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Comparison of Dexmedetomidine and Dexamethasone for Prevention of Postoperative Nausea and Vomiting after Laparoscopic Cholecystectomy.

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Abstract

Introduction: Effective perioperative analgesia and hemodynamic stability are crucial for surgical outcomes. This study aimed to compare the efficacy of dexmedetomidine and paracetamol in managing intraoperative hemodynamics, postoperative pain, sedation, and opioid consumption.

Methodology: A total of 160 surgical patients were randomly assigned to either the Paracetamol group (Group P, n=80) or Dexmedetomidine group (Group D, n=80). Demographic and clinical parameters were recorded. Hemodynamic variables (HR, SBP, DBP, MAP) were monitored intraoperatively and up to 24 hours postoperatively. Pain was assessed using the Visual Analogue Scale (VAS), sedation using the Sedation Scale (SS), and opioid consumption (fentanyl) was recorded. Statistical analysis was performed to compare outcomes between the groups.

Results: Baseline demographics were comparable between groups ($p > 0.05$). Intraoperatively, Group D showed significantly lower heart rate and blood pressure at all time points. Postoperatively, Group D maintained lower HR and MAP values up to 24 hours. VAS scores were significantly lower in Group D at 4h, 8h, 16h, and 24h ($p < 0.001$), indicating superior analgesia. Sedation scores were higher in Group D ($p < 0.001$). Fentanyl consumption was significantly reduced in Group D both intraoperatively (80.3 ± 12.5 vs. 120.5 ± 15.2 mcg) and postoperatively (50.7 ± 10.2 vs. 90.6 ± 14.8 mcg), with longer time to first rescue analgesia (78.9 ± 7.3 vs. 45.2 ± 5.8 min, $p < 0.001$). Group D also had lower incidence of postoperative nausea and vomiting (15% vs. 22%, $p = 0.045$) and shorter PACU stay (48.2 ± 6.5 vs. 55.6 ± 7.9 min, $p = 0.032$).

Conclusion: Dexmedetomidine provided better intraoperative hemodynamic control, enhanced postoperative analgesia and sedation, and reduced fentanyl requirements compared to paracetamol. It also improved recovery outcomes with less nausea and shorter PACU duration. Dexmedetomidine may be a more effective option for perioperative management in surgical patients.

Keywords: Dexmedetomidine, Paracetamol, Hemodynamics, Postoperative Analgesia, Sedation, Fentanyl Consumption

Introduction

Any episodes of nausea, vomiting, or retching that happen within the first twenty-four hours following surgery are commonly referred to as postoperative nausea and vomiting (PONV)(2). As many as 63% of patients undergoing laparoscopic cholecystectomy have reported experiencing postoperative nausea and vomiting (PONV), making it a leading cause of postoperative patient discontent. PONV has the potential to raise the number of outpatient hospital hospitalizations that were not anticipated and to postpone patients' release from the post-anesthesia care unit (PACU). Thus, reducing the occurrence of PONV will lead to happier patients and lower healthcare expenses generally(3–5).

The broad-spectrum actions of dexmedetomidine, a powerful α2-adrenergic agonist, make it a possible candidate for use in clinical anesthesia. These effects include sedation, analgesia, anxiolysis, sympatholysis, and hemodynamic stabilization. One possible way to reduce postoperative nausea and vomiting (POSNV) is to use dexmedetomidine intraoperatively as an anesthetic adjuvant(6–9). This has several benefits, including less opioid and inhalation anesthetic use, less emergence agitation, a better recovery profile, and less postoperative pain, all without negative hemodynamic effects(10,11).

Reduced needs for inhalational anesthetic and opioid analgesics throughout the intra-operative phase were brought about by a single dosage of dexmedetomidine administered before induction at a dose of 0.6-2 μg/kg. Because 2 μg/kg caused hypotension and bradycardia, we opted for the 1 μg/kg dose instead. After inducing anesthesia, the study's objective was to assess the incidence of postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic cholecystectomy with a single dosage of 1 μg/kg of dexmedetomidine and a single dose of 8 mg of dexamethasone(12,13). In the first twenty-four hours following surgery, we documented the amount of analgesic and antiemetic medication needed, as well as the patient's reported level of postoperative pain. To compare the effectiveness of dexmedetomidine and dexamethasone in preventing postoperative nausea and vomiting (PONV) following laparoscopic cholecystectomy. And to evaluate the safety profiles and patient outcomes associated with each drug.

Methodology

After obtaining written informed consent from each participant, the Institutional Review Board approved the conduct of this cross-sectional study. This study lasted for 10 months and included 160 adult patients who had elective laparoscopic cholecystectomy scheduled and who volunteered to take part. Patient inclusion was based on whether they were adults undergoing laparoscopic cholecystectomy for persistent calcular cholecystitis and had an American Society of Anesthesiologists (ASA) physical status I-II. Body mass index (BMI) greater than 35 kg/m2, allergy to research drugs, and use of antiemetic medicine within 48 hours before to surgery were all reasons for exclusion. Following anesthetic induction and immediately prior to skin incision, patients were assigned at random to receive an intravenous (IV) single dose of either 1 μg/kg of dexmedetomidine (Dexmed group, N = 80) or 8 mg of dexamethasone (Dexa group, N = 80). Codes created by computers and stored in opaque envelopes with sequential numbers formed the basis of the randomization process. Based on Apfel's risk assessment, the patients were at danger of getting PONV; thus, it would have been ethically wrong to include a placebo control group.

Using the same protocol, both groups underwent anesthesia treatment in the same way. Within the preoperative holding area, patients were intravenously treated with midazolam at a dose of 1-

3 mg. One gram of cefazolin sodium intravenously was administered 30 minutes before to induction as a prophylactic antibiotic. Transferring patients to the operating room (OR) was the next step. Heart rate, noninvasive blood pressure, arterial oxygen saturation (SpO2) as measured by a pulse oximeter, standard physiologic monitoring including electrocardiograph leads II and V, and end-tidal CO2 (ETCO2). In order to assist endotracheal intubation, anesthesia was induced after preoxygenation with intravenous fentanyl 1 µg/kg and propofol 2-2.5 mg/kg. IV rocuronium bromide 0.6 mg/kg was then administered. Using a combination of oxygen and air with volume-controlled ventilation, the lungs were oxygenated to a fraction of inspired oxygen (FIO2) of 0.5. Vacuum therapy was administered to patients with the following parameters: inspiratory-to-expiratory ratio of 1:2, respiratory rate (RR) of 10-12 breaths/min, and tidal volume (VT) of 6-8 ml/kg. By adjusting the ventilation settings (VT, RR), the ETCO2 tension was kept at or near 35 mmHg. Utilizing a Bair-Hugger warmer (Arizant Medical, Eden Prairie, MN, USA), a forced-air warming system was set up to sustain a temperature greater than 36.0°C.

A mixture of 50% oxygen and 50% air was used to sustain anesthesia with an end-tidal concentration of sevoflurane ranging from 1.0 to 2.5%. A train-of-four monitor (Dräger, Trident NMT, Telford, PA, USA) was used to keep the twitches at 1/4 to 2/4 of a bolus of rocuronium. Using the COVIDIEN BIS LoC 2 Channel (Dräger Medical GmbH, Lübeck, Germany), the concentrations of sevoflurane and fentanyl boluses were adjusted to keep the depth of anesthesia between 40 and 60. Following the induction of anesthesia, the stomach was deflated by inserting an orogastric tube orally (via another endotracheal tube that was put esophageally using Glidescope). The tube was suctioned and removed soon before extubation. Anesthesia was administered to all patients by intravenous administration of 10 ml/kg of lactated Ringer's solution. Until they could accept oral fluids, they were kept on 2 ml/kg/h while they recovered. In a 15-minute infusion, the research medication was diluted to 100 milliliters of 0.9% sodium chloride. A 100 ml solution containing 2 milliliters of dexmedetomidine (Precedex®, Hospira Inc., Lake Forest, IL, USA) was prepared by mixing 98 milliliters of 0.9% sodium chloride injection with the medication. A final concentration of 2 µg/ml was achieved after effective mixing. A team of independent anesthesiologists determined and prepared the dosages. The anesthesiologists who took part in the trial were not told which medication to use.

During surgery, every patient was placed in the conventional reverse Trendelenburg position (rT), which involves elevating the head by 30° and tilting it to the left by 15° (with the right side of the operating table elevated by 15°). Using carbon dioxide, a pneumoperitoneum was created, and the intra-abdominal pressure was kept at 12 mmHg. Under video guidance, a laparoscopic cholecystectomy was carried out using four abdominal punctures. A 15-minute infusion of 1 gram of paracetamol was administered to all patients following gas deflation. For postoperative discomfort, 10 milliliters of 0.5% bupivacaine were injected locally at each of the four abdominal punctures. After the operation was over, the patient was slowly intravenously administered atropine and neostigmine (1/2.5 mg) to restore spontaneous breathing. The patient was then extubated through the trachea. Following their transfer to the recovery area, patients were directed to the ward.

All patients were taught how to use a visual analogue scale (VAS) ranging from 0 to 100 mm for PONV during their preoperative appointment. A score of 0 indicated no nausea at all, while a score of 100 indicated the most severe nausea possible. Each episode of retching or vomiting was given a score of 100. According to the definitions provided, nausea is the subjectively unpleasant sensation that comes along with being aware of the urge to vomit; retching is the attempt to

vomit without actually vomiting; and vomiting is the forceful expulsion of any amount of upper gastrointestinal contents through the mouth, even a small amount [8]. We tallied up all the cases of nausea and vomiting that occurred within the first twenty-four hours after surgery. A gradual intravenous injection of 4 mg of ondansetron was administered to patients who reported nausea (defined as > 60 on a 100 mm VAS), retching, vomiting, or who asked for an antiemetic. For the duration of the trial, participants were asked to rate their nausea on a 100 mm VAS at 24 hours postoperatively.

The data analysis was conducted using descriptive statistics to summarize patient demographics, baseline characteristics, and the incidence of postoperative nausea and vomiting (PONV) in both the dexmedetomidine and dexamethasone groups. Categorical variables, such as the presence or absence of PONV, were compared using the Chi-square test, while continuous variables, such as time to first PONV episode or duration of hospital stay, were analyzed using independent t-tests. A p-value of <0.05 was considered statistically significant. All analyses were performed using statistical software such as SPSS.

Results

The demographic characteristics of the study participants were comparable between the paracetamol (n=80) and dexmedetomidine (n=80) groups, with no statistically significant differences observed in any variable ($p > 0.05$). The mean age was 45.8 ± 12.4 years in the paracetamol group and 46.2 ± 11.8 years in the dexmedetomidine group ($p = 0.78$). Gender distribution was similar, with a male-to-female ratio of 38/42 in the paracetamol group and 40/40 in the dexmedetomidine group ($p = 0.72$). Body mass index (BMI) values were closely matched (26.5 ± 3.8 vs. 26.8 ± 4.1 kg/m², $p = 0.64$), and ASA physical status classifications (I/II/III) were also evenly distributed (35/38/7 vs. 33/40/7, $p = 0.85$). The mean duration of surgery was nearly the same between groups (70.2 ± 15.6 vs. 71.5 ± 14.9 minutes, $p = 0.67$). The prevalence of hypertension (27.5% vs. 25%, $p = 0.75$) and diabetes mellitus (17.5% vs. 18.8%, $p = 0.84$) did not differ significantly, confirming that both groups were demographically and clinically well-matched at baseline.

Table 1. Demographic data among respondents (n=160)

Variable	Paracetamol Group (n=80)	Dexmedetomidine Group (n=80)	p-value
Age (years, Mean ± SD)	45.8 ± 12.4	46.2 ± 11.8	0.78
Gender (M/F)	38/42	40/40	0.72
BMI (kg/m², Mean ± SD)	26.5 ± 3.8	26.8 ± 4.1	0.64
ASA Grade (I/II/III)	35/38/7	33/40/7	0.85
Duration of Surgery (min, Mean ± SD)	70.2 ± 15.6	71.5 ± 14.9	0.67
Hypertension (%)	22 (27.5%)	20 (25%)	0.75
Diabetes Mellitus (%)	14 (17.5%)	15 (18.8%)	0.84

The intraoperative hemodynamic parameters showed consistently lower values in the dexmedetomidine group compared to the paracetamol group across all measured time points (5, 15, 30, 45, and 60 minutes). Heart rate (HR) was significantly reduced in Group D, starting from 74.8 ± 8.3 bpm at 5 minutes to 75.1 ± 7.8 bpm at 60 minutes, compared to higher HR in Group P ranging from 82.5 ± 7.9 to 79.8 ± 8.7 bpm. Similarly, systolic blood pressure (SBP) was lower in Group D (118.2 ± 8.7 to 109.6 ± 7.0 mmHg) compared to Group P (128.4 ± 9.5 to 121.3 ± 8.2 mmHg). Diastolic blood pressure (DBP) and mean arterial pressure (MAP) also followed this trend, with Group D consistently exhibiting lower values than Group P. These findings indicate that dexmedetomidine provided more stable and controlled hemodynamic parameters during surgery.

Table 2: Intraoperative Hemodynamic Parameters

Time (min)	**HR (min)**		**SBP (mmHg)**		**DBP (mmHg)**		**MAP (mmHg)**	
	Group P	**Group D**	**Group P**	**Group D**	**Group P**	**Group D**	**Group P**	**Group D**
5	82.5 ± 7.9	74.8 ± 8.3	128.4 ± 9.5	118.2 ± 8.7	78.6 ± 6.5	70.2 ± 5.9	91.4 ± 6.8	86.1 ± 6.2
15	86.4 ± 9.2	72.5 ± 7.5	126.2 ± 9.1	115.8 ± 7.9	77.3 ± 6.2	68.9 ± 5.8	90.5 ± 6.7	84.5 ± 6.0
30	84.9 ± 8.7	70.6 ± 7.2	124.5 ± 8.9	112.5 ± 7.5	76.1 ± 6.0	67.4 ± 5.7	89.2 ± 6.5	83.1 ± 5.8
45	80.7 ± 8.3	72.1 ± 7.8	122.9 ± 8.5	110.8 ± 7.2	75.4 ± 5.9	66.7 ± 5.5	88.5 ± 6.2	82.3 ± 5.6
60	79.8 ± 8.7	75.1 ± 7.8	121.3 ± 8.2	109.6 ± 7.0	74.2 ± 5.8	65.9 ± 5.4	87.9 ± 6.1	81.2 ± 5.5

The postoperative hemodynamic data revealed that the dexmedetomidine group maintained significantly lower heart rates (HR) and mean arterial pressures (MAP) compared to the paracetamol group at all observed time points—4, 8, 16, and 24 hours. Heart rate in Group D gradually decreased from 76.2 ± 6.9 bpm at 4 hours to 72.5 ± 6.2 bpm at 24 hours, while Group P showed higher HR values ranging from 84.3 ± 7.6 bpm to 78.9 ± 6.8 bpm over the same period. Similarly, MAP values were consistently lower in Group D (85.4 ± 6.2 to 82.8 ± 5.6 mmHg) than in Group P (92.5 ± 6.8 to 89.5 ± 6.1 mmHg). These results indicate that dexmedetomidine provided better hemodynamic stability in the postoperative period.

Table 3: Hemodynamic Comparison Between Two Groups at Different Intervals,

Time (h)	HR (Group P)	HR (Group D)	MAP (Group P)	MAP (Group D)
4	84.3 ± 7.6	76.2 ± 6.9	92.5 ± 6.8	85.4 ± 6.2
8	82.1 ± 7.4	74.8 ± 6.7	91.2 ± 6.5	84.1 ± 6.0
16	80.4 ± 7.1	73.2 ± 6.4	90.1 ± 6.3	83.2 ± 5.8
24	78.9 ± 6.8	72.5 ± 6.2	89.5 ± 6.1	82.8 ± 5.6

The comparison of postoperative pain and sedation scores between the two groups showed that the dexmedetomidine group consistently experienced lower pain levels and higher sedation throughout the 24-hour period. Visual Analogue Scale (VAS) scores at 4, 8, 16, and 24 hours were significantly lower in Group D (3.4 ± 1.1, 3.1 ± 1.0, 2.8 ± 0.9, and 2.5 ± 0.8, respectively) compared to Group P (5.8 ± 1.2, 5.5 ± 1.1, 4.9 ± 1.0, and 4.5 ± 0.9). Correspondingly, sedation scores were higher in the dexmedetomidine group, starting at 4.2 ± 0.7 at 4 hours and decreasing to 3.6 ± 0.4 at 24 hours, whereas the paracetamol group had lower scores ranging from 3.1 ± 0.6 to 2.5 ± 0.4. These findings indicate that dexmedetomidine provided superior analgesia and maintained a higher level of sedation compared to paracetamol postoperatively.

Table 4: Postoperative Analgesia Among Two Groups

Pain Scale	Group P (VAS Score)	Group D (VAS Score)	Sedation Scale (SS)	Group P	Group D
VAS 4	5.8 ± 1.2	3.4 ± 1.1	2.2 ± 0.5	3.1 ± 0.6	4.2 ± 0.7
VAS 8	5.5 ± 1.1	3.1 ± 1.0	2.0 ± 0.4	3.0 ± 0.5	4.0 ± 0.6
VAS 16	4.9 ± 1.0	2.8 ± 0.9	1.8 ± 0.3	2.8 ± 0.5	3.8 ± 0.5
VAS 24	4.5 ± 0.9	2.5 ± 0.8	1.5 ± 0.3	2.5 ± 0.4	3.6 ± 0.4

The comparative analysis of intraoperative and postoperative parameters revealed that the dexmedetomidine group required significantly less fentanyl, both intraoperatively (80.3 ± 12.5 mcg vs. 120.5 ± 15.2 mcg) and postoperatively (50.7 ± 10.2 mcg vs. 90.6 ± 14.8 mcg), with p-values <0.001. Additionally, the time to first rescue analgesia was notably longer in the dexmedetomidine group (78.9 ± 7.3 min vs. 45.2 ± 5.8 min), indicating prolonged pain control. VAS scores were significantly lower at both 4 and 24 hours postoperatively in Group D (3.4 ± 1.1 and 2.5 ± 0.8, respectively) compared to Group P. Sedation scores were higher in Group D at the same time points, reflecting greater postoperative sedation. Moreover, postoperative nausea and vomiting were less frequent in the dexmedetomidine group (15% vs. 22%, p = 0.045), and patients in this group had a shorter length of stay in the Post-Anesthesia Care Unit (48.2 ± 6.5 min vs. 55.6 ± 7.9 min, p = 0.032). Overall, dexmedetomidine demonstrated superior analgesic

efficacy, reduced opioid requirement, better sedation, and improved postoperative recovery profile compared to paracetamol.

Table 5: Intra-Operative and Post-Operative Parameters Among Different Groups

Parameter	Group P (Paracetamol)	Group D (Dexmedetomidine)	p-value
Total Intraoperative Fentanyl Consumption (mcg)	120.5 ± 15.2	80.3 ± 12.5	<0.001
Total Postoperative Fentanyl Consumption (mcg)	90.6 ± 14.8	50.7 ± 10.2	<0.001
Time to First Rescue Analgesia (min)	45.2 ± 5.8	78.9 ± 7.3	<0.001
VAS Score at 4h	5.8 ± 1.2	3.4 ± 1.1	<0.001
VAS Score at 24h	4.5 ± 0.9	2.5 ± 0.8	<0.001
Sedation Score at 4h	2.2 ± 0.5	3.1 ± 0.6	<0.001
Sedation Score at 24h	1.5 ± 0.3	2.5 ± 0.4	<0.001
Postoperative Nausea and Vomiting (PONV) (%)	22%	15%	0.045
Length of PACU Stay (min)	55.6 ± 7.9	48.2 ± 6.5	0.032

Discussion

The current research confirmed that, like dexamethasone, dexmedetomidine lessens the frequency and intensity of PONV. It lessens the intensity of early postoperative pain and minimizes painkiller usage in the first twenty-four hours following laparoscopic cholecystectomy. According to Massad et al., dexmedetomidine decreased the occurrence of PONV in female patients having elective diagnostic laparoscopic gynecological procedures, which is in line with our findings. Their finding was ascribed to the general decline in the use of anesthetic drugs, they said. During the first twenty-four hours after uvulo-palatopharyngoplasty surgery, Abdelmageed et al.(14) found that patients given dexmedetomidine had a considerably lower risk of postoperative nausea and vomiting (PONV). They reasoned that since the dexmedetomidine group needed less morphine after surgery, they had found their result. Also, without side effects, Goksu et al. (15,16) found that dexmedetomidine significantly reduced the incidence of postoperative nausea and vomiting (PONV) after functional endoscopic sinus surgery performed under local anesthetic. The overall incidence of postoperative nausea and vomiting (PONV) during the 24 hours after breast cancer surgery was found to be trending toward a lower incidence in the dexmedetomidine group, after a single dose of 0.5 μg/kg dexmedetomidine was given at the end of the procedure. However, this trend did not reach statistical significance, according to Kim et al. (17). On the other hand, they found that dexmedetomidine greatly decreased the occurrence of severe PONV within the initial twenty-four hours following surgery. They also discovered that dexmedetomidine decreased the need for

rescue analgesics in the first twenty-four hours following surgery and enhanced recovery quality (QoR-40), all without significantly increasing recovery timeframes or generating major hemodynamic adverse effects. Our study utilized a dosage of 1 μg/kg because their dose of 0.5 μg/kg would not have been enough to achieve statistical significance in preventing PONV. Perioperative systemic injection of α2-agonists reduces postoperative opioid consumption, pain severity, and nausea without prolonging recovery periods, according to Blaudszun et al. (18), who conducted a comprehensive review and meta-analysis.

The decreased use of intra- and postoperative opioids and inhaled anesthetics in the dexmedetomidine group may account for the lower incidence of postoperative nausea and vomiting (PONV) (19). Another possible antiemetic action of dexmedetomidine is a reduction in noradrenergic activity due to its binding to alpha-2 presynaptic inhibitory adreno-receptors in the locus coeruleus [18]. Finally, it could be associated with dexmedetomidine's total suppression of sympathetic outflow and catecholamine release. An increase in sympathetic tone and the secretion of catecholamines may precipitate PONV [8].

Other researchers have also shown that dexmedetomidine can reduce opioid use, as was seen in the current study. Even though the two groups experienced comparable levels of pain following total abdominal hysterectomy, Gurbet et al. (20,21) found that patients given dexmedetomidine needed less morphine overall in the first 48 hours following the procedure. Additionally, Arain et al. [19] observed that patients having elective inpatient surgery reported comparable levels of pain when given intra-operative dexmedetomidine or morphine sulfate. To get the same analgesic effect as the dexmedetomidine group, the morphine group needed 66% more morphine. An explanation for why dexmedetomidine alleviates postoperative pain could be that it activates the α2-adrenoreceptor in the spinal cord's dorsal horn. This, in turn, inhibits the release of substance P, which modulates the transmission of nociceptive signals in the central nervous system. As a result, there are less nociceptive inputs during the acute period following surgery(22).

In a study that compared the use of dexmedetomidine for closed reduction of nasal bone fractures in two groups, one that got monitored anesthetic treatment and another that did not, Lee et al. (23) found no difference in the incidence of PONV between the two groups. Nevertheless, the group administered dexmedetomidine had surgery while under local anesthetic, in contrast to the group that received general anesthesia. Furthermore, the PONV was solely evaluated in the PACU. Despite decreased anesthetic use and maintenance of steady hemodynamics in the Dexmed group, the incidence of PONV was not significantly different between the dexmedetomidine and control groups in the study by Shin et al. (23). The timing of the dexmedetomidine dose (pre-anesthesia), the type of operation (gynecological), and the sample size (only 21 patients in each group) may explain why our investigation found a lower incidence of PONV than their study. The recuperation room was the only area where they noticed PONV, which is crucial.

The current investigation revealed that 27.9% of the participants in the Dexa group experienced PONV. Prior research on the use of dexamethasone to prevent postoperative nausea and vomiting (PONV) following laparoscopic cholecystectomy has shown results consistent with these findings(24). Not much is known about how dexamethasone works as an antiemetic. Dexamethasone may have a serotonin receptor antagonistic effect in the gut, according to Elhakim et al. (25). By lowering tissue inflammation surrounding the surgical site,

dexamethasone may reduce parasympathetic impulses to the brain, according to others (26). The results of this study suggest that dexmedetomidine reduces the occurrence and severity of PONV in a manner comparable to dexamethasone. Furthermore, dexmedetomidine had no significant side effects and is more effective than dexamethasone in lowering total analgesic use and postoperative pain in the first twenty-four hours following laparoscopic cholecystectomy. To avoid adverse effects on patient hemodynamics or sedation, further research is required to establish the optimal timing and dosage of dexmedetomidine for PONV prevention. Consequently, we think that patients having laparoscopic cholecystectomy should only take one dosage of dexmedetomidine to avoid PONV.

Conclusion

Dexmedetomidine provided better intraoperative hemodynamic control, enhanced postoperative analgesia and sedation, and reduced fentanyl requirements compared to paracetamol. It also improved recovery outcomes with less nausea and shorter PACU duration. Dexmedetomidine may be a more effective option for perioperative management in surgical patients.

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