Original Article

Study on Role Of Dexmetedomine Infusion In Early Extubation After Coronary Artery Bypass Grafting

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Abstract

Background: Postoperative pain has negative consequences on patients' outcomes after cardiac surgery. Routine management with opioid and or non-steroidal anti-inflammatory medications has several disadvantages. Opioids have several undesirable side effects, including nausea, vomiting, decreased gastrointestinal motility, respiratory depression, drowsiness, and hemodynamic effect with large doses. Moreover, non-opioids analgesics, such as non-steroidal anti-inflammatory drugs and acetaminophen, may be a useful complement to opioids for postoperative pain relief. Dexmedetomidine (DEX) is a highly selective α2 receptor agonist that provides better sedation, analgesic, and anxiolytic effect. This property is considered unique among sedatives used for intensive care units generally.

Objectives: The present study was undertaken to determine the role of an early administration of dexmedetomidine in decreasing opioid use post-cardiac surgery and its effects on the quality of postoperative recovery in patients after coronary artery bypass grafting.

Methodology: The present study included a total of 120 patients who underwent CABG at our tertiary care hospital. These Patients were randomly allocated into two groups, Group A included 60 patients who received postoperative DEX infusion for sedation and Group B included 60 patients who did not receive DEX infusion. All patients were intubated, ventilated, and sedated by propofol intravenous (IV) infusion 25–50 μg/kg/min.
On admission to CSICU, vital signs were recorded, and group A patients were started on DEX IV infusion 0.2–0.4 μg/kg/h. while patients in group B were maintained only on propofol infusion. Vital signs, including heart rate (HR), oxygen saturation, and end-tidal carbon dioxide, were continuously monitored, and blood pressure was monitored both invasively and non-invasively.

Results: The present study included a total of 120 patients who underwent CABG at our tertiary care hospital. These Patients were randomly allocated into two groups, Group A included 60 patients who received postoperative DEX infusion for sedation and Group B included 60 patients who did not receive DEX infusion. The results of our study indicate that the pain scores gradually improved in Group A as compared to Group B, which means that early DEX infusion following CABG operations was associated with reduction in morphine usage, decrease in pain severity and improvement in sedation which encouraged early extubation as seen in table 2 and 3.

Conclusion: The findings of our study indicate that administration of dexmedetomidine in the early postoperative period can be safe. It may reduce the use of opioids, has sedative, analgesics, and sympatholytic effects that could play a useful role during the management of coronary artery bypass patients, and may improve postoperative recovery.

Keywords: post-operative pain, dexmetedomine, extubation, coronary artery bypass grafting and opioids.

INTRODUCTION:

Postoperative pain has negative consequences on patients' outcomes after cardiac surgery. Routine management with opioid and or non-steroidal anti-inflammatory medications has several disadvantages. Opioids have several undesirable side effects, including nausea, vomiting, decreased gastrointestinal motility, respiratory depression, drowsiness, and hemodynamic effect with large doses. Moreover, non-opioids analgesics, such as non-steroidal anti-inflammatory drugs and acetaminophen, may be a useful complement to opioids for postoperative pain relief. Additionally, non-opioid analgesics can reduce the need for opioids and minimize its side effects. However, the efficiency of these medications can be limited, as it can seriously affect the patients postoperatively because of their effect on bleeding and renal function [1-3].

Dexmedetomidine (DEX) is a highly selective α2 receptor agonist that provides better sedation, analgesic, and anxiolytic effect. This property is considered unique among sedatives used for intensive care units generally [4, 5]. Many studies on DEX in postoperative high-risk non-cardiac patients showed that those patients required significantly lower sedative agents. Furthermore, dexmedetomidine has a less hemodynamic effect and non-significant respiratory depression [6, 7]. Additionally, patients who received DEX experienced mutual sedation and smooth extubation and they had lower mortality [7].

The present study was undertaken to determine the role of an early administration of dexmedetomidine in decreasing opioid use post-cardiac surgery and its effects on the quality of postoperative recovery in patients after coronary artery bypass grafting.

OBJECTIVES OF THE STUDY:

The objective of the present study is to determine the role of an early administration of dexmedetomidine in decreasing opioid use post-cardiac surgery and its effects on the quality of postoperative recovery in patients after coronary artery bypass grafting.

METHODOLGY:

Source of data: This is a prospective observational study conducted in the department of Anaesthesia in association with Dept. of Cardiology of our tertiary care hospital.

Study design: prospective observational study.

Sample size: we included a total of 120 patients who underwent CABG at our tertiary care hospital.

Inclusion criteria: we included a total of 120 patients who underwent CABG at our tertiary care hospital willing to give voluntary consent.

Exclusion criteria: Patients with renal failure, prolonged postoperative intubation for more than 8 h because of hemodynamic instability or bleeding, and patients who had re-exploration were excluded.

Study protocol and data collection: The present study included a total of 120 patients who underwent CABG at our tertiary care hospital. These Patients were randomly allocated into two groups, Group A included 60 patients who received postoperative DEX infusion for sedation and Group B included 60 patients who did not receive DEX infusion. All patients were intubated, ventilated, and sedated by propofol intravenous (IV) infusion 25–50 μg/kg/min.

On admission to CSICU, vital signs were recorded, and group A patients were started on DEX IV infusion 0.2–0.4 μg/kg/h. while patients in group B were maintained only on propofol infusion. Vital signs, including heart rate (HR), oxygen saturation, and end-tidal carbon dioxide, were continuously monitored, and blood pressure was monitored both invasively and non-invasively. Patients were started on acetaminophen 1 g IV every 6 h, and 2–3 mg of morphine were administered intravenously if the pain was suspected in case of unexplained tachycardia and hypertension when the patients were still intubated. We reviewed the difference in total morphine consumption and vital data between the two groups while patients were intubated.

Our protocol was to start weaning the patients from sedation and prepare for extubation 2 h after admission to CSICU and after ensuring the stable hemodynamic and full return of muscle power, so once these criteria were met, propofol and DEX infusion were turned off, and patients were extubated after full recovery. Our primary outcome was the pain score assessed by the primary nurse and physician immediately after extubation.

The pain was evaluated using Linear Visual Analog Scale Score (VAS), ranging from no pain (0) to worst possible pain (10). We reviewed the pain scores and vital signs every hour in all patients for the first 12 h post-extubation in addition to sedation score.

Sedation score was assessed by modified Ramsay score (MRS) and ranged from 1 to 6 as follows: 1 = anxious/agitated, 2 = cooperative oriented, 3 = responds to commands only, 4 = asleep with brisk response to light glabellar tap (LGT), 5 = sluggish response to (LGT), 6 = asleep no response to (LGT). Our protocol was to administer 2–3 mg of morphine to the patient once the pain score is ≥2, and the total morphine consumption in the first 12 h post-extubation in both groups was reviewed, and that was our secondary outcome in addition to the vital data and sedation scores in the first 12 h after extubation.

Linear Visual Analog Scale Score

VAS Score	Intensity of pain
0 – 2	No pain to slight pain
2 – 5	Mild pain.
5 – 7	Moderate pain.
7 – 9	Severe pain.
10	Worst possible pain.

Statistical analysis: Continuous data were presented as mean ± standard deviation and categorical data as count and percent. *T* test was used to compare the continuous variables, and chi-squared test or fisher exact test was used for categorical variables when appropriate. The trend of pain severity was investigated by a repeated measure analysis of variance (ANOVA) model.

RESULTS:

The present study included a total of 120 patients who underwent CABG at our tertiary care hospital. These Patients were randomly allocated into two groups, Group A included 60 patients

who received postoperative DEX infusion for sedation and Group B included 60 patients who did not receive DEX infusion.

Table 1: shows the comparison of preoperative, operative and post-operative data between the two groups		
	Group A	**Group B**
Age (years)	56 ± 8.68	57.3 ± 8.8
Weight (kgs)	87 ± 10.2	83 ± 9.8
Height (mt)	1.64± 8.4	1.66 ± 9
Duration of anaesthesia (min)	323 ± 54	318± 58
Operative time (min)	242 ± 16	244 ± 14
ICU stay in days	2 ± 0.8	2.8 ± 0.4
Intubation time	5± 2.8	6± 3.4
MAP	80.12± 5.23	82.14 ± 5.6
HR	80 ± 2.4	82 ± 2.6
Modified RS (median)	3	3
Pain intensity score median	1	2

Table 2: Shows VAS scores in both the groups postoperatively		
Time	**Group A**	**Group B**
1st hr	0.32±0.98	1.08±0.56
3 hrs	0.89±1.07	0.96±1.03
6 hrs	1.24±1.9	3.74±2.07
8 hrs	0.36±0.14	0.94±1.96
12 hrs	0.16±1.2	0.32±0.24
24 hrs	0.01±0.84	0.01±0.89

Table 3: Shows sedation scores during and after extubation		
	Group A	**Group B**
During intubation	**5.4**	**4.6**
Immediately after extubation	3.3	2
2 hours after extubation	2.9	2.1
4 hours after extubation	2.7	2
6 hours after extubation	2.3	2
8 hours after extubation	2.3	1.9

DISCUSSION

The present study included a total of 120 patients who underwent CABG at our tertiary care hospital. These Patients were randomly allocated into two groups, Group A included 60 patients who received postoperative DEX infusion for sedation and Group B included 60 patients who did not receive DEX infusion. The results of our study indicate that the pain scores gradually improved in Group A as compared to Group B, which means that early DEX infusion following CABG operations was associated with reduction in morphine usage, decrease in pain severity and improvement in sedation which encouraged early extubation as seen in table 2 and 3.

Arain and associates found a brief increase in blood pressure in the DEX group, which was related to activation of α2 agonist on the smooth muscle of the vessel wall, which leads to transient vasoconstriction and increased in mean arterial pressure. We have noticed this in both groups. However, we thought these initial hemodynamic changes in MAP and HR were most probably related to post-surgical stress, the surgical procedures itself, or pre-existing hypertension as it happened in both groups. The decrease in MAP and HR was related to more gradual central effect

of DEX in patients who received it, while the reduction of MAP for patients who did not receive DEX and depended on morphine as main analgesic most probably was related to decreasing catecholamine and direct vasodilatation effect of morphine considering that there was no significant difference in the number of patients receiving inotropes and vasodilators between the two groups [8,9]. Our findings were in line with Liu and coworkers [10] meta-analysis, which stated that DEX lead to a shorter length of intubation, but it can be associated with bradycardia in patients after cardiac surgery compared with propofol. This tendency to lower the heart rate and systolic blood pressure with decreased incidence of tachycardia and arrhythmias have a cardioprotective effect, as stated by another meta-analysis by Gong and coauthors [11]. On the other hand, Mukhtar and colleagues concluded in their study that intraoperative DEX infusion attenuated the hemodynamic and neuroendocrine response to surgical trauma and cardiopulmonary bypass. The same findings were declared by Priye and associates who concluded that DEX infusion, even those without the loading dose, have a safe, effective adjuvant analgesic effect. It can reduce narcotic consumption without undesirable hemodynamic effects in cardiac surgery patients.

CONCLUSION

The findings of our study indicate that administration of dexmedetomidine in the early postoperative period can be safe. It may reduce the use of opioids, has sedative, analgesics, and sympatholytic effects that could play a useful role during the management of coronary artery bypass patients, and may improve postoperative recovery.

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