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RESEARCH ARTICLE

PRE-INCISIONAL LOCAL INFILTRATION IN LAPAROSCOPIC SLEEVE GASTRECTOMY

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ABSTRACT

Objectives: Laparoscopic procedures have reduced postoperative pain. Nevertheless, incision-site pain still occurs. Although opioids are the cornerstone of postoperative pain management they have side affects. Moreover increased pain is self-reported at incision sites and abdominal wall. The aim of this study was to evaluate the role of trocar site infiltration with local bupivacaine and lidocaine mixture for pain control after laparoscopic sleeve gastrectomy (LSG).

Materials and Method: Forty-six patients undergoing laparoscopic sleeve gastrectomy operation were included the study (23/23). Patients received dexketoprofen trometamol 50mg and tramadol 0.5mg/kg before closure. In Group C, pethidine 100mg was administered additionally. In Group L, patients received 28ml (8 ml for liver elevator site and 5 ml to each trocar site) local anesthetic (LA) mixture (50-50% bupivacaine 5mg/ml-lidocaine %2) before suturation. All patients received PCA with 400mg/100ml tramadol. Opioid consumption, VRS, rescue analgesic, mobilisation time were evaluated.

Results: VRS was lower in Group L at 30 minutes, other times were similar. Aldrete scores were higher in Group L at all points. Mobilisation time was shorter, rescue analgesic time was longer, and opioid consumption was less in Group L.

Conclusion: LA infiltration to trocar sites in LSG provided good recovery and better pain management with improved patient comfort.

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INTRODUCTION

Laparoscopic bariatric weight-loss surgical procedures have been increased over time. There are many factors that affect reovery after surgery. Pain is one of these perioperative factors that affects recovery after bariatric surgery (Schumann, 2011). A high prevalence of obstructive sleep apnea in obese patients makes safe analgesic management difficult (Schug and Raymann, 2011). Nausea, vomiting, pruritus, urinary retention, sedation, respiratory depression, and postoperative ileus are associated with opioids and make recovery complicated (Benyamin *et al*., 2008). Furthermore, increased pain has been self-reported at laparoscopic incision sites and in the abdominal wall (Elvir-Lazo and White, 2010). In our instution we similarly noticed that patients suffered from pain in the trocar sites, especially at the liver elevator site. We considered, postoperative pain management requires a combination of analgesic agents and interventions that can target different parts of the pain pathway.

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Local tissue infiltration has many advantages, such as simplicity, safety and low cost. In several studies including laparoscopic cholecystectomy, laparoscopic inguinal hernia repair and gynecological laparoscopic surgery this procedure has been investigated (Gupta, 2005; Pavlidis *et al*., 2003; Gerges *et al*., 2006; El Hachem *et al*., 2014). Also reviews in literature of the use of local anesthetics, including bupivacaine, on surgical patients have shown inconsistent results relative to their utility in reducing postoperative pain (Schug *et al*., 1998; Smith, 2011; Miller and Smith, 2006) The aim of this study was to evaluate the role of the trocar site infiltration of the local bupivacaine and lidocaine mixture for postoperative pain control after laparoscopic sleeve gastrectomy (LSG).

MATERIALS AND METHODS

This prospective study was conducted at Sanko University Medical Faculty Hospital between February and August 2017. Approval for the study was granted by the Institutional Ethics Committee of Sanko University, Gaziantep, Turkey (No: 2017/01-5 date: 25.01.2017). Written informed consent was obtained from all patients. The study included patients undergoing LSG. Exclusion criteria were; 1) age <16years or

>40 years, 2) significant comorbid diseases of the liver, kidneys or heart, 3) history of drug or alcohol abuse, 4) allergy to the study drugs, 5) chronic pain syndrome or chronic narcotic use. The LSG operation was performed on all patients with standard anesthesia management using propofol 200mg, rocuronium 0.5 mg/kg, fentanyl 0.2 mcg/kg and sevoflurane for maintenance. The dosage calculation was based onlean body weight (Sinha and Eckmann, 2015). Using a computer-generated randomisation list, 46 patients were included in the study and randomly allocated to one of the two groups. In Group C (n=23) patients received dexketoprofen trometamol 50mg and tramadol 0.5mg/kg 1 hour, and pethidine hydrochloride 100mg 30 minutes before closure. In Group L (n=23), patients received dexketoprofen trometamol 50mg and tramadol 0.5mg/kg 1 hour before closure and 28ml (8 ml for liver elevator site and 5 ml to each 4 trocar sites) local anesthetic (LA) mixture (50-50% bupivacaine 5mg/ml and lidocaine %2) before suturation. All patiens received PCA with 400 mg tramadol. PCA was set as 0.3 mg/kg/hr infusion, locked time 20 minutes and bolus 10ml. The demographic data of age, gender, and body mass index (BMI) were recorded. Observation was started after anesthetics stopped in operating room. A blind anesthesiologist observed until patients were discharged from hospital.

Sugammadex was used for reversal of rocuronium. After extubation, the patients were transferred to the post-anaesthetic care unit (PACU) for observation for 30 minutes, or longer if appropriate. If a patient required rescue analgesia, intravenous pethidine 20 mg was given, and the dose repeated if necessary. For ambulation and discharge of the patients, a standard clinical protocol was applied; the patient had to meet the following criteria: stable and average vital signs; oriented; pain, nausea or vomiting adequately controlled; all drains, catheters, tubes and dressings secured; no new symptoms that may threaten a safe recovery; minimal wound leakage; adequate peripheral circulation; and minimal dizziness or shortness of breath after sitting for 10 minutes. The same surgical method was applied by the same surgical team to all the patients. With the patient in the reverse Trendelenburg position the procedure was applied with the method of placing 5 trocars in the French position. The abdomen was inflated with internal 14mmHg carbon dioxide and the stomach was mobilised by cutting the gastrocolic and gastrosplenic ligaments with a 5mm LigaSure (Covidien, Dublin, Ireland) starting from approximately 4cm prepyloric. At this stage, methylene blue was administered to the patients.

After resection was completed, the orogastric tube was removed as far as the oesophagogastric junction, the pylorus was closed with long intestinal forceps and methylene blue was administered until fully circulated in the remnant stomach. In patients determined with leakage, the whole staple line was sutured with 2/0 non-absorbable sutures. The leakage test was then repeated. The stomach tissue was extracted from the prepyloric incision. A drain was placed in all patients. Primary outcome measures were postoperative VRS (verbal rating scale) of 0 to10, where 0 corresponds tono pain and 10 indicates the worst pain ever experienced. The patients were asked to indicate a score at 30 minutes, then at 1, 2, 6 and 12 hours postoperatively. Other outcomes were mobilisation time, first rescue analgesic time (100mg pethidine hydrochloride was given i.v. when rescue analgesia was required) and total opioid consumption as ml in the first 24 hours. Secondary outcomes included postoperative complications (nausea, vomiting, itching, respiratory depression, urinary retention etc.,) and Aldrete scores at 5, 10 and 15 minutes after extubation in the operating room.

Statistical analysis

SPSS 23.0 (IBM Corporation, Armonk, New York, USA) and PAST3 (Hammer, Ø., Harper, D.A.T., Ryan, P. D. 2001. Paleontological statistics) programs were used for the analysis of data. Conformity to normal distribution was evaluated with the Kolmogorov-Smirnov with Lilliefors correction test for univariate data, and with Mardia's test (Dornieden and Hansen Omnibus) for multivariate data. The Levene test was evaluated for homogeneity of variance. The Independent-samples t test with Bootstrap results was used for the comparison of two independent groups, and the Mann-Whitney U test was used with the Monte Carlo simulation technique. Friedman's Two-Way was applied to examine the repeated measurements of dependent variables and Post Hoc analysis (non-parametric posthoc tests (Miller (1966)) was tested with the Monte Carlo simulation results. Categorical data were compared with each other in the Fisher Exacttest (Exact). Quantitative data were expressed in the tables as mean ± standard deviation (SD), median ± IQR (interquartile range) and the median range (maximum-minimum) values. Categorical data were expressed as number (n) and percentage (%). Data were examined at 95% confidence and a value of $p<0.05$ was accepted as statistically significant. Statistical analyses were performed by Hüseyin Candan, Biostatistics Specialist.

RESULTS

The study included 46 patients (23 patients in each group) undergoing LSG surgery between February and August 2017. Baseline demographic data are presented in Table 1.

Table 1. Demographicandclinicaldata

	Group L (n=23)	Group C (n=23)
Age (years)	26.65±6.23	30.50±8.36
BMI	45.83±3.05	46.11±3.27
First rescueanalgesic time (hour)	4 (6-1)*	2 (3-1)
Mobilisation time (hour)	6 (8-6)*	8 (10-6)
Gender		
Female	19	14
Male	4	8

*p<0.01

There were no differences between the groups in respect of age, gender and BMI. The patients in both groups were predominantly female. The VRS scores of both groups at 30 minutes, and 1, 2, 6 and 12 hours postoperatively are shown in Table 2.

Table 2. Aldretescores

Aldretescore	Group L	Group C
5th minute	6 (7-5)*	4 (5-3)
10th minute	8 (10-7)*	6 (7-5)
15th minute	10 (10-9)*	8 (10-6)

*P<0.05

The VRS score was significantly lower in group L at 30 mins (4 (5-3)/ 5 (6-4) $p<0.05$) but at all other times the scores of both groups were similar. Incisional infiltration of LA improved respiration. In group L, all patients discharged from ICU at 24th hour and discharged from hospital at 4th day. But in group C, 4 patients detained in ICU 12 hours more, also these 4 patients discharged from hospital at 5th day ($p<0.05$).

These patients were detained with a reason of respiratory distress (tachypnea, desaturation without nasal O_2 support) (Table 3).

Table 3. Discharge From ICU* and Hospital

	ICU	Hospital
Groups		
Group L	24 hours: 23	3 days: 23
	36 hours: 0	4 days: 0
Group C	24 hours: 19	3 days: 19
	36 hours: 4**	4 days: 4**

*IntensiveCareUnit
**p<0.05

Mobilisation started at 6 hours postoperatively and average mobilisation time was significantly shorter in Group L (6 (8-6) /8 (10-6) p<0.05). The first rescue analgesic drug time was longer (4 (6-1)/2 (3-1) p<0.05) and opioid consumption was significantly lower in Group L. Opioid consumption was assessed as ml from PCA. The Aldrete scores at 5,10 and 15 minutes were significantly higher in Group L (Table 4).

Table 4. VRS scores

VRS	Group L	Group C
30th minute	4 (5-3)	5 (6-4)*
1st hour	6 (8-5)	6 (8-5)
2nd hour	6 (7-4)	5 (6-4)
6th hour	4 (5-3)	4 (5-3)
12th hour	4 (4-3)	3,5 (4-3)

No major complications were observed within the first 24 hours postoperatively. No vomiting was seen in either group and the incidence of nausea was significantly lower in Group L (3/8 p<0.05).

DISCUSSION

Postoperative pain associated with laparoscopic surgery is less intense and lasts for a shorter time than the pain experienced after open surgery. As there is less functional impairment and pain, patients can be discharged and return to normal daily activities earlier (Inan *et al*., 2004). Pain reaches a peak within the first few hours of the operation and diminishes over the next 2-3 days (Bisgaard *et al*., 1999). Some patients experience a rather painful early postoperative period. Conditions such as coughing and mobilization particularly aggravate the pain The main sources of pain following LSG are the incision sites within the abdominal wall. According to these findings many studies have examined other LA such as ropivacaine levobupivacaine or bupivacaine (Inan *et al*., 2004; Bava *et al*., 2016). The results of this study have demonstrated that LSG patients at our institution who received a single dose bupivacaine and lidocaine mixturea dministered to the surgical incision sites, required a lesser amount of postoperative opioids. Patients in both groups had a similar but significant reduction in VRS pain ratings during the first 30 minutes postoperatively, but there was no significant difference between the groups over the entire postoperative time period. These results are consistent with current literature that suggests that anesthetic infiltrations administered directly to surgical incision sites have a variable effect on postoperative opioid requirements and self-reported pain scores even though these studies have been of laparoscopic cholecystectomy (LC) operations. (McDonnell *et al*., 2008; Zhao *et al*., 2014; Yu *et al*. 2014). Following LC, patients experience pain not only in the abdominal wall and incision sites, but also visceral pain and shoulder pain. But LSG patients experience pain only in the abdominal wall and incision sites postoperatively.

The findings of the current study are consistent with the results of many previous studies (Kehlet and Liu, 2007; Scott, 2010; Coughlin *et al*., 2010; Moncada *et al*., 2016) and the preoperative administration of anaesthetic drugs has been recommended with either intraperitoneal infiltration or local trocar site infiltration. Intraperitoneal injection of LA must be considered as many studies in literature have recommended the use of intraperitoneal instillation of LA to reduce post-operative pain but the majority have recommended its use in association with incision infiltration of anesthetic. However, this technique is more expensive and more difficult to perform than incision infiltration. There have also been studies that have compared intraperitoneal injection and incisional infiltration and have concluded that incisional infiltration of LA is more effective than the intraperitoneal route (Scott, 2010). Systemically administered opioids depress the respiratory drive, level of consciousness, and supraglottic airway muscle tone resulting in hypoxia and hypercapnia (Macintyre *et al*., 2011). Obesity is associated with anatomic and pathophysiological pharynx abnormalities that are predisposed to airway collapse. The combined effects of obesity on pharyngeal function and the central nervous system effects of opioid-induced ventilator impairment and obstructive sleep apnea greatly increase the risk of respiratory adverse events in this population. One strategy to reduce the risk of life-threatening postoperative morbidity following bariatric surgery is to use adjunct analgesics or interventions to minimize opioid requirements. As gastric reduction associated with bariatric surgery may also increase the toxicity of NSAIDs, these agents are generally not recommended for use following bariatric surgery (Miller and Smith, 2006).

Therefore, interventions such as LA infiltration, intraperitoneal installation can be considered more appropriate to minimize opioid consumption. Accordingly, in the current study, nausea was seen at a significantly lower rate in the local anesthetic group and no vomiting was seen in either group. Mobilisation time was the other primary outcome of this study and LA infiltration was observed to shorten this time. Early mobilisation in obese patients is important because obesity is a prothrombotic state and is associated with increased morbidity and mortality from thrombotic disorders such as myocardial infarction, stroke and VTE (Blokhin and Lentz, 2013). The postoperative incidence of VTE may be 10 times higher in obese women compared with healthy-weight counterparts (Parkin *et al*., 2012). Previous VTE is an independent risk factor for patients having gastric bypass surgery (Demaria *et al*., 2007). A hypercoagulable state may extend beyond two weeks, warranting extended postoperative VTE prophylaxis depending on the type of surgery and the patient's BMI (Magee *et al*., 2010). Obesity per se is a risk factor for VTE and it is recommended that all obese patients, undergoing all but minor surgery, should receive VTE prophylaxis. Guidelines for postsurgical VTE prophylaxis were published by the National Institute for Health and Care Excellence in 2010 (https://www.nice.org.uk/guidance/qs3). Strategies to reduce the risk of VTE include early postoperative mobilisation, mechanical compression devices, thromboembolic device (TED) stockings, anticoagulant drugs, and vena caval filters. However, mobilisation can be difficult when the patient is in pain so pain management is important.

Conclusion

Local anesthetic infiltration to the trocar sites in LSG operations decreased VRS scores only at 30 minutes postoperatively but decreased opioid consumption, shortened mobilisation time, prolonged the time to first rescue analgesia and improved discharge. Aldrete scores were higher so recovery was faster. It can be concluded that local anesthetic infiltration improves pain management after laparoscopic sleeve gastrectomy and should be employed as a part of multimodal postoperative pain management.

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