Original Article

Sedation Effects by Dexmedetomidine versus Propofol in Decreasing Duration of Mechanical Ventilation after Open Heart Surgery

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Abstract

Objective: The objective of this study was to compare the suitability (efficacy and safety) of dexmedetomidine versus propofol for patients admitted to the intensive care unit (ICU) after the cardiovascular surgery for the postoperative sedation before weaning from mechanical ventilation. **Background:** Sedation is prescribed in patients admitted to the ICU after cardiovascular surgery to reduce the patient discomfort, ventilator asynchrony, to make mechanical ventilation tolerable, prevent accidental device removal, and to reduce metabolic demands during respiratory and hemodynamic instability. Careful drug selection for sedation by the ICU team, postcardiovascular surgery should be done so that patients can be easily weaned from mechanical ventilation after sedation is stopped to achieve a shorter duration of mechanical ventilation and decreased the length of stay in ICU. **Methods:** A total of 50 patients admitted to the ICU after cardiovascular surgery, aged from 18 to 55 years and requiring mechanical ventilation on arrival to the ICU were enrolled in a prospective and comparative study. They were randomly divided into two groups as follows: Group D patients (n = 25) received dexmedetomidine in a maintenance infusion dose of 0.8 μg/kg/h and Group P patients (n = 25) received propofol in a maintenance infusion dose of 1.5 mg/kg/h. The patients were assessed for 12 h postoperatively, and dosing of the study drug was adjusted based on sedation assessment performed with the Richmond Agitation-Sedation Scale **(**RASS**)**. The patients were required to be within the RASS target range of −2 to +1 at the time of study drug initiation. At every 4 h, the following information was recorded from each patient such as heart rate (HR), mean arterial pressure (MAP), arterial blood gases (ABG), tidal volume (TV), exhaled TV, maximum inspiratory pressure, respiratory rate and the rapid shallow breathing index, duration of mechanical ventilation, midazolam and fentanyl dose requirements, and financial costs. **Results:** The study results showed no statistically significant difference between both groups with regard to age and body mass index. Group P patients were more associated with lower MAP and HR than Group D patients. There was no statistically significant difference between groups with regard to ABG findings, oxygenation, ventilation, and respiratory parameters. There was significant difference between both the groups in midazolam and fentanyl dose requirement and financial costs with a value of $P < 0.05$. **Conclusion:** Dexmedetomidine is safer and equally effective agent for the sedation of mechanically ventilated patients admitted to the ICU after cardiovascular surgery compared to the patients receiving propofol, with good hemodynamic stability, and equally rapid extubation time.

Keywords: *Dexmedetomidine, open heart, propofol*

Introduction

The patients undergoing coronary artery bypass graft (CABG) surgery and/or aortic/mitral valve surgery are often fasttracked to extubation within 1–6 h because they are generally able to resume ventilation spontaneously immediately after recovery from anesthesia. Unfortunately, long-term sedation and analgesia for approximately 2.6%–22.7% of them is needed because they required prolonged mechanical ventilation.[1,2] Weaning from mechanical ventilation after cardiovascular surgery is still one of the most complex tasks in everyday work of cardiothoracic anesthetist. New drugs for varied sedation strategies are desirable to improve the outcomes of this specific group of patients. Commonly, sedation after cardiovascular surgery is used in the intensive care unit (ICU) to improve tolerance of mechanical ventilation, reduce metabolic demands during respiratory, and hemodynamic instability.[3,4] Nowadays, newer drugs available for sedation may play an important role in decreasing the duration of mechanical ventilation, length of ICU stay, and cost-effectiveness.[3,5]

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Propofol, is a preferred sedative in ICU after cardiovascular surgery because it offers advantages over benzodiazepines regarding the lack of accumulation, quick onset, easy adjustment, and fast recovery after discontinuation. It has sedative and hypnotic effects mediated through the GABA receptor but has no analgesic action. Adverse effects associated with propofol included pain on injection, hypotension, bradycardia, respiratory depression, and hypertriglyceridemia. Propofol infusion syndrome is a rare but life-threatening adverse effect and remains a concern.[6]

Dexmedetomidine (precedex); a novel sedative analgesic used after cardiovascular surgery does not cause respiratory depression. Its selective α2 action may provide more hemodynamic stability.[5,6] At low doses, the dominant effect of α2-adrenoreceptor agonist activation is a reduction in sympathetic tone. The net effect of dexmedetomidine action is a significant reduction in circulating catecholamines with a slight decrease in blood pressure (BP) and a modest reduction in heart rate (HR).[7] When dexmedetomidine is administered as a continuous infusion, it is associated with predictable and stable hemodynamic changes and its lack of respiratory depression are desirable for the management of mechanically ventilated patients after cardiovascular surgery.

The aims of this study are to compare the suitability (efficacy and safety) of dexmedetomidine versus propofol for patients admitted to the ICU after cardiovascular surgery before weaning from mechanical ventilation and their effects on the duration of mechanical ventilation. Secondary endpoints included the length of stay (LOS) in ICU, requirement of a second sedative agent, and cost-effectiveness.

Methods

This was a Prospective, Randomized, Comparative study. It was conducted on patients admitted to the ICU after the cardiovascular surgery in the period between April 2016 and May 2017. Fifty mechanically ventilated patients after cardiovascular surgery aged above 18 years were included in the study. Informed written consent was obtained from their relatives. Patients meeting the inclusion criteria with the need for the mechanical ventilation on arrival to the ICU received either dexmedetomidine or propofol as initial choice of the sedative agent after surgery.

Anesthesia and cardiopulmonary bypass procedure

After connection of the standard five monitoring tools (pulse oximetry, electrocardiogram noninvasive BP, End-tidal CO_2, and temperature probe which was inserted nasopharyngeal after the induction of general anesthesia), all patients were preoxygenated for 3 min at an adjusted fraction of inspired oxygen (FiO_2) of 1.0.

All patients were given general anesthesia which was induced with midazolam (2–3 mg), fentanyl (0.2 mg), propofol (0.5–1.5 mg/kg), and rocuronium bromide (0.6–0.9 mg/kg), and was maintained with inhaled isoflurane and continuous infusion of propofol (1–2 mg/kg/h), arterial line (22-gauge plastic cannula) was inserted for invasive BP monitoring in the left radial artery or in the nondominant hand.

Central line insertion and central venous pressure monitoring was done routinely. A total of 0.1–0.2 mg fentanyl was intravenously administered before the skin incision, sternotomy, aortic cannulation, and initiation of cardiopulmonary bypass.

Operative technique

All operations were performed through standard median sternotomy and cardiopulmonary bypass (CPB) was instituted with a single two-stage right atrial cannulation or double vena cava cannulation for venous drainage and an ascending aorta cannulation for arterial perfusion and aortic root cannulation and/or coronary sinus cannulation for delivering cold crystalloid cardioplegic solutions. CABG surgeries were performed using left internal thoracic artery for grafting left anterior descending artery and saphenous vein grafts for other arteries if indicated and valve replacement surgeries were performed using mechanical valves either in Mitral or Aortic position.

Intensive Care Unit management and starting the study drugs

At the end of the operation, patients were admitted directly to the cardiothoracic ICU. The patients were mechanically ventilated, assessed for 12 h in the postoperative period. Patients were ventilated by the volume-assist control mode with a tidal volume (TV) of 8–10 mL/kg of predicted body weight. The FIO_2 and respiratory rate (RR) adjustments were made according to routine blood-gas analyses to maintain the partial pressure of arterial oxygen (PaO2) between 80 and 100 mm Hg and partial pressure of arterial carbon between 35 and 40 mm Hg.

Patients were divided into two groups as follows: Group (D): 25 patients were given dexmedetomidine. Group (P): 25 patients were given propofol. Exclusion criteria included as follows: acute severe neurological disorder, mean arterial pressure (MAP) <55 mm Hg despite appropriate intravenous volume replacement and vasopressors, HR <50/min, atrioventricular-conduction block Grade II or III (unless pacemaker installed), patients using alpha-2 agonists or antagonists within 24 h before randomization, patients were excluded if they received both dexmedetomidine and propofol concomitantly for the primary sedation or an alternative agent as the primary sedation, had a prior solid organ transplant, or were pregnant or lactating.

At the time of enrollment, the following information were recorded from each patient:

1. HR, MAP
2. Arterial blood gases (ABG) findings, TV, exhaled TV (VTE), maximum inspiratory pressure (MIP), RR,

and the rapid shallow breathing index (f/TV) were calculated
3. Duration of mechanical ventilation and LOS in ICU
4. Midazolam and fentanyl dose requirements in both the groups
5. Financial Costs in both the groups.

Starting the study drugs

The starting maintenance infusion dose of the study drug was 0.8 μg/kg/h for dexmedetomidine and 1.5 mg/kg/h for propofol, corresponding to the midpoint of the allowable infusion dose range. Dosing of study drug was adjusted by the managing clinical team based on sedation assessment performed with the Richmond Agitation-Sedation Scale **(**RASS**)**, at a minimum of every 4 h interval.

Patients in either group not adequately sedated by the study drug titration received open-label midazolam bolus doses of 0.01–0.05 mg/kg at 10- to 15-minute intervals until adequate sedation (RASS range, −2–1) achieved with a maximum dose of 4 mg in 8 h. If oversedation (RASS range, −3–5) did not respond to decreasing the study drug infusion rate, the infusion was stopped until the patients return to the acceptable sedation range.

Analgesia with fentanyl bolus doses (0.5–1.0 μg/kg) was administered as needed every 15 min. Intravenous bolus doses of fentanyl were also be given before an anticipated noxious stimulation such as chest physiotherapy or suctioning as per requirement.

Intravenous haloperidol was permitted for the treatment of agitation or delirium in increments of 1–5 mg, repeated every 10–20 min as needed.

The study drug infusion was stopped at the time of extubation in both groups. The decision to extubate a patient was left to the independent discretion of the consulting anesthetist, usually after a trial of spontaneous breathing, or a trial under low-level pressure support. However, before extubation, the patient had to be neurologically alert and oriented, able to move equally all four limbs, breathe spontaneously, and obey commands.

Statistical analysis

The collected data were organized, tabulated, and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 13, SPSS Inc. Chicago, IL, USA). For qualitative data, the comparison between two groups and more was done using the Chi-squared test, paired *t*-test, and the mean and standard deviation. Statistical significance was adopted at $P < 0.05$ for the interpretation of results of tests of significance.

Results

A total of 65 mechanically ventilated patients at the ICU after the cardiovascular surgery were enrolled in the study. Of these 65 patients, 15 were excluded from the study. The remaining 50 eligible were randomized, allocated, and divided into two groups as follows: Group D: 25 patients were given dexmedetomidine and Group P: 25 patients were given propofol [Figure 1].

The mean age of patients in Groups D and P was 53.7 ± 6.1 and 52.5 ± 7.4, respectively with no statistical significant difference between both groups with a value of $P = 0.66$ [Table 1].

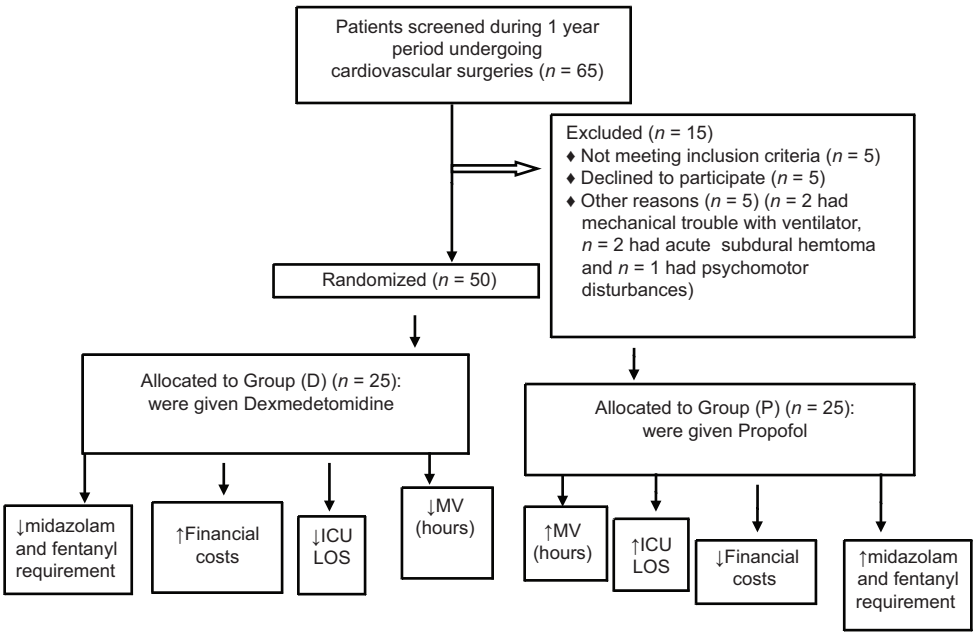

Figure 1: Flow diagram of participant progress through the phases of a randomized trial. A total of 65 patients were enrolled in the study. Of these 65 patients, 15 were excluded from the study. The remaining 50 eligible and were randomized, allocated to groups (*n* = 25) and analyzed (*n* = 25)

Regarding gender distribution in both groups, Group D consisted of 12 males and 13 females while Group P consisted of 11 males and 14 females with no statistical significant difference between both groups with a value of $P = 0.19$ [Table 1].

There was no statistical significant difference between both groups regarding mean body mass index (BMI) (23.84 ± 2.85 in Group D and 23.14 ± 2.35 in Group P with a value of $P = 0.43$) [Table 1]. For the type of cardiovascular surgery and the duration of CPB performed (107 ± 49 min and 119 ± 62 min in Groups D and P), no significant difference was seen between the two groups. Up to 30% of patients had undergone coronary artery bypass surgeries, while the remaining patients underwent either the aortic valve or mitral valve replacement surgery or a combination of both.

Regarding MAP, there was a statistical significant difference between both groups of the study at 4, 8, and 12 h after admission to the ICU after cardiac surgery and 1 h after weaning from the mechanical ventilation with MAP being higher in Group D than in Group P. [Table 2], while regarding HR, there was a statistical significant difference between both groups of the study at 4, 8, and 12 h after admission to the ICU after cardiac surgery and 1 h after weaning from the mechanical ventilation with HR being lower in Group D than in Group P [Table 3].

Regarding ABG findings (pH, $PaCO_2$, and HCO_3), there was no statistical significant difference between both groups at all-time interval of the study with a value of $P > 0.05$ [Table 4].

Comparison between the studied groups was done with numerical indices used to predict the successful weaning

Table 1: Demographic data and patient characteristics

Parameter	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Age (years)	53.7±6.1	52.5±7.4	−0.43	0.66
Weight (kg)	73.05±3.74	76.1±7.11	1.69	0.66
Height (cm)	172.05±7.63	174.15±6.57	0.9327	0.3569
BMI (kg/m^2)	23.84±2.85	23.14±2.35a	−0.7984	0.43
Duration of the CPB (min)	107±49	119±62	3.9	0.17
Type of the operation CABG /MVR/AVR	2-14/9	2-15/8	2.8	0.17
Aortic cross clamp time (min)	80±39	99±52	2.5	0.16
MV (h)	8.25±2.6	7.75±2.6	−1.176	0.232
ICU length of stay (h)	8.65±0.88	9.1±1.22	−1.338	0.09
Parameter	***n* (%)**	***n* (%)**	***t***	***P***
Gender				
Male	12 (50)	11 (30)	1.66	0.19
female	13 (50)	14 (70)		

SD: Standard deviation, BMI: Body mass index, CPB: Cardiopulmonary bypass, CABG: Coronary artery bypass graft, MV: Mechanical ventilation, and ICU: Intensive Care Unit, MVR: Mitral valve replacement, AVR: Aortic valve replacement

Table 2: Mean arterial pressure measurements at different times between groups

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Baseline	101.5±13.23	100±9.23	−0.416	0.68
4 h	98.2±0.27	93.9±8.29	−2.318	0.02*
8 h	94.9±8.81	86.95±10.29	−2.625	0.01*
12 h	90.45±11.75	80.15±16.12	−2.309	0.02*
1 h after weaning from ICU ventilation	98.8±10.1	92.9±6.9	−2.141	0.03*

*P<0.05 is significant. SD: Standard deviation, ICU: Intensive Care Unit

Table 3: Heart rate measurements at different times between groups

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Base	102.6±15.87	109.8±14.16	1.513	0.138
4 h	89.45±11.24	97.45±9.41	2.442	0.019*
8 h	82.5±10.7	93.8±13.71	2.208	0.03*
12 h	82.05±11.22	91.8±15.22	3.962	0.001*
1 h after weaning from ICU ventilation	97.87±12.6	106.49±11.8	2.237	0.032*

*P<0.05 is significant. SD: Standard deviation, ICU: Intensive Care Unit

Table 4: Arterial blood gases findings at different times between groups

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Base				
pH	7.42±0.18	7.4±0.11	−0.424	0.674
$PaCO_2$	34.35±7.35	35.55±9.11	−0.459	0.649
HCO_3	20.35±4.4	19.7±3.44	−0.521	0.606
4 h				
pH	7.41±0.89	7.39±0.05	−0.100	0.921
$PaCO_2$	33.32±9.68	34.35±11.26	0.310	0.758
HCO_3	21±6.37	20.4±4.84	−0.335	0.739
8 h				
pH	7.39±0.09	7.37±0.09	−0.703	0.486
$PaCO_2$	34.25±8.6	36.9±9.4	0.931	0.358
HCO_3	22.2±4.34	20±5.11	−1.468	0.15
12 h				
pH	7.39±0.11	7.36±0.99	−0.070	0.944
$PaCO_2$	35.35±8.11	39.45±8.48	1.563	0.126
HCO_3	20.3±5.47	20.32±4.21	−0.009	0.998
1 h after weaning from ICU ventilation				
pH	7.41±0.32	7.4±0.2	−0.119	0.906
$PaCO_2$	36.81±4.7	37.27±5.2	0.294	0.771
HCO_3	21.7±3.56	20.3±3.89	−1.187	0.243

ICU: Intensive Care Unit, SD: Standard deviation

Table 5: Oxygenation parameters findings at different times between groups

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Base				
PaO_2	110.45±42.47	105.4±31.23	−0.428	0.671
O_2 saturation	96.05±2.11	95.5±5.94	−0.39	0.699
PaO_2/PAO	0.471±0.049	0.493±0.069	1.1626	0.2523
4 h				
PaO_2	135.73±39.08	112.2±38.58	−1.916	0.921
O_2 saturation	95.7±2.32	96.45±1.76	1.152	0.257
PaO_2/PAO	0.513±0.078	0.527±0.089	0.529	0.5998
8 h				
PaO_2	100.2±27.56	115.4±36.16	1.495	0.486
O_2 saturation	97.42±3.31	94.9±5.88	1.674	0.103
PaO_2/PAO	0.447±0.108	0.461±0.075	0.476	0.6367
12 h				
PaO_2	96.9±32.14	117.65±44.63	1.687	0.944
O_2 saturation	96.6±2.01	95.4±6.18	−0.826	0.414
PaO_2/PAO	0.423±0.12	0.419±0.25	−0.065	0.9489
1 h after weaning from ICU ventilation				
PaO_2	100.19±38.33	110.49±35.9	0.587	0.386
O_2 saturation	97.12±3.38	96.33±3.64	−0.71	0.481
PaO_2/PAO	0.459±0.083	0.448±0.068	−0.459	0.6492

ICU: Intensive Care Unit, SD: Standard deviation

and time to extubation such as MIP, TV, and PaO2/PAO2. There was no statistical significant difference between both groups with a value of $P > 0.05$ [Tables 5 and 6].

Regarding analgesics dose requirements, there was a statistical significant difference between both groups of the study with requirement being higher in Group P with a value of $P < 0.05$ [Table 7].

Regarding financial costs, there was a statistical significant difference between both groups of the study with cost being higher in Group D with a value of $P < 0.05$ [Table 8].

Table 6: Ventilation parameters findings at different times between groups

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Base				
MIP	−22.45±2.17	−21.67±1.89	−1.91	0.241
VT_E	382.84±13.71	382.90±12.860	0.014	0.9887
TV (ml/kg)	430.25±21.12	430.75±18.87	0.0790	0.9375
RR (min)	20.8±5.09	19.6±5.17	−0.739	0.464
RSBI	48.55±12.25	45.65±12.33	−0.746	0.4601
f/TV				
MIP	−23.70±1.93	−22.82±2.01	−1.412	0.1660
VT_E	383.19±15.32	382.98±14.77	−0.044	0.9650
TV (ml/kg)	431.25±24.16	431.75±21.17	0.0696	0.94
RR (min)	17.45±2.48	15.55±3.68	−1.915	0.063
f/TV	40.67±6.8	36.05±8.41	−1.9104	0.0637
8 h				
MIP	−24.15±1.84	−23.61±1.83	−0.931	0.3579
VT_E	383.72±14.47	384.21±14.89	0.106	0.9165
TV (ml/kg)	432.75±27.17	433.25±26.96	0.0584	0.9537
RR (min)	17.6±3.1	16.75±5.04	−0.643	0.524
f/TV	40.82±7.66	38.70±11.71	−0.6776	0.502
12 h				
MIP	−24.40±1.73	−23.98±2.13	−0.685	0.4978
VT_E	384.0±13.71	386.04±12.63	0.490	0.6274
TV (ml/kg)	446.25±35.94	458.4±49.34	0.890	0.3790
RR (min)	13.74±4.49	11.97±3.82	−1.343	0.187
f/TV	41.15±7.51	38.13±6.89	−1.324	0.193
1 h after weaning from ICU ventilation				
MIP	−27.76±1.54	−27.63±1.62	−0.260	0.796
VT_E	414.1±34.72	427.54±44.33	1.067	0.2925
TV (ml/kg)	455.75±24.98	458.5±25.55	0.3442	0.7326
RR (min)	18.55±6.92	17.34±4.76	−0.596	0.554
f/TV	49.21±10.04	48.94±10.17	−0.0845	0.9331

MIP: Maximum inspiratory pressure, VTE: Exhaled tidal volume, TV: Tidal volume, RR: Respiratory rate, f/TV: The rapid shallow breathing index, SD: Standard deviation

Table 7: Comparison between Groups P and D regarding midazolam and fentanyl dose requirements

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Midazolam	5.7±1.98	10.95±3.59	−5.7	0.000*
Fentanyl	0.16±0.08	0.29±0.07	−5.3	0.000*

*P<0.05 is significant. SD: Standard deviation

Discussion

Sedation of mechanically ventilated patients after the different types of cardiovascular surgeries such as coronary artery bypass surgeries, aortic valve, and mitral valve replacement or a combination of them, is often used to improve the comfort, reduce anxiety and stress, and facilitate nursing care. Furthermore, they are used in conjunction with analgesics to provide patient comfort and safety.[3,8] The ideal sedative agent after the cardiovascular surgery should be cheap and have a short duration without cumulative effects, allowing for rapid recovery of effective spontaneous respiration after interruption of its administration in patients underwent mechanical ventilation after the cardiovascular surgery.[9]

For decades, gamma-aminobutyric acid (GABA) receptor agonists (e.g., propofol and midazolam) have been used extensively as a sedative of choice in the ICUs after the cardiovascular surgery.[5]

Dexmedetomidine is an intravenous drug (since 1999 in the U. S.) that offers anxiolysis and analgesia but no respiratory depression. The lack of respiratory depression is desirable for the management of mechanically ventilated patients.[7,10]

In this study, there was no statistical significant difference between both study groups with regard to age, sex, weight, height, and BMI with a value of $P > 0.05$.

Decreasing the time on mechanical ventilation reduces the risk of ventilator-associated complications such as

Table 8: Comparison between Groups P and D regarding financial costs

Variable	Mean±SD		*t*	*P*
	Group D (*n*=25)	Group P (*n*=25)		
Financial costs (EP)	570±108.79	203.6±37.30	99.297	0.000*

*P<0.05 is significant. EP: Egyption pound, SD: Standard deviation

pneumonia and stress ulcers, decreases the patient's risk of becoming delirious, and has significant cost implications. In this study, with regard to the duration of mechanical ventilation and LOS in the ICU after cardiovascular surgery, there was no significant difference between both groups. These results go in harmony with Wanat *et al*.[11] and Jakob *et al*.[4] who reported in their results that "No difference was seen in ICU LOS. Hospital LOS was shorter in patients in the dexmedetomidine group" and showed that the median duration of mechanical ventilation including noninvasive ventilation in PRODEX study, it was 118 h (48–327 h) for propofol and 97 h (45–257 h) for dexmedetomidine (Gehan-Wilcoxon $P = 0.24$).

This disagrees with EL-Baradey *et al*.[12] in their study-"Can integrative weaning index (IWI) be a routine predictor for weaning success?" found that the length of ICU stay (days) was significantly shorter in Group I where the IWI was used.

Regarding hemodynamic parameters MAP and HR, there was a statistical significant difference between both groups; MAP was higher in Group D while HR was higher in Group P.

These results goes in agreement with Srivastava *et al*.[13] who reported that baseline hemodynamic parameters such as HR and MAP were similar among the groups ($P > 0.05$). After administration of the study drug patients, Group D had a significantly lower HR comparison to Groups P and M ($P < 0.01$) and there was a statistically significant decrease in MAP compared to baseline value in all groups at all-time intervals ($P < 0.05$), except postextubation period ($P > 0.05$).

With regard to ABG analysis-pH, PaCO2, HCO3 and Oxygenation parameters-PaO2, SaO2, and PaO2/PAO2, the results showed that there were no significant difference between both groups of the study with a value of $P > 0.05$ at any time interval 4, 8, 12 h, and 1 h after the extubation in the whole study duration.

Furthermore, the study results showed that there was no statistical significant differences between both groups of the study with a value of $P > 0.05$ with regard to the ventilation parameters-MIP and VT_E.

The need for other analgesics "Midazolam and Fentanyl" with the study drugs was assessed in the study and the results showed that the need for these analgesics decreases with dexmedetomidine.

These results are similar to study published by Srivastava *et al*.,[13] in their results, all patients received short acting fentanyl infusion (5 mcg/ml). The infusion rate was adjusted by the ICU doctor as required by the patient to relieve pain and the mean fentanyl dose requirements in Group P (0.50 ± 0.14) was significantly more compared to Group D (0.26 + 0.13) with a value of $P < 0.001$.

Regarding financial costs, this study showed that the use of dexmedetomidine in Group D was associated increased costs than the use of propofol in Group P and there was a statistical significant difference between both groups with a value of $P < 0.05$.

The study has important limitations. First, limited studies which discuss sedation in the ICU after cardiac surgery enforced authors to use some studies discussing sedation in ICU with noncardiac surgical patients. Second, no subgroup analysis of patients who received combination sedation with both agents was done. The patients who required more than one agent for sedation, even if being used exclusively during or around the time of extubation, may be at risk for increased time on mechanical ventilation and worse overall outcomes. Use of combination sedation and resulting outcomes needs to be addressed in future studies. Third, small sample size, so the study included only 50 participants underwent CABG only or complex operations such as combined valve/CABG procedures who are most likely to experience respiratory failure and defined as needing mechanical ventilation for more than 72 h, as the patients going for valvular surgery often have issue of increased lung water which doesn't happen exactly with coronary artery disease patients undergoing CABG but fortunately this did not happen with our cases in this study. The sample size was restricted to 50 cases due to logistic reasons such as the study drug was provided free of cost to all the study participants and limiting the inclusion of more cases.

Conclusion

Dexmedetomidine is safer and equally effective agent for the sedation of mechanically ventilated patients admitted to the ICU after cardiovascular surgery compared to patients receiving propofol with good hemodynamic stability and extubation time as rapid as propofol.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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