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CLINICAL TRIAL REPORT

Effect of Intravenous Infusion of Lidocaine Compared with Ultrasound-Guided Transverse Abdominal Plane Block on the Quality of Postoperative Recovery in Patients Undergoing Laparoscopic Bariatric Surgery

Jing Sun[1,2], Shan Wang[1,2], Jun Wang[1,2], Xiuxiu Gao[1,2], Guanglei Wang[1,2]

[1]Jiangsu Province Key Laboratory of Anesthesiology, Xuzhou Medical University, Xuzhou, Jiangsu, People's Republic of China; [2]Department of Anesthesiology, The Affiliated Hospital of Xuzhou Medical University, Xuzhou, Jiangsu, People's Republic of China

Correspondence: Guanglei Wang, Department of Anesthesiology, The Affiliated Hospital of Xuzhou Medical University, No. 99 Huaihai West Road, Xuzhou, 221000, People's Republic of China, Tel +8613852087156, Email 13852087156@163.com

Purpose: To investigate the effect of intravenous infusion of lidocaine compared with ultrasound-guided transverse abdominal plane (TAP) block on the quality of postoperative recovery and analgesic effect in patients undergoing bariatric surgery.

Patients and Methods: Ninety-nine ASA II–III patients scheduled for elective laparoscopic bariatric surgery were randomized into the lidocaine group (group L), transverse abdominal plane block group (group T), and control group (group C). Group L: a loading dose of 1.5 mg/kg lidocaine was given at induction, followed by 2 $mg \cdot kg^{-1} \cdot h^{-1}$ maintenance until the end of surgery. Group T: ultrasound-guided bilateral administration of 0.25% ropivacaine in the transverse abdominal plane was given after induction of general anesthesia. Group C: no additional treatment was performed. Quality of recovery-40 (QoR-40) was assessed at 24 h after surgery. Consumption of propofol and remifentanil, visual analog scale (VAS) pain scores at rest at 0, 6, 12, and 24 h postoperatively, time to return of intestinal function, use of remedial analgesics within 24 h after surgery, adverse reactions were recorded.

Results: Compared with Group C, Group L and Group T had higher QoR-40 scores at 24 h postoperatively, and the difference was statistically significant (P=0.002 and P=0.003, respectively). However, there was no difference between Group L and Group T (P=0.128). In addition, compared with those of Group T and Group C, VAS scores at 12 h and 24 h postoperatively were lower in Group L (P <0.0166).

Conclusion: Both intravenous infusion of lidocaine and ultrasound-guided TAP block provided good postoperative recovery and postoperative analgesia for patients with bariatric surgery, and intravenous infusion of lidocaine provided better analgesia at 12 h and 24 h postoperatively compared with TAP block.

Keywords: lidocaine, TAP block, bariatric surgery, postoperative recovery, postoperative pain

Introduction

Morbid obesity is often comorbid with metabolic diseases such as diabetes mellitus and hypertension, which reduces patients' quality of life, increases the risk of death, and reduces their life expectancy.[1] Laparoscopic bariatric surgery is currently the main surgical procedure for the treatment of morbid obesity, and intraoperative and postoperative analgesia is still dominated by opioids. However, postoperative complications such as respiratory depression, nausea and vomiting and delayed recovery of gastrointestinal function can easily occur, and nausea and vomiting can lead to increased intragastric pressure, which is one of the causes of anastomotic fistula; moreover they can also lead to increased blood pressure, which can lead to postoperative bleeding.[2] Therefore, reducing intraoperative and postoperative opioid use can reduce such complications. It has been reported in the literature that continuous intraoperative infusion of lidocaine or TAP block both have some analgesic effect and can reduce the use of opioids. However, no studies have compared the quality of postoperative recovery, postoperative analgesic effects, and

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perioperative opioid consumption between intravenous lidocaine and TAP block in morbidly obese patients undergoing laparoscopic bariatric surgery. This study focused on the differences in the quality of postoperative recovery and analgesic effects between the two methods in patients undergoing gastric decompression by intravenous infusion of lidocaine or ultrasound-guided transverse abdominal plane block, providing new ideas for multimodal analgesic strategies and improvements of the quality of postoperative recovery in patients undergoing perioperative gastric decompression.

Patients and Methods

General Information

This is a single-blind, prospective, randomized controlled trial and has been approved by the Ethics Committee of The Affiliated Hospital of Xuzhou Medical University (XYFY2021-KL075-02). The trial was registered prior to patient enrollment at the Chinese Clinical Trial Registry (ChiCTR1900023411). This study complies with the Declaration of Helsinki and adheres to CONSORT guidelines. Written informed consent was obtained from all patients. Patients aged 18–65 years with BMI ≥35 kg/m^2 and American Society of Anesthesiologists (ASA) physical status II–III met the inclusion criteria. The exclusion criteria were as follows: Contraindication to nerve block, such as coagulation dysfunction or puncture site infection; history of allergy to local anesthetics; preoperative cardiac arrhythmias; history of postoperative nausea and vomiting or motion sickness; chronic pain, long-term use of opioid analgesics, corticosteroids, and/or pregnancy; history of substance abuse, mental illness, or communication disorders; laparoscopy to open abdomen; and refusal to sign informed consent. Patients were also excluded from the study if surgery lasted more than 3 h; if the patient was allergic to general anesthetic or withdrew halfway; and if they were admitted to the intensive care unit (ICU). Each individual was randomly assigned to the lidocaine group (Group L), transverse abdominal plane block group (Group T), and control group (Group C) in a 1:1:1 ratio by using the tool from www.randomization.com. The details of each patient's method of anesthesia were stored in an opaque, sealed envelope and opened only by researchers before anesthesia induction. All participants, preoperative and postoperative follow-up assessors and statisticians were blinded to the group allocation.

Anesthesia Protocol

All participants fasted for 8 h and forwent water for 4 h before surgery. After participants entered the operation room, electrocardiogram (ECG) parameters, heart rate (HR), pulse oxygen saturation (S_pO2) and upper-limb mean blood pressure (MBP) were monitored. Upper limb venous access was opened, and radial artery puncture was performed under local anesthesia. Anesthesia index (Ai, Pearlcare Anesthesia Depth Monitor, Conview YY-105, Zhe-jiang Yiyang Medical Technology Co., LTD.) was recorded to monitor the depth of anesthesia over a range from 0 to 100. The lower the value, the deeper the anesthesia.

At induction, patients in all three groups were injected with 0.05 mg/kg midazolam, 0.3 mg/kg etomidate, 0.5 μg/kg sufentanil, rocuronium 0.6 mg/kg and 5 mg dexamethasone. A loading dose of 1.5 mg/kg lidocaine was given at induction in Group L. All the medications in the study protocol were dosed based on the dosing body weight [ideal body weight (IBW) + 0.4 × (actual body weight−IBW)]. When the TOF value dropped to zero, a tracheal tube was inserted through the mouth when Ai<60. After tracheal intubation, mechanical ventilation was performed in pressure-controlled–volume-guaranteed ventilation mode (PCV-VG) with a tidal volume of 6–8 mL/kg, an inspiratory-to-expiratory ratio of 1:2, an inspired oxygen concentration of 60%, an oxygen flow rate of 2 L/min, a positive end-expiratory pressure (PEEP) value of 5 cmH_2O, and an adjusted respiratory rate to maintain $P_{et}CO_2$ at 35–45 mmHg. Before the start of surgery, the patients in Group L were given lidocaine maintained at a rate of 2.0 $mg{\cdot}kg^{-1}{\cdot}h^{-1}$ after induction until the end of the operation, and the patients in Group T were given 0.25% ropivacaine under ultrasound guidance to perform bilateral transverse abdominal plane blocks (20 mL each side) after induction of general anesthesia. The ultrasound probe was placed on the lateral abdominal wall in the mid-axillary line between the lower costal margin and iliac crest. A spinal needle was advanced using in-plane technique between the aponeurosis of the internal oblique and transversus abdominis muscles (Figure 1). Patients in Group C were not given additional treatment.

Anesthesia was maintained with 2–5 $mg{\cdot}kg^{-1}{\cdot}h^{-1}$ propofol, 0.1–0.3 $\mu g{\cdot}kg^{-1}{\cdot}h^{-1}$ remifentanil and 1% sevoflurane. The infusion rate of propofol or remifentanil was adjusted during surgery to maintain an Ai value at 40–60, blood pressure and heart rate within 20% of the basal value. After pneumoperitoneum was established, the intra-abdominal pressure fluctuated between 9 and 13 mmHg. Intraoperative blood pressure was maintained within 20% of the baseline

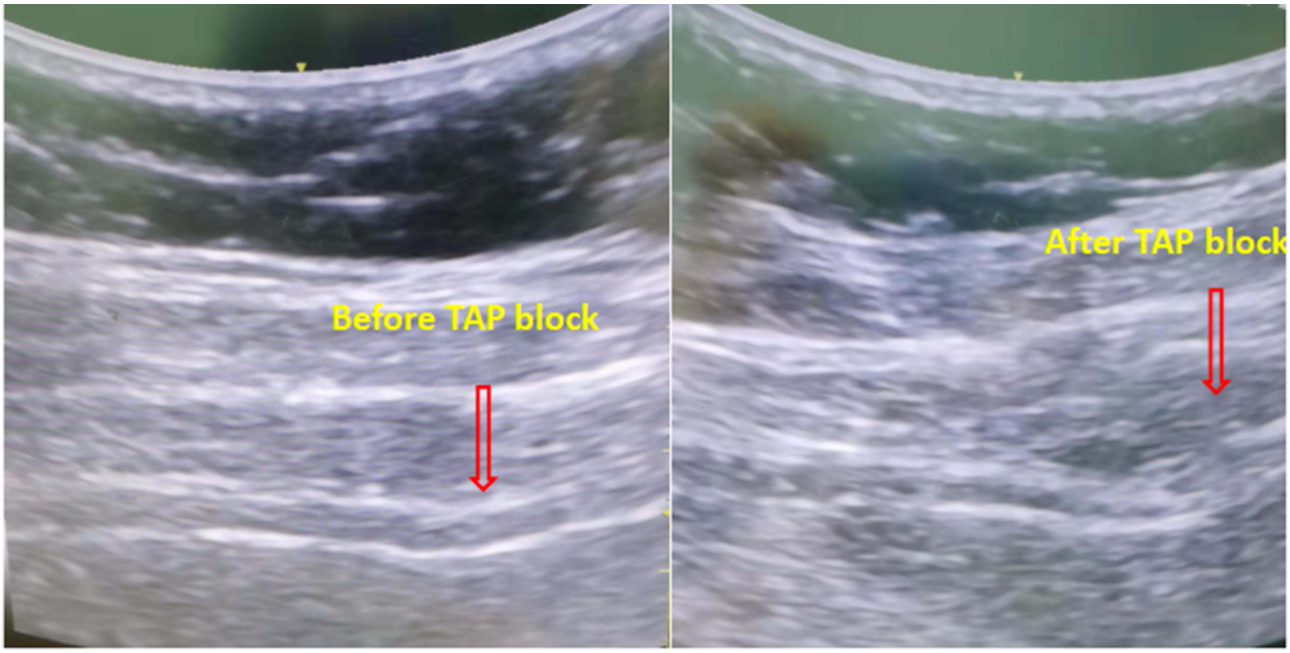

Figure 1 Process of TAP block as seen on ultrasound examination.

value. If the mean blood pressure (MBP) was <30% of the baseline, 3 mg ephedrine (HR < 50 beats/min) or 40 μg phenylephrine (HR≥50 beats/min) was administered. Five milligrams urapidil was injected when the MBP was >30% of the baseline, and 0.5 mg atropine was administered if HR was <40 beats/min. These steps were repeated if necessary. Intraoperative intravenous infusion of sodium, potassium, magnesium, calcium and glucose consisted of a crystalloid solution (multiple electrolytes of sodium, potassium, magnesium, calcium, glucose) and succinyl gelatin in a volume ratio of 2:1. Intraoperative arterial blood was collected intermittently for blood gas analysis to maintain a stable internal environment. All patients were given 12.5 mg dolasetron and 30 mg aminotriol ketorolac intravenously 15 min before the end of surgery. All intravenous and inhaled drugs were stopped after finishing skin closure. The oxygen flow was adjusted to 6 L/min at the end of the operation.

All patients were transferred to the postanesthesia care unit (PACU) for resuscitation and extubation. Residual neuromuscular blockade was antagonized routinely with 1.0 mg neostigmine and 0.5 mg atropine if there were no contraindications. Postoperatively, 60 mg aminotriol ketorolac was routinely administered intravenously by a surgeon unaware of the subgroup, and dezocine was used on an individual basis to maintain VAS below or equal to 4 points, with data collected by study team personnel.

Primary and Secondary Outcomes

Primary Outcome Measure

The primary outcome measure of this study was the Quality of Recovery-40 (QoR-40)[3] questionnaire assessed at 24 h after surgery. The QoR-40 questionnaire measures 40 items from 5 dimensions of recovery: physical comfort, physical independence, emotional state, psychological support and pain. Each item is rated from 1 to 5 points, and the aggregate score is 200 points (best quality). 4.8 is the minimal clinically important difference for QoR-40 scale scores.[4]

Secondary Outcomes Measures

VAS scores at rest were assessed at 0, 6, 12, and 24 h postoperatively. The duration of surgery, extubation time, PACU stay time, intraoperative consumption of propofol and remifentanil, use of vasoactive drugs, blood loss, consumption of diazoxide within 24 h after the operation, adverse reactions, time to first exhaust, number of postoperative bowel movements before discharge and

hospital stay durations were also recorded. Pain intensity was evaluated using a VAS score (0 = no pain, 10 = worst imaginable pain). The time to first exhaust was defined as the interval between the end of surgery and the first flatulence.

Sample Size Calculation

The sample size was calculated on the basis of a pilot study in which the mean QoR-40 scores in the three groups were 174, 168, and 152; the standard deviations were 16, 18, and 18, respectively. Assuming an α of 0.05 and β of 0.1 and using PASS version 15.0, accounting for a 20% dropout rate, each group needed 36 patients in this trial.

Statistical Analysis

SPSS statistical software (version 26.0; SPSS Inc., IBM, Chicago, IL, USA) was used for statistical data analysis; The measurement data used the Shapiro–Wilk test to determine the normality of the data distribution, and the Levene method was used to test the homogeneity of variance. Data are expressed as the mean (SD) for parametric continuous variables and as the median (interquartile range [IQR]) for nonparametric distribution of data. Categorical data are expressed as a number (percentage). The chi-square test or Fisher exact test with Yates correction was used to compare differences in categorical variables when appropriate. Analysis of variance was used to compare continuous parametric variables, and the Kruskal–Wallis test was used for continuous nonparametric variables. Post hoc analysis was performed using Bonferroni adjustment in the case of statistically significant differences observed among multiple groups. Two-sided $P < 0.05$ was considered statistically significant.

Results

A total of 108 patients were screened to participate in the trial, of whom nine were excluded. Two of these patients were excluded because they underwent temporarily canceled surgery, and one had a history of postoperative nausea. After being enrolled, six more patients were excluded; among them, two patients were excluded because surgery took more than 3 h, two patients were converted to open surgery, one patients were admitted to the ICU after the operation and one withdrew halfway. Ultimately, 99 patients were included in the statistical analysis. No significant differences were found among the three groups in terms of baseline characteristics (Table 1, Figure 2).

Table 1 Patient's Characteristics of Demographic Data

	Group L (n=33)	Group T (n=33)	Group C (n=33)	*P*
Gender (M/F)	7/26	10/23	5/28	0.329
Age (yr)	32.67±6.93	31.42±8.53	32.88±6.99	0.698
Height (m)	1.68±0.08	1.67±0.07	1.66±0.08	0.458
Weight (kg)	117.95±13.77	118.30±12.01	113.39±13.01	0.234
Body mass index (kg/m^2)	41.78±4.28	42.43±4.53	41.33±4.73	0.612
ASA physical status (II/III)	21/12	23/10	24/9	0.720
Hypertension	5(15.15%)	4(12.12%)	7(21.21%)	0.593
Diabetes mellitus	10(30.30%)	8(24.24%)	5(15.15%)	0.341
Obstructive sleep apnea-hypopnea syndrome	13(39.39%)	14(42.42%)	11(33.33%)	0.742
Surgical procedure (Gastric sleeve /Roux-en-y gastric bypass)	29/4	28/5	29/4	0.917
Surgical duration (minutes)	120(100–145)	110(92.5–130)	105(90–142)	0.144
Intravenous fluid (mL)	1050(975–1250)	1050(925–1125)	1000(900–1050)	0.203

Notes: Data are presented as Mean ± SDs, numbers (%) or medians (interquartile range).
Abbreviations: ASA, American Society of Anesthesiologists; Group L, lidocaine group; Group T, TAP group; Group C, control group.

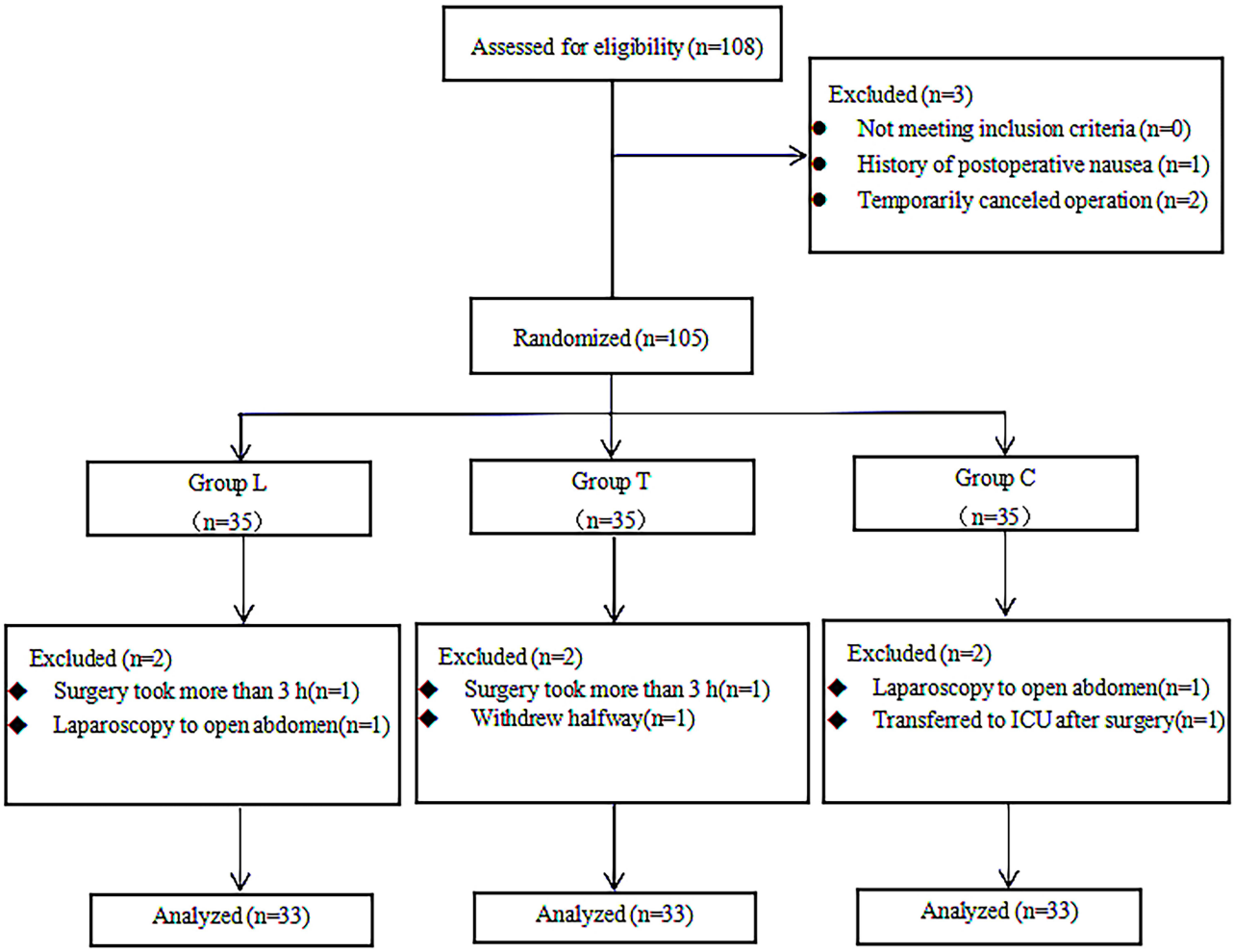

Figure 2 CONSORT flow diagram with study overview and recruitment profile.
Notes: Group L, lidocaine group; Group T, TAP group, Group C, control group.
Abbreviations: CONSORT, Consolidated Standards for Reporting of Trials; ICU, intensive care unit.

The median (IQR) QoR-40 scores were 170 (166.00–175.50), 167 (162.50–172.00), and 161 (158.00–163.50) for Group L, Group T, and Group C, respectively. Compared with Group C, the overall QoR-40 scores of Group L and Group T increased significantly at 24 h postoperatively, and the difference was statistically significant (P=<0.001; P=0.001, respectively). When analyzing each questionnaire domain, a significantly higher improvement in Group L was noted for physical comfort, physical independence, and pain at 24 h after surgery compared with Group C (P<0.001; P=0.002; P<0.001, respectively). The scores of these three areas were also significantly higher in Group T than in Group C (P=0.001; P=0.003; P=0.014, respectively). In addition, the pain perception score was higher in Group L than in Group T (P =0.008, Table 2).

The VAS scores at rest at 6 h postoperatively were significantly lower in Group L and Group T than in Group C (Group L vs Group C, P=0.006; (Group T vs Group C, P=0.011). Compared with Group T and Group C, the VAS scores at 12 h and 24 h postoperatively were lower in Group L (P<0.0166). There was no difference in VAS scores at 0 h among the three groups (P=0.708). When we compared the intragroup values using the repeated measures test, there were significant differences in VAS scores at all time points compared with those at 0 h in all group (Figure 3).

Compared with Group C, intraoperative remifentanil consumption was lower in Group L and Group T (P<0.010, P=0.002, respectively). Consumption of dezocine within 24 h postoperatively was different across groups (Group L vs Group C, P=0.002; (Group T vs Group C, P=0.008). Time to first leave bed and first exhaust were faster in Group L and Group T than in Group C (P=0.006; P=0.011, respectively), and there was no significant difference in intraoperative

Table 2 QoR-40 Score (n=99)

	Group L (n=33)	Group T (n=33)	Group C (n=33)	*P*
Emotional state	39(38.00–41.00)	39(37.50–40.00)	38(36.00–39.50)	0.09
Physical comfort	50(48.50–52.50)[a]	49(47.00–51.50)[a]	47(44.50–48.00)[b]	<0.001
Physical independence	20(19.00–22.00)[a]	20(19.00–22.00)[a]	19(17.00–21.00)[b]	0.002
Psychological support	29(28.00–30.00)	29(28.00–29.00)	28(27.50–32.00)	0.266
Pain	32(30.50–33.00)[ab]	30(29.00–32.00)[a]	29(28.00–31.00)[b]	<0.001
Total	170(166.00–175.50)[a]	167(162.50–172.00)[a]	161(158.00–163.50)[b]	<0.001

Notes: Data are presented as medians (interquartile range). [a]Compared with control group, $P < 0.0166$; [b]Compared with TAP group, $P < 0.0166$.
Abbreviations: Group L, lidocaine group; Group T, TAP group; Group C, control group.

propofol consumption, use of vasoactive drugs, extubation time, PACU stay time, first postoperative defecation, or hospital stay duration among the three groups (P>0.05, Table 3).

Five, four and fourteen patients in Group L, Group T and Group C, respectively, had vomiting ($P = 0.020$), and there was no significant difference in the incidence of postoperative nausea, chills, fever, and hypoxemia among the three groups of patients ($P > 0.05$, Table 4).

Discussion

Laparoscopic bariatric surgery is an effective method for the treatment of morbid or complex obesity.[5,6] However, there are some serious perioperative challenges and factors that may hinder perioperative outcome or recovery in bariatric surgery patients.[7,8] Postoperative pain may have a negative impact on recovery, ambulation, gastrointestinal function, and

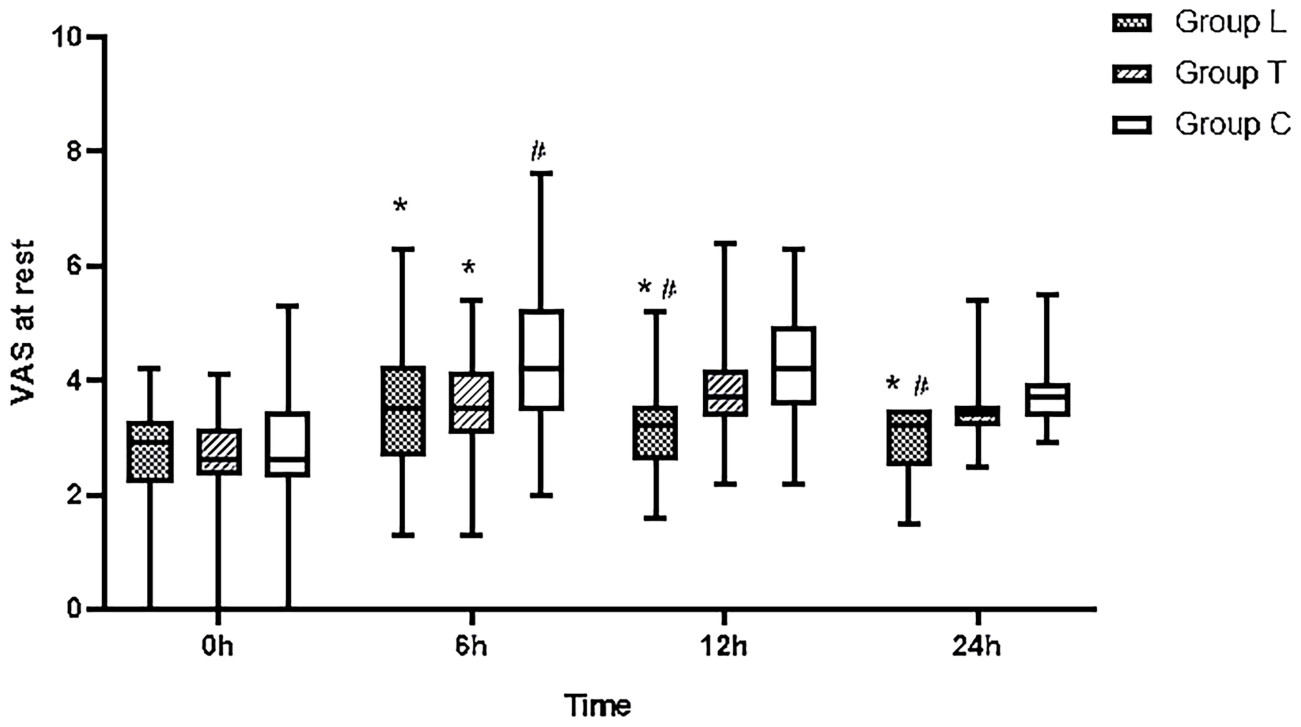

Figure 3 VAS scores at rest.
Notes: Data are expressed as median (horizontal bar), interquartile range (box) and the maximum and minimum values (whiskers). All groups were compared using Kruskal–Wallis *H*-test. *Compared with Group C, $P < 0.0166$; #Compared with Group T, $P< 0.0166$.
Abbreviations: Group L, lidocaine group; Group T, TAP group; Group C, control group.

Table 3 Perioperative Data Among the Three Groups

	Group L (n=33)	Group T (n=33)	Group C (n=33)	*P*
Consumption of propofol (mg)	375(275–540)	317(258–525)	335(285–545)	0.914
Consumption of remifentanil (mg)	1.31(1.21–1.56)[a]	1.24(0.98–1.93)[a]	1.64(1.32–2.21)[b]	0.004
Use of vasoactive drugs				
Ephedrine or Phenylephrine	15(45.45%)	13(39.39%)	12(36.36%)	0.746
Urapidil	2(6.06%)	3(9.09%)	1(3.03%)	0.341
Atropine	3(9.09%)	1(3.03%)	1(3.03%)	0.456
Extubation time (min)	11.3(9.7–14.3)	11.3(9.8–12.6)	11.5(10.4–13.9)	0.551
PACU stay time (min)	28.1±2.6	28.4±2.2	27.9±2.7	0.656
Consumption of dezocine within 24h postoperativeiy	9.85±6.67[a]	10.75±5.61[a]	15.76±9.53[b]	0.003
Time to first leave bed (h)	15.7(12.9–17.9)[a]	16.7(11.8–18.6)[a]	18.3(16.6–21.3)	0.006
Time to first exhaust (h)	17.4(16.2–21.6)[a]	18.2(16.3–21.1)[a]	21.3(17.5–24.5)	0.011
First postoperative defecation	5(15.15%)	6(18.18%)	5(15.15%)	0.928
Hospital stay duration (d)	2.1(1.8–3.1)	1.9(1.9–2.4)	2.5(1.5–3.9)	0.419

Notes: Data are presented as Mean ± SD, number (%) or median (interquartile range). [a]Compared with Group C, $P < 0.0166$; [b]Compared with Group T, $P < 0.0166$.
Abbreviations: PACU, post-anesthesia care unit; Group L, lidocaine group; Group T, TAP group; Group C, control group.

Table 4 Postoperative Incidence of Adverse Reactions

	Group L (n=33)	Group T (n=33)	Group C (n=33)	*P*
Nausea	14(42.42%)	16(48.48%)	21(63.63%)	0.207
Vomit	5(15.15%)[a]	6(18.18%)	14(42.42%)	0.020
Fever	1(3.03%)	0	3(9.09%)	0.109
Shivering	2(6.06%)	1(3.03%)	2(6.06%)	0.759
Hyoxemia	4(12.12%)	2(6.06%)	3 (9.09%)	0.689

Notes: Data are presented as number (%). [a]Compared with Group C, $P < 0.0166$.
Abbreviations: Group L, lidocaine group; Group T, TAP group; Group C, control group.

length of hospital stay. In addition, serious adverse effects such as apnea, hypoxemia, drowsiness, intestinal obstruction, vomiting, delayed activity, and mortality are associated with the use of opioid analgesics in bariatric patients.[9,10] Therefore, it is highly desirable to use multimodal strategies to minimize opioid-related side effects and improve postoperative recovery in bariatric patients undergoing surgery. The QoR-40 scale[11] not only has a final score but also provides a comprehensive assessment of the quality of recovery in terms of five dimensions: emotional state, physical comfort, psychological support, self-care, and pain perception. The higher the postoperative QoR-40 score is, the better the quality of postoperative recovery. Several studies have shown that the QoR-40 questionnaire can be used for immediate assessment of patients' recovery quality after surgery.

In recent years, intravenous lidocaine and TAP block have been increasingly used for postoperative analgesia, but their efficacy is still controversial. Studies have found that intravenous infusion of lidocaine and TAP block can relieve postoperative acute pain, reduce the use of opioids, and improve postoperative comfort.[12,13] However, G. Dewinter[14] found that intravenous lidocaine could not improve the postoperative morphine dosage or postoperative recovery of

patients undergoing posterior spinal fusion. Kane[15] observed that TAP block did not improve the QOR-40 score after laparoscopic hysterectomy, nor did it reduce the use of narcotic analgesics.

Our study found that intravenous infusion of lidocaine or ultrasound-guided TAP block could both improve postoperative recovery quality scores, but there was no significant difference between the two interventions. The improvement in the total score was mainly reflected in the three aspects of physical comfort, self-care ability and pain perception, which was consistent with Wang's finding[16] that intravenous lidocaine could improve the postoperative recovery quality of patients undergoing thoracoscopic lung cancer.

In addition, we observed a lower prevalence of nausea in the anesthesia care unit in the lidocaine group than in the control group. This observation likely resulted from the lower opioid consumption by the lidocaine group. Several mechanisms have been proposed to explain the opioid-sparing effects of perioperative systemic lidocaine. First, intravenous infusion of lidocaine has anti-inflammatory properties that can minimize the pain caused by surgical inflammation.[17,18] Second, systemic lidocaine can also directly block the sodium channel of nerve fibers that transmit pain.[19] Last, systemic lidocaine may reduce the need for volatile anesthetic and/or opioid drugs during surgery, which may minimize the development of hyperalgesia after surgery.[20–22] This also explains the good analgesia provided by the lidocaine group within 24 h after surgery.

The TAP block group also showed perioperative opioid savings, consistent with previous studies.[23] In addition, we observed a reduction in the 6-hour postoperative resting VAS score in the TAP group compared to the control group. However, pain scores at 12 and 24 h were similar in the two groups. This might have been due to the occurrence of rebound pain. This may explain the reported duration of TAP block action between 6 and 8 h after a single injection,[24] which is consistent with Emile 's finding.[25] This also explain why the lidocaine group had lower pain scores at 12 and 24 h after surgery than the TAP group and higher scores in the pain perception component of the quality of recovery score. TAP block has been included in the most recent ERAS guidelines for bariatric surgery with strong recommendation and high level of evidence,[26] however, compared with the lidocaine group, the TAP group did not show an advantage in our study. Gupta C[27] also found that Intravenous lidocaine improved pain score in obese patients undergoing laparoscopic bariatric surgery as compared to TAP Block.

Hanson[28] found that a continuous intravenous infusion of lidocaine offers noninferior analgesia compared with ultrasound-guided unilateral, single-injection, TAP block within the first 24 h following kidney transplant surgery. In addition, the Lidocaine group had improved patient satisfaction with analgesia scores in the first 24 h following surgery. However, there was no difference in overall postoperative opioid consumption or opioid-related adverse events between groups. Our study found similar results.

Regarding the safety aspects of the two interventions, the currently recommended protocol for intravenous application of lidocaine is a loading dose of 1.0 to 2.0 mg/kg followed by a continuous intravenous drip of 1.0 to 2.0 $mg \cdot kg^{-1} \cdot h^{-1}$, when the blood concentration of lidocaine is well below the concentration that produces toxic adverse effects (5.0 μg/mL).[29,30] In this study, lidocaine-related adverse reactions did not occur during lidocaine infusion according to dosing body weight. TAP block is a local anesthetic injected between the internal oblique and transverse abdominis muscles to block the abdominal nerve in the plane, thereby blocking the transmission of pain signals in the abdominal wall. Because the needle alignment and depth are clearly visible under ultrasound guidance, with a high success rate of block, in our patients, with the modified technique, the visibility of the muscle layers could be improved by the 15° tilt away from the side in which block had to be performed. An assistant pulled the abdomen toward the opposite side. No adverse reactions related to TAP block occurred during this study.

This study also has some limitations. First, the plasma concentration of lidocaine was not detected in the study, but according to previous studies,[31] the dose in this study is safe. Second, although the dose of ropivacaine used for TAP block in our trial has been shown to be effective for postoperative pain relief in other trials,[32] the most effective amount of local anesthesia remains controversial, which may be one of the reasons that TAP block has not shown an advantage. Meanwhile, the VAS scores at 12 and 24 hours were higher in the TAP block group may also be related to the duration of action of ropivacaine. Finally, we did not include a joint application of lidocaine and TAP block group. Under the premise of ensuring safety, it may become a more advantageous intervention for multimodal analgesia. However, in a recent intravenous lidocaine international consensus statement on suggestions for postoperative analgesia, intravenous

lidocaine should not be used in conjunction with other local anesthetic interventions or while under the effect of other local anesthesia interventions.[33]

Conclusion

There was no difference between intravenous lidocaine and ultrasound-guided TAP block in improving the quality of postoperative recovery, as both promoted earlier sedation activity and provided good postoperative recovery and post-operative analgesia in patients with laparoscopic bariatric surgery. Intravenous lidocaine provided better analgesia at 12 h and 24 h postoperatively compared with TAP block.

Data Sharing Statement

The individual participant's data that underlying the results reported in this article would be accessed with approval from the corresponding author after 6 months of publication. The study protocol, statistical analysis plan and clinical study report will also be available.

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Disclosure

The authors report no conflicts of interest in this work.

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