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Comparison between dexmedetomidine and propofol for short-term sedation of postoperative mechanically ventilated patients

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Abstract
Background and Objectives: Post-operative patients requiring mechanical ventilation in surgical ICUs frequently require adequate sedation and analgesia to modulate physiological responses to stress and pain, reducing morbidity and mortality in the ICU. Inadequate sedation and analgesia can have serious consequences, including self-removal of important intraluminal tubes and vascular catheters, aggressive behaviour by patients toward care providers, and poor patient–ventilator synchrony. Sedation can lead to a longer duration of mechanical ventilation, as well as longer ICU and hospital stays. Dexmedetomidine is a highly selective and potent 2 adrenergic agonist with anxiolytic, anaesthetic, hypnotic, and analgesic properties. It is approved for use as a sedative agent in post-operative intensive care units. We compared the efficacy and safety profile of Dexmedetomidine to that of the most commonly used sedative, Propofol, as a short-term sedative in post-operative patients in ICUs.
Methodology: 100 patients over the age of 18 who had major abdominal or pelvic surgeries requiring at least 6 hours of artificial ventilation and were admitted to intensive care units were included as subjects, and they were randomly divided into two groups of fifty each. Group D received Dexmedetomidine at a loading dose of 2.5g/kg and a maintenance dose of 0.5g/kg/hr, while Group P received Propofol at a loading dose of 1mg/kg and a maintenance dose of 0.5mg/kg/hr. The level of sedation using the Ramsay sedation score, hemodynamic variables, safety profile, and fentanyl requirement to achieve adequate analgesia.
Results: The Ramsay sedation score was within the desired range (2-4) in both the Dexmedetomidine and Propofol groups (p>0.05). Patients who received Dexmedetomidine infusion had significantly lower heart rates than patients who received Propofol infusion (p0.00). There were no significant differences in SBP, DBP, MAP, or oxygen saturation between the two groups. The total Fentanyl dose requirement was significantly higher in the Propofol group (66.310.1g) than in the Dexmedetomidine group (31.09.5 g; p=0.001).
Conclusion: Dexmedetomidine and Propofol are both safe sedatives for post-operative mechanically ventilated patients. Patients in the Dexmedetomidine group were easily aroused to cooperate with no signs of irritation and less Fentanyl analgesia.

Keywords: dexmedetomidine, propofol, sedative drugs, heart rates, SBP, DBP, map

Introduction
The Intensive Care Unit (ICU) is a high-stress, uncomfortable environment for patients. Adequate sedation and analgesia are essential for modulating physiological responses to stress and pain, thereby reducing morbidity and mortality in the ICU [1]. Sedation and analgesia are required in the surgical ICU for intubated mechanically ventilated patients to tolerate the tracheal tube, artificial ventilation, cough suppression, and to prevent respiratory fighting during intensive care procedures such as bronchial suctioning, physiotherapy, and catheter placement [2].
Sedation of patients reduces the stress response, provides anxiolysis, improves ventilator support tolerance, and facilitates nursing care. Sedatives, on the other hand, have negative side effects and have the potential to prolong mechanical ventilation while also increasing health-care costs [3-5].
An ideal sedative agent should have a rapid onset of action, be effective at providing adequate sedation, allow for rapid recovery after discontinuation, be easy to administer, have little drug accumulation, have few adverse effects, interact with other drugs minimally, and be inexpensive.

6 Inadequate sedation and analgesia can have serious consequences, such as self-removal of important intraluminal tubes and vascular catheters, aggressive behaviour by patients toward care providers, and poor patient–ventilator synchrony. 7 Sedation can result in a longer duration of mechanical ventilation, longer ICU and hospital stays, an increased incidence of ventilator-associated pneumonia, and a patient's inability to communicate with health care providers or family members [8].

Propofol (2, 6, di-isopropylphenol) is a rapidly metabolised intravenous anaesthetic agent with no cumulative effect. The drug's rapid metabolism and lack of cumulation would make it suitable for continuous infusion in the ICU. However, it has been linked to dose-dependent respiratory depression, hypotension, and hyperlipidaemia. 10 It lacks analgesic properties, and long-term use of high-dose propofol has been linked to prolonged infusion syndrome [11].

Newer drugs, which have advantages over traditional drugs, are now used for sedation in critically ill patients. Dexmedetomidine is a 2a adrenoreceptor agonist with a distinct mechanism of action, providing sedation and anxiolysis through receptors in the locus ceruleus, a small nucleus present in the pons, analgesia through receptors in the spinal cord, and stress attenuation with no significant respiratory depression. In addition to sedation, dexmedetomidine has analgesic properties, does not cause respiratory depression, has a sympatholytic effect on the stress response, preserves neutrophil function (in contrast to the neutrophil-suppressing effect of GABA agonist medications), and may induce a more natural sleep-like state [9].

Because dexmedetomidine is a new drug, there have been fewer studies in India so far. The use of dexmedetomidine as a sedative, particularly in the surgical intensive care unit, has not been studied. As a result, the current randomised prospective study was conducted to compare the sedative and analgesic properties, safety profile, cardiovascular responses, ventilation, and extubation characteristics of dexmedetomidine to propofol in order to provide alternative or better sedation in post-operative mechanically ventilated patients.

Aim and Objectives

The comparative study of dexmedetomidine and propofol for sedation in postoperative mechanically ventilated patients has following objectives.

To evaluate

- Onset, duration and level of sedation
- Hemodynamic parameters (HR, BP, SPO2)
- Requirement of add on Fentanyl analgesia in post-operative patients
- Complications

Materials and Methods

A randomized prospective stud entitled comparison between dexmedetomidine and propofol for short-term sedation of postoperative mechanically ventilated patients was undertaken in the Intensive Care Unit of Apollo Hospital.

Subjects included 100 patients over the age of 18 who already had major abdominal or pelvic surgeries that required at least 6 hours of artificial ventilation and were admitted to the Intensive care units of the aforementioned hospitals. Before beginning the study, permission was obtained from the Institutional Ethical Review Committee. An informed bilingual written consent was obtained from the patient if they were conscious and cooperative, or from the patients' immediate Kith and Kin. The following were the inclusion and exclusion criteria:

Inclusion Criteria

- Patients aged 18 years and above
- Post-operative mechanically ventilated patients who require atleast 6hrs artificial ventilation after major abdominal or pelvic surgery.

Exclusion Criteria

- Neurological procedures
- Known allergy to propofol or dexmedetomidine
- Known or suspected pregnancy

About 60 patients who satisfied the inclusion and exclusion criteria were allocated randomly in to two groups by using random numbers table.

Group D - Dexmedetomidine group received a loading dose- 2.5µg/kg and a maintenance dose- 0.5µg/kg/hr.

Group P - Propofol group received a loading dose- 1mg/kg and a maintenance dose- 0.5mg/kg/hr.

Anaesthetic technique prior to entry into the ICU was carried out with 5 mg /kg thiopental sodium, 3-4 µg/kg fentanyl and vecuronium 0.05 mg/kg. Direct laryngoscopy and endotracheal intubation was done with appropriate endotracheal tubes, maintenance of anaesthesia was provided with 33%O2+66%N2O+intermittent halothane + intermittent positive pressure ventilation. Neuromuscular blockade was provided by vecuronium as required. At the end of the surgical procedure, neuromuscular blockade was not reversed and artificial ventilation was continued.

After admission to Intensive care units, patients were randomized into either of one group, an IV line was secured and patients were connected to multipara meter which records heart rate, non-invasive measurements of SBP, DBP, MAP, and continuous ECG monitoring and oxygen saturation. Patients were immediately artificially ventilated with synchronized intermittent artificial ventilation (SIMV). With pressure support mode. Sedatives used before study enrollment was discontinued prior to the initiation of the study drug. Each patient received study drug after randomization. Optional loading doses (up to 2.5µg/kg dexmedetomidine or 1mg/kg propofol) was administered at the investigator’s discretion. The starting maintenance infusion dose of study drug was 0.5µg/kg/hr for dexmedetomidine and 0.5mg/kg/hr for propofol corresponding to the midpoint of the allowable infusion dose range. Dosing of study dose was adjusted by managing clinical team based on sedation assessment performed with the Ramsay Sedation Score (RSS), a minimum of every 1 hour for first 6 hours, thereafter every 2 hours. Analgesia with fentanyl bolus doses (0.5-1µg/kg) was administered as needed every 15 minutes. No other sedatives or analgesics or muscle relaxants were allowed during the study period. Study drug infusion was stopped at the time of extubation in both the groups or after a maximum of 24hours.

The following parameters were assessed

1. Onset of sedation in both groups
2. Level of sedation was assessed by Ramsay sedation score initially every 1hr for 6hours, there after every 2 hours till extubation or up to 24 hours
3. Hemodynamic parameters (HR, BP, SPO2)
4. Pain assessment using visual analog score
5. Total fentanyl requirement and duration of ICU stay.

Results

A randomized prospective study was conducted in order to evaluate the efficacy and safety of Dexmedetomidine in comparison to propofol in the management of sedation for post- operative patients in surgical ICUs. A total of 100 post-operative patients were divided randomly into two groups of 50 each. Group D received Dexmedetomidine and Group P received Propofol infusion. The results obtained were as follows.

Table 1: Age Distribution

Age (Yrs)	Dexmed	Propofol
Mean Age ± SD	39.4 ± 13.3	39.6 ±12.8

Table 1 shows age distribution of study groups. The mean age of patients of the Dexmedetomidine group was 38.2±13.3 years and that of the Propofol group was 39.6 ± 12.8 years. There was no statistically significant difference in the age of patients between Dexmedetomidine and Propofol groups. Both groups were similar with respect to age distribution (p=0.82).

Table 2: Sex wise Distribution

Sex	Dexmed		Propofol	
	No.	%	No.	%
Male	28	56.0	26	52
Female	22	44.0	24	48
Total	50	100	50	100.0

About 56% of patients in Dexmedetomidine group and 52% of patients in Propofol group were males. There was no statistically significant difference in the gender between Dexmedetomidine and Propofol groups (p=0.80).

Table 3: Shows the mean weights of patients of both groups

	Dexmed		Propofol	
	Mean	SD	Mean	SD
Weight (Kg)	59.6	10.94	65.4	9.8

Table 3 shows the mean weights of patients of both groups. The mean weight of patients of Dexmedetomidine group was 59.6±10.94 kg and that of Propofol group was 65.4±9.8 kg. There was no statistically significant difference in the body weight between Dexmedetomidine group and Propofol group (p=0.06).

Table 4: Sedation Score comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	2.6	1.0	2.4	0.7	-0.3	1.61	0.10
1 Hr	3.5	0.7	3.7	0.5	0.3	-1.15	0.26
2 Hrs	3.9	0.6	4.6	0.8	00.2	-1.50	0.12
3 Hrs	4.2	0.6	4.4	0.5	0.1	-0.53	0.60
4 Hrs	4.1	0.7	4.4	0.8	0.2	-4.11	0.21
5 Hrs	4.3	0.6	4.0	0.5	-0.1	-2.81	0.11
6 Hrs	4.2	0.5	3.5	0.8	-0.3	1.51	0.13
8 Hrs	3.8	0.8	3.6	0.9	-0.2	0.91	0.36
10 Hrs	3.6	0.7	3.4	1.2	-0.4	0.47	0.63
12 Hrs	3.4	0.8	3.7	0.8	0.3	-1.22	0.23
14 Hrs	3.0	0.9	3.1	1.0	0.1	-0.23	0.72
16 Hrs	2.4	0.8	3.0	0.7	0.3	-0.90	0.37
18 Hrs	2.3	0.6	2.6	0.8	0.6	-1.07	0.28

Table 4 shows the mean Ramsay sedation scores in both groups at different intervals. The mean Ramsay sedation score ranged from 2.4 to 3.5 in Group D and 2.6 to 3.7 in Group P. The sedation scores were not statistically significant between Group D and Group P.

Table 5: Heart Rate comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	96.6	11.7	93.5	13.3	4.3	1.21	0.12, NS
1 Hr	81.7	11.1	93.1	14.2	-12.1	-3.74	0.00 **
2 Hrs	78.1	11.2	93.5	14.4	-14.5	-4.30	0.00 **
3 Hrs	78.7	11.0	94.0	14.2	-15.1	-4.60	0.00 **
4 Hrs	78.6	10.4	93.6	14.6	-14.3	-4.19	0.00 **
5 Hrs	78.8	11.0	94.4	13.7	-15.5	-4.84	0.00 **
6 Hrs	78.9	10.5	93.2	14.1	-14.2	-4.21	0.00 **
8 Hrs	79.4	10.7	93.6	13.5	-15.3	-4.62	0.00 **
10 Hrs	78.4	11.3	93.3	13.3	-14.3	-4.34	0.00 **
12 Hrs	76.8	10.6	93.4	13.8	-15.4	-4.57	0.00 **
14 Hrs	79.6	10.6	93.7	14.4	-15.4	-4.64	0.00 **
16 Hrs	80.3	13.2	88.3	13.3	-8.3	-2.36	0.02 *
18 Hrs	85.2	13.3	91.1	12.7	-4.4	-1.36	0.14, NS

The basal heart rate were comparable in both the groups. Statistical evaluation between the groups showed a significant fall in heart rate in Group D after drug administration and the fall in heart rate was maintained throughout the study period. A fall of 17 beats per min was observed immediately after administration of Dexmedetomidine. The mean heart rate ranged between 76–96 bpm in Group D and 88 – 93 bpm in Group P. There was statistically highly significant fall in heart rate in Group D compared to Group P (p=0.00).

Table 6: SBP comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	117.0	10.6	119.2	9.3	1.5	-0.76	0.44
1 Hr	113.2	11.3	116.3	8.4	-0.7	0.36	0.73
2 Hrs	113.8	10.5	115.9	8.6	-1.2	0.69	0.67
3 Hrs	113.8	9.8	115.2	8.6	-1.3	0.56	0.58
4 Hrs	114.3	10.5	112.0	9.3	-3.0	1.17	0.22
5 Hrs	113.6	10.3	111.3	10.5	-1.5	0.75	0.46
6 Hrs	113.4	10.6	110.9	8.7	-3.0	1.23	0.27
8 Hrs	113.8	10.7	111.2	7.8	-2.4	1.05	0.37
10 Hrs	114.6	11.0	111.5	9.0	-2.3	0.95	0.35
12 Hrs	112.4	13.0	113.6	7.8	0.3	-0.06	0.99
14 Hrs	115.3	11.9	115.3	8.7	-1.2	0.34	0.72
16 Hrs	116.5	13.5	114.8	4.8	-1.7	0.43	0.65
18 Hrs	115.4	13.4	114.2	5.2	-3.2	0.68	0.39

The mean SBP were ranged from 112.0 to 117.7 mmHg in Group D, while that in Group P were ranged from 110.0 to 119.2 mmHg. There was no statistically significant difference in SBP between Group D and Group P.

Table 7: DBP comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	72.6	7.2	69.4	6.5	2.4	1.41	0.13
1 Hr	70.8	6.5	68.6	5.7	2.8	2.87	0.12
2 Hrs	68.9	6.7	66.5	6.1	2.9	1.74	0.07
3 Hrs	68.5	6.9	66.2	6.0	2.3	2.87	0.121
4 Hrs	69.4	7.9	66.0	7.0	3.4	2.61	0.08
5 Hrs	69.5	6.6	67.3	7.4	2.6	1.43	0.8
6 Hrs	71.5	6.8	67.7	6.0	3.6	2.11	0.03
8 Hrs	69.8	7.4	67.7	6.6	2.1	1.28	0.22
10 Hrs	69.3	7.9	66.8	6.0	2.9	1.38	0.11
12 Hrs	69.6	7.2	69.6	5.2	0.3	0.15	0.82
14 Hrs	71.7	8.2	68.5	6.1	3.3	1.78	0.13
16 Hrs	71.3	11.3	68.0	5.5	3.7	1.49	0.25
18 Hrs	70.7	11.7	71.2	6.1	-1.5	-0.28	0.6

The mean basal DBP were comparable in both groups (P=0.16). The mean DBP were ranged from 68.5 to 72.6 mmHg in Group D and that in Group P were ranged from 66.0 to 71.2 mmHg. There was no statistically significant difference in DBP among the two groups.

Table 8: MAP comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	85.3	7.9	85.6	6.7	1.2	0.70	0.48
1 Hr	84.2	6.6	82.3	5.8	2.3	2.03	0.24
2 Hrs	83.6	7.3	81.4	6.8	2.4	1.31	0.19
3 Hrs	82.4	6.5	81.3	6.5	2.6	2.02	0.08
4 Hrs	83.6	7.2	81.4	7.4	2.5	2.02	0.10
5 Hrs	84.1	6.9	81.8	8.0	2.3	1.19	0.23
6 Hrs	84.2	7.1	81.3	6.1	3.1	1.80	0.08
8 Hrs	84.2	8.1	82.5	6.4	2.2	1.17	0.23
10 Hrs	84.2	6.1	82.5	5.9	2.2	2.46	0.200
12 Hrs	85.1	6.3	84.2	5.1	0.9	0.56	0.58
14 Hrs	87.3	8.6	83.8	5.6	2.6	1.24	0.22
16 Hrs	87.2	8.7	83.1	4.5	4.3	1.6	0.06
18 Hrs	87.4	8.4	84.2	4.3	3.2	1.01	0.31

Table shows the MAP of both the groups. The basal MAP in group D was comparable to Group P (p=0.48). The mean MAP during study period were ranged from 82.4 to 87.4 mmHg in Group D whereas the mean MAP in Group P were ranged from 81.3 to 85.6 mmHg. There was no statistically significant differences in MAP among the two groups.

Table 9: SPO2 comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	97.3	0.7	98.8	1.1	0.0	0.00	1.00
1 Hr	98.7	1.1	97.1	0.8	0.3	1.43	0.17
2 Hrs	98.8	0.7	97.3	0.9	0.8	3.38	0.001 *
3 Hrs	99.9	0.9	98.3	1.0	0.2	0.84	0.42
4 Hrs	99.2	0.4	98.7	0.7	0.4	1.84	0.07
5 Hrs	98.8	1.2	98.2	0.6	-0.4	-4.44	0.001 *
6 Hrs	98.6	1.0	99.1	0.9	-0.6	-3.3	0.001 *
8 Hrs	97.3	1.0	99.7	0.8	-0.2	-2.01	0.008 *
10 Hrs	97.6	1.0	98.6	0.9	-0.1	-0.35	0.71
12 Hrs	98.9	0.9	98.7	1.1	-0.3	-0.74	0.31
14 Hrs	98.1	1.2	99.2	0.9	-0.3	-0.64	0.35
16 Hrs	98.8	0.9	98.1	0.6	0.3	0.67	0.36
18 Hrs	97.3	0.7	98.4	0.8	-0.6	-2.09	0.05

Table shows the oxygen saturation of both the study groups. The oxygen saturation level was ranged from 97.3 to 99.9% in Group D and that in Group P was ranged from 97.1 to 99.1%. There was no statistically significant difference in oxygen saturation between Group D and Group P.

Table 10: VAS score comparison

Time Interval	Dexmed		Propofol		Mean diff.	t value	P value
	Mean	SD	Mean	SD			
0 Hr	5.7	1.2	6.4	2.1	0.7	-2.53	0.060
1 Hr	3.1	1.2	3.9	1.0	0.8	-2.84	0.060
2 Hrs	2.3	0.7	3.2	1.2	0.7	-2.66	0.140
3 Hrs	2.8	0.8	2.9	0.6	-0.2	1.33	0.18
4 Hrs	2.8	0.6	2.7	7.8	-0.2	-1.26	0.30
5 Hrs	2.8	0.4	2.8	0.6	0.0	0.00	1.00
6 Hrs	2.4	0.7	2.8	0.4	-0.2	1.13	0.24
8 Hrs	2.6	0.4	2.3	0.4	0.1	0.001	1.00
10 Hrs	2.7	0.7	2.8	0.5	0.2	0.001	1.00
12 Hrs	2.4	0.6	2.9	0.5	0.2	-1.65	0.10
14 Hrs	2.3	0.5	2.5	0.5	0.2	-1.15	0.23
16 Hrs	2.8	0.8	2.9	0.0	-0.2	1.64	0.10
18 Hrs	2.8	0.7	2.7	0.6	-0.3	0.53	0.23

Table and graph shows the visual analog scores of study groups. The mean VAS in Group D were ranged from 2.3 to 3.1 after the infusion of Dexmedetomidine while that of mean VAS in Group P were ranged from 2.3 to 3.9 after the infusion of Propofol. There was no statistically significant difference in VAS between Group D and Group P.

The mean dose of Fentanyl requirement to achieve adequate analgesia was 31.0 ± 9.5µg in Group D and that of mean Fentanyl requirement in Group P was 66.3 ± 10.1µg. Statistical evaluation between the groups showed a statistically highly significant reduction in the dose of Fentanyl requirement in Group D compared to group P(p=0.001).

The mean ICU stay in Group D was 2.4 days and that of Group P was 2.6 days. There was no statistically significant difference in ICU stay between Group D and Group P. (p=0.22).

Discussion

The consequences of inadequate sedation and analgesia can be substantial, including self-removal of important intraluminal tubes and vascular catheters, aggressive behaviour by patients against care providers, and poor patient–ventilator synchrony [7]. Over sedation can lead to prolonged duration of mechanical ventilation, longer ICU and Hospital stays, increased incidence of ventilator associated pneumonia and inability of patients to communicate with health care providers or family members [8].

The currently available sedatives includes Propofol and benzodiazepines like Midazolam, both will provide adequate sedation but they also produce many adverse effects. Benzodiazepines are anxiolytic and amnestic agents, but they can also cause paradoxical agitation in the elderly.

Propofol (2, 6, di-isopropylphenol) is a short acting and rapidly metabolized intravenous anaesthetic agent with no cumulative effect. The rapid metabolism of the drug and virtual lack of cumulation would make it suitable for continuous infusion in the ICU. But it can cause dose dependent respiratory depression, hypotension and hyperlipidaemia [10]. It lacks analgesic properties and high dose and prolonged use of Propofol have been found to results in prolonged infusion syndrome [11].

Many newer sedatives are available in the market. Dexmedetomidine is one such newer sedative which is a α2a adrenoreceptor agonist with a unique mechanism of action, providing sedation and anxiolysis via receptors within the locus ceruleus, a small nucleus present in the pons, analgesia via receptors in the spinal cord and attenuation of the stress response with no significant respiratory depression. In addition to sedation, dexmedetomidine provides analgesic effects, a lack of respiratory depression, sympatholytic blunting of the stress response, preservation of neutrophil function and may establish a more natural sleep-like state [9].

Dexmedetomidine is recently introduced in India (only in 2009) and available as 50 µg/0.5ml,100 µg/ml, 200 µg/2ml ampoule (Dexem, Themis Medicare Limited) and not many studies have been done using dexmedetomidine as a sedative in post-operative surgical ICUs.

Hence the study was undertaken to evaluate the efficacy, hemodynamic variables and safety profile of Dexmedetomidine as short term sedative in comparison with most commonly used sedative Propofol in post-operative mechanically ventilated patients.

Demographic criteria

The mean age of the subjects in this study was 39.4 ± 13.9 years in Dexmedetomidine group and 39.6 ± 12.8 years in Propofol group. About 56% in Group D and 52% in Group P were males. The mean weight of patients were 59.6 Kgs and 65.4 Kgs in Group D and Group P, respectively. There

was no statistically significant difference with regards to mean age, weight and sex. Hence the two groups were comparable.

Sedation Score

The level of sedation was assessed by Ramsay sedation score. The mean Ramsay sedation score ranged from 2.4 to 3.5 in Group D and 2.6 to 3.7 in Group P. There was no significant difference in Ramsay sedation score between Group D and Group P during the study period. In a similar study by Samia Elbaradie *et al.*, [2] dexmedetomidine produced equivalent sedation as propofol and the patients who were received Dexmedetomidine, despite artificial ventilation and intubation, were easily aroused to co-operate without showing irritation.

Prerana N Shah *et al.*, [12] in his study found that patients who received Dexmedetomidine infusion achieved similar level of sedation as patients who received Propofol infusion.

Hemodynamic Parameters

In the present study, there was a significant bradycardia in Dexmedetomidine group compared to Propofol group. There was fall of 15 bpm after dexmedetomidine infusion and the fall in heart rate was sustained throughout the study period and did not required any treatment. In a similar study by Hussein M Agameya *et al.*, [13] heart rate showed significant reduction in dexmedetomidine group than in propofol group (p= 0.026).

In a study by Samia Elbaradie *et al.*, [2] also noted Patients who received dexmedetomidine infusion had significantly lower heart rates compared to patients who received Propofol infusion, (p=0.041), but did not need any intervention. In one more study by Anger K E *et al.*, [14] noted there was no significant difference in the incidence of sinus bradycardia between Dexmedetomidine and Propofol group.

The mean systolic blood pressure in Propofol group were decreased about 6 mm Hg from baseline value whereas the fall in Dexmedetomidine group were 5 mmHg from baseline value, immediately after transfusion of study drugs, which was non-significant. The mean diastolic blood pressure were decreased by 4 mmHg and 3mmHg in Dexmedetomidine and Propofol groups, respectively and it was not significant.

The mean arterial pressure were reduced by 3mmHg and 4mmHg in Dexmedetomidine and Propofol groups, respectively. The fall in MAP in patients received Propofol did not need any intervention and it was not significant. In a similar study by Samia Elbaradie *et al.*, [2] noted there was no significant difference in MAP between Dexmedetomidine and Propofol group. No patients in the 2 groups required inotropic support.

In a study by Hussein M Agameya *et al.*, [14] also noted there was no significant difference in MAP in both Dexmedetomidine and Propofol groups. In one more study by Anger K E *et al.*, [15] noted Dexmedetomidine therapy resulted in a higher incidence of hypotension and analgesic consumption compared with propofol- based sedation therapy. In a study by Ahmed El Shaer *et al.*, [16] noted there was no significant difference in hemodynamic variables in both Dexmedetomidine and Propofol group.

The mean oxygen saturation levels were within the optimal range in both groups during the study period of 24 hours. In a similar study by R.M. Venn and R.M. Grounds [17] noted that there was no significant difference between oxygen saturation and arterial blood gases in both Dexmedetomidine and Propofol groups. In a study by Venn RM, Hell J *et al.*, [18] noted there were no differences in respiratory rates, oxygen saturations, arterial pH and arterial partial carbon dioxide tension (PaCO2) between the groups. Interestingly the arterial partial oxygen tension (PaO2): fractional inspired oxygen (FIO2) ratios were statistically significantly higher in the dexmedetomidine group. In a study by Herr *et al.*, [19] noted the blood gases were similar in both the groups.

Analgesia

In the present study, visual analog scores were within the optimal range. VAS of 2-3 was achieved in both groups using Fentanyl analgesia. The total Fentanyl requirement was significant in Propofol group when compared with Dexmedetomidine group (p<0.00). In a similar study by Prerana N Shah *et al.*, [12] noted patients who received propofol infusions required significantly more analgesics than patients who received Dexmedetomidine infusions.

In a study by Herr D L *et al.*, [19] noted requirement of morphine was significantly more in Propofol group compared to Dexmedetomidine group. In one more study by Hussein M Agameya *et al.*, [13] noted propofol group required almost three times analgesic doses than for dexmedetomidine group, which could be attributed to the central analgesic properties of dexmedetomidine.

ICU Stay

In the present study, there was no significant difference in length of ICU stay in both groups. In a similar study by R.M. Venn and R.M. Grounds [17] noted the recovery time and length of ICU stay were similar in both Dexmedetomidine and Propofol groups.

Conclusion

The study aimed to compare the efficacy and safety of Dexmedetomidine to Propofol as a short-term sedative in post-operative mechanically ventilated patients in surgical intensive care units. Dexmedetomidine is a new alpha 2 agonist that is as effective as Propofol while also having a similar safety profile. Patients in the Dexmedetomidine group were easily aroused to cooperate without displaying signs of irritation, and they required less Fentanyl analgesia.

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Conflict of Interest

None

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