflexes and hemodynamic responses effectively during emergence from anaesthesia providing smooth extubation. It provide adequate sedation, maintaining patient's arousability and delay the need for analgesia in the post-operative period.

KEYWORDS :

INTRODUCTION

Advanced airways such as endotracheal intubation is an integral part of the modern general anaesthesia for securing airway. Endotracheal intubation as well as extubation irritates the larynx and pharynx which are associated with various cardiovascular and airway responses leading to increase in heart rate (tachycardia), hypertension (HTN), cardiac arrhythmias, myocardial ischemia (MI), coughing, agitation, bronchospasm, increased bleeding, raised intracranial tension etc.

There are many theories explaining sudden increase in PR and BP during extubation, such as a rise in catecholamine[1], irritation of airway due to suctioning, intense pain from incised wounds and emergence.[2]

Cardiovascular responses are more marked in patients with pre-operative hypertension, predisposing them to cardiac or cerebral complications. It is essential to prevent autonomic response like sympathetic hyperactivity in order to maintain hemodynamic stability and reduction of morbidity. The presence of the endotracheal tube often leads to reflex responses, amongst which the most common is coughing. Upto76-96% incidence of post-extubation bucking and coughing has been reported in literature. For smooth extubation it is required to prevent straining, excessive movement, coughing, breath holding or laryngospasm.

Laparoscopic surgeries have several advantages but at the same time the procedure is not free from risks. Pneumoperitoneum creation in laparoscopic surgeries, leads to adverse changes in various systems of human body including cardiovascular, respiratory and acid base balance system. Various factors which leads to haemodynamic changes in patient are release of catecholamine, carbon di-oxide absorption, vasopressin release and position of the patient. The autonomic sympathetic nervous system activation due to release of above mentioned factors along with the trendelenburg and lithotomy position often causes rise in systemic vascular resistance (SVR) and mean arterial pressure (MAP). Trendelenburg position leads to redistribution of blood from periphery to central part i.e. extremities to heart whereas lithotomy position causes rise in SVR.

Many agents have been used to facilitate the smooth extubation like, Intra-tracheal local anaesthetic instillation[3] ,intra-cuff lignocaine, intravenous lignocaine ,short acting opioids such as fentanyl and remifentanil[4], esmolol, labetalol, diltiazem, PGE1 and verapamil.

According to literatures, Dexmedetomidine is an 2-adrenoreceptor agonist which has been used to facilitate the extubation after surgeries and in ICU.[5]

It has been found that Dexmedetomidine use in the intraoperative period causes decrease in serum catecholamine levels by 90%, which in turn blunts the haemodynamic response to laryngoscopy, tracheal intubation, pneumo-peritoneum and extubation.

It also provides sedation with no respiratory depression and further decreases post-operative pain killer drugs requirements.

Nitroglycerine (NTG) is being used since many years for attenuating raised BP intra-operatively. It has also been used for decreasing the hypertensive response during laryngoscopy, tracheal intubation & extubation.

NTG generate NO (Nitric oxide) which causes vasodilatation in vascular smooth muscle leading to decrease in blood pressure. It also relaxes the respiratory tract smooth muscle and hence it is preferred by anaesthesiologist to prevent laryngospasm.

Therefore we conducted this study in order to compare the effects of intravenous NTG with Dexmedetomidine on hemodynamic responses to extubation and recovery in patients undergoing laparoscopic surgeries.

MATERIAL AND METHOD

This prospective observational study was conducted on 60 patients undergoing laparoscopic surgery to evaluate and compare the effect of intravenous nitro-glycerine (NTG) with dexmedetomidine on hemodynamic responses to extubation and recovery. Sixty patients was divided into two groups of 30 each with ASA grade I or II in age group (20yr-60yr). Hospital research & ethical committee permission was taken. Written informed consent for anaesthesia was taken. The study was carried out as a double-blind trial from Jan 2017 to June 2018 in the M G M hospital, Navi Mumbai.

Sample size is 60 patients.

Patients were randomized into 2 groups of 30 each. Randomisation was done by picking CHIT IN A BOX method. This was a double blind study i.e. patient as well as investigator was blinded and hence was unaware of the group that the patient is belonging to.

Group D (30 Patients)- Dexmedetomidine 0.75 μ/kg in 20 ml normal saline using Infusion Syringe Pump

Group N (30 Patients)- NTG 2 μ/kg in 20ml normal saline Infusion Syringe Pump.

Inclusion Criteria:

- ASA grade 1 and grade 2 patients.
- Age group of 18-50 years.
- Patient giving valid informed consent.
- Patient scheduled to undergo any laparoscopy surgeries under GA
- Patient of either sex

Exclusion Criteria:

- Patient's refusal
- ASA physical status III and IV
- Co-morbid diseases (cardiac, pulmonary, neurological disease).
- Allergy to the drug to be used

INSTRUMENTS

- Intravenous Cannula 20G
- Syringes
- Anaesthesia Machine With Vaporizer
- Endotracheal Tube No 7 And 7.5 , 8 And 8.5
- Monitors : ECG Monitor
- Dexmedetomidine 100 Mics In 1 ml Ampoule
- Normal Saline
- 20 ml Syringe For Infusion
- Extention Tube 50 Cm
- Syringe Pump (Infusion Pump)
- Pulse Oximeter
- NIBP Monitor
- Manual BP Apparatus

PREPARATION OF DRUGS:

- The total dose of the study drug Dexmedetomidine was calculated for each patient according to 0.75 mics/kg and was diluted to 20 ml with normal saline in 20 ml syringe.
- The total dose of the drug NTG was calculated for patient according to 2 mics/kg and was diluted to 20 ml with normal saline in 20 ml.

PROCEDURE:

Patient were interviewed and examined 1 day before surgery. Informed consent along with pre- operative evaluation and relevant investigations as per record form was done.

On arrival to operation-theatre, monitoring of heart rate, systemic arterial blood pressure, pulse oximetry (SpO_2), echocardiogram (ECG) was done. After securing intravenous line, infusion of lactate Ringer was started. Patients was given premedication with intravenous Midazolam (1mg), Fentanyl (2 g/kg), and Glycopyrrolate (0.2 mg) followed by study medication according to group allocation five minutes prior to induction of general anaesthesia.

After pre-oxygenation, induction was done with Propofol (2 mg kg), and tracheal intubation was facilitated with Vecuronium bromide 0.08 mg /kg .. Anaesthesia was maintained with Isoflurane and N_2O (60%) in oxygen. All patients was mechanically ventilated to maintain the EtCO2 between 35-40 mm Hg. Additional analgesia during the surgery was achieved with Fentanyl (25 g). Fifteen minutes prior to the expected time of surgery inhalational agents was discontinued and patients will receive the specified solutions intravenously over 15 min prior to extubation.

- GROUP D (n=30) will receive Dexmedetomidine infusion over 10 minutes
- GROUP N (n=30) will receive NTG infusion over 10 minutes

The time of starting of drug was recorded and following parameters was noted. Heart rate HR, systolic BP and diastolic BP was recorded after we switch off the inhalational agents and then infusion was started. Thereafter at 1, 3, 5, 10 and 15 minutes readings was taken .

When patient's spontaneous respirations were considered sufficient and patients were able to obey simple commands, suction of throat was done followed by extubation Neostigmine 0.05 mg/kg and Glycopyrollate 0.02mg/kg. Heart rate HR, systolic BP and diastolic BP was recorded at the time of extubation and thereafter at 1, 3 ,5 , 10 and 15 minutes after extubation and tabulated as shown below.

Occurrence of any event like laryngospasm, bronchospasm, desaturation, respiratory depression, vomiting, hypotension, bradycardia or undue sedation was noted. Respiratory Depression defined as respiratory rate of less than or equal to 8/min or oxygen saturation of $\leq$ 85%. Nausea, vomiting if present, was treated with Inj. Ondansetron 4 mg i.v.

Rigors, shivering, Itching, postoperative pruritus was controlled with inj. chlorpheniramine 2cc i.v. Patients was observed for 30 min

Quality of extubation was evaluated based on cough immediately after extubation, using a 5 point rating scale

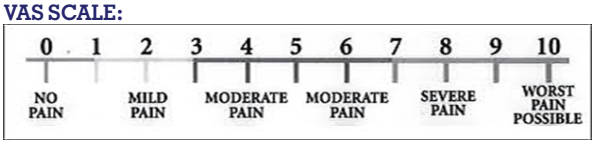
(Extubation Quality Score):

- 1 = no coughing
- 2 = smooth extubation, minimal coughing (1 or 2 times)
- 3 = moderate coughing (3 or 4 times)
- 4 = severe coughing (5-10 times) and straining
- 5 = poor extubation, very uncomfortable (laryngospasm and coughing >10 times).

Postoperative sedation was evaluated on a 6 point scale (Ramsay Scale):

- 1 = Anxious or agitated and restless or both
- 2= Cooperative, oriented and tranquil
- 3 = Drowsy but responds to commands
- 4 = Asleep, brisk response to light glabellar tap or loud auditory stimulus
- 5 = Asleep, sluggish response to light glabellar tap or loud auditory stimulus
- 6 = Asleep and unarousable
- Pain was assessed according to the Visual Analogue scale (VAS). Rescue analgesia was provided with Paracetamol.

VAS SCALE:



- 0 – no pain
- 1-3 – mild pain
- 4-7 – moderate pain
- >7 – severe pain
- 10 – worst pain

Statistical analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software ver. 17 for analysis. Qualitative data was presented as frequency and percentages and analysed using chi-square test. Quantitative data was presented as mean and SD and compared by t-test. P-value < 0.05 was taken as level of significance.

RESULTS:

The present prospective randomized double blind study was conducted at Department of Anaesthesiology to study and compare the effect of intravenous nitro-glycerine (NTG) with dexmedetomidine on hemodynamic responses to extubation and recovery in patients undergoing laparoscopic surgery.

After approval from the Institutional Ethical Committee and written informed consent, sixty patients of ASA physical status I and II of either sex between the age of 18 to 58 years who were scheduled to undergo elective surgery under general anaesthesia were enrolled for the study, were randomly and equally divided into two groups 30 patients of each according to computer generated random table.

Patients of Group 1 (30 Patients) received Dexmedetomidine 0.75 μ/kg in 20 ml normal saline using infusion syringe pump. Patients of Group 2 (30 Patients) received nitroglycerine (NTG) 2 μ/kg in 20ml normal saline infusion syringe pump.

Demographic profile

Patient's age, weight, height, gender ratio and ASA physical status were considered as demographic parameters. Age, weight and height were analyzed by using one way ANOVA and chi-square test was used to analyze gender ratio and ASA physical status. Both the groups were comparable in terms of age, weight, height, gender ratio and ASA physical status. [Table 5.1]

Table 1 Demographic profile of the study population

Parameters	Group 1	Group 2	P value
Age (years)	41.77 ± 5	40.27 ± 4.4	0.227
Weight (kg)	59.17 ± 9	60.43 ± 9.4	0.599
Height(cm)	159.97 ± 6.5	160.83 ± 9.4	0.681
Gender (M/F)	18/12	21/9	0.417
ASA (I/II)	24/6	23/7	0.754

Data are presented asMean ± SD or absolute numbers. P value >0.05 is statistically insignificant

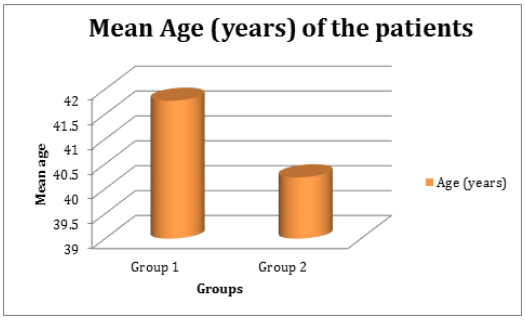
The mean age of patients in Groups 1 and 2 was 41.77 ± 5 years and 40.27 ± 4.4 years respectively. Statistically, there was no significant difference between the groups (p= 0.22). [Table-5.1; Graph-5a]

The mean weight of patients in Groups 1 and Group 2 was 59.17 ± 9 and 60.43 ± 9.4 kilograms respectively. Statistically, there was no significant difference between the groups (p= 0.599). [Table-5.1; Graph-5b]

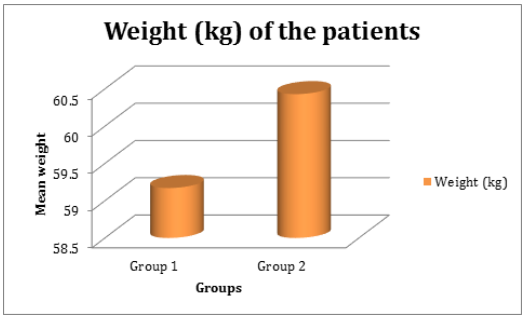
The mean height of patients in Groups 1 and 2 was 159.97 ± 6.5 cm and 160.83 ± 9.4 cm respectively. Statistically, there was no significant difference between the groups (p= 0.687). [Table-5.1; Graph 5c]

The gender ratio (Male:Female) in patients of Group 1 was 18:12 and in patients of Group 2 was 21:9 and were comparable as p value was 0.417. Statistically, there was no significant difference between the groups (p=0.417). [Table-5.1; Graph 5d]

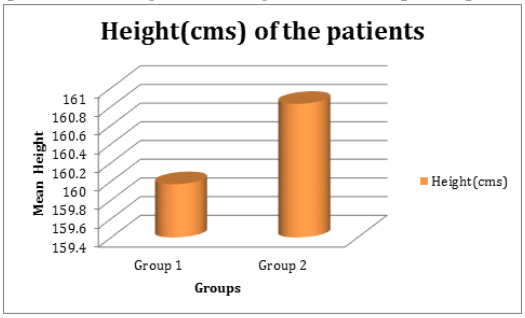
American Society of Anesthesiologists (ASA) Physical Status Ratio (I/II) was 24/6 in patients of Group 1 and 23/7 in patients of Group 2. Both groups did not differ significantly in their ASA Physical status. (p =0.754). [Table-5.1; Graph 5e]



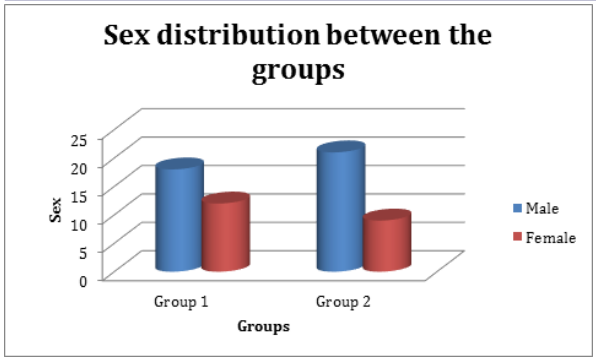
Graph 1a: Showing Mean Age of the Study Groups



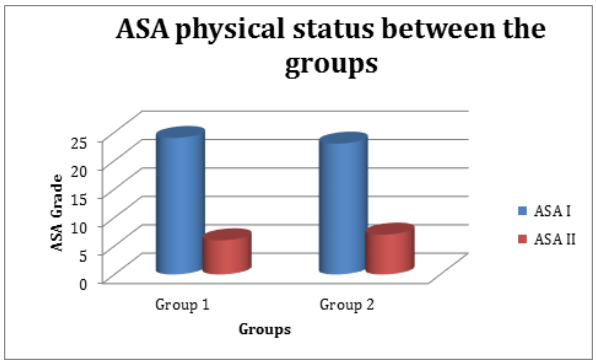
Graph 1b: Showing Mean Weight of the Study Groups



Graph 1c: Showing Mean Height of the study groups



Graph 1d: Distribution of patients according to Gender between the Groups



Graph 1e: Distribution of patients according to ASA physical status between the Groups

Hemodynamic Parameters

At base line, the systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR)and peripheral oxygen saturation (SpO2) of the patients in both groups were compared statistically using unpaired student 't' test. The mean SBP, diastolic BP, pulse rate, and SpO2 in patients of Group 1 was 134.4 ± 5.8 mmHg, 77.87 ± 2 mm Hg, 98.64 ± 13.21 mmHg and 98.9 ± 0.89 % respectively, while in patients of Group 2, it was 133.4 ± 4.8 mmHg, 77.2 ± 3.9 mm Hg, 97.88±11.7 mmHg and 99.00 ± 0.87 % respectively. Both the groups were comparable and there was no statistically significant difference in the preoperative baseline systolic BP, diastolic BP, heart rate in patients of both the groups. [Table 2]

Table 2 Baseline Systolic blood pressure, Diastolic blood pressure, Heart rate and SpO2

Parameters	Group 1	Group 2	P value
Systolic BP(mmHg)	134.4 ± 5.8	133.4 ± 4.8	0.504
DBP (mmHg)	77.87 ± 2	77.2 ± 3.9	0.432
Heart rate (beats/min)	98.64 ± 13.21	97.88±11.7	0.202

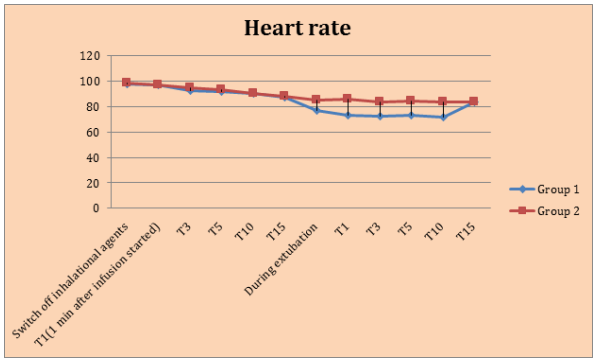
Data are presented as Mean ± SD. P value >0.05 is statistically insignificant

Table 3 Comparison of mean Heart rate at different time intervals between the groups

Heart rate	Group 1		Group 2		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Switch off inhalational agents	97.8	5.8	98.67	6.2	0.58
T1(1 min after infusion started)	97.13	4.9	96.93	5.3	0.88
T3	92.93	4.6	94.73	4.3	0.121
T5	91.6	4.4	93.73	4.5	0.069
T10	90.13	4.1	90.53	4.3	0.712
T15	87.67	3.6	87.93	3.6	0.775
During extubation	77.27	1.8	85.47	2.7	0.0001**
T1	73.53	2.1	85.8	2.5	0.0001**
T3	72.13	2.2	83.33	1.7	0.0001**
T5	73.07	1.9	84.4	1.9	0.0001**
T10	72.07	1.9	83.4	1.5	0.0001**
T15	83.47	1.4	83.93	1.4	0.205

Data are presented as Mean ± SD. P value <0.001 is statistically highly significant

As seen in the above table, from Switch off inhalational agents to T15, heart rate in Group 1and in Group 2 were comparable in both groups. There was significant decrease in heart rate in group 1 as compared to group 2 from extubation (20.53% vs 13.2%) to T10 (25.73% vs 15.27%).



Graph 1 F; Comparison of mean Heart rate at different time intervals between the groups

Table 4 Comparison of mean Systolic Blood Pressure at different time intervals between the groups

Systolic BP	Group 1		Group 2		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Switch off inhalational agents	136	5.1	134	5.8	0.427
T1(1 min after infusion started)	131	5.4	131	3.2	0.815
T3	122	4.8	132	4.1	0.0001**
T5	124	6.7	133	3.1	0.0001**
T10	122	5.6	130	3.2	0.0001 **
T15	123	5.5	129	3.4	0.0001 **
During extubation	121	4.8	131	4.9	0.0001**
T1	123	3.5	133	5.8	0.0001 **
T3	122	3.1	122	5.7	0.867
T5	121	5.2	122	5.6	0.647
T10	120	4.9	121	7.0	0.74
T15	119	4.8	121	3.3	0.843

Data are presented as Mean ± SD. P value <0.001is statistically highly significant

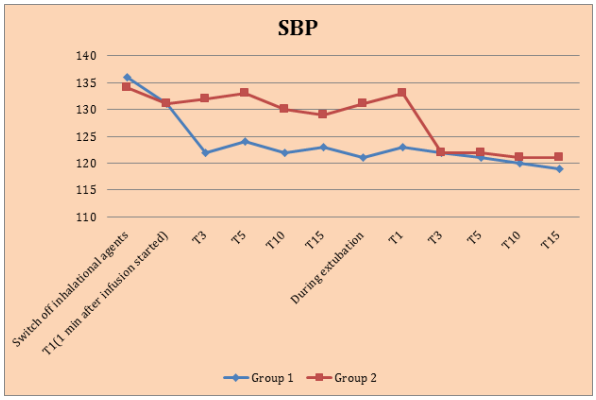
As seen in the above table, from Switch off inhalational agents to T1, SBP in Group 1and in Group 2 were comparable in both groups . There was significant decrease in SBP in group 1 as compared to group 2 from T3 (14% vs 2%) to T1 (13% vs 1%).

Table 5 Comparison of mean Diastolic Blood Pressure at different time intervals between the groups

Diastolic BP	Group 1		Group 2		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Switch off inhalational agents	82.67	6.4	81.87	3.3	0.543

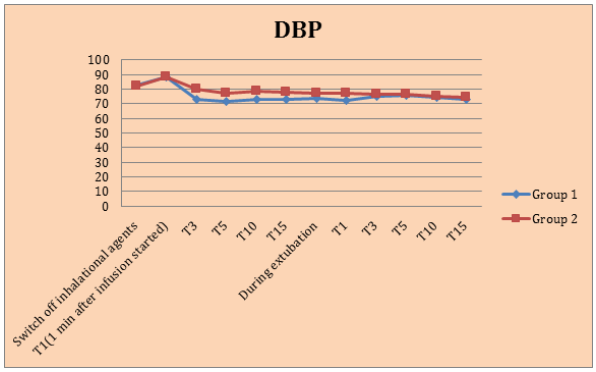
T1(1 min after infusion started)	88.47	5.8	88.2	5.4	0.85
T3	72.73	2.0	80.27	2.7	0.0001**
T5	71.73	2.1	77.27	2.7	0.0001**
T10	72.8	1.9	78.33	2.5	0.0001**
T15	72.93	2.0	77.73	2.7	0.0001**
During extubation	73.6	2.8	77.53	2.6	0.0001**
T1	72.6	2.7	77.07	2.9	0.0001**
T3	75.2	4.1	76.27	2.6	0.233
T5	76	3.9	76.8	2.7	0.351
T10	74.4	3.1	75.07	2.6	0.374
T15	73.4	3.0	74. 7	2.2	0. 434

Data are presented as Mean ± SD. P value <0.001is statistically highly significant



Graph 1G ; Comparison of mean Systolic Blood Pressure at different time intervals between the groups

As seen in the above table, from Switch off inhalational agents to T1, DBP in Group 1 and in Group 2 were comparable in both groups . There was significant decrease in DBP in group 1 as compared to group 2 from T3 (9.94% vs 1.6%) to T1 (10.07 % vs 4.8%).



Graph 1H ; Comparison of mean Diastolic Blood Pressure at different time intervals between the groups

Table 6 Comparison of average Mean Arterial Pressure at different time intervals between the Groups

Mean arterial pressure	Group 1		Group 2		P value
	Mean	Std. Deviation	Mean	Std. Deviation	
Switch off inhalational agents	92.13	5.5	89.47	6.0	0.079
T1(1 min after infusion started)	90.33	6.0	87.6	5.7	0.076
T3	79.33	3.6	89.53	6.0	0.0001**
T5	81.4	2.7	89.33	5.8	0.0001**
T10	77.93	2.9	85.8	5.0	0.0001**
T15	78.2	3.0	83	2.6	0.0001**
During extubation	79.33	3.6	80.93	4.4	0.125
T1	78.67	2.7	79.87	2.6	0.079
T3	78.67	3.3	78.27	2.4	0.596
T5	77.73	3.4	78.07	2.3	0.658
T10	78.87	3.7	79.87	2.6	0.23
T15	77.53	3.5	79.2	3.0	0.05

Data are presented as Mean ± SD. P value <0.05 is statistically significant, P value <0.001is statistically highly significant

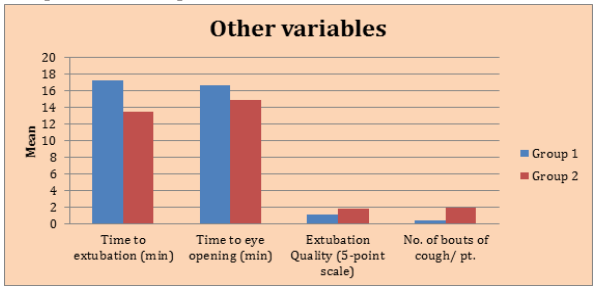
As seen in the above table, from Switch off inhalational agents to T1, MAP in Group 1 and in Group 2 were comparable in both groups . There was significant decrease in MAP in group 1 as compared to group 2 from T3 (12.8% vs 0.06 %) to T15 (13.93 % vs 6.47%).

Graph 1I Comparison of average Mean Arterial Pressure at different time intervals between the Groups

Table 7 Mean comparison of regression parameters between the groups

Variables	Group 1		Group 2		P value
	Mean	SD	Mean	SD	
Time to extubation (min)	17.31	1.9	13.43	2.6	0.0001
Time to eye opening (min)	16.67	2.4	14.9	1.8	0.0001
Extubation Quality (5-point scale)	1.01	0.52	1.79	0.84	0.0001
No. of bouts of cough/ pt.	0.39	0.1	1.9	1.2	0.0001

As seen in the above table, Time to extubation (min) (17.31 ± 1.9 vs 13.43 ± 2.6) and Time to eye opening (min) (16.67 ± 2.4 vs 14.9 ± 1.8) was significantly higher in Group 1 as compared to Group 2 while Extubation Quality (5-point scale) (1.01 ± 0.52 vs 1.79 ± 0.84) and No. of bouts of cough/ pt (0.39 ± 0.1 vs 1. 9 ± 1.2) was significantly lower in Group 1 as compared to Group 2.



Graph 1J; Mean comparison of regression parameters between the groups

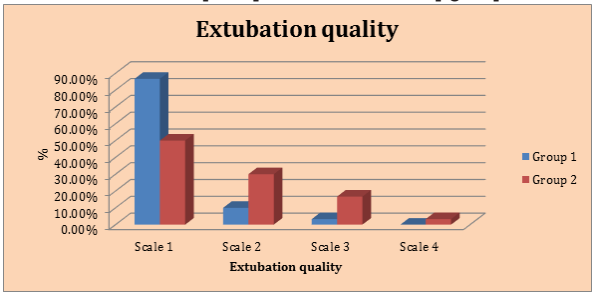
Table 8 Comparison of the study groups based on extubation quality

Extubation Quality	Group		Total
	Group 1	Group 2	

Scale 1	26	15	41
	86.70%	50.00%	68.33%
Scale 2	3	9	12
	10.00%	30.00%	20.00%
Scale 3	1	5	6
	3.30%	16.70%	10.00%
Scale 4	0	1	1
	0.00%	3.30%	1.67%
Scale 5	0	0	0
	0.00%	0.00%	0.00%
Total	30	30	60
	100.00%	100.00%	100.00%

P value – 0.001

As seen in the above table, most of the study population in group 1 had extubation quality of scale 1 (86.70%) followed by scale 2 (10%) and scale 3 (3.3 %) while in group 2, 50% had extubation quality of scale 1 , 30% of scale 2 , 16.70% of scale 3 , 3.3% of scale 4. There was statistically significant difference between extubation quality and different study groups.

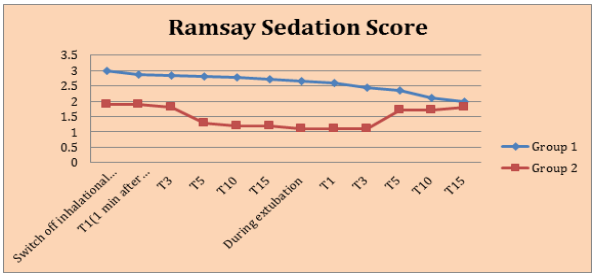


Graph 1K: Comparison of the study groups based on extubation quality

Table 9 Comparison of the study groups based on Ramsay sedation score

Ramsay Sedation Score	Group 1		Group 2		P
	Mean	SD	Mean	SD	value
Switch off inhalational agents	2.98	0.19	1.9	0.25	0.765
T1(1 min after infusion started)	2.87	0.19	1.9	0.24	0.832
T3	2.85	0.18	1.8	0.24	0.912
T5	2.82	0.17	1.3	0.23	0.001
T10	2.78	0.17	1.2	0.22	0.001
T15	2.71	0.16	1.2	0.21	0.001
During extubation	2.67	0.16	1.1	0.21	0.001
T1	2.61	0.16	1.1	0.2	0.001
T3	2.44	0.15	1.1	0.2	0.001
T5	2.35	0.14	1.7	0.19	0.453
T10	2.11	0.13	1.7	0.19	0.726
T15	2	0.11	1.8	0.18	0.891

As seen in the above table, from Switch off inhalational agents to T3, Ramsay sedation score in Group 1 and in Group 2 were comparable in both groups. There was significant decrease in Ramsay sedation score in group 1 as compared to group 2 from T5 (0.16% vs 0 6 %) to T3 (0.54 % vs 0.80%).

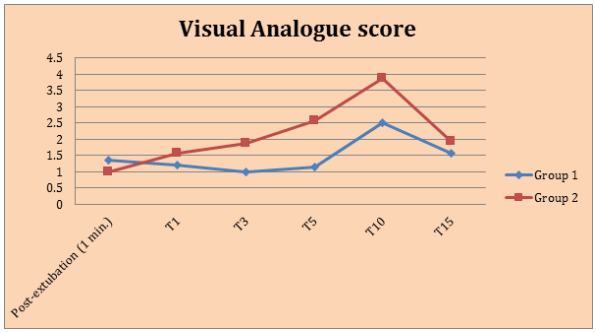


Graph 1L: Comparison of the study groups based on Ramsay sedation score

Table 10 Comparison of the study groups based on Visual analogue score

VAS score	Group 1		Group 2		P
	Mean	SD	Mean	SD	value
Post-extubation (1 min.)	1.36	0.49	1	0.29	0.003
T1	1.20	0.41	1.56	0.65	0.023
T3	1.01	0.50	1.88	0.53	0.04
T5	1.16	0.98	2.56	0.65	0.014
T10	2.52	1.83	3.88	1.90	0.498
T15	1.56	0.71	1.94	0.44	0.061

As seen in the above table, there was significant decrease in visual analogue score in group 1 as compared to group 2 from Post-extubation (1 min.) to T5.



Graph 1 M: Comparison of the study groups based on Visual analogue score

DISCUSSION

Demographic profile

The mean age of patients in Groups 1 and 2 was 41.77 ± 5 years and 40.27 ± 4.4 years respectively. Statistically, there was no significant difference between the groups (p= 0.22). The mean weight of patients in Groups 1 and Group 2 was 59.17 ± 9 and 60.43 ± 9.4 kilograms respectively. Statistically, there was no significant difference between the groups (p= 0.599).

The mean height of patients in Groups 1 and 2 was 159.97 ± 6.5 cm and 160.83 ± 9.4 cm respectively. Statistically, there was no significant difference between the groups (p= 0.687). The gender ratio (Male:Female) in patients of Group 1 was 18:12 and in patients of Group 2 was 21:9 and were comparable as p value was 0.417. Statistically, there was no significant difference between the groups (p=0.417).

American Society of Anesthesiologists (ASA) Physical Status Ratio (I/II) was 24/6 in patients of Group 1 and 23/7 in patients of Group 2. Both groups did not differ significantly in their ASA Physical status. (p =0.754).

This is in agreement with the study conducted by Vineela Ch et al., Both groups were similar demographically and there was no significant difference in terms of age, sex & body weight

Similarly in the study conducted by Ramila H Jamaliya et al., the two groups were similar with respect to age, sex, weight, and ASA physical status.

Shrirang et al. also repoted the patients in the two groups were comparable for age, weight and male:female ratio, ASA physical status,

At base line, the systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR)and peripheral oxygen saturation (SpO2) of the patients in both groups were compared statistically using unpaired student 't' test. The mean SBP, diastolic BP, pulse rate, and SpO2 in patients of Group 1 was 134.4 ± 5.8 mmHg, 77.87 ± 2 mm Hg, 98.64 ± 13.21 mmHg and 98.9 ± 0.89 % respectively, while in patients of Group 2, it was 133.4 ± 4.8 mmHg, 77.2 ± 3.9 mm Hg,

97.88±11.7 mmHg and 99.00 ± 0.87 % respectively. Both the groups were comparable and there was no statistically significant difference in the preoperative baseline systolic BP, diastolic BP, heart rate in patients of both the groups.

Heart rate

In the present study, from Switch off inhalational agents to T15, heart rate in Group 1and in Group 2 were comparable in both groups . There was significant decrease in heart rate in group 1 as compared to group 2 from extubation (20.53% vs 13.2%) to T10 (25.73% vs 15.27%). It was also observed that at the time of extubation, the DEX group (HR = 92.5 ± 11.80 bpm) maintained a significantly superior hemodynamic profile than the NTG group (HR = 126.3 ± 10.44 bpm); P < 0.05

SBP and DBP

In the present study, from Switch off inhalational agents to T1, SBP in Group 1and in Group 2 were comparable in both groups . There was significant decrease in SBP in group 1 as compared to group 2 from T3 (14% vs 2%) to T1 (13% vs 1%).
In the present study, from Switch off inhalational agents to T1, DBP in Group 1 and in Group 2 were comparable in both groups . There was significant decrease in DBP in group 1 as compared to group 2 from T3 (9.94% vs 1.6%) to T1 (10.07 % vs 4.8%).

MAP

In this study, from Switching off the inhalational agents to T1, MAP in Group 1 and in Group 2 was comparable in both groups. There was significant decrease in MAP in group 1 as compared to group 2 from T3 (12.8% vs 0.06 %) to T15 (13.93 % vs 6.47%).

In DEX group (MAP = 89.33 ± 8.08 mmHg), it was observed that it maintained a significantly superior hemodynamic parameter as compared to NTG group (MAP = 107 ± 3.77 mmHg); P < 0.05. DEX group showed 13.93 % reduction in MAP which was same as that observed by Richa et al.[9]

NTG acts by releasing nitric oxide (NO) having half life of 0.1 second. Dexmedetomidine shows its action by selectively binding to 2 receptors. Above phenomenon further explains that higher time is required for restoring baseline map in DEX group as compared to NTG group. This action lasts even after the hypotensive drugs are being stopped.

In DEX group, the hypotension caused by the drug can only be reverted when it diffuses out of its receptors. In our study this can be the probable reason for hemodynamic stability seen at the time of extubation.

The favorable hemodynamic profile induced by DEX can be attributed to the well-established sympatholytic effects of 2-agonists. The 2-receptors are involved in regulating the autonomic and cardiovascular systems. The vasoconstriction caused by Alpha-2 receptors is mainly because of their presence on blood vessels and as they are present on sympathetic terminals also they inhibit nor-epinephrine release. DEX in its lower doses is mainly sympatholytic. DEX when binds to 2 receptors leads to reduction of sympathetic outflow and augmentation of vagal activity leading to reduction in HR and cardiac output. Patients in the NTG group would have achieved the target MAP as NTG acts by liberating nitrite ions which get converted to nitric oxide which activates guanylyl cyclase to eventually cause vascular smooth muscle relaxation. This reduction in smooth muscle tone is more pronounced in the venous system, causing a decreased venous return to the heart and therefore reducing the stroke volume and hence reducing the cardiac output. NTG infusion causes activation of the renin-angiotensin system. This may be the cause for tachycardia in the patients in NTG group. NTG is also known to cause reflex tachycardia.[5]

Other variables

In the present study, Time to extubation (min) (17.31 ± 1.9 vs 13.43 ± 2.6) and Time to eye opening (min) (16.67 ± 2.4 vs 14.9 ± 1.8) was significantly higher in Group 1 as compared to Group 2 while Extubation Quality (5-point scale) (1.01 ± 0.52 vs 1.79 ± 0.84) and No. of bouts of cough/ pt (0.39 ± 0.1 vs 1. 9 ± 1.2) was significantly lower in Group 1 as compared to Group 2. This findings is in agreement with the study conducted by Duangdee Rummasak et al., Times to eye opening and following commands were considerably longer in the dexmedetomidine group, but the time to extubation showed no meaningful difference.

Extubation quality

In the present study, most of the study population in group 1 had extubation quality of scale 1 (86.70%) followed by scale 2 (10%) and scale 3 (3.3 %) while in group 2, 50% had extubation quality of scale 1 , 30% of scale 2 , 16.70% of scale 3 , 3.3% of scale 4. There was statistically significant difference between extubation quality and different study groups.

Ramsay sedation score

In the present study, from Switch off inhalational agents to T3, Ramsay sedation score in Group 1 and in Group 2 were comparable in both groups. There was significant decrease in Ramsay sedation score in group 1 as compared to group 2 from T5 (0.16% vs 0 6 %) to T3 (0.54 % vs 0.80%).

Visual analogue score

In the present study, there was significant decrease in visual analogue score in group 1 as compared to group 2 from Post-extubation (1 min.) to T5. This findings correlate well with the study conducted by Sukhminder Jit Singh Bajwa et al., found that intra-operative fentanyl requirement was significantly reduced in the dexmedetomidine group as compared to the other two groups. The time to first analgesic request was significantly prolonged in group D when compared to other groups. The analgesic efficacy of dexmedetomidine has been appreciated in diverse settings.[8]

Similarly in the study conducted by Duangdee Rummasak et al., early postoperative pain after 30 and 60 minutes and the requirement for meperidine were not meaningfully different between the 2 groups.

CONCLUSION:

In conclusion, our study demonstrates that the Dexmedetomidine at a dose of 0.75μg/kg body weight as compared to NTG (2 μg/kg body weight)when administered as infusion over 10 minutes, before tracheal extubation attenuates the airway reflexes and hemodynamic responses effectively during emergence from anaesthesia providing smooth extubation. It provide adequate sedation, maintaining patient's arousability and delay the need for analgesia in the post-operative period.

Hence we recommend the use of Dexmedetomidine in patients under GA before extubation for smoother emergence, and further studies are needed in larger population before its recommendation in patients of CAD, Hypertension, cerebral vascular diseases, neurosurgeries.

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