

# The effect of bupivacaine on postoperative pain in patients who underwent laparoscopic sleeve gastrectomy

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## ABSTRACT

**Introduction:** It is known that pain is an important parameter that affects the healing process after surgery. In this study, we aimed to investigate the effect of bupivacaine on pain in the first 24 h postoperatively in patients who underwent laparoscopic sleeve gastrectomy (LSG) by administering bupivacaine to both the intraperitoneal and preperitoneal areas during the surgery.

**Materials and Methods:** The effect of bupivacaine on postoperative pain in 78 patients who underwent LSG between January 2023 and May 2023 was evaluated retrospectively. The patients were divided into two groups: bupivacaine-applied and non-applied groups. Patients were compared in terms of postoperative 4th h, 8th h, and 24th h visual analogue scale (VAS) and length of hospital stay.

**Results:** The median age of the total study population was 36 (27–44) and 66 (84.6%) of them were female. 48 (61.5%) patients were non-smokers, 16 (20.5%) of them were ex-smokers, and 14 (17.9%) patients were active smokers. 24 (30.8%) patients had diabetes mellitus, and 16 (20.5%) had hypertension. There were 39 (50%) patients in the control group and 39 (50%) patients in the study group. The VAS scores at the 4<sup>th</sup>, 8<sup>th</sup>, and 24<sup>th</sup> h postoperatively were significantly lower in the study group ( $p<0.001$ ,  $p<0.001$ ,  $p=0.044$ , respectively).

**Conclusion:** The use of local anesthesia in the perioperative period of bariatric surgery provides better pain control in the first 24 h. Effective postoperative pain control alone is not determinative of the length of the hospital stay.

**Keywords:** Bupivacain, Laparoscopic sleeve gastrectomy, Postoperative pain

## Introduction

The postoperative recovery process of patients as well as the time of reintegrating to normal lives following discharge, can both be severely impacted by pain. Prolonged surgical pain adversely affects patients' physiological and psychological well-being.<sup>[1]</sup>

Pain is well recognized to activate the sympathetic nervous system. As a result of patients' increased sympa-

thetic system activation, poor pain management might cause cardiac and digestive system disorders.<sup>[2]</sup>

It is known that the use of systemic analgesics (opioid and non-opioid) in patients for pain control after surgery is a routine practice. In particular, opioid analgesics delay recovery by causing side effects such as sedation, nausea, and vomiting in patients. Utilization of local anesthetics lessens the need for systemic analgesics, contributes to



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a more comfortable postoperative recovery period, and accelerates the return to normal life. Performing surgical procedures by laparoscopic method and applying local anesthesia to the incision lines reduces the duration of hospital stays by providing less postoperative pain and earlier mobilization after surgery.<sup>[3,4]</sup>

Bariatric surgery has proven to be superior to other treatment methods by providing physical, psychological, and metabolic improvements in the treatment of obesity, and the frequency of its application has increased in the last few decades. In bariatric surgery, it is aimed to reduce postoperative pain, faster recovery, and earlier discharge in patients.<sup>[3]</sup> Currently, the most popular bariatric surgical procedure is known as laparoscopic sleeve gastrectomy (LSG).<sup>[5]</sup> There are publications in the literature that demonstrate local anesthetic applied to incision regions, preperitoneal areas, and intraperitoneal locations can reduce postoperative pain following LSG.<sup>[6,7]</sup> However, studies examining the effect of applying local anesthesia to both the intraperitoneal area and the preperitoneal area on postoperative pain are limited.

In this study, we aimed to investigate the effect of bupivacaine on pain in the first 24 h postoperatively in patients who underwent LSG by administering bupivacaine to both the intraperitoneal and preperitoneal areas during the surgery.

## Materials and Methods

Between January 2023 and May 2023, patients who underwent LSG at the University of Health Sciences Umranıye Education and Research Hospital General Surgery clinic were retrospectively examined. Patients aged between 18 and 65 years with a BMI of 40 and above or 35 and above, with additional disease related to weight, were included in the study. Patients who underwent other bariatric surgical procedures, underwent revision surgery, had previous gastrointestinal system surgery, were allergic to local anesthesia, and took nonsteroidal anti-inflammatory drugs in the last 24 h before surgery were excluded from the study. Approval was obtained from the Ethics Committee of our hospital for the study (June 21, 2023/218498428).

Age, gender, preoperative weight, preoperative BMI, smoking status, comorbidities, preoperative white blood cell (WBC) value, WBC value taken on the evening of the operation day, postoperative 4<sup>th</sup>–8<sup>th</sup>–24<sup>th</sup> h visual analogue scale (VAS) values, and hospital stay of patients were recorded.

The kg/m<sup>2</sup> formula was used to calculate the BMI. The pain status of the patients was determined by the VAS score, which is a numerical value between 0 and 10, in which the pain at the 4<sup>th</sup>, 8<sup>th</sup>, and 24<sup>th</sup> h after surgery corresponds. The patient had no pain at all; it was accepted as '0', while the greatest pain experienced so far was accepted as "10." The corresponding value between 0 and 10 of the pain in the determined hours was recorded.<sup>[3]</sup> The length of stay (LOS) in the hospital was calculated as the time between 07:00 a.m. on the morning of the operation and the time of discharge.

All patients included in the study received the same premedication and postoperative treatment and were operated by the same surgeon. In addition, the patients were advised to mobilize 4 h after the operation, trifold exercise was started, and clear food was given at the 6<sup>th</sup> postoperative hour.

The patients were divided into two groups: control group and the study group. Following the LSG surgery, 20 mL of 0.2% bupivacaine was evenly injected into the preperitoneal region of each of the five port incision points after 30 mL of 0.2% bupivacaine had been poured into the gastrosplenic area and on the stapler line. The control group did not perform an out-of-routine procedure after surgery. The groups were compared in terms of preoperative demographic data, postoperative 4<sup>th</sup> h, 8<sup>th</sup> h, and 24<sup>th</sup> h VAS scores, and length of hospital stay.

## Surgical Technique

The operation started with the classical 5-trochar method in the reverse trendelenburg position. The distal part of the stomach was freed up to 4 cm from the pylorus along its greater curvature, while the proximal portion was released up to the left crus. LSG was carried out vertically using a 38 French oro-gastric bougie, beginning 4–6 cm from the pylorus and concluding proximally 1–2 cm from the crust.

## Statistical Analysis

Acquired data were analyzed with the SPSS (IBM Corp., Released 2019 IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.) program. To test the normality, Shapiro-Wilk was utilized. Since none of the continuous data were distributed normally, all of the continuous data were expressed as medians (25–75% quartiles). For comparison of the non-normally distributed continuous data, the Mann-Whitney U-test was used. Categorical data

were expressed as frequency (%), and to compare the categorical data, the Chi-square test was used. The level of statistical significance was determined as  $p < 0.05$ .

## Results

Ninety-four patients were analyzed for the study, and 16 of them were excluded due to various reasons, leaving a total of 78 patients for the final statistical analysis (Fig. 1).

The median age of the total study population was 36 (27–44), and 66 (84.6%) of them were female. 48 (61.5%) patients were non-smokers, 16 (20.5%) of them were ex-smokers, and 14 (17.9%) patients were active smokers. 24 (30.8%) patients had diabetes mellitus, and 16 (20.5%) had hypertension. There were 39 (50%) patients in the control group and 39 (50%) patients in the study group.

There was no statistically significant difference between the study groups in terms of age, sex, presence of diabetes mellitus, presence of hypertension, preoperative weight, preoperative BMI, smoking status, preoperative WBC, or postoperative WBC; therefore, the study groups were found to be comparable. The basic descriptives of the total study population and the comparison of the study groups in terms of their descriptives are shown in Table 1.

The median VAS score of the control group 4 h after the operation was 6 (6–7) and the study group was 4 (4–5), and the difference between the groups was statistically signifi-

cant ( $p < 0.001$ ). The median VAS score of the control group 8 h after the operation was 4 (3–5) and the study group was 3 (2–3), and the difference between the groups was statistically significant ( $p < 0.001$ ). The median VAS score of the control group 24 h after the operation was 2 (1–3) and the study group was 2 (0–2), and the difference between the groups was statistically significant ( $p = 0.044$ ).

The median LOS of the control group was 53 h (52–54) and that of the study group was 53 h (52–55), and the difference between the groups was not significant ( $p = 0.616$ ). The measures of the primary outcome are summarized in Table 2.

## Discussion

It is known that pain is one of the most important problems seen after surgery in both open and laparoscopic surgery. It is also a significant symptom that has an impact on the patient's recovery following bariatric surgery. Studies have continued, although laparoscopic bariatric surgery has partially reduced postoperative pain. Patients can mobilise earlier, recover more quickly, and be discharge from the hospital earlier with effective pain management.<sup>[8,9]</sup>

In our study, we found that the demographic data were homogeneously distributed between the study group and the control group. While we found that the VAS scores at the 4<sup>th</sup>, 8<sup>th</sup>, and 24<sup>th</sup> h postoperatively were significantly lower in the study group, we did not find any significant difference in terms of length of hospital stay.

By pouring one group of saline and the other intraperitoneal bupivacaine hydrochloride, Alamdari et al. examined the impact of perioperative local anesthesia on postoperative pain at the 6<sup>th</sup> h, 12<sup>th</sup> h, and 24<sup>th</sup> h. They discovered that all of them had considerably lower numeric rating scale scores in the bupivacaine group.<sup>[10]</sup> According to Safari et al., they poured saline in one group and bupivacaine in the other group perioperatively in the gastrosplenic area to compare the effects of local anesthesia on pain at the postoperative 1<sup>st</sup> h, 4<sup>th</sup> h, 8<sup>th</sup> h, and 24<sup>th</sup> h. They discovered that the local anesthesia group experienced noticeably reduced pain at all periods.<sup>[11]</sup> The effects of bupivacaine utilization on shoulder and abdominal pain at the postoperative 0<sup>th</sup> h, 1<sup>st</sup> h, 6<sup>th</sup> h, and 24<sup>th</sup> h were investigated by Schipper et al. At all times, they found no significant distinction between the groups.<sup>[12]</sup> In our research, we discovered that during the 4<sup>th</sup>, 8<sup>th</sup>, and 24<sup>th</sup> h of the postoperative period, the VAS scores of the study

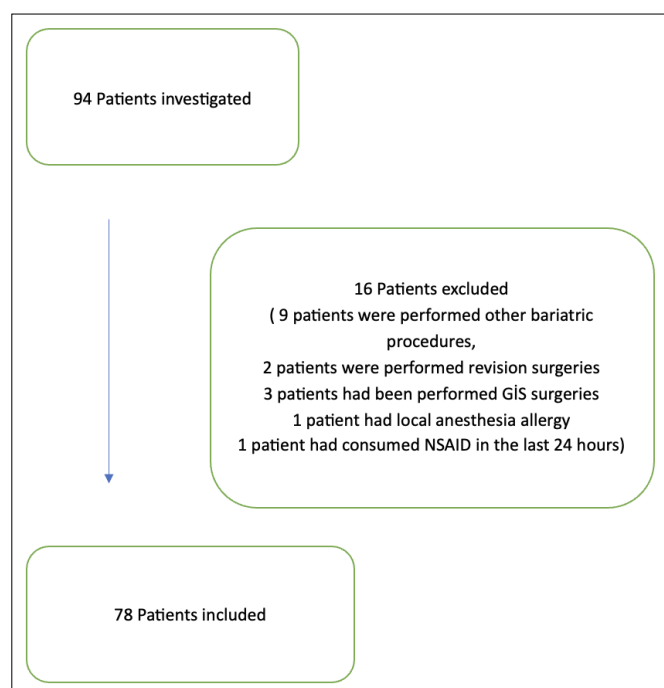


Figure 1. Flow Chart.

**Table 1. Basic descriptives of the total study population and the comparison of the groups**

	Total population (n=78)	Control group (n=39)	Study group (n=39)	p
Age, Median (25–75% quartiles)	36 (27–44)	31 (27–41)	37 (27–47)	0.187
Sex (female), n (%)	66 (84.6)	33 (50)	33 (50)	1.000
Diabetes Mellitus, n (%)	24 (30.8)	12 (30.8)	12 (30.8)	1.000
Hypertension, n (%)	16 (20.5)	6 (15.4)	10 (25.6)	0.262
Smoking status				
Non-smoker, n (%)	48 (61.5)	24 (61.5)	24 (61.5)	0.343
Ex-smoker, n (%)	16 (20.5)	6 (15.4)	10 (25.6)	
Active smoker, n (%)	14 (17.9)	9 (23.1)	5 (12.8)	
Preoperative weight (kg), Median (25–75% quartiles)	118	117 (108–125)	119 (110–130)	0.421
Preoperative BMI (kg/m <sup>2</sup> ), Median (25–75% quartiles)	43	43 (40–46)	43 (41–49)	0.517
Preoperative WBC (/L), Median (25–75% quartiles)	9005 (7458–10220)	8350 (6940–10280)	9210 (8000–10200)	0.174
Postoperative WBC (/L), Median (25–75% quartiles)	14210 (12655–16853)	13500 (12280–16230)	15180 (13100–17020)	0.224

BMI: Body mass index; WBC: White blood cell.

**Table 2. Primary outcome measures**

	Control group	Study group	p
VAS 4 <sup>th</sup> h, Median (25–75% quartiles)	6 (6–7)	4 (4–5)	<0.001
VAS 8 <sup>th</sup> h, Median (25–75% quartiles)	4 (3–5)	3 (2–3)	<0.001
VAS 24 <sup>th</sup> h, Median (25–75% quartiles)	2 (1–3)	2 (0–2)	0.044
LOS hours, Median (25–75% quartiles)	53 (52–54)	53 (52–55)	0.616

LOS: Length of stay; VAS: Visual analogue scale.

group, in which we applied intraperitoneal and preperitoneal bupivacaine, were lower at all hours.

In research by Symons et al., patients who underwent Roux-en-Y gastric bypass were divided into two groups, with one group giving preoperative bupivacaine while the other group did not. They explored the patients' postoperative pain and lengths of hospital stay, but they found no statistically significant variations in the length of hospital stay.<sup>[13]</sup> Paulson et al. applied intraperitoneal bupivacaine to patients who underwent laparoscopic cholecystectomy and found that the patients were discharged statistically significantly earlier.<sup>[14]</sup> In our study, we did not detect a significant difference between the groups in terms of length of hospital stay.

This study contains some limitations. The first and most important thing is that the study is retrospective. Second, the fact that the number of patients is small can again be considered an important limitation. Another limitation is that pain is a subjective condition and can vary from person to person, so different responses can be given to the same level of pain.

## Conclusion

In conclusion, the use of local anesthesia in the perioperative period of bariatric surgery provides better pain control in the first 24 h, when the postoperative pain is most intense.

There are many factors that affect postoperative discharge lengths, and effective postoperative pain control alone is not determinative of the length of hospital stay.

## Disclosures

**Ethics Committee Approval:** Approval was obtained from the Ethics Committee of our hospital for the study (June 21, 2023/218498428).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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