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Original Article

Ultrasound-Guided Oblique Subcostal Transversus Abdominis Plane Block For Patients Undergoing Laparoscopic Hysterectomy: A Prospective Randomized Controlled Study

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ABSTRACT

Objective: Laparoscopic hysterectomy increases patient comfort in terms of postoperative pain. However, many patients struggle with postoperative pain after laparoscopic operations. This study aims to evaluate the postoperative analgesic efficacy of oblique subcostal transversus abdominis plane (OSTAP) block in laparoscopic hysterectomy operations.

Methods: 58 female patients aged between 18 and 65, with the American Society of Anesthesiologists (ASA) physical status I-II, were recruited in this randomized controlled study. In the OSTAP group, a block was applied with 0.25% bupivacaine. For postoperative analgesia, 1gr paracetamol and 100mg tramadol were administered intravenously (IV) to all patients. No additional procedure was applied to the control group (Group C). The amount of postoperative analgesic consumption, time to first analgesic requirement and visual analog scale (VAS) scores of the patients were evaluated.

Results: The mean 24-hour tramadol consumption of the patients was 58.62±48.22 mg in the OSTAP group, while it was 165.52±93.640 mg in Group C ($p<0.001$). While the time to the first analgesic requirement was 396.43±202.508 minutes in the OSTAP group, it was 119.79±71.361 minutes in Group C ($p<0.001$). VAS values at 0, 1, 2, 6, 12 and 24th hours and the number of patients in need of tramadol were found to be significantly lower in the OSTAP group ($p<0.05$).

Conclusion: In our study, it was concluded that OSTAP block application is an effective analgesic method in laparoscopic hysterectomy because of the reduction in 24-hour total tramadol consumption and VAS scores, and the prolongation of the time until the first analgesic requirement was prolonged.

INTRODUCTION

The use of laparoscopy in the surgical treatment of gynecological diseases has significantly changed the traditional hysterectomy practice. Although patient comfort in terms of postoperative pain has increased with laparoscopic hysterectomy, many patients struggle with postoperative pain after laparoscopic operations.[1] Incision and trocar region pain, dissection of the pelvic region, increased stretching of the intraabdominal cavity due to pneumoperitoneum and upside-down position during surgery are among the main causes of pain.[1,2]

Opioids are frequently used for postoperative analgesia. However, regional anesthesia techniques have been used in recent years due to many side effects such as sedation, itching, nausea and vomiting caused by opioids.[3] Oblique subcostal transversus abdominis plane (OSTAP) block is a regional anesthesia method that blocks the nerves of the upper and lower anterior abdominal wall from T6 to L1 in addition to the thoracic region nerves.[4] Although there are many studies on the use of OSTAP, especially in laparoscopic cholecystectomy,[5–7] data on its use in laparoscopic hysterectomy are limited.[2]

In this study, we aimed to evaluate postoperative analgesic consumption amounts, duration of first analgesic requirement and visual analog scale (VAS) scores in patients who underwent OSTAP block application in laparoscopic hysterectomy operations.

MATERIALS AND METHODS

Local ethics committee approval (2019/514/167/28-06.02.2019) was obtained for the single-blind prospective randomized controlled study. The study was carried out under the principles stated in the Declaration of Helsinki. After signing informed consent forms, 58 female patients with American Society of Anesthesiologists (ASA) physical status I to II, aged 18 to 65 years who were scheduled for laparoscopic hysterectomy were recruited in this randomized controlled study. Patients who refused to participate in the study, and those with coagulopathy, liver and kidney function problems, local anesthetic allergy, and body mass index (BMI) >40 were excluded from the study.

The sample of the study was calculated by power analysis. It was found that at least 40 patients, 20 in each group, should be included in the study in order for the results to be significant at 90% power and 5% type I error levels. However, considering that there would be losses from the sample, a total of 58 patients, 29 from each group, were included in the study. The patients were divided into two groups as oblique subcostal block group (Group OSTAP) and the control group (Group C), using the closed envelope method.

Anesthesia application

Standard ASA monitoring techniques including temperature monitoring, electrocardiography (ECG), peripheral oxygen saturation (SpO_2), end-tidal carbon dioxide monitoring ($EtCO_2$) and non-invasive blood pressure measurement were applied to all patients in the operating room. All patients received a standard general anesthetic regimen including 1–1.5 mcg/kg fentanyl intravenous (İV), propofol 1–2 mg/kg iv, and rocuronium bromide 0.6 mg/kg iv during anesthesia. Following endotracheal intubation, anesthesia was continued with 1–2% sevoflurane in a 50% oxygen-air mixture. 15 minutes before the end of the operation, 100 mg tramadol iv and 1 g paracetamol iv were administered for analgesia to all patients in both the block group and the control group.

For nausea and vomiting, 10 mg metoclopramide iv was administered to the patients. After the surgical procedure was completed, the OSTAP block was applied to the patients in the study group. At the end of the operation, 0.01 mg/kg of atropine and 0.04 mg/kg of neostigmine were administered to the patients for decurarization. After sufficient muscle strength and respiratory effort were observed, the patient was extubated and taken to the recovery unit.

Block application

While the patient was in the supine position, regional sterile conditions were provided with 10% povidone iodide solution. A 6–13 Mhz linear ultrasonography (USG Esaote, Via E. Melen, 77 16152 Genova, Italy) probe was used for imaging. A 22 G and 100mm block needle (Stimuplex® Ultra 360® B-Braun medical, Melsungen, Germany) was inserted between the rectus abdominis and transversus abdominis muscles. A total of 40 ml local anesthetic solution consisting of 0.25% bupivacaine, 20 ml on each side, was administered to the right and left sides of the anterior abdominal wall.

Standard postoperative analgesia protocol

All patients were administered 1 g paracetamol iv every 8 hours during the postoperative

24-hour period. If the visual analog scale (VAS) values were found to be 4 or higher during the follow-up of the patients, tramadol 100 mg iv was administered as a rescue analgesia.

Postoperative pain assessment

Pain levels of the patients were measured with 10-point VAS at 0, 1, 2, 6, 12, 24 hours. No pain was evaluated as 0 points, and severe pain as 10 points. VAS scores, time to first analgesic requirement, and total tramadol consumption were recorded.

Statistical analysis

While evaluating the data obtained in the study, descriptive statistical methods (percentage, mean, standard deviation, median) were used. Pearson's chi-square test was used for categorical variables between groups. The student's t-test was used for parametric data and the Mann Whitney-U test was used for non-parametric data.

RESULTS

A total of 62 patients were included in the study. Two patients were excluded because they had coagulopathy and 2 patients refused to participate in the study. The remaining 58 patients were analyzed.

Table 1. Comparison of the groups in terms of demographic data, pain, nausea-vomiting and complications

	Group OSTAP (n=29)	Grup Control (n=29)	p
Age (mean±SD)	50.48±7.008	50.28±7.468	0.803**
ASA, n (%)			
1	11 (37.9)	10 (34.5)	1.000*
2	18 (62.1)	19 (65.5)	
Nausea-Vomiting, n (%)			
No	23 (79.3)	24 (82.8)	0.559*
Mild	3 (10.3)	4 (13.8)	
Moderate	3 (10.3)	1 (3.4)	
Pain, n (%)			
No	15 (51.7)	5 (17.2)	0.012*
Yes	14 (48.3)	24 (82.8)	

*Chi-square test. **Student's t-test. OSTAP: Oblique Subcostal Transeversus Abdominis Plane Block; SD: Standard deviation.

Table 2. Comparison of analgesic requirement and VAS scores of the groups

	Group OSTAP (n=29)	Group Control (n=29)	p
	Mean±SD	Mean±SD	
First analgesic requirement time (minute)	396.43±202.508	119.79±71.361	<0.001*
Total analgesic consumption (mg)	58.62±48.229	165.52±93.640	<0.001*
	Median (Min-Max)	Median (Min-Max)	
VAS 0 hour	1 (0–4)	3 (0–7)	<0.001**
VAS 1 hour	1 (0–3)	3 (0–5)	0.002**
VAS 2 hour	2 (0–5)	4 (0–6)	<0.001**
VAS 6 hour	3 (0–6)	4 (0–8)	0.003**
VAS 12 hour	2 (0–4)	3 (0–7)	<0.001**
VAS 24 hour	2 (0–4)	2 (0–4)	0.010**

*Student's t-test. **Mann-Whitney U test. OSTAP: Oblique Subcostal Transeversus Abdominis Plane Block; VAS: Visual Analog Scale.

There was no difference between the groups in terms of age, ASA, nausea-vomiting scores (p>0.05) (Table 1).

No complications developed in any of the patients included in the study.

The number of patients with pain in group C was found to be significantly higher than in group OSTAP (p=0.012) (Table 1).

The mean 24-hour tramadol consumption was 58.62±48.22 mg in group OSTAP and 165.52±93.640 mg in group C (p<0.001) (Table 2).

The time to the first analgesic requirement was found to be 396.43±202.508 minutes in group OSTAP and 119.79±71.361 minutes in group C (p<0.001) (Table 2).

The VAS values of the patients at 0,1,2,6,12 and 24 hours were significantly lower in the OSTAP group than in group C (p<0.05) (Table 2).

DISCUSSION

In this study, total tramadol consumption, VAS values and the number of patients requiring analgesics were found to be significantly lower in the OSTAP group compared to the control group. The time to first analgesic administration was significantly longer in the OSTAP group.

Multimodal analgesia involves the combined use of two or more approaches to minimize both postoperative pain and opioid use. In recent years, block applications have been generally used for this purpose. Various studies have shown that OSTAP block provides effective analgesia for pain associated with surgery. Korkmaz Toker et al.[2] applied a bilateral OSTAP block using 40 ml of bupivacaine at a concentration of 0.375% in laparoscopic hysterectomy operations. As a result, they found that 24-hour tramadol consumption and VAS scores were significantly lower in the OSTAP group compared to the control group. Similarly, in our study, both total tramadol consumption and VAS scores of the OSTAP group were found to be significantly lower than the control group. However, in our study, unlike this study, 40 ml of local anesthetic at a concentration of 0.25% was used and it was observed that effective analgesia could be achieved with this dose. Reducing the drug concentration is important both to prevent excessive drug consumption and to prevent possible unwanted side effects of local anesthetics.

Applied OSTAP with 40 ml of 0.25% bupivacaine for analgesia after laparoscopic cholecystectomy in their study, Breazu et al.[8] found the 24-hour opioid consumption to be 32±26.05 mg in the OSTAP group and 79±16.68 mg in the control group. They also reported that the VAS scores measured in the 24-hour period were significantly lower than the control group. In another study, OSTAP block was applied with a local anesthetic solution at a dose and concentration similar to that of Brezau et al. As a result, it was found that the pain scores and analgesic consumption of the patients were lower than the control group.[9] The results of our study were also consistent with the findings of these studies, and it was found that OSTAP block provided effective analgesia in postoperative pain management.

There are different approaches regarding the application of the transversus abdominis plane (TAP) block used for anterior abdominal wall analgesia. In the classical TAP block applied to the region between the Costa arc and the iliac crest, a local anesthetic solution is administered between the transversus abdominis and internal oblique muscles. However, it is stated that this approach does not provide analgesia in interventions above the umbilicus.[4] Ghisi et al.[10] reported that there was no decrease in 24-hour opioid consumption compared to the control group in their study in which they applied classical TAP block in laparoscopic hysterectomy. In another study in which classical TAP block was applied in the same type of surgery, it was reported that pain scores and narcotic analgesic consumption did not decrease.[11] In laparoscopic hysterectomy, trocar entry points are applied above the umbilicus level. For this reason, it is thought that adequate analgesia cannot be provided in this region with classical TAP application. Unlike previous studies, the OSTAP block we applied

in our study was found to provide dermatomal blockade in this area as well and to be an effective analgesic method.

Another important finding in our study is that the time to the first analgesic requirement was longer in the OSTAP group than in the control group. This finding shows that OSTAP block is particularly effective in early pain control. In their work, Ramsay et al.[12] state that acute control of postoperative pain increases patient comfort, provides earlier mobilization, less pulmonary complications, and faster recovery.

Shin et al.[13] reported in a study in which they applied OSTAP block, that there was no difference in the development of complications and nausea and vomiting compared to the control group. The fact that there was no difference between the groups in terms of complications and nausea and vomiting in our study supports that OSTAP block application is a method that can be applied safely.

As a result, it was concluded that OSTAP block application is an effective analgesic method in laparoscopic hysterectomy because of the decrease in 24-hour total tramadol consumption and VAS scores, and the prolongation of the first analgesic requirement time.

Ethics Committee Approval

This study approved by the Kartal Dr. Lutfi Kirdar Training and Research Hospital Clinical Research Ethics Committee (Date: 06.12.2019, Decision No: 2019/514/167/28).

Informed Consent

Prospective study.

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: T.Ş., K.T.S.; Design: T.Ş.; Supervision: K.T.S.; Data: T.Ş.; Analysis: T.Ş.; Literature search: T.Ş.; Writing: T.Ş., K.T.S.; Critical revision: T.Ş., K.T.S.

Conflict of Interest

None declared.

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Laparoskopik Histerektomi Operasyonu Uygulanan Hastalarda Oblik Subcostal Transversus Abdominis Plan Bloğu: İleriye Yönelik Randomize Kontrollü Bir Çalışma

Amaç: Laparoskopik histerektomi ameliyat sonrası ağrı açısından hasta konforunu arttırır. Ancak birçok hasta laparoskopik operasyonlardan sonra ameliyat sonrası ağrı ile mücadele etmektedir. Bu çalışmada, laparoskopik histerektomi operasyonlarında oblik subkostal transversus abdominis plan (OSTAP) bloğunun ameliyat sonrası analjezik etkinliğinin değerlendirilmesi amaçlandı.

Gereç ve Yöntem: ASA fiziksel durumu I ila II olan, yaşları 18 ila 65 arasında olan 58 kadın hasta bu randomize kontrollü çalışmaya dahil edildi. OSTAP grubunda %0.25 bupivakain ile blok uygulandı. Tüm hastalara ameliyat sonrası analjezi için 1 gr parasetamol ve 100 mg tramadol intravenöz (IV) uygulandı. Kontrol grubuna ek bir işlem uygulanmadı. Hastaların ameliyat sonrası analjezik tüketim miktarı, ilk analjezik ihtiyacına kadar geçen süre ve vizüel analog skala (VAS) skorları değerlendirildi.

Bulgular: Hastaların 24 saatlik ortalama tramadol tüketimi grup OSTAP'da 58.62±48.22 mg iken, grup grup K'da 165.52±93.640 mg idi ($p<0.001$). İlk analjezik gereksinim zamanı grup OSTAP'da 396.43±202.508 dk iken grup K'da 119.79±71.361 dk idi ($p<0.001$). Bakılan 0, 1, 2, 6, 12 ve 24. saatteki VAS değerleri ve tramadol ihtiyacı olan hasta sayıları OSTAP grubunda anlamlı olarak daha düşük bulundu ($p<0.05$).

Sonuç: Çalışmamızda 24 saatlik toplam tramadol tüketimi ve VAS skorlarında azalma görülmesi, ilk analjezik gereksinim zamanının ise uzamış olması nedeniyle, OSTAP blok uygulamasının laparoskopik histerektomide etkili bir analjezi yöntemi olduğu sonucuna varılmıştır.

Anahtar Sözcükler: Ağrı; histerektomi; subkostal blok.