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Research Article

Efficacy and Safety of Dexmedetomidine in a Minimal Bolus Dose and as a Rescue Agent to Combat the Adverse Haemodynamic Effects During Laparoscopic Surgeries

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ABSTRACT

Background: The aim of the study is to evaluate the effects of dexmedetomidine on attenuation of adverse hemodynamic effects that are caused due to various stimuli during intraoperative period of laparoscopic surgeries under general anaesthesia and provide smooth transition from intraoperative to post-operative period. **Materials and Methods:** 60 ASA grade I and II patients undergoing elective laparoscopic surgeries were enrolled for the study with 30 patients eachin group A and group B. Patients in group A received 20 mcg dexmedetomidine 10 min before induction and maintenance infusion of 0.6 mcg/kg/hr 10 min after gas insufflation. Patients in group B received induction drugs followed by incremental supplementation of fentanyl 0.5 mcg kg^{-1}, propofol 0.3 mg kg^{-1}) 10 min after gas insufflation to maintain hemodynamic parameters within 20% of baseline values. **Results:** There was no significant heart rate difference between both the groups after induction. Only significant increase was noted after gas insufflation in group B whereas blood pressure was significantly higher in group B immediately after induction of anaesthesia, after gas insufflation, deflation and immediately after extubation. **Conclusion:** A small bolus dose of dexmedetomidine before induction is effective in attenuating stress response to laryngoscopy and intubation without causing any adverse effects. However, there is a need for additional doses as rescue agent to attenuate response during oneumoperitoneum and for extubation.

KEYWORDS

Laparoscopy, pneumoperitoneum, stress response, dexmedetomidine

INTRODUCTION

First laparoscopic cholecystectomy was done successfully by Philp Mouret in 1987. Since then laparoscopic surgery has become the gold standard. The benefits of minimal access techniques include less pain, early mobilization, shorter hospital stay and better cosmetic results, which have further increased its applications.

During general anesthesia laryngoscopy, tracheal intubation and extubation are the critical events provoking transient but marked sympathoadrenal response manifesting as hypertension and tachycardia. In addition, in laparoscopic surgery CO_2 is routinely used to create pneumoperitoneum, which causes increased plasma level of catecholamine and vasopressin. Elevation of intra-abdominal pressure with raised diaphragm causes various adverse effects on the cardiovascular system such as

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decreased cardiac output, elevated arterial pressure and increased systemic and pulmonary vascular resistance leading to hypertension and tachycardia. Hence, a drug, which can blunt hemodynamic responses to laryngoscopy, intubation and pneumoperitoneum without having any adverse effects like respiratory depression and Postoperative Nausea and Vomiting (PONV) was required for the purpose.

Dexmedetomidine is an alpha-2-adrenergic agonist, which is the pharmacologically active dextroisomer of medetomidine. It has properties of analgesia, sympatholysis and titrating sedation without major respiratory depression[1]. It reduces opioid requirements and stress response to surgery ensuring a stable hemodynamic state. It has distribution half-life of approximately 6 min, so can be used successfully for attenuating the stress response to laryngoscopy[2]. Based on literature evidence of dexmedetomidine to be a useful adjuvant to general anesthesia to attenuate hemodynamic responses of pneumoperitoneum in laparoscopy surgeries this study was planned.

The study was formulated with the primary objective to evaluate the efficiency of low dose dexmedetomidine bolus administration on attenuation of hemodynamic response to laryngoscopy and intubation and to evaluate the effect of maintenance dose of drug as a rescue agent on intraoperative hemodynamic profile during laparoscopy surgeries and to ensure smooth transition of patient from intraoperative to post-operative period.

MATERIALS AND METHODS

Following approval of the Institutional Ethics Committee and after obtaining informed written consent, 60 patients belonging to ASA grade I and II physical status of 18-70 years age group were enrolled in the study. Pregnant patients, patients on adrenergic blocking drugs, calcium channel blockers or with history of alcohol, opioid, sedative drug abuse were all excluded from the study. Randomization was done using computer generated random number and concealment by closed envelop method into 2 groups-Group A and B.

Patients belonging to group A (n:30) were given low dose dexmedetomidine 20 mcg over 10 min as bolus dose before induction of anesthesia and maintainance infusion of dexmedetomidine at 0.6 mg/kg/hr 10 min after gas insufflation (as a rescue agent) and the Infusion was stopped at the time of gas deflation.

Patients belonging to group B (n:30) did not receive any drug infusion prior to induction of anesthesia and received fentanyl 0.5 mcg kg^{-1} and propofol 0.3 mg kg^{-1} in incremental doses 10 min after gas insufflation as well as deepening of anaesthesia with inhalation agents.

Large bore intravenous cannula secured in all the patients in the preoperative period. Multi para monitors were connected on table and baseline parameters (heart rate, blood pressure, O_2 saturation) recorded in all the patients. Induction of anesthesia was as per institutional protocol and uniformity was maintained in all the patients in either groups. Intravenous administration of glycopyrrolate 0.2 mg, midazolam 0.03 mg kg^{-1}, fentanyl 2 mcg kg^{-1}, propofol 2 mg kg^{-1} was used for induction of anesthesia. Vecuronium 0.1 mg kg^{-1} was routinely used and in cases with anticipated difficult intuation succinylcholine 2 mg kg^{-1} was administered intravenously to facilitate intubation. Airway secured with appropriate sized endotracheal tube and bilateral air entry confirmed. Diclofenac 75 mg intravenous infusion immediately after intubation and paracetamol infusion 10 min prior to extubation was used routinely in all patients as institutional protocol. Anesthesia was maintained with 02: N2O (50:50), Isoflurane as the inhalational agent in all patients. Extubation was carried out once patient met criteria for extubation.

Patient's heart rate, Non Invasive Blood Pressure (NIBP), SPO2 and EtCO2 were monitored at every 5 min interval in the intraoperative period and every 15 min after extubation. The goal was to maintain hemodynamic parameters within 20% of baseline values in both the groups. In patients where the hemodynamic parameters crossed this acceptable limit even after attempts with medication as per group allocation, who needed other anti-hypertensive medication for maintainance of hemodynamic profile within normal limits were excluded from the study.

Statistical methods

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean±SD (minimum-maximum) and results on categorical measurements are presented in number (%). Significance is assessed at 5% level of significance.

Student 't'-test (2 tailed, independent) has been used to find the significance of study parameters on continuous scale between 2 groups (Inter group analysis) on metric parameters. Leven's test for homogeneity of variance has been performed to assess the homogeneity of variance. A t-test is a statistical test that is used to compare the means of 2 groups. It is often used in hypothesis testing to determine whether a process or treatment actually has an effect on the population of interest or whether 2 groups are different from one another with the null hypothesis (H0) is that the true difference between these group means is zero and the alternate hypothesis (Ha) is that the true difference is different from zero.

Chi-square/fisher exact test has been used to find the significance of study parameters on categorical scale between 2 or more groups, non-parametric setting for qualitative data analysis. Fisher exact test used when cell samples are very small.

Significant figures

+Suggestive significance (p-value: $0.05<p<0.10$)

*Moderately significant (p-value: $0.01<p\leq 0.05$)

**Strongly significant (p-value: $p\leq 0.01$)

Statistical Software

The statistical software namely SPSS 22.0 and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

All 60 patients enrolled in the study completed the study. Both the groups, group A and group B consisted of 30 patients each.

Patients in both the study groups were comparable with respect to the demographic characteristics ($p\geq 0.05$) as seen in (Table 1-3 and Figure 1-3).

In both groups A and B there was no difference in HR at induction, after 5 min and 10 min after induction, whereas,

Table 1: Age distribution of patients studied

Age (years)	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total
<30	0 (0%)	3 (10%)	3 (5%)
30-40	9 (30%)	7 (23.3%)	16 (26.7%)
41-50	11 (36.7%)	7 (23.3%)	18 (30%)
51-60	5 (16.7%)	9 (30%)	14 (23.3%)
>60	5 (16.7%)	4 (13.3%)	9 (15%)
Total	30 (100%)	30 (100%)	60 (100%)
Mean±SD	47.37±11.09	47.37±13.08	47.37±12.03

Samples are age matched with p =1.000, student t-test

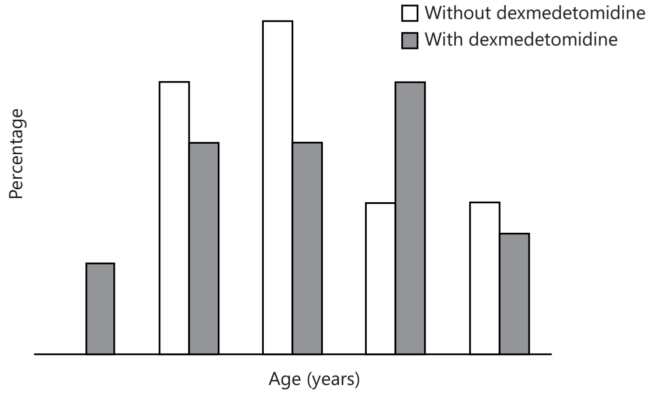

Figure 1: Age distribution of patients studied

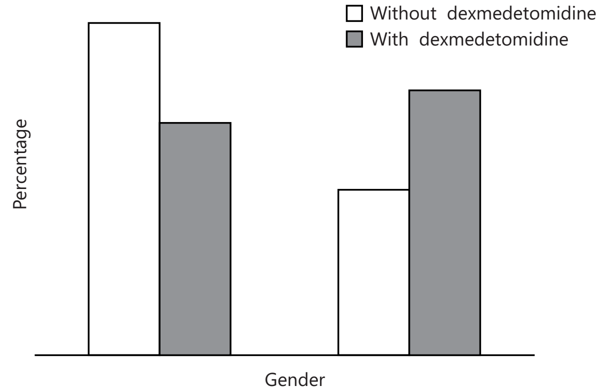

Figure 2: Gender distribution of patients studied

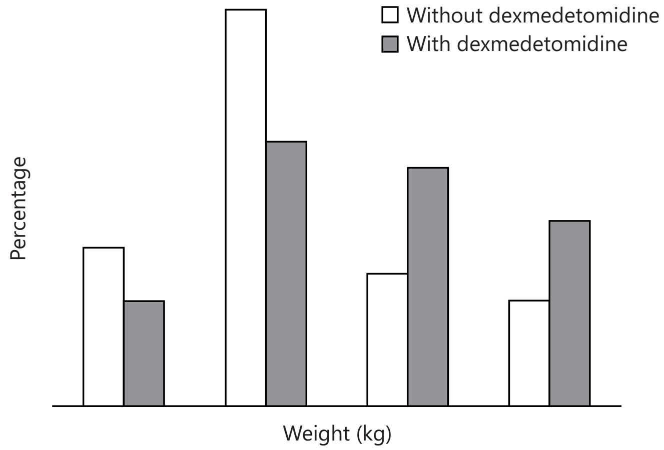

Figure 3: Weight (kg) distribution in 2 groups of patients studied

Table 2: Gender distribution of patients studied

Gender	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total
Female	20 (66.7%)	14 (46.7%)	34 (56.7%)
Male	10 (33.3%)	16 (53.3%)	26 (43.3%)
Total	30 (100%)	30 (100%)	60 (100%)

p = 0.118, Not significant, Chi-Square test

Table 3: Weight (kg) distribution in 2 groups of patients studied

Weight (kg)	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total
<60	6 (20%)	4 (13.3%)	10 (16.7%)
60-70	15 (50%)	10 (33.3%)	25 (41.7%)
71-80	5 (16.7%)	9 (30%)	14 (23.3%)
>80	4 (13.3%)	7 (23.3%)	11 (18.3%)
Total	30 (100%)	30 (100%)	60 (100%)

p = 0.112, Not significant, Chi-Square test

Table 4: Heart rate-a comparison in 2 groups of patients studied

Heart rate	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total	p-value
0	85.90±13.89	80.33±11.78	83.07±13.05	0.102
5	93.10±12.07	90.80±10.80	91.93±11.40	0.443
10	89.83±10.61	89.80±11.61	89.81±11.03	0.992
Gas inflation				
0	88.55±14.13	84.37±12.92	86.42±13.58	0.240
5	95.66±14.91	86.47±11.37	90.98±13.91	0.010**
10	102.14±11.06	88.43±11.98	95.17±13.36	<0.001**
	Incremental doses of fentanyl, propofol and deepening of anesthesia with inhalational anesthetics	Dexmedetomidine infusion (0.6 mcg/kg/hr)		
0	104.76±10.58	90.43±10.41	95.62±12.48	<0.001**
5	101.40±14.79	91.40±9.11	92.83±10.45	0.046*
10	95.00±8.29	91.07±9.28	92.08±9.10	0.244
15	96.83±8.64	90.63±9.52	95.49±9.08	0.087+
20	90.79±8.67	87.50±9.20	90.08±8.76	0.354
25	82.59±8.91	81.88±9.39	82.43±8.89	0.844
30	80.48±8.30	80.75±9.24	80.54±8.38	0.938
35	77.83±7.36	76.25±9.62	77.49±7.78	0.619
Gas deflation				
0	81.97±9.17	86.30±10.30	84.17±9.92	0.094+
5	80.69±7.36	86.77±9.37	83.78±8.91	0.008**
10	80.69±6.92	86.79±9.85	83.74±8.98	0.008**
Extubation				
0	88.69±8.9	92.67±10.64	90.71±9.94	0.126
5	84.66±7.91	89.93±8.10	87.34±8.37	0.014*
10	81.90±6.34	87.87±6.42	84.93±7.00	0.001**

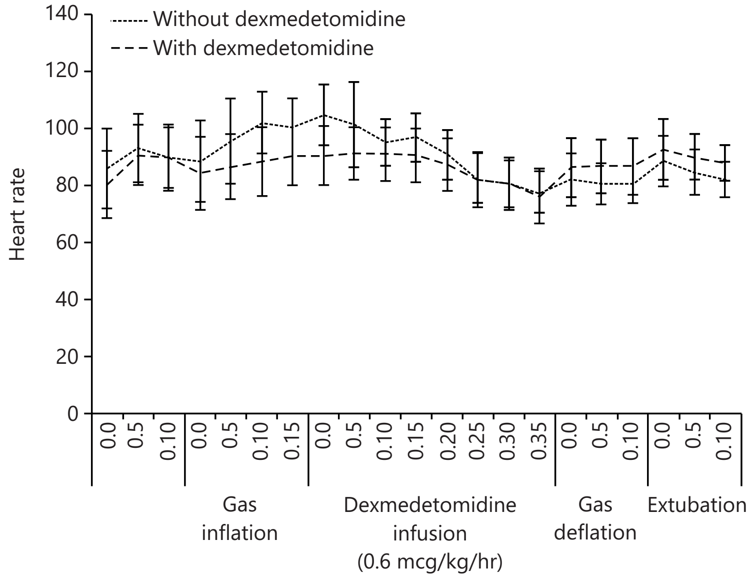

Figure 4: Heart rate-a comparison in 2 groups of patients studied

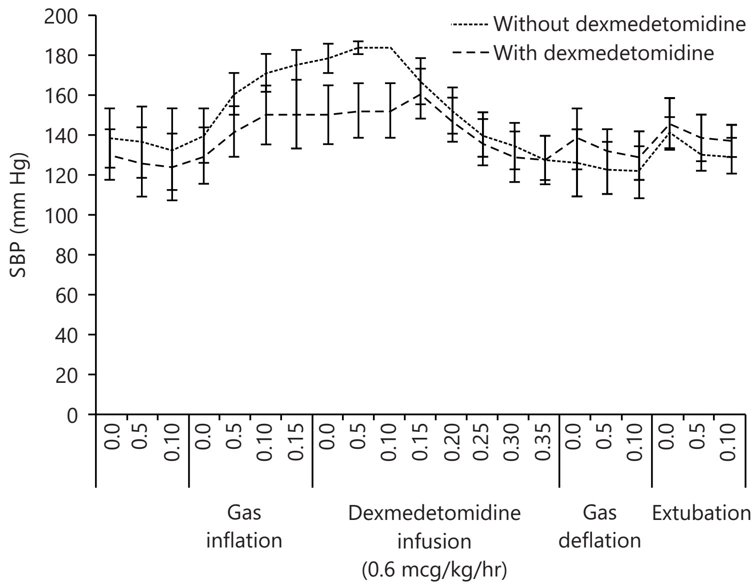

Figure 5: Systolic blood pressure-SBP (mm Hg)-a comparison in 2 groups of patients studied

there was a significant increase in heart rate at 5, 10 min after gas insufflation, upto 5 min after maneuvers to maintain hemodynamics, upto 10 min after gas deflation and upto 10 min after extubation in group B than in group A (Table 4 and Figure 4).

Systolic blood pressure in group B was significantly higher than in group A at 1st 10 min after induction, upto 10 min after gas insufflation and upto 10 min after supplementation with agents for its correction, upto 10 min of gas deflation and upto 10 min after extubation (Table 5 and Figure 5).

Diastolic blood pressure was significantly higher at 5 and 10 min after gas insufflation and 1st 10 min after taking measures to decrease hemodynamic response in group B than in group A (Table 6 and Figure 6).

EtCo2 (End tidal carbondioxide) values were significantly higher immediately after induction and at 10 min after gas insufflation in group B than in group A (Table 7 and Figure 7).

Spo2 values were comparable in both the groups after intubation and 1st 5 min after gas insufflation and higher spo2 in group A than group B in 1st 5 min after gas inflation, upto 5 min after drug intervention and during extubation as seen in (Table 8 and Figure 8).

Table 5: Systolic blood pressure-SBP (mm Hg)-A comparison of hemodynamic parameters in 2 groups of patients studied

SBP (mm Hg)	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total	p-value
0	139.47±14.68	130.87±12.69	135.17±14.28	0.018*
5	137.20±18.14	126.90±17.55	132.05±18.44	0.029*
10	133.30±20.34	124.70±16.43	129.00±18.84	0.077+
Gas inflation				
0	140.47±13.88	130.00±14.15	135.23±14.86	0.005**
5	161.53±10.45	142.57±13.02	152.05±15.12	<0.001**
10	172.37±9.36	150.83±14.56	161.60±16.28	<0.001**
	Incremental doses of fentanyl, propofol and deepening of anesthesia with inhalational anesthetics	Dexmedetomidine infusion (0.6 mcg/kg/hr)		
0	179.47±7.25	151.00±14.99	161.3±18.74	<0.001**
5	184.40±3.29	153.00±13.30	157.49±16.62	<0.001**
10	185.00±0.00	153.34±13.83	154.4±14.76	0.032*
15	167.50±11.68	161.43±13.01	165.57±12.31	0.129
20	153.00±11.82	148.00±11.18	151.41±11.73	0.191
25	140.63±10.94	137.00±11.81	139.48±11.22	0.323
30	135.37±11.71	130.00±12.94	133.66±12.23	0.178
35	129.31±10.73	128.38±12.31	129.01±11.12	0.799
Gas deflation				
0	126.87±16.87	139.03±14.97	132.95±16.96	0.005**
5	123.77±13.29	133.10±10.36	128.43±12.72	0.004**
10	122.2±13.02	130.41±11.93	126.24±13.06	0.014*
Extubation				
0	142.37±8.02	146.37±13.12	144.37±10.97	0.160
5	131.02±8.61	139.33±11.14	135.18±10.73	0.002**
10	130.30±8.77	137.83±8.33	134.07±9.29	0.001**

Table 6: Diastolic blood pressure-DBP (mm Hg)-a comparison in 2 groups of patients studied

SBP (mm Hg)	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total	p-value
0	84.83±8.40	79.50±10.31	82.17±9.70	0.032*
5	83.37±9.66	82.07±10.63	82.72±10.09	0.622
10	81.97±12.12	80.03±10.08	81.00±11.09	0.504
Gas inflation				
0	91.27±10.10	85.93±11.48	88.60±11.05	0.061+
5	102.90±7.64	95.33±10.24	99.12±9.74	0.002**
10	106.13±5.78	96.33±11.21	101.23±10.13	<0.001**
	Incremental doses of fentanyl, propofol and deepening of anesthesia with inhalational anesthetics	Dexmedetomidine infusion (0.6 mcg/kg/hr)		
0	109.82±5.76	95.57±8.06	100.72±10.02	<0.001**
5	111.00±2.65	97.07±8.75	99.06±9.52	0.001**
10	101.86±3.67	95.21±9.99	96.50±9.45	0.095+
15	100.80±7.34	101.91±10.34	101.10±8.13	0.704
20	92.70±8.11	94.55±10.61	93.20±8.75	0.556
25	85.03±7.66	84.09±11.21	84.78±8.61	0.760
30	80.90±8.37	78.82±10.84	80.34±9.00	0.519
35	78.13±6.43	79.00±6.2.00	78.37±6.30	0.702
Gas deflation				
0	78.73±8.23	88.90±10.55	83.82±10.69	<0.001**
5	78.30±7.57	84.43±7.96	81.37±8.30	0.003**
10	75.27±9.94	83.86±9.59	79.49±10.61	0.001**
Extubation				
0	86.23±7.54	91.83±8.47	89.03±8.44	0.009**
5	78.63±9.17	87.13±6.99	82.88±9.15	<0.001**
10	77.83±5.86	84.10±5.86	80.97±6.61	<0.001**

Table 7: End tidal carbondioxide-EtCo2-A comparison in 2 groups of patients studied

EtCo2	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total	p-value
0	0.00±0.00	0.00±0.00	0.00±0.00	-
5	33.74±2.57	32.11±1.67	32.93±2.3	0.008**
10	35.20±2.87	31.50±6.28	33.35±5.19	0.005**
Gas inflation				
0	38.50±4.55	36.83±3.59	37.68±4.15	0.123
5	41.87±4.38	40.10±3.71	41.00±4.12	0.101
10	44.17±3.92	43.86±3.91	44.02±3.88	0.766
	Incremental doses of fentanyl, propofol and deepening of anesthesia with inhalational anesthetics	Dexmedetomidine infusion (0.6 mcg/kg/hr)		
0	46.67±3.76	46.12±2.74	46.47±3.41	0.601
5	47.13±3.47	47.20±1.64	47.14±3.26	0.967
10	46.34±3.34	46.00±0.00	46.33±3.28	0.920
15	48.11±2.52	45.79±4.36	46.34±4.10	0.140
20	46.33±1.73	45.24±2.97	45.50±2.75	0.304
25	46.44±1.67	45.76±2.40	45.92±2.25	0.431
30	46.44±1.42	45.69±1.83	45.87±1.76	0.266
35	45.89±1.69	45.34±1.80	45.47±1.77	0.427
Gas deflation				
0	41.80±4.72	39.28±2.48	40.56±3.97	0.013*
5	37.73±4.61	34.97±2.49	36.37±3.94	0.006**
10	34.66±3.92	32.03±1.88	33.34±3.32	0.002**
Extubation				
0	0.00±0.00	0.00±0.00	0.00±0.00	-
5	0.00±0.00	0.00±0.00	0.00±0.00	-
10	0.00±0.00	0.00±0.00	0.00±0.00	-

Table 8: SpO2%-a comparison in 2 groups of patients studied

SpO2%	Group B (Without dexmedetomidine)	Group A (With dexmedetomidine)	Total	p-value
0	97.69±1.23	97.87±1.20	97.78±1.20	0.577
5	99.00±0.71	99.13±0.51	99.07±0.61	0.408
10	99.48±0.57	99.53±0.57	99.51±0.57	0.736
Gas inflation				
0	99.10±0.82	99.63±0.49	99.37±0.72	0.004**
5	99.17±0.80	99.57±0.50	99.37±0.69	0.027*
10	99.14±0.92	99.47±0.63	99.31±0.79	0.112
	Incremental doses of fentanyl, propofol and deepening of anesthesia with inhalational anesthetics	Dexmedetomidine infusion (0.6 mcg/kg/hr)		
0	99.35±0.61	99.47±0.68	99.43±0.65	0.571
5	98.80±1.10	99.50±0.57	99.40±0.69	0.035*
10	99.20±1.23	99.24±0.87	99.23±0.96	0.908
15	99.34±0.61	99.46±0.52	99.38±0.58	0.555
20	99.48±0.51	99.54±0.52	99.50±0.51	0.746
25	99.38±0.78	99.23±0.93	99.33±0.82	0.592
30	99.24±0.69	98.92±0.64	99.14±0.68	0.166
35	99.28±0.65	99.23±0.73	99.26±0.66	0.842
Gas deflation				
0	99.14±0.52	99.40±0.50	99.27±0.52	0.052+
5	99.52±0.51	99.37±0.56	99.44±0.53	0.283
10	99.38±0.49	99.52±0.51	99.45±0.50	0.299
Extubation				
0	98.03±0.73	98.47±0.78	98.25±0.78	0.032*
5	97.59±1.02	97.57±0.73	97.58±0.88	0.933
10	97.90±0.77	97.87±0.68	97.88±0.72	0.875

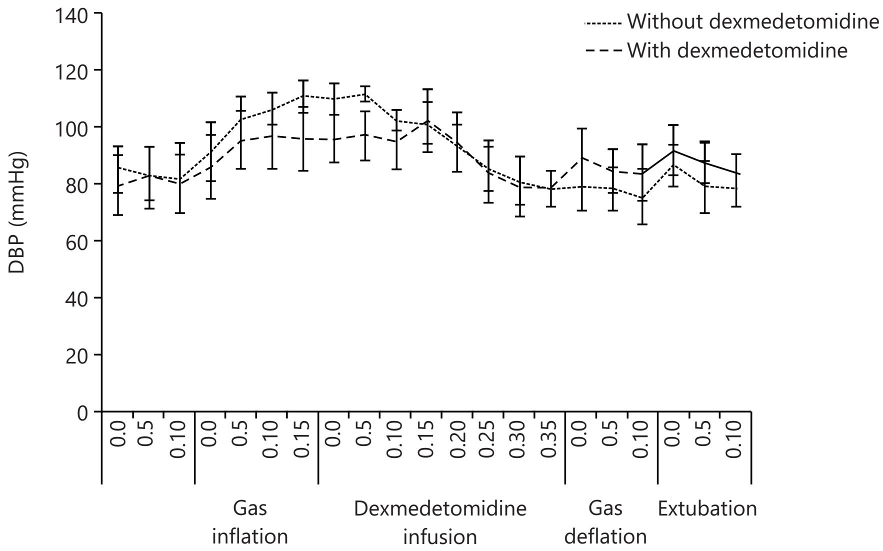

Figure 6: Diastolic blood pressure-DBP (mm Hg)-a comparison in 2 groups of patients studied

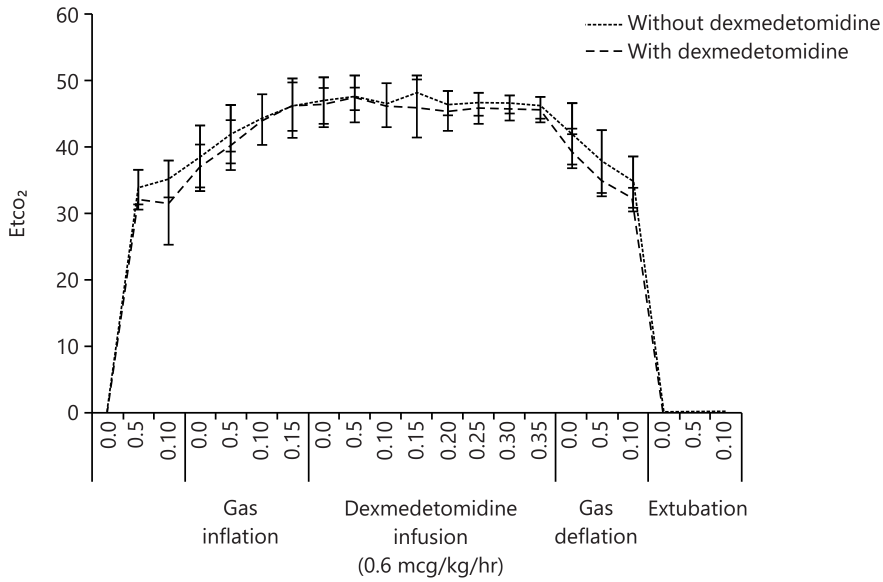

Figure 7: End tidal carbondioxide-EtCo2-a comparison in 2 groups of patients studied

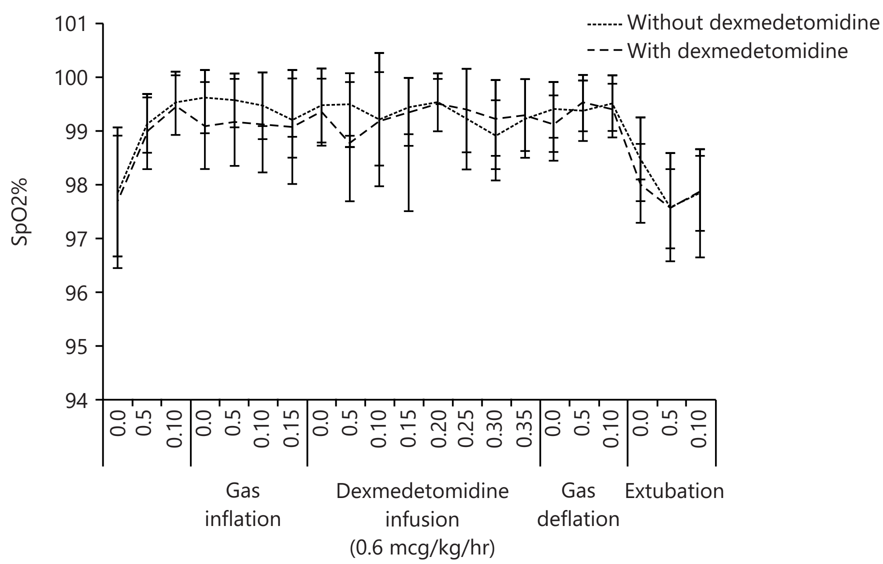

Figure 8: SpO2%-a comparison in 2 groups of patients studied

As it was noticed that there was increase in blood pressure values in both the groups after gas insufflation with an aim to keep the hemodynamic parameters.

DISCUSSION

Dexmedetomidine has proven to be a wonder drug in anaesthesiologists armamentarium due to the multidimensional advantages offered by the drug. The role of al α2 agonists in regulating the autonomic and cardiovascular response is well understood, whereby they inhibit the release of the catecholamine from the sympathetic nerve terminals[3]. Dexmedetomidine also enables a smooth transition from the time of administration of reversal to the post-extubation phase by suppressing CNS sympathetic activity. The basic effect of dexmedetomidine on CVS is to decrease the heart rate and systemic vascular resistance. Emergence form anaesthetic effect and extubation are equally crucial as is the laryngoscopy, intubation and surgical period as the depth of anaesthesia decreases abruptly and the rising levels of catecholamine's can be detrimental to patients, especially elderly and known hypertensive, Ischemic heart disease patients.

Hence, this study using dexmedetomidine was designed. wherein only a small bolus dose of dexmedetomidine (20 mcg) was administered to study group A which was done mostly to avoid sudden hypotension and bradycardia associated with synergistic effect of induction drugs. This was the uniqueness in our study compared to studies performed earlier by other authors. And we decided to start maintenance infusion only after 10 min of gas insufflation to assess the efficacy of the bolus drug in suppressing the hemodynamic response to gas insufflation. There have been many studies in literature to evaluate its effects in attenuation of hemodynamic response to intubation and gas insufflation during laparoscopic surgeries. These studies have compared dexmedetomidine with other α2 agonists, opioids and propofol infusions[4,5]. The studies performed earlier have used maintenance doses of dexmedetomidine in varying strengths and have evaluated the optimal dose. However, there is no study till date where only a low bolus dose was administered to evaluate its effect. In one study, we have chosen a very small dose of 20 mcg dexmedetomidine bolus dose irrespective of weight with an aim to evaluate the efficiency of this small dose of the drug in maintaining hemodynamic parameters. This minute doses were also chosen with an intention to minimize the adverse effects which could be anticipated due to co-administration of induction drugs and in our study, we found that this small dose was effective in attenuating stress response to laryngoscopy and intubation as the blood pressure values remained within acceptable limits in dexmedetomidine group (group A) till the gas insufflation. However, this low bolus dose was ineffective in attenuating the hemodynamic response to gas insufflation which required further measures to suppress this response. Based on the required rescue methods at this stage, it was further evaluated for the efficacy of dexmedetomidine maintainance infusion with other conventional methods using fentanyl, propofol, inhalational agent in maintaining the hemodynamic profile within acceptable limits in perioperative period.

Earlier studies revealed a better hemodynamic profile with dexmedetomidine maintenance infusions or bolus along with maintainance infusions in attenuating the stress response during laparoscopic surgeries whereas in our study we found that there was need for bolus as well as maintenance dose to maintain hemodynamic profile within acceptable limits[6-12]. This can be attributed to the small bolus dose of drug administered by us in our study.

Vora *et al.*[13] in their study have found dexmedetomidine to provide better hemodynamic profile in perioperative period and blunt stress response to intubation and extubation[13]. In their study, bolus dose before intubation followed by maintenance dose immediately after intubation was administered. Whereas in our study, maintenance infusion was started 10 min after gas insufflation inspite of this results obtained in our study was similar to their study.

Janardhana and Thimmaiah[5] in their study have compared propofol with dexmedetomidine and found that dexmedetomidine to be superior to propofol in attenuating hemodynamic profile to pneumoperitoneum and they have also noted postoperatively significant sedation in group D[5]. A similar result was obtained in our study in spite of using a lower dexmedetomidine bolus than their study. However, sedation was not assessed by us.

Our study results were comparable to study by Gupta *et al.*[6], where they have found dexmedetomidine to attenuate response to laryngoscopy and intubation, pneumoperitoneum, extubation[6]. But, they have used 1 mcg kg^{-1} as bolus infusion followed by 0.2 mcg/kg/hr as maintenance. Where as in our study, a small uniform bolus dose of 20 mcg followed by 0.6 mcg/kg/hr as infusion 10 min after gas insufflation was used.

As concluded by Jan *et al.*[7] in their study in patients undergoing laproscopic cholecystectomy, dexmedetomidine to be an effective intraoperative medication[7]. We are also of the same opinion that dexmedetomidine is effective medication even at low bolus dose of 20 mcg followed by 0.6 mcg/kg/hr infusion as rescue agent even if started 10 min after gas insufflation. As there were no patients in either group who had any adverse effects (such as hypotension, bradycardia) it was very clear from our study that the small bolus dose was effective in attenuating response to intubation without causing any undue cardiovascular adverse effects due to the co-administration of induction drugs during anesthesia.

Limitations of our study

- In our study we did not assess for sedation score
- Extubation response was not assessed in our study
- Analgesia requirement in both the groups was not compared

CONCLUSION

We concluded that low bolus doses of 20 mcg dexmedetomidine followed by maintenance infusion of 0.6 mcg/kg/hr starting 10 min after gas insufflation is equally effective in attenuating the stress response to various stimuli during laparoscopic cholecystectomy.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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DISCLAIMERS

The opinions expressed in this article are the authors' personal views and do not represent that of their affiliated organizations, employers, or associations.

DATA AVAILABILITY STATEMENT

Not Applicable

AUTHOR CONTRIBUTIONS

BNG conceived the review idea. RR conducted the literature search. JP and KK prepared the first draft of the manuscript. PR reviewed, edited and revised the manuscript substantially on the key intellectual content. BNG and PR finalized and approved the current version agreed to be accountable for accuracy and integrity and decided to submit the manuscript to Trends in Medical Research.

HIGHLIGHTS OF THE STUDY

- Dexmedetomidine is a wonder drug and has gained popularity due to its multidimensional properties
- Studies performed earlier have used dexmedetomidine infusion in a wide dose range from 0.4-1 mcg/kg/hr
- This study is unique because of the constant bolus dose of drug (20 mcg) irrespective of patient's body weight. Our study findings clearly demonstrated a beneficial effect of this bolus dose in attenuation of stress response to laryngoscopy, intubation and there was no occurence of any adverse hemodynamic effect due to anesthesia induction drugs proving this to be a safe and effective dose
- Our study finding also suggested that there was need for maintenance infusion for suppression of stress response to gas insufflation. However, this infusion gave the additional benefit of providing smooth extubation response
- There was no residual effect of the drug noted in our study to cause any postoperative complications. Thus, providing a smooth transition from intraoperative to postoperative phase

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