



The Effects of Preincisional Levobupivacaine Infiltration on Extubation Comfort, Postoperative Recovery and Visual Analogue Scale in Appendectomy Patients

Apendektomi Hastalarında Preinsizyonel Levobupivakain İnfiltrasyonunun Ekstübasyon Konforu, Postoperatif Derlenme ve Vizüel Analog Skala Üzerine Etkileri

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Objective: The aim of our study was to determine the effect of preincisional 0.25% levobupivacaine infiltration on extubation comfort, postoperative recovery and visual analogue scale (VAS) in appendectomy patients.

Methods: Forty 15-60-year-old patients at American Society of Anaesthesiologists (ASA) physical status I-II, scheduled for appendectomy were included in the study. After routine monitoring, anaesthesia induction was performed with propofol, fentanyl and rocuronium; later, maintenance was continued with sevoflurane. Patients were divided into two groups randomly. A total 20 mL of 0.25% (50 mg) levobupivacaine was injected around the incision line as a rectangle in Group 1. Levobupivacaine was not administered in Group 2 patients. Heart rate, peripheral oxygen saturation, additional fentanyl requirement and mean blood pressure were recorded during the operation. All patients were evaluated according to difficulties encountered during extubation

Results: Discharge time, necessity of diclofenac and postoperative VAS values at 0-1 hours were statistically lower in Group 1 patients than the Group 2 patients ($p<0.05$). Difficulties, like straining, cough, laryngo-bronchospasm, vomiting and nausea during extubation, were 5% and 25% in Group 1 and Group 2, respectively, but these differences were not statistically significant ($p=0.077$).

Conclusion: Infiltration of 0.25% of levobupivacaine as a rectangle which included the incision line before surgery decreases discharge time, provides analgesia well in the early postoperative period and diminishes the requirement of analgesics in appendectomy patients.

Key Words: Appendectomy, preincisional, pre-emptive, levobupivacaine

Amaç: Çalışmamızda apendektomi planlanan olgularda preinsizyonel %0,25'lik levobupivakain infiltrasyonunun, ekstübasyon konforu, postoperatif derlenme ve vizüel analog skala (VAS) skoru üzerine olan etkileri araştırıldı.

Yöntemler: Apendektomi planlanan, American Society of Anaesthesiologists (ASA) I-II fiziksel durumunda, 15-60 yaş arası 40 olgu çalışmaya dahil edildi. Rutin monitörizasyonun ardından anestezi induksiyonu propofol, fentanil ve rokuronyum ile yapılarak, idame sevofloran ile sağlandı. Olgular rastgele olarak 2 gruba ayrıldı. Baklava dilimi şeklinde cerrahi insizyon bölgesini içeren, 20 mL %0,25'lik (50 mg) levobupivakain infiltrasyonu yapılanlar Grup 1, levobupivakain infiltrasyonu yapılmayanlar ise Grup 2 olarak tanımlandı. Ameliyat süresince kalp hızı, periferik oksijen saturasyonu, ek fentanil ihtiyacı ve ortalama kan basıncı kaydedildi. Tüm hastalar ekstübasyon süresince karşılaşılan zorluklar, servise gönderilme zamanı, postoperatif 0-1. saatlerdeki ağrı ve diklofenak ihtiyacı açısından değerlendirildi.

Bulgular: Olguların servise gönderilme zamanı, diklofenak ihtiyacı, postoperatif 0-1. saatlerde ağrı VAS değerleri Grup 1'de, Grup 2'ye göre istatistiksel olarak anlamlı derecede düşük bulundu ($p<0,05$). Ekstübasyon süresince karşılaşılan ıkınma, öksürük, laringo-bronkospazm ve bulantı-kusma benzeri zorluklar Grup 1'de %5, Grup 2 %25 olarak saptandı, ancak bu fark istatistiksel bakımdan önemli bulunmadı ($p=0,077$).

Sonuç: Apendektomi hastalarında, cerrahi öncesi baklava dilimi şeklinde insizyon hattını içeren %0,25'lik levobupivakain infiltrasyonunun, hastaların servise gönderilme zamanını kısalttığı ve erken postoperatif dönemde iyi bir analjezi sağlayarak analjezik ihtiyacını azalttığı sonucuna varıldı.

Anahtar Kelimeler: Apendektomi, preinsizyonel, preemtif, levobupivakain

Introduction

Pre-emptive analgesia is a sensory blockade before incision as a pain control strategy intended to counteract central sensitisation, a state of elevated sensitisation of excitable spinal neurons, coupled to a decreasing threshold for peripheral afferent pain terminals. Pre-emptive analgesia aims at diminishing postoperative pain by the blockade of nociceptive afferent pain pathways of the peripheral and central nervous system. Postoperative pain is one of the serious problems and is a leading fac-

tor for patient dissatisfaction. Additionally, nociceptive afferent stimulations take a role in the occurrence of surgical stress response as a result of tissue damage. That is why it is affirmed that the occurrence of intraoperative surgical stress responses can be avoided by pre-emptive analgesia (1). Infiltration of the surgical area is an easier, cheaper and safer method for local analgesia. However it is almost neglected. It is usually used in small orthopaedic or plastic surgeries, but usage of pre-emptive analgesia is increasing year after year because it is effective postoperative analgesia and due to the diminishing effect of the necessity of narcotic analgesics and hospitalisation time (2).

The aim of this study was to determine the effects of preincisional 0.25% of levobupivacaine infiltration on extubation comfort, postoperative recovery and visual analogue scale (VAS) in appendectomy patients.

Methods

With approval from the Medical School Committee at Yuzuncu Yil University (09.05.2013-16) and the patients' written consent, 40 15-60-year-old American Society of Anaesthesiologists (ASA) physical status I-II, appendectomy-planned patients were enrolled this study. Patients with extensive peritonitis and middle line incision were excluded. After induction with 2 mg kg⁻¹ propofol, 2 µg kg⁻¹ fentanyl and 0.5 mg kg⁻¹ rocuronium, maintenance was performed with 50% O₂ + N₂O and 1-2% sevoflurane. Heart rate, mean blood pressure, peripheral oxygen saturation and administered fentanyl doses were recorded. Patients were divided into two groups randomly. A total of 20 mL 0.25% (50 mg) levobupivacaine was infiltrated around the incision line as a rectangle before surgery to Group 1 patients. Levobupivacaine was not administered in group II patients. Postoperative VAS scores at 0-1 hours; difficulties encountered during extubation, which are laryngo-bronchospasm excessive haemodynamic responses and problems, like nausea and vomiting, of all patients were recorded. Pain measurement scale was described to patients before surgery. Patients marked the severity of their pain from 0 to 10. 0 (zero) indicates absence of pain, and 10 is an unbearable pain. Postoperative recovery of patients was evaluated with the Modified Aldrete Scoring (MAS) system. After the value of MAS reached to ≥9, patients were discharged from the operating room and leaving time were also recorded (3); 75 mg of diclofenac was injected intramuscularly to rescue analgesia in patients whose VAS scores ≥4.

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (IBM SPSS, Inc., Chicago, IL, USA) for Windows software. Firstly, some introductory statistical ratios were calculated for both groups. Later, for the comparison of average values of the examined parameters for both groups, student's *t*-test was used. Furthermore, a ratio test was preferred for the comparison of the examined character ratios in each group. A level of *p*<0.05 was used to indicate statistical significance in all analyses.

Results

There was no significant difference between groups in terms of operation time, ASA and demographic features (Table 1).

There was no statistical significant difference between groups in terms of heart rate, mean blood pressure and oxygen saturation in all measured times except at the 40th minute. The heart rate and mean blood pressure were significantly higher in group II patients at the 40th minute (*p*=0.033) (Table 2). There was no requirement of additional fentanyl except an induction dose in both groups. Preoperative VAS scores were not also significantly different between groups. However, postoperative VAS scores at 0 (*p*=0.036) and 1 hour (*p*=0.04) were lower in Group 1, and these were statistically significant. Likewise, discharge time (*p*=0.045) and necessity of diclofenac (*p*=0.029) were also lower in Group 1 patients. Frequency of vomiting and nausea was 5% and 20% in Group 1 and Group 2 patients, respectively. Straining, cough, laryngo-bronchospasm, vomiting and nausea during extubation rates were 5% and 25% in Group 1 and Group 2, respectively (*p*=0.077). These differences were not statistically significant.

Discussion

Postoperative pain is a cause of restriction in mobilisation and disturbance of respiratory functions of patients. They

Table 1. Demographic features of patients (mean±SD)

	Group 1 (n=20)	Group 2 (n=20)
Age (years)*	24.40±8.54	27.30±10.04
Gender (Male/Female)	7/13	12/8
Weight (kilograms)*	65.15±14.16	66.35±13.26
ASA† (I-II)	17/3	16/4
Operation time (minute)*	31.55±8.06	32.45±6.55

*Data presented like as mean±standard deviation, †ASA: American Society of Anesthesiologists

Table 2. Values of VAS score, HR/ MBP at 40th minute, recovery time and requirement of analgesia in both groups (mean±SD)

	Group 1 (n=20)	Group 2 (n=20)	p value
Preoperative VAS* score	2.45±1.54	2.85±1.23	<i>p</i> >0.05
Postoperative VAS score	3.05±1.36	5.30±1.17	<i>p</i> =0.036
Postoperative first hour VAS score	2.65±0.49	3.45±0.89	<i>p</i> =0.040
Discharging time from operation room (minute)	6.75±1.16	7.75±1.02	<i>p</i> =0.045
Necessity of Diclofenac	0.30±0.47	1.00±0.00	<i>p</i> =0.029
HR/ MBP at 40th minute†	76.4±11.9/ 81.4±9.5	88.5±18.3/ 92.2±16.5	<i>p</i> =0.033

*VAS: visual analogue scale; †HR/MBP: heart rate/mean blood pressure

are causes of increasing hospitalisation time and economical losses. Nociceptive impulses are the main cause of surgical stress response, and they arrive to the central nervous system via A delta and C afferent nerve fibres, like pain sense (1).

The importance of peripheral and central modulations in nociception have created the “pre-emptive analgesia” concept in surgical patients. The aim of this concept is to provide effective pharmacological analgesia before surgical trauma. Infiltration of the surgical region by local anaesthetics, central neuron blockade, opioids, and administration of an effective dose of ketamine or non-steroid anti-inflammatory drugs all can be used for this purpose. Direct infiltration of incision with local anaesthetics or blockade of the region is an easy technique and beneficial method for the treatment of postoperative pain. Pre-emptive analgesia is carried out with regional or systemic analgesics before surgery, and it avoids central sensitisation of pain pathways and diminishes the requirement of analgesics (4). Local analgesics alone provide excellent analgesia. Motor blockade is rare with diluted local analgesics, but analgesia is perfect (5).

Insufficient pain treatment affects the healing period of patients. Pulmonary, thromboembolic and cardiovascular complications may arise as a result of insufficient pain control and may lead to prolonged hospitalisation. Efficient analgesia can reduce hospitalisation time, economical losses, morbidity and mortality (2).

Postoperative efficacy of the infiltrative treatment depends on more than one factor. These factors are the type of surgery, administration time of infiltration, location, concentration and volume of local anaesthetics, adjuvant medications and measurement methods (1).

Bupivacaine and ropivacaine infiltration has been used in more trials with the purpose of pre-emptive analgesia. However, there are not many trials of levobupivacaine infiltration for this reason.

In the literature, there are different results about the efficacy of several concentrations and volumes of local analgesics for pre-emptive analgesia. Victory et al. (6) determined that there was no favourable effect of preincisional or postincisional bupivacaine infiltration on the requirement of analgesia and pain scores in abdominal hysterectomy patients. Johansson et al. (7), Cobby and Reid (8), Klein et al. (9) and Updike et al. (10) determined that there were similar results in terms of consumption of opioids, VAS scores and the time to requirement of additional analgesics between groups administered local anaesthetics to the superficial and deep layers of the abdomen and control groups. However, when the local anaesthetics were injected to all layers of the abdomen, then the requirement of postoperative opioids was decreased.

There are many trials about the efficacy of pre-emptive anaesthetic infiltration. In the study of Cherian et al. (11), 0.375% bupivacaine was infiltrated to the muscle and

subcutaneous tissue before closure of the incision line in unilateral laminectomy patients due to lumbar disc hernia. Postoperative elapsed time for the requirement of the first analgesics was 807.7 and 181.4 minutes in the bupivacaine-infiltrated and control groups, respectively. They concluded that this method was safe and effective. Bagul et al. (12) infiltrated subcutaneous 10 mL of 0.5% bupivacaine preincisionally in thyroidectomy patients, and they found that pain scores were 33 and 50 in the bupivacaine-infiltrated and control groups, respectively, at first sixth hour, but there was not any difference at the 24th hour. There was no requirement of morphine in the bupivacaine group, but it was 25% in the control group. They reported that infiltration of bupivacaine was easy and provided good pain control on thyroidectomy patients, and it does not have any unfavourable effect on healing of the wound, like lividness or cosmetics. Cnar et al. (13) infiltrated 0.25 mL kg⁻¹ of levobupivacaine to two groups of children, who underwent hernia repair after general anaesthesia and just before the end of the surgery. They noted that the requirement of additional analgesics, objective pain score, heart rate and stress response of pain were lower in both groups when compared with the control group. This difference continued for 24 hours. Gurbet et al. (14) evaluated the effect of pre-emptive analgesia on unilateral lumbar discectomy patients. They classified all patients into five groups: 30 mL of 0.25% levobupivacaine and 40 mg of methylprednisolone administered just before the sutures of incision to Group 1 patients, Group 2 patients treated with only levobupivacaine ipsilateral intramuscularly Group 3 and 4 patients were also treated in the same way as Group 2 patients but with levobupivacaine administered before incision. Only 30 mL of 0.9% NaCl was injected to control group patients before the wound suture. Demographic features, vital signs, postoperative pain scales and usage of morphine were recorded. There was a favourable result in four groups when compared with the control group. In the first 24 hours, consumption of morphine was 13.9 mg and 27.6 mg in the study groups and control group, respectively. Likewise, hospitalisation time also was 19.3 and 25.7 hours in the study groups and control group, respectively. They reported a high incidence of nausea in control group when compared with the study groups. As a result, they concluded that usage of levobupivacaine alone or combined with methylprednisolone provides excellent pain control in unilateral lumbar discectomy patients and diminishes the requirement of opioids.

Bartın et al. (15) suggested that blockade of superficial cervical plexus with 0.5% of levobupivacaine preincisionally in patients who had thyroid surgery under general anaesthesia yields good haemodynamic stability and decreases the requirement of intraoperative and postoperative analgesics. Additionally, they reported that first sixth hour VAS scores were also significantly lower in the levobupivacaine-administered group than the control group.

In our study, discharge time (6.75 ± 1.16 min), postoperative VAS at 0 (3.05 ± 1.36) and 1 hour (2.65 ± 0.49) and requirement of diclofenac (450 mg for 20 patients) were lower in levobupivacaine-infiltrated patients. Conversely, discharge time (7.75 ± 1.02 min), immediate (5.30 ± 1.17) and first-hour (3.45 ± 0.89) postoperative VAS and requirement of diclofenac (1500 mg for 20 patients) were higher in Group 2 patients. There was no local or systemic complication. Elevated values of heart rate and mean blood pressure at the 40th minute were attributed to the diminishing analgesic effect of fentanyl in group II patients. Due to the continued analgesic effect of pre-emptive levobupivacaine infiltration, there was no elevation of heart rate and mean blood pressure at the 40th minute in group I patients. Our results are like many other trial results, and it supports a favourable contribution of pre-emptive analgesia to postoperative analgesia.

Conclusion

Infiltration of 0.25% levobupivacaine as a rectangle which included the incision line before surgery decreases discharge time, provides analgesia in the early postoperative period and diminishes the requirement of analgesics in appendectomy patients. We believe that usage of levobupivacaine is more advantageous for this reason.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Yüzüncü Yıl University School of Medicine (09.05.2013-16).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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