E-ISSN: 2706-9575
P-ISSN: 2706-9567
IJARM 2021; 3(1): 486-492
Received: 06-06-2021
Accepted: 25-06-2021

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Dexmedetomidine premedication as an adjuvant to fentanyl in patients undergoing elective surgeries under general anaesthesia

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DOI: https://doi.org/10.22271/27069567.2021.v3.i1h.330

Abstract
Aims and Objectives: Alpha-2 agonists are being increasingly used as adjuvants in general anaesthesia. The present study was carried out to evaluate the ability of intravenous Dexmedetomidine as premedicant in decreasing intraoperative dose of opiods, anaesthetics and for attenuation of haemodynamic responses during laryngoscopy, tracheal intubation, surgery and extubation.
Methods: Hundred patients scheduled for elective general surgery were randomized into 2 groups, D & F [n=50 in each group]
Group F: Received Fentanyl 2 mcg/kg.
Group D: Received Dexmedetomidine 1 mcg/kg IV over 20 minutes plus fentanyl 2mcg/kg IV 3 minutes before induction. Maintenance infusion of Dexmedetomidine 0.4mcg/kg/hr was given.
Discussion: The sedative, analgesia and anxiolytic effects of Dexmedetomidine are attributed to its stimulation of alpha2A subtype in CNS.
Results: The pressor responses were effectively decreased by Dexmedetomidine and were highly significant on comparison. The mean dose of opioids & anaesthetics were also decreased significantly by Dexmedetomideine.
Conclusion: Dexmedetomidine is an excellent drug as it not only decreases the magnitude of haemodynamic responses to intubation, surgery & extubation, but also decreases the dose of opioids & anaesthetics in achieving adequate analgesia & anaesthesia respectively.

Keywords: dexmedetomidine, fentanyl, premedication, general anaesthesia, sedation, anxiolysis

Introduction
Induction of anaesthesia and tracheal intubation may cause profound alteration of the haemodynamic state of the patient consequent to both the effects of anesthetic drug administered perioperatively and the adrenergic state of the patient [1].
The magnitude of haemodynamic changes observed may be dependent on various factors such as depth of anaesthesia, whether any measures are taken prior to airway manipulation, the anaesthetic agent used, the duration of surgery. To date, the exact mechanism of haemodynamic responses to laryngoscopy and intubation has not been clarified. The principle mechanism in hypertension and tachycardia is the sympathetic response [2, 3] which may be the result of increase in catecholamine activity [4].
The use of alpha 2 adrenoreceptor agonists like clonidine is new for this purpose. The disadvantages of clonidine are long half life, rebound hypertension and relatively less alpha 2 to alpha 1 selective action. This led to a search for more potent and specific alpha 2 agonists like dexmedetomidine [5].
Both Clonidine and dexmedetomidine have actions on both α-1 and α-2 receptors but Dexmedetomidine is highly specific and selective α-2 adrenoceptor agonist with α2:α1 binding selectivity ratio of 1620:1 compared to 220:1 for clonidine [7].
Several studies have been carried out to study the effects of dexmedetomidine as a premedicant and as an adjunct to general anaesthesia. The authors concluded that dexmedetomidine as preanaesthetic medication as single intravenous dose before induction decreases thiopental anaesthetic requirements and improves recovery from anaesthesia with no serious haemodynamic or other adverse effects [7].
A basic need is continuously felt among the anaesthesiologist fraternity for the desired availability of a drug that effectively suppresses all the hazardous responses to obnoxious stimuli with a maximum safety margin.

Dexmedetomidine has become an important addition to the anaesthesiologist‟s armamentarium both as an adjuvant to general anaesthesia and as a component of procedural sedation technique. With emphasis on multidimensional features of dexmedetomidine, our study will be to determine whether the addition of dexmedetomidine will decrease the dose of opioids and anaesthetics for attenuation of hemodynamic response during laryngoscopy, tracheal intubation, surgery and extubation [8].

Aim & Objectives

The study of dexmedetomidine as an adjuvant to fentanyl as premedication in patients undergoing elective surgeries under GA has the following objectives.

To evaluate

- The level of sedation and anxiety
- Haemodynamic response to induction, laryngoscopy and intubation
- Intra operative hemodynamic parameters(HR, NIBP,O_2 saturation)
- Intra operative anaesthetic requirements
- Intra operative analgesic(Fentanyl) requirement
- Haemodynamic response to extubation
- Possible side effects
- Recovery time

Source of data

The study was conducted on 100 patients, undergoing elective surgeries under General anaesthesia at Katuri Medical College, Guntur from the academic year December 2018 to July 2020.

Methods for collection of data

100 patients undergoing surgical procedures were randomly selected.

Informed, written consent were taken from patients. Result values were recorded using a preset proforma.

1. Inclusion criteria

- ASA grade I and II
- Age 18 to 50 years

2. Exclusion criteria

- Patient refusal
- ASA grade III and IV
- Patients with liver, renal and cardiovascular disorders
- Epilepsy
- COPD patients
- Pregnancy
- Patients on antipsychotics
- History of any drug allergy

3. Procedure

The patients were divided into 2 groups, of 50 each, in a random, single blinded manner. A detailed history, complete physical examination and routine investigations were done for all patients. IV lines were secured and patients were premedicated with Inj Ranitidine 50 mg IV, Inj Ondansetron 4mg IV and Inj Glycopyrrolate 0.2mg IV. Baseline parameters (Heart rate, NIBP and SpO_2) were recorded.

Group F received Fentanyl 2 microgram/kg IV 3 minutes before induction.

Group D received Dexmeditomidine 1 microgram/kg given over 20 minutes plus fentanyl 2 microgram/kg IV 3 minutes before induction. Maintenance infusion of Dexmedetomidine 0.4mcg/kg/hr was given.

Induction was done with Inj Thiopentone sodium in a dose sufficient to abolish the eyelash reflex, followed by Inj Succinylcholine 2mg/kg to provide neuromuscular blockade. Laryngoscopy was performed and intubation was done with cuffed Endotracheal tube of appropriate size. Anaesthesia was maintained with 33:66 O_2 and N_2O plus Inj Vecuronium bromide for muscle relaxation plus Halothane. Halothane concentration will be adjusted to maintain systolic blood pressure within 20% of preoperative values. Maintenance infusion of Dexmedetomidine 0.4mcg/kg/hr was given. Haemodynamic and respiratory parameters were recorded at regular intervals of time till the completion of surgery. At the end of surgical procedure residual neuro muscular blockade was antagonized with Inj neostigmine 0.5mg/kg and Inj glycopyrrolate 0.4mg IV. Extubation was carried out as a routine procdure and stress response to extubation was recorded. Patient was shifted to recovery room.

Before and after induction period, level of sedation and anxiety, haemodynamic parameters, haemodynamic response to induction, laryngoscopy, intubation and extubation, necessity of additional anaesthetic agent and possible side effects were compared among the 2 groups.

- Injection thiopentone dose requirements till the abolision of eye lash reflexes noted.
- Requirements of halothane to maintain blood pressure within 20% of basal values are noted.
- Mean requirements of intraoperative analgesics noted.
- Recovery time noted in the groups with regard to protrusion of tongue, sustained head lift and response to other verbal commands.
- Level of sedation noted using Ramsay sedation score before intubation and after extubation

Ramsay sedation scoring

Monitoring

The following cardiovascular parameters were recorded in all patients.

- Heart rate [HR] in beats per minute
- Systolic blood pressure [SBP] in mm of Hg
- Diastolic blood pressure [DBP] in mm of Hg
- Mean arterial pressure [MAP] in mm of Hg
- Oxygen Saturation
- Recovery time

The above cardiovascular parameters were monitored in the following time interval

- Basal before giving study drug
- After drug
- After intubation
- Ten minutes after intubation
- Fifteen minutes after intubation
- Thirty minutes after intubation n so on

Side effects

- Hypotension was defined as SBP $\leq$ 20% of baseline value

- Tachycardia was defined as HR > 25% of baseline value.
- Bradycardia was defined as HR < 45 beats/ minute.
- Any dysrrhythmia was defined as any ventricular or supra ventricular beat or any rhythm other than sinus.
- Incidences of all these parameters were recorded in both the groups.
- The side effects of the study drug like hypotension, bradycardia and sedation were noted.

Statistical methods

- Results are presented as Mean, Standard deviation and Number and percentages.
- Unpaired „t" test was useedd to compare the mean levels between 2 groups
- Categorical data was analysed by chi square test
- A p value of 0.05 or less was considered to be statistically significant
- SPSS Ver 17 was used for analysis
- Microsoft word and Excel have been used to generate graphs, tables etc.

Results

Table 1: Shows age distribution of the patients in both the groups

Age (Yrs)	Fentanyl	Dexmed
Mean Age±SD	34.4± 9.8	34.8 ± 9.6
t value	0.21	
P value	0.84, NS	
Unpaired t test		

The minimum age in both groups F & D were 20 and 19 years respectively. The maximum age in both groups was 50 years. The mean age in group F and D were 34.4 ± 9.8 and 34.8 ± 9.6 respectively.
There was no significant difference in the age of patients between the Group F and Group D. Both the groups were similar with respect to age distribution (P = 0.84).

Table 2: Sexwise Distribution

Sex	Fentanyl	Dexmed	Group S	
	No.	%	No.	%
Male	20	40.0	21	42.0
Female	30	60.0	29	58.0
Total	50	100.0	30	100.0

From the above table it is seen that statistically there is no significant change in the gender in both the groups.

Table 3: ASA Grade

ASA	Fentanyl	Dexmed	Group S	
	No.	%	No.	%
1	36	72.0	33	66.0
2	14	28.0	17	34.0
Total	50	100.0	50	100.0

X^2= 0.42, P = 0.52, NS

From the above table, in Group F, 72% patients belongs to ASIA I and 28% patients, ASA II. In group D, 66% patients ASA I and 34% patients, ASA II. Statistically no significant difference found in both the groups.

Table 4: Weight Distribution

Weight (Kg)	Fentanyl	Dexmed	Group S	
	Mean	SD	Mean	SD
	54.68	5.45	55.74	6.75
t value	-0.86			
P value	0.39, NS			

Unpaired t test

It shows body weight distribution of the patients. The mean body weight in Group F was 54.68 ± 5.45 and in group D it was 55.74 ± 6.75. There was no significant difference in the body weight distribution in both the groups.

Table 5: Dose of Thiopentone Mg/Kg

Dose of Thiopentone Mg/Kg	Fentanyl		Dexmed	
	Mean	SD	Mean	SD
	5.28	0.28	3.78	0.40
t value	21.42			
P value	< 0.001, HS			

The mean dose of thiopentone required in Group F was 5.28 ± 0.28 and in Group D it was 3.78 ± 0.4. This is statistically highly significant P = < 0.001.

Table 6: Level of Sedation

	Fentanyl		Dexmed		Mean Diff	T	P
	Mean	SD	Mean	SD			
Basal	1.7	0.5	1.7	0.5	0.0	0.00	1.00, NS
AT	2.0	0.0	3.4	0.5	1.4	-20.31	< 0.001, HS
AE	1.4	0.5	3.0	0.0	1.6	-22.86	< 0.001, HS

Basal mean level of sedation in group F and in group D was 1.7±0.5. There is no statistical difference in both the groups. After giving drug in Group F, the mean level of sedation was 2 ±0.0 and in group D 3.4 ± 0.5. It was statistically highly significant between Group F and Group D.
In group F, the mean level of sedation after extubation was 1.4 ± 0.5 and in group D it was 3 ± 0.0. There was statistically highly significant difference between both the groups after extubation.

Table 7: Heart Rate comparison

HR	Fentanyl		Dexmed		Mean Diff	t	P
	Mean	SD	Mean	SD			
Basal	79.1	7.5	82.3	12.0	-3.20	-1.60	0.11, NS
AT	78.8	7.0	74.7	9.2	4.04	2.47	0.02 *
AI	84.9	8.2	73.2	9.7	11.68	6.50	0.00 **
10'	83.5	7.3	69.9	8.3	13.60	8.74	0.00 **
15'	83.8	7.8	69.0	9.5	14.88	8.59	0.00 **
30'	84.1	7.4	68.0	6.6	16.12	11.50	0.00 **
45'	91.4	8.7	71.0	8.0	20.32	12.20	0.00 **
60'	100.2	9.7	70.9	8.9	29.29	12.75	0.00 **
90'/AE	112.0	15.3	69.2	3.9	42.80	8.58	0.00 **

In group F (Fentanyl) and in Group D (Dexmedetomidine) the basal mean HR were 79.1 ± 7.5 and 82.3 ± 12 respectively.
There was no statistical difference between both the groups in basal HR. After giving drug, Group F showed mean HR 78.8 ± 7 and group D showed 74.7 ± 9.2 (P = 0.02). Both the groups showed significant statistical difference. After intubation, in group F mean HR 84.9 ± 8.2 and in Group D 73.2 ± 9.7 (P = 0.00).

There was highly significant statistical difference between both the groups after intubation. By 10, 15, 30, 45, 60 and 90 minutes after intubation, the mean HR remained low in group D compared to group F even after extubation and this is statistically highly significant. (P = 0.00).

Table 8: SBP comparison

SBP	Fentanyl		Dexmed		Mean Diff	t	P
	Mean	SD	Mean	SD			
Basal	128.2	6.0	127.4	11.3	0.80	1.22	0.734
AT	121.8	9.5	116.4	8.7	5.32	2.92	0.004*
AI	130.2	6.5	112.2	10.4	17.96	10.40	0.00 **
10'	128.6	9.1	106.7	10.5	21.84	11.12	0.00 **
15'	131.6	9.0	108.0	15.3	23.60	9.38	0.00 **
30'	133.8	7.8	110.9	18.2	22.84	8.15	0.00 **
45'	138.4	8.4	116.4	15.0	22.04	9.04	0.00 **
60'	145.4	7.1	120.2	19.1	25.26	8.23	0.00 **
90'/AE	148.7	7.2	113.4	11.1	35.27	6.92	0.00 **

In group F, the basal mean SBP was 128.2±6 mmHg. In group D, it was 127.4±11.3 mmHg. There was no statistical difference between both the groups.

After drug administration, there was fall in SBP in Group F 121.8 ± 9.5 and fall in SBP in Group D was 116.4 ± 8.7. It was statistically significant (P = 0004) After intubation, mean SBP in group F was 130.2 ± 6.5 and in group D it was 112.2 ± 0.4. The difference is statistically highly significant. The SBP values at 10, 15, 30, 45, 60 and 90 minutes after intubation are statistically highly significant (P = 0.000) in both the groups. The SBP continued to be at lower levels compared to the basal value even after extubation.

Table 9: DBP comparison

DBP	Fentanyl		Dexmed		Mean Diff	t	P
	Mean	SD	Mean	SD			
Basal	76.6	6.1	78.3	7.5	-1.70	1.34	0.223
AT	75.0	5.8	73.0	9.2	1.96	1.27	0.21, NS
AI	81.0	4.7	67.5	10.1	13.52	8.55	0.00 **
10'	79.2	5.4	64.3	7.5	14.92	11.40	0.00 **
15'	80.6	5.5	65.6	10.0	15.00	9.27	0.00 **
30'	79.9	9.4	67.1	10.6	12.80	6.41	0.00 **
45'	86.2	5.5	70.5	9.0	15.68	10.49	0.00 **
60'	92.3	5.5	74.5	13.6	17.71	7.95	0.00 **
90'/AE	93.3	2.7	71.6	8.0	21.73	6.33	0.00 **

In group F, basal mean DBP was 76.6 ± 6.1 mmHg and in Group D it was ± 7.5 mm Hg. Statistically no difference found between 2 groups.

After drug administration, the mean DBP in Group F and Group D were 75 ± 5.8 and 73 ± 9.2 respectively. Statistically no difference found between both the groups immediately after administration of Drug. (P = 0.21)

After intubation, Mean SBP in group F was 81 ± 4.7 and in Group D was 67.5 ± 10.1. There was statistically highly significant difference found between both the groups (P = 0.00). At 10, 15, 30, 45, 60 and 90 minutes after intubation difference DBP mean values remained lower in Group D.

The increase in mean DBP in group F was statistically highly significant (P = 0.000) compared to group D.

Table 10: MAP comparison

	Fentanyl		Dexmed		Mean Diff	t	P
	Mean	SD	Mean	SD			
Basal	91.8	3.4	90.8	3.4	1.00	1.42	1.000
AT	89.8	5.9	87.9	8.1	1.88	1.33	0.19, NS
AI	96.9	5.5	83.8	9.2	13.08	8.65	0.00 **
10'	95.6	6.7	79.9	7.9	15.72	10.68	0.00 **
15'	97.6	7.3	81.4	10.7	16.28	8.88	0.00 **
30'	100.6	5.9	82.1	11.0	18.48	10.48	0.00 **
45'	104.4	5.2	87.5	11.7	16.84	9.32	0.00 **
60'	110.0	5.1	90.1	11.7	19.97	10.07	0.00 **
90'/AE	111.0	0.9	86.2	10.8	24.80	5.54	0.00 **

In group F basal mean MAP was 91.8 ± 3.4 and in Group D it was 90.8 ± 3.4 mmHg. There was no statistical difference between two groups. (P=1.00). After drug administration, there was fall in MAP in both the groups. In group F 89.8 ± 5.9 and in Group D 87.9 ± 1.88, but fall in MAP is of not statistically different in both groups. Immediately after intubation, 10, 15, 30, 45, 60 and 90 minutes after intubation, the fall in MAP was more in group D and statistically highly significant compared to Group F. In group D, MAP continued to be at lower levels even after extubation.

Table 11: SPO_2 comparison

	Fentanyl		Dexmed		Mean Diff	t	P
	Mean	SD	Mean	SD			
Basal	98.9	0.7	99.6	0.5	-0.64	-5.20	0.00 **
AT	98.5	0.6	98.6	0.5	-0.10	-0.91	0.37, NS
AI	98.1	0.9	98.1	0.5	0.01	0.03	0.97, NS
10'	98.6	0.8	98.3	0.6	0.30	1.83	0.07, NS
15'	98.5	0.7	98.4	0.9	0.02	0.12	0.91, NS
30'	98.2	0.6	97.6	1.1	0.53	2.82	0.01 *
45'	98.2	0.9	97.4	1.1	0.77	3.82	0.00 **
60'	97.7	0.8	97.1	1.3	0.60	2.39	0.02 *
90'/AE	97.3	0.5	96.0	0.7	1.33	4.18	0.001*

After extubation in Group F, SPO2 fell till 97.3% and in Group D, it was till 96%. The SPO2 were comparable in both the groups without any clinical significance.

Table 12: Inhalational Agent Requirement

Inhalational	Fentanyl		Dexmed	
	No.	%	No.	%
Yes	45	90.0	6	12.0
No	5	10.0	44	88.0
Total	100	100.0	100	100.0

In group F, 90% of patients required inhlational agent.

In group D, only 12% of patients required to supplement with inhalational agent. Statistically highly significant difference found in both the groups ($P< 0.001$).

Table 13: Total dose of vecuronium bromide required for muscle relaxation

	Dose of Vecuronium bromide required for muscle relaxation (mg)
Group F	4.70±1.36
Group D	3.74±1.22
p-value	0.000 (HS)

($p< 0.01$) – Highly significant (HS)

The mean dose of vecuronium bromide required for muscle relaxation in group F and group D were 4.70±1.36 and 3.74±1.22 respectively.
Statistical evaluation between the groups showed a statistical significant reduction in dose of vecuronium bromide for muscle relaxation (p=0.000).

Table 14: Intraop Analgsic Requirement

Intraop analgsic req	Fentanyl		Dexmed	
	Mean	SD	Mean	SD
	2.40	0.2	1.56	0.3
t value	15.68			
P value	< 0.001, HS			

In group F, mean dose of fentanyl required was 2.4 ± 0.2 (mcg / kg / hr). In group D, it was 1.56 ± 0.3. Statistically highly significant difference found in both the groups.

Table 15: Recovery Time

Recovery Time (In Mins)	Fentanyl		Dexmed	
	Mean	SD	Mean	SD
	6.79	0.87	4.37	1.19
t value	11.3			
P value	< 0.001, HS			

The mean recovery time in Group F was 6.79 minutes whereas in Group D it was 4.37 minutes. The differences between both the groups were statistically highly significant.

Table 16: Side Effects

Side effects	Fentanyl		Dexmed	
	No.	%	No.	%
Nausea	0	0.0	2	4.0
Vomitting	0	0.0	2	4.0
None	50	100.0	46	92.0
Total	50	100.0	50	100.0

Only 2 patients (4%) in Group D has Nausea and 2 patients (4%) had vomiting. No statistically significant difference between both the groups.

Discussion

The use of alpha 2 adrenoceptor agonists like clonidine is new for this purpose. The disadvantages of clonidine are longer half – life, rebound hypertension, relatively less α2 to α1 selective action. The led to a research for more potent and specific α2 agonists like dexmedetomidine.
Dexmedetomidine is a new highly selective α2 adrenoceptor agonist that can be titrated to the desired level of sedation without significant respiratory depression. Dexmedetomidine has an analgesic sparing effect, significantly reducing opioid requirements both during and after Surgery. In addition, dexmedetomidine has a sympotholytic effect that can attenuate the stress response to surgery, mitigating tachycardia and hypertension. Because of its analgesic properties “Co-operative sedation” and lack of respiratory depression, dexmedetomidine is increasingly being used as premedicant.
The present study was undertaken to study the effects of Dexmethemidine premedicant as an adjuvant to fentanyl in patients undergoing elective surgery under GA.

Demographic criteria

In our study, majority of patients were middle aged in both the groups. In group F there were 20 males and 30 females and in group D there were 21 males and 29 females.
The mean weight either group were aso identical. Patients were belonged to ASA I or II status in either groups. The type of surgeries performed were also indentical in both the groups. These parameters were kept identical in both the groups to avoid variations in intraoperative and post operative outcome of patients.

Dose of thiopentone required for induction

We studied the total dose of thiopentone required for induction in each group. In group F, the mean dose of thiopentone required for induction was 290 mg (5.28 mg/kg body weight) and in group D, dose required was 210 mg (3.78 mg / kg) showing reduction of 1.5 mg/ kg body weight (32%) which is statistically highly significant (p = 0.000).
Various authors have studied the effect of dexmedetomidine on thiopentone requirements for induction of anaesthesia.
Aanta *et al*., [9] studied the effect of intravenous dexmedetomidine on the dose of thiopentone requirement for induction. In this study the dose of thiopentone required for induction in control group and dexmedetomidine group was 329±100 mg and 207±49 mg respectively showing a reduction by 37%.

Sedation scoring

In group F, mean sedation score after drug administration was 2 and in group D it was 3.4 which was statistically significant. In Group F, mean sedation score after extubation was 1.4 and in group D it was 3. Patients were responding to commands with clear conscious and alert state of mind. Sedation scores were significantly better in group D.
Yildiz *et al*. [10] studied the effect of single preinduction dose of dexmed 1 μg / kg between on CVS response resulting from laryngoscopy and endotracheal intubation, need of anaesthetic agents and peri operative hemodynamic stability and sedation. The sedation score were > 4 in all patients in dexmed group and steward awakening scores were > 6 in 56% of dexmed group.
Sukhminder Singh *et al*., [8] studied the effect of iv Dexmedetomidine 1mcg/kg on various haemodynamic parameters and sedation compared to Fentanyl group and they found sedation scores were significantly better in Group D patients.
Dexmedetomidine induces sleep by activating endogenous non-rapid eye movement pathways. Stimulation of alpha-2A receptors in the nucleus ceruleus inhibits nor adrenergic neurons and disinhibits GAB Anergic neurons in the ventrolateral preoptic nucleus (VLPO). Dexmedetomidine induced sedation qualitatively resembles normal sleep.
In the present study, following laryngoscopy and intubation, the mean HR increased by 6 bpm in group F whereas in dexmed group mean HR decreased by 9 bpm which is statistically highly significant.
Basar *et al*. [13] observed a increase in HR by 5 bpm in control group and decrease in HR by 5 bpm in dexmedetomidine group after intubation who received iv dexmedetomidine 0.5mcg/kg and haemodynamic parameters were maintained till the end of surgery which concurs with our study.

But in our study, there is significant difference in HR till completion of surgery at regular intervals of time, as we conducted our study with IV infusion of Dexmed at 0.4 mcg / kg / hr throughout the Surgery. Decrease in heart rate caused by the inhibition of the central sympathetic outflow overriding the direct stimulant effects. Another possible explanation for the subsequent heart rate decrease is the stimulation of presynaptic alpha-2 adrenoceptors, leading to a decrease in norepinephrine release [11].

Change in systolic BP

After Dexmedetomidine administration there is a gradual reduction in SBP which was statistically highly significant.

Aho *et al*., [12], Raph Getler *et al*., [6] and Keniya *et al*. [13] found a continuous gradual reduction of SBP as in our study.

Change in DBP

After Dexmed administration, there is a gradual decrease of DBP which is statistically significant as continuous infusion of dexmedetomidine was kept throughout Surgery.

Aho *et al*. [12] observed a continuous decrease of DBP in dexmed group which concurs with out study.

Change in MAP

After administration of dexmed there is a continuous fall in MAP in dexmed group which is statistically significant.

Basar *et al*. [7] noted a decrease in MAP by 7 mm Hg in dexmed group which concurs with our study.

Basal *et al*. [7] found a decrease in MAP by 10 mm Hg in Dexmed group which concurs with our study.

Sukhminder Jit Singh *et al*. [8] found a significant decrease in MAP in Dexmed group compared to fentanyl group which again concurs with our study.

Decrease in blood pressure is due to inhibition of the central sympathetic outflow overriding the direct stimulant effects and also due to a decrease in norepinephrine release [11].

SPO_2 comparison

Both the groups comparable with respect to SPO_2. In group D, dexmed causes fall in Oxygen saturation upto 95-96% which returned to normal on waking up the patients after extubation. The incidence of absolute respiratory depression (defined as a respiratory rate < 8 or an SPO_2 of < 90%) was significantly lower in both the groups before intubation and after extubation. None of the patient need intervention for respiratory depression. Dr. Sukhminder, Jit Singh *et al*. [8], study concluded that in Group D there wall fall in SPO_2 upto 94-95% which retured to normal on waking up the patients in group D which concurs with our study.

Inhalational agent comparison

In our study, in group F, 90% of patients needed halothane inhalational agent maintainance to maintain SBP within 20% of pre operative values.

In group D, only 12% patients needed halothane for maintainance which was statistically highly significant. Requirement of inhalation agent for maintenance of anaesthesia during the entire surgery was markedly reduced as we used a lower inspiratory concentration of halothane in Group D as compared with Group F.

Aho M *et al*., [12] concluded in their study that the mean end tidal concentration of inhalational agent was significantly less in dexmedetomidine group than in fentanyl group which concurs with our study.

Dose of vecuronium bromide required for muscle relaxation

We also studied the total dose of vecuronium required in each group. We found the total dose of vecuronium required in fentanyl and dexmedetomidine group for muscle relaxation was 4.70±1.36 mg and 3.74±1.22 mg respectively which was statistically highly significant (p=0.000).

Talke *et al*. [14] studied the effect of dexmedetomidine on neuromuscular blockade and noted that dexmedetomidine increased the plasma concentration of rocuronium significantly ($p< 0.05$). The authors could not find a definitive reason for this effect. They hypothesized that dexmedetomidine might have influenced the pharmacokinetics of rocuronium by decreasing both renal and hepatic blood flow. Similar observation was made by Ghada Ahmad *et al*. [15].

Intra operative requirement of analgesics

In our study, the mean dose of fentanyl required in Group F was 2.4 mcg / kg / hr in group D it was 1.56 mcg/kg/hr.

Dr. Sukhminder *et al*. [8] concluded in their study mean dose of fentanyl required in Group F was 2.6 mcg / kg / hr and less in Group D 1.2 mcg / kg / hr which concurs with our study.

Recovery Time

In our study, the mean recovery time in Group F was 6.79 minutes whereas in Group D it was 4.37 minutes. The differences between the recovery characteristics in both the groups with regard to protrusion of tongue, sustained head lift and response to other verbal commands was significantly on statistically comparison.

Dr. Skukhminde *et al*. [8] studied the effect of IV dexmed 1 µg/kg on various haemodynamic parameters, sedation score and recovery time concluded in their study the mean recovery time was significantly low in Group D compared to Group F.

Side Effects

In our study only 4% of patients in group D had nausea and vomiting witout any much adverse effects statistically of no significance. Studies using dexmedetomidine have commonly reported cardiac side effects like bradycardia and sinus pause which is mainly due to sympatholytic effect as well as preservation of baroreflex mechanism. But none of the patients in the present study had such an incidence, which could have warranted the use of atropine possibly due to usage of a lower dose of dexmed and bolus dose given slowly over 20 mins. To substantiate the cardiovascular safety of such drugs, such a small study of ours is not sufficient and larger meta analytical studies required.

Conclusion

Dexmedetomidine at a dose of 1µg/kg body weight diluted in 100 ml saline given over 20 minutes before induction followed by infusion of 0.4mcg/kg body weight not only decreases the magnitude of haemodynamic responses to intubation, surgery and extubation but also decreases the dose of opioids and anaesthetics in achieving adequate analgesia and anaesthesia respectively without significant side effects.

Acknowledgment
The author is thankful to Department of Anaesthesiology for providing all the facilities to carry ut this work.

Conflict of Interest
None

Funding Support
Nil

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