

ORIGINAL RESEARCH

Assessment of effectiveness of Dexmedetomidine, Magnesium sulphate, Lidocaine in multimodal anaesthesia via opioid free analgesia in morbidly obese patients undergoing laparoscopic bariatric surgery under general anaesthesia

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ABSTRACT

Background: The opioid consumption is reduced intraoperatively, effective nociception and reduction in post operative opioid consumption is achieved. This study was carried out to assess the effectiveness of Dexmedetomidine, Magnesium sulphate, Lidocaine in multimodal anaesthesia via opioid free analgesia in morbidly obese patients undergoing laparoscopic bariatric surgery under general anaesthesia. **Materials & Methods:** 100 patients undergoing elective laparoscopic bariatric surgery of both genders were divided into 2 sections - Group A and Group B (50 patients in each group). In Group A induction was done with opioid free multimodal anaesthesia regimen using dexmedetomidine, lignocaine and Magnesium sulphate and cisatracurium as the muscle relaxant, maintained with O₂, N₂O and sevoflurane. In Group B induction was done with opioid free multimodal anaesthesia regime using cisatracurium as the muscle relaxant, maintained with O₂, N₂O and sevoflurane. Heart rate, Blood pressure, Spo₂ were recorded pre, intra and post operatively. Patients were assessed for VAS score post operatively. **Results:** No Significant difference in mean SBP was observed before induction (p=0.687) and immediately after induction (p=0.824), however mean SBP was significantly higher at 10 minutes after induction (p=0.017) and after extubation (p=0.020) among those who were not given these 3 drugs. No Significant difference in mean DBP was observed before induction (p=0.589) and immediately after induction (p=0.250), however mean DBP was significantly higher at 10 minutes after induction (p=0.047) and after extubation (p=0.007) among those who were not given these 3 drugs. No Significant difference in mean heart rate was observed before induction (p=0.260) and 10 minutes after induction (p=0.117), however mean heart rates were significantly higher immediately after induction (p=0.001) and after extubation (p=0.001) among those who were not given these 3 drugs compared to those who received the drugs. A significant difference was obtained in terms of using antihypertensive between the two groups. Use of propofol alone (57.4%), propofol with labetalol (10.6%) and propofol with NTG (8.5%) was more among the patients who did not receive the drugs, however those who received, propofol with labetalol and NTG was not used and in maximum patients surgery was performed without the use of antihypertensive (P<0.001). **Conclusion:** Authors concluded that heart rate, blood pressure were significantly higher at 10 minutes after induction and after extubation among those who were not given those 3 drugs. A significant difference was observed in the use of anti-hypertensives during the procedure between the group that received the 3 drugs and the group that did not. Post operative VAS score was less among the patients who received Dexmedetomidine and Magnesium sulphate and lignocaine intraoperatively.

Key words: Anaesthesia, Dexmedetomidine, Opioid

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INTRODUCTION

Opioid free anaesthesia is technique where the intraoperative use of systemic, neuraxial or intracavitary opioid is completely eliminated. The opioid consumption is reduced intraoperatively, effective nociception and reduction in post operative opioid consumption is achieved.¹ The spectrum of OSA/OFA can be of prime utility in patients of high risk of opioid related respiratory complications for bariatric surgeries and patients with pulmonary limitations including obstructive airway diseases.^{2,3}

It is speculated that opioid free anaesthesia may provide adequate pain control while reducing intraoperative and post operative opioid consumption and also would reduce opioid related adverse effects.⁴ Opioid-free anaesthesia provides certain advantages, including smooth and fast recovery during emergence from anaesthesia and the prevention of acute opioid tolerance after surgery.⁵ This is especially useful for obese patients who have a higher risk of opioid-related complications, such as exacerbation of sleep apnea disorder and postoperative respiratory depression, ileus, nausea, and vomiting due to particularly high basal endogenous opioid levels and increased opioid sensitivity. Limiting opioids and their potential side effects in perioperative and postoperative period in obese patients while still managing adequate analgesia may facilitate faster recovery and ICU discharge.⁶ This study was carried out to assess the effectiveness of Dexmedetomidine, Magnesium sulphate, Lidocaine in multimodal anaesthesia via opioid free analgesia in morbidly obese patients undergoing laparoscopic bariatric surgery under general anaesthesia.

MATERIALS & METHODS

The present study comprised of 100 patients undergoing elective laparoscopic bariatric surgery of both genders at Sri Aurobindo Medical college and postgraduate institute and Mohak Super speciality hospital. All gave their written consent for the participation in the study. All ASA grade I, II, III patients planned for elective laparoscopic procedure under general anaesthesia, age group between 18 to 65 years and BMI >40 kg/m². Exclusion criteria was ASA grade IV patients, patients coming from emergency after surgery or revision surgery and patients not giving consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 sections - Group A and Group B (50 patients in each group). Patients were kept nil by mouth for 8 hours prior to the procedure and an informed, written consent was taken. Immediate pre operative vitals, heart rate, blood pressure, spo₂, RR were recorded in OT. Patient was induced with general anaesthesia as per fixed protocols.

In Group A induction was done with opioid free multimodal anaesthesia regimen using dexmedetomidine, lignocaine and Magnesium sulphate and cisatracurium as the muscle relaxant, maintained with O₂, N₂O and sevoflurane. In Group B induction was done with opioid free multimodal anaesthesia regime using cisatracurium as the muscle relaxant, maintained with O₂, N₂O and sevoflurane. Heart rate, Blood pressure, Spo₂ were recorded pre, intra and post operatively. Patients were assessed for VAS score post operatively. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I: Comparison of systolic blood pressure

SBP	Group B		Group A		P value
	Mean	SD	Mean	SD	
Before induction	115.91	15.738	117.57	15.201	0.687
Immediately after induction	134.79	9.471	135.33	9.013	0.824
10 minutes after induction	125.28	14.978	115.71	14.650	0.017
After extubation	142.09	14.003	134.24	8.342	0.020

No Significant difference in mean SBP was observed before induction (p=0.687) and immediately after induction (p=0.824), however mean SBP was significantly higher at 10 minutes after induction (p=0.017) and after extubation (p=0.020) among those who were not given these 3 drugs.

Table II: Comparison of diastolic blood pressure

DBP	Group B		Group A		P value
	Mean	SD	Mean	SD	
Before induction	74.83	13.381	73.10	10.099	0.598
Immediately after induction	93.45	6.756	91.38	6.837	0.250
10 minutes after induction	80.43	10.613	74.48	12.508	0.047
After extubation	98.60	9.757	92.24	5.656	0.007

No Significant difference in mean DBP was observed before induction (p=0.589) and immediately after induction (p=0.250), however mean DBP was significantly higher at 10 minutes after induction (p=0.047) and after extubation (p=0.007) among those who were not given these 3 drugs.

Table III: Comparison of heart rate

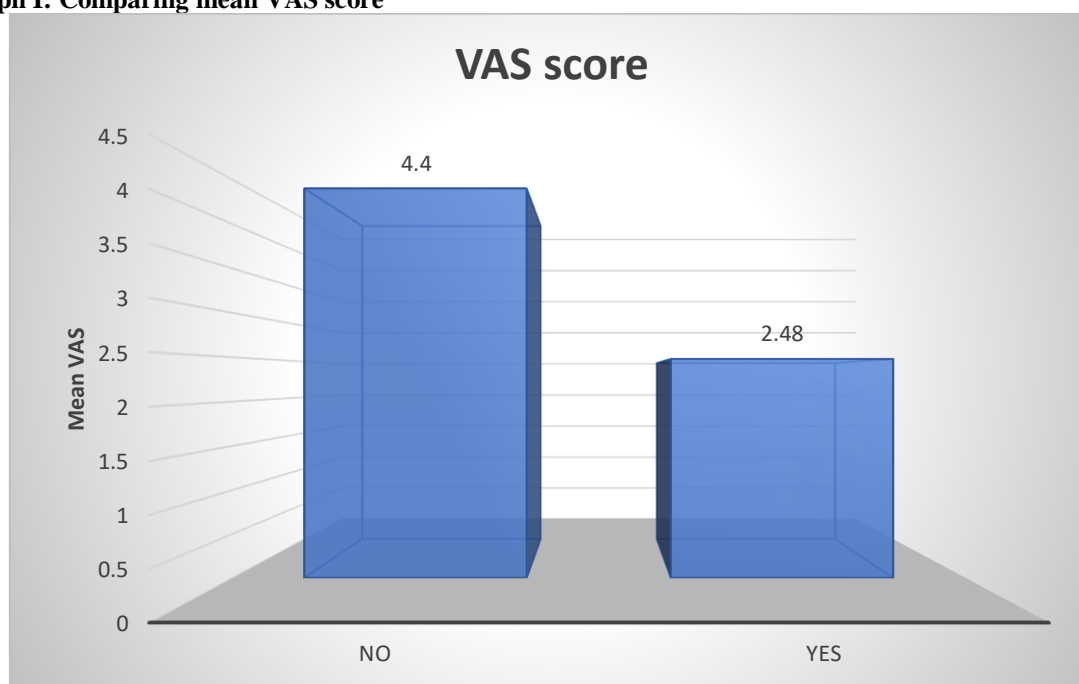
Heart Rate	Group B		Group A		P value
	Mean	SD	Mean	SD	
Before induction	78.06	12.438	74.57	9.796	0.260
Immediately after induction	96.30	8.325	89.19	7.711	0.001
10 minutes after induction	81.21	5.579	78.81	6.169	0.117
After extubation	105.21	9.269	97.19	7.659	0.001

No Significant difference in mean heart rate was observed before induction ($p=0.260$) and 10 minutes after induction ($p=0.117$), however mean heart rates were significantly higher immediately after induction ($p=0.001$) and after extubation ($p=0.001$) among those who were not given these 3 drugs compared to those who received the drugs.

Table IV: Use of antihypertensive drugs

Use of antihypertensive		Group B	Group A	Total	P value
Propofol	Count	27	3	30	<0.001
	%	57.4%	14.3%	44.1%	
Propofol with labetolol	Count	5	0	5	
	%	10.6%	0.0%	7.4%	
Propofol with NTG	Count	4	0	4	
	%	8.5%	0.0%	5.9%	
Nil	Count	11	18	29	
	%	23.4%	85.7%	42.6%	

A significant difference was obtained in terms of using antihypertensive between the two groups. Use of propofol alone (57.4%), propofol with labetolol (10.6%) and propofol with NTG (8.5%) was more among the patients who did not receive the drugs, however those who received propofol with labetolol and NTG was not used and in maximum patients surgery was performed without the use of antihypertensive ($P<0.001$).

Graph I: Comparing mean VAS score

On comparing mean VAS score between patients with and without these drugs, it was revealed that pain score was less among those who received dexmedetomidine, magnesium sulphate and

lidocaine (2.48 ± 1.365) as compared to those without these (4.40 ± 0.798). This highlights that they also assist in pain reduction during the surgery as revealed by the significant p value of <0.001 .

DISCUSSION

The slope of the concentration-effect curve steepens with the synergistic interactions between anesthetic

drugs with different mechanisms when using a multimodal approach, meaning that small decreases in drug concentrations result in larger decreases in drug

effects, thereby facilitating the emergence from anaesthesia.^{7,8} By attenuating opioid-induced hyperalgesia with opioid-free anaesthesia, postoperative opioid use and their adverse effects can be reduced. Furthermore, opioid-free anaesthesia can help to prevent addiction following the liberal use of opioids during the perioperative period.⁹ This study was carried out to assess the effectiveness of Dexmedetomidine, Magnesium sulphate, Lidocaine in multimodal anaesthesia via opioid free analgesia in morbidly obese patients undergoing laparoscopic bariatric surgery under general anaesthesia.

Patients were found to have higher fluctuations in heart rate and blood pressure when they were given opioid free anaesthesia without Dexmedetomidine, Magnesium sulphate and lignocaine. Ziemann-Gimmel et al¹⁰ conducted a study in which the classic group (n=59), patients underwent general anaesthesia with volatile anaesthetics and opioids. In the Total i.v. anaesthesia (TIVA) group (n=60), patients underwent opioid-free TIVA with propofol, ketamine, and dexmedetomidine. The severity of PONV was assessed using a Likert scale (none, mild, moderate, and severe). Patients in both groups had similar clinical characteristics, surgical procedure, and PONV risk scores and required similar amounts of postoperative opioid. In the Classic group, 22 patients (37.3%) reported PONV compared with 12 patients (20.0%) in the TIVA group [P=0.04; risk 1.27 (1.01-1.61)]. The absolute risk reduction was 17.3% (number-needed-to-treat=6). The severity of nausea was statistically different in both groups (P=0.02). The severity of PONV was significantly worse in the Classic group. There was no difference either in the number of patients requiring AERM in the postoperative period or in the number of AERM doses required. Patients undergoing bariatric surgery are at high risk of postoperative nausea and vomiting (PONV). Despite triple PONV prophylaxis, up to 42.7% of patients require antiemetic rescue medication (AERM).

Post operative VAS score in both the groups were comparable and found to be higher immediately after surgery in group B. Maximum VAS score reached during the total duration of study were compared in both the groups. There is a positive, weak, statistically significant correlation between blood pressure (P=0.020), heart rate (P=0.001) and VAS score (P=0.001) of both the groups. Mulier et al¹¹ included all 9246 patients who underwent laparoscopic bariatric surgery. They analysed the effect of continuous clinical deep NMB and OFA and covariates on 1 month post-operative complications using the Clavien-Dindo (CD) classification (grades II-V) and healthcare utilization (hospital length of stay [LOS], rates of reoperations within 1 week, high-dependency care unit admissions, and readmissions within 1 month). Covariates included experience of the attending anaesthesiologist, patient age, sex, body mass index, American Society of Anesthesiologists

physical status score, obstructive sleep apnoea syndrome, diabetes, hypertension, surgery type, surgical team experience, and neostigmine use. OFA, continuous deep NMB, surgical and anaesthesia team experience, younger age, and surgery type were associated with fewer complications. OFA was associated with lower healthcare resource utilization. Reduced LOS was also associated with younger age, surgical team experience, and surgery type, but not continuous deep NMB.

Feld et al¹² evaluated whether dexmedetomidine infusion could replace fentanyl for facilitation of open gastric bypass surgery. Twenty bariatric patients with an average body mass index of 54 to 61 kg/m² undergoing surgery for open gastric bypass were randomized to receive either fentanyl (0.5-microg/kg bolus, 0.5 microg.kg(-1)/h(-1), n = 10) or dexmedetomidine (0.5-microg/kg bolus, 0.4 microg.kg(-1)/h(-1), n = 10) for intraoperative analgesia. In both groups, end-tidal desflurane was adjusted to maintain the bispectral index at 45 to 50. In the operating room, blood pressure and heart rate were measured at 5-minute intervals. Bispectral index and end-tidal desflurane concentration were measured every hour. During recovery in the post-anaesthesia care unit, patient-evaluated pain scores and morphine use by patient-controlled analgesia pump were determined. During surgery, desflurane concentrations necessary to maintain the bispectral index at 45 to 50 were decreased, and blood pressure and heart rate were lower with in the dexmedetomidine compared with fentanyl group. In the post-anaesthesia care unit, pain scores and morphine use were decreased in the dexmedetomidine group.

The limitation the study is small sample size.

CONCLUSION

Authors concluded that heart rate, blood pressure were significantly higher at 10 minutes after induction and after extubation among those who were not given those 3 drugs. A significant difference was observed in the use of anti-hypertensives during the procedure between the group that received the 3 drugs and the group that did not. Post operative VAS score was less among the patients who received Dexmedetomidine and Magnesium sulphate and lignocaine intraoperatively.

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