Cukurova Medical Journal

Araştırma Makalesi / Research Article

Effect of Ultrasound Guided Rectus Sheath Block on Postoperative Analgesia after Laparotomy with Transverse Incision in Children

Transvers Insizyonla Laparotomi Uygulanan Çocuklarda Ultrason Kılavuzluğunda Rektus Kılıf Bloğunun Postoperatif Analjezi Üzerine Etkisi

Aydın Halefoğlu[1], Ersel Güleç[1], Zehra Hatipoğlu[1], Dilek Özcengiz[1]

[1]Cukurova Unuiversity Faculty of Medicine, Department of Anesthesiology and Reanimation, ADANA

Cukurova Medical Journal 2015;40(3):534-541.

ABSTRACT

Purpose: Rectus sheath block have been used for postoperative pain control in adult patients undergoing abdominal surgery. To investigate the effect of the ultrasound guided rectus sheath block (RSB) with levobupivacaine on both intraoperative sevoflurane consumption and postoperative analgesia after laparotomy with transverse incision in children.

Material and Methods: Forty patients with ASA I-II physical status, aged 3-7 years and undergoing laparotomy with transverse incision were randomly allocated into two groups. Patients were administered general anesthesia and before the beginning of surgery ultrasound guided RSB with 0.2 mL/kg, 0.25% of levobupivacaine and thirty minutes before the surgery the loading dose of morphine of 0.1 mg/kg intravenously were received in group RSB and group M, respectively. Analgesic drug pump with 0.01 mg/kg bolus doses of morphine and 30 minutes lockout interval was set up postoperatively in both groups. Concentrations (%) and consumed amounts (mL/h) of sevoflurane during the surgery and systolic and diastolic blood pressure, heart rate, and peripheral oxygen saturation values were recorded both intraoperative and postoperative period in each groups. Analgesic consumption with postoperative analgesic drug pump, FLACC pain scores, sedation level, nausea, vomiting, supplemental analgesic requirement and side effects were also recorded.

Results: Demographic data and hemodynamic parameters were similar in both groups excepting that systolic arterial pressure values were reduced in group RSB than in group M. Inhaled concentration and consumed amounts of sevoflurane were decreased in group RSB compared with group M. Averages of consumptions of sevoflurane were 18.7±2.1 mL/h and 21.5 ±2.9 mL/h in group RSB and group M, respectively ($p<0.001$). Postoperative FLACC scores, sedation scores, and morphine consumption for 24 hours were lower in group RSB than in group M ($p<0.001$). Three patients had nausea in group M, however no nausea and vomiting was observed in group RSB and any patients did not need supplemental analgesia postoperatively.

Conclusions: Ultrasound guided RSB is superior to intravenous morphine according to intraoperative anesthetic gas consumption and postoperative pain control in children undergoing abdominal surgery using transverse incision.

Key words: Children, laparotomy, levobupivacaine, postoperative pain, rectus sheath block, ultrasound

ÖZET

Amaç: Rektus kılıf bloğu abdominal cerrahi geçirecek olan erişkin hastalarda postoperatif ağrı kontrolünde kullanılmaktadır. Çalışmamızda levobupivakain ile ultrason kılavuzluğunda rektus kılıf bloğunun çocuklarda transvers

insizyon ile uygulanan laparatomide intraoperatif anestezik gaz tüketimi ve postoperatif analjezi üzerine etkisini araştırmayı amaçladık.

Materyal ve Metod: Çalışmamızda 3-7 yaşları arasında ve fizik durumu ASA I-II olan transvers insizyon ile laparatomi uygulanacak 40 çocuk hasta rastlantısal olarak iki gruba yerleştirildi. Hastaların tamamına genel anestezi uygulandı. Grup RSB' deki hastalara cerrahi başlamadan hemen önce 0,2 ml/kg, %0,25 levobupivakain ile ultrason kılavuzluğunda rektus kılıf bloğu uygulandı. Grup M'deki hastalara da cerrahi bitmeden 30 dakika önce intravenöz yolla 0,1 mg/kg morfin uygulandı. Tüm hastalara postoperatif dönemde 0,01 mg/kg morfin bolus doz ve 30 dakika kilit süresi olan bir analjezik ilaç pompası kuruldu. İntraoperatif kullanılan sevofluran konsantrasyonları ve tüketilen miktarları, hemodinamik değişkenler, periferik oksijen satürasyonlar kaydedildi. Postoperatif dönemde morfin tüketim miktarı, FLACC ağrı skorları, sedasyon seviyeleri, yan etkiler ve ek analjezik tüketimleri de kaydedildi.

Bulgular: Demografik veriler ve hemodinamik değişkenler her iki grupta birbirine benzerdi. Ancak sistolik arter basınçları grup RSB'de grup M'ye göre anlamlı olarak daha düşüktü. Kullanılan sevofluran konsantrasyon seviyeleri ve tüketilen miktarları grup RSB'de grup M'ye göre anlamlı olarak düşüktü. Ortalama sevofluran tüketim miktarları grup RSB'de 18,7±2,1 ml/saat iken grup M'de 21,5 ±2,9 ml/saat idi ($p<0.001$). 24 saat boyunca postoperatif FLACC skorları, sedasyon skorları ve morfin tüketim miktarları grup RSB'de grup M'ye göre anlamlı düşüktü ($p<0.001$). Grup M'de 3 hastada bulantı görüldü bununla birlikte grup RSB'de hiçbir hastada bulantı veya kusma görülmedi. Hiçbir hastada postoperatif ek analjezik gereksinimi gözlenmedi.

Sonuç: Ultrason kılavuzluğunda rektus kılıf bloğu, transvers insizyon uygulanan abdominal cerrahi geçiren çocuklarda intraoperatif anestezik gaz tüketimi ve postoperatif ağrı kontrolü yönünden intravenöz morfine göre daha üstündür.

Anahtar kelimeler: Çocuk, laparotomi, levobupivakain, postoperatif ağrı, rektus kılıf bloğu,ultrason

INTRODUCTION

Postoperative pain is one of the most important problems influencing the morbidity after surgery. Several drugs have been used for postoperative pain control such as non-steroid anti-inflammatory drugs, paracetamol and opioids with different types of applications including per oral, nasal, intravenous bolus, intravenous patient-controlled and intravenous nurse or parent-controlled analgesia[1-3]. Peripheral nerve block techniques have been frequently performed to provide pain relief after surgery. Ultrasound increases peripheral nerve block success rate with less side effects[4]. Recently, ultrasound guided rectus sheath block (RSB) is a new technique for postoperative pain control following abdominal surgery[5-7]. The effects of levobupivacaine are similar to bupivacaine and it has more advantage such as less cardiovascular side effects than bupivacaine[8]. We aimed to investigate the effects of ultrasound guided RSB on both intraoperative anesthetic gas and postoperative morphine consumptions for abdominal surgery with transverse incision.

MATERIAL and METHODS

After obtaining the Ethics Committee approval and informed parental consent, 40 pediatric patients aged 3−7 years, having American Society of Anesthesiologists physical status I−II undergoing abdominal surgery including liver, gall bladder, spleen, small intestine, cecum, colon, rectum, intra-abdominal masses, umbilical, paraumbilical, and inguinal hernia with transverse incision were enrolled into the prospective, randomized study.

Patients were randomly allocated into two groups (Group RSB, n = 20; Group M, n = 20) by computer generated randomization table list. Patients who had American Society of Anesthesiologists physical status III and above, parents who did not consider to participate in the study, those with systemic (septicemia, bacteremia) or local infection, bleeding and shock, predisposition for bleeding and anticoagulant therapy given, central nervous system disease, allergy to local anesthetics, severe respiratory, hepatic, and renal failure were excluded from the study. Premedication was not administered to any

patients. Children who were taken into the operating room with their parents were informed regarding the surgery and anesthetic procedure. Electrocardiography, heart rate (HR), systolic (SBP) and diastolic (DBP) blood pressures, and peripheral oxygen saturation (SpO2) were evaluated by anesthesia device monitor (Draeger Medical Systems, Inc. Telford, PA, USA) with 15 minutes intervals after 5th minute of induction during the surgery. General anesthesia was administered to both groups. The induction of anesthesia was obtained with 3−5 mg/kg of thiopental sodium, intravenously. Patients were intubated by providing muscle relaxation with 0.1 mg/kg vecuronium bromide after the induction. 0.45% NaCl-5% Dextrose mixture solution was given at a rate of 3−10 mL/kg/h intravenously.

Ultrasound guided RSB was performed in group RSB patients before the skin incision. The block was applied using levobupivacaine of 0.25% with saline at a total volume of 0.2 mL/kg. The patients in group M received 0.1 mg/kg dose of morphine at 30 minutes before the closure of the abdomen. By the surgeon, transverse incision was performed close to the midline and extended to lateral according to type of surgery, if necessary. All patients were administered morphine via analgesic drug pump (CADD-Legacy® pump, Smiths Medical MD, Inc. St. Paul, MN, USA). It was set up with 0.01 mg/kg bolus dose of morphine and 30 minutes lock out interval for postoperative pain management.

Total amount of sevoflurane consumption was measured at the end of the surgery and these amounts were recorded as mL/h per hour by dividing operation time. RSB procedure was performed with ultrasound guidance (ultrasonography device MyLab Five Esaote, Maastricht, The Netherlands) with 15 MHz linear transducer by the same anesthesiologist who is expert using ultrasonography and can recognize the structures in the rectus sheath and the surrounding tissues.

The RSB was bilaterally performed with 22-gauge block needle at umbilicus level under real-time ultrasound imaging after sterile transducer and skin preparation. The needle placement site was identified by imaging the posterior rectus sheath with optimal ultrasound settings. After inserting the block needle with in-plane ultrasound guidance technique, it was advanced confirming by negative aspiration test and levobupivacaine of 0.25% with a total volume of 0.2 mL/kg was bilaterally injected between the rectus muscle and posterior rectus sheath on each side of umbilicus. The spread of local anesthetic solution was monitored with real-time ultrasound imaging.

SBP, DBP, HR, and SpO_2 values were recorded at 5^{th}, 15^{th}, 30^{th} minutes and 1^{st}, 2^{nd}, 4^{th}, 6^{th}, 8^{th}, 12^{th}, and 24^{th} hours, postoperatively. Primary outcome measures were FLACC (facial expression, leg movement, activity, cry, and consolability) scores[9] and morphine consumptions that were recorded to evaluate the postoperative pain and secondary outcome measure was the level of sedation using a sedation scale (0: awake, 1: mild sedation, 2: asleep, arousable, 3: deep asleep, unarousable) with the same intervals following surgery. If FLACC pain score is ≥ 5, patients are considered to have significant pain. These patients were planned to give additional morphine. A nurse who is trained for morphine pump took postoperative observations every half hour and administered morphine, if necessary.

The levels of nausea and vomiting were assessed postoperatively with nausea and vomiting scale (0: no nausea, 1: only nausea, 2: retching, 3: vomiting). Ondansetron was considered to administer by six hours intervals if nausea and vomiting score was ≥ 2 or the score was 1 with uncomfortable feeling. Patients were observed to the other possible side effects of the procedure during first 24 hours.

The statistical analysis of the data was applied by SPSS 18.0 statistics software. Continuous measurements (age, height, weight, etc.) were summarized by the mean and standard

deviation. Repeated Measures Analysis was used to evaluate the changing of continuous measurements of patients at different times (SBP, DBP, etc.) during the intraoperative and postoperative follow-up. Independent samples t-test or Mann-Whitney U test was used to detect instant differences between the groups if necessary. A P value of < 0.05 was considered as the level of statistical significance for all tests.

RESULTS

Demographic characteristics of the groups were (age and weight) not differ significantly between two groups (Table 1). There was no statistically significant difference according to hemodynamic parameters; however, SBP values were statistically lower in group RSB than group M from 5th minutes to 8th hours.

Consumed sevoflurane concentration values were determined to be decreased in group RSB compared with group M from 30th to 180th minutes ($p < 0.05$). The concentrations of sevoflurane were demonstrated in Table 2. The averages of sevoflurane consumption were 18.7 ± 2.1 mL/h and 21.5 ± 2.9 mL/h in group RSB and group M, respectively ($p < 0.001$). FLACC scores were significantly lower in group RSB compared with group M at the 2nd hour and subsequent hours ($p < 0.05$) (Table 3).

The cumulative morphine consumption was statistically lower in group RSB compared with group M for 24 hours, postoperatively ($p < 0.001$) (Table 4). Patients did not need to any rescue analgesic administration. Sedation scores were determined as 0 in group RSB, however they were found to be higher in group M for study times ($p < 0.001$). Eighty percent of patients had mild sedation (score: 1) and asleep but possible to arouse (score: 2) at 5th minute and 16% of them continued as mild sedation (score: 1) during 24 hours in group M. The averages of sedation score were 0 and 0.9 (mild sedation) in group RSB and group M, respectively. There were two mild and one moderate postoperative nausea in group M, however there were no vomiting, antiemetic drug necessity and any side effect for all the patients.

Table 1. Demographic data of the groups.

	Group RSB (n=20)	Group M (n=20)
Age (year)	3.8±2.3	4.1±2.8
Weight (kg)	24.5±1.3	26.4±1.4

SD: standard deviation, **kg**: kilogram

Table 2. The concentrations of sevoflurane in groups (%)

Time in surgery (min)	Group RSB (n=20)	Group M (n=20)
5	1.98±0.62	1.93±0.16
15	1.70±0.31	1.87±0.26
30	1.44 ±0.36	1.84±0.32*
45	1.31±0.30	1.78±0.38*
60	1.16±0.25	1.73±0.38*
75	1.05±0.20	1.62±0.41*
90	1.05±0.17	1.51±0.49*
120	1.04±0.16	1.51±0.44*
150	0.96±0.19	1.16±0.38*
180	1.00±0.00	1.42±0.39*

*p<0.05, min: minutes, SD: standard deviation

Table 3. FLACC scores for postoperative pain.

Duration (n:20)	Group RSB	Group M
5th min	3.1±1.7	2.5±2.6
15th min	2.2±1.6	2.0±2.4
30th min	0.8±1.1	1.6±2.2
1st h	0.2±0.5	0.9±1.3
2nd h	0.1±0.2*	0.8±0.9
4th h	0.0±0.0*	0.7±0.9
6th h	0.0±0.0*	0.6±0.9
8th h	0.0±0.0*	0.5±0.8
12th h	0.0±0.0*	0.2±0.6
24th h	0.0±0.0*	0.1±0.4

*p<0.05, **min**:minute, **h**: hour, **SD:** standard deviation

Table 4. Total morphine consumption (mg)

Duration (n:20)	Group RSB	Group M
5th min	0.06±0.16*	2.49±1.36
15th min	0.15±0.18*	2.51±1.36
30th min	0.25±0.22*	2.63±1.46
1th h	0.42±0.43*	2.77±1.59
2th h	0.56±0.48*	2.93±1.63
4th h	0.73±0.51*	3.23±1.75
6th h	0.89±0.55*	3.44±1.82
8th h	1.22±0.68*	3.76±2.10
12th h	1.60±0.87*	4.23±2.36
24th h	1.88±1.00*	4.77±2.97

*p<0.05, min: minute, h: hour, SD: standard deviation

DISCUSSION

Our study suggests that ultrasound guided RSB is superior to intravenous morphine for postoperative pain control and reduces significantly intraoperative sevoflurane consumption in abdominal surgery with transverse incision. Regional blocks have an increasing trend for postoperative pain control in children[10]. Recently, the RSB have been reported to be an efficacious approach for postoperative pain management[7].

The combination of RSB and ilio-inguinal block was proposed to provide a wider block area in abdominal surgery with transverse incision[11]. We performed RSB alone obtaining sufficient analgesia for abdominal surgery with transverse incision. A few reports in the literature are remarkable related to RSB for children. These studies including mostly pediatric umbilical, paraumbilical, and inguinal hernia repair surgeries have quite successful results[7,12]. Additionally, our study demonstrated that the RSB reduced intraoperative sevoflurane consumption and provided sufficient postoperative analgesia. In the present study, RSB was performed with 0.1 mL/kg, 0.25% of levobupivacaine. In accordance with our study, Willschke et al.[13] found that ultrasound guided RSB bilaterally with 0.1 mL/kg, 0.25% of levobupivacaine provides effective analgesia for

umbilical hernia repair. The authors pointed out that ultrasonography can be reduce the risk of complication and failure and permits to be used a lower volume of local anesthetic without disturbances in success rate and efficacy of the block. Correspondingly, some studies suggested that ultrasound-guided RSB has superiority for perioperative or postoperative analgesia compared with local anesthetic infiltration[7,12]. Furthermore, a retrospective analysis to be studied in patients underwent hypertrophic pyloric stenosis surgery reported that ultrasound guided RSB with a dose of 0.3 mL/kg ropivacaine 0.3% in each side of the abdomen above the umbilicus provided sufficient analgesia to prevent postoperative pain[14]. Similarly, we suggests that ultrasound guided RSB with 0.1 mL/kg levobupivacaine 0.25% in each side of the abdomen provides adequate analgesia.

On the other hand, Isaac et al. 5 stated that RSB was not advantageous for postoperative analgesia compared with local anesthetic wound infiltration after umbilical hernia repair surgery. In this study, both RSB and wound infiltration were applied with a total amount of 0.8 mL/kg and 0.25% of bupivacaine with concentration of 1:200,000 epinephrine. This dose was higher than the dose we used in the study. In the literature, ultrasound guided rectus block was reported to decrease the dose and volume of local anesthetic[15].

Dolan et al.[16] evaluated to the accuracy of local anesthetic distribution in the RSB applied by one who is not a specialist using loss of resistance (LOR) or ultrasound guidance. Accuracy of local anesthetic location with LOR was 45% however; the placement was superficial and deep to the rectus sheath with the percentages of 34 and 21%, respectively. They demonstrated that ultrasound significantly advanced the accuracy of local anesthetic location with 89% of success rate at first injection of local anesthetic.

A recent study described a new approach of ultrasound-guided RSB including the peripheral block of the 10th intercostal nerve introducing to lateral edge of the rectus abdominis muscle and concluded that this approach may be prefer to rule out anatomical variations of the nerves and to avoid a risk of hematoma in this region for umbilical hernia repair surgery [17]. We performed RSB passing through the rectus muscle; however, we did not observe any hematoma in the muscle.

It has been used analgesic drug pump with bolus doses of morphine between 0.01 and 0.05 mg with or without background infusion in pediatric surgeries[18-22]. In our study, we used an analgesic drug pump both to provide pain relief and to consider postoperative morphine consumption with 30 minutes lockout interval and 0.01mg/kg bolus dose of morphine. Neuraxial or peripheral nerve blocks can be preferred to reduce the dose of opioid used and thus its adverse effects such as sedation, postoperative nausea and vomiting, respiratory depression and urinary retention[11,23-25]. Some studies reported that RSB decreased the opioid consumption and the adverse effects of opioids[7,11]. Correspondingly, we did not observe postoperative sedation in group RSB, whereas it was found to be increased in group M. Any side effect was not found in both of groups excepting presence of nausea in three patients in group M.

A limitation of this study is that RSB includes the anterior branches of the ventral rami, however it does not contain the lateral branches. RSB may be cause a partial blockage at the surgical site when transverse incision was extended to lateral from the midline.

The present study concluded that preoperative RSB with ultrasound guidance provides effective analgesia and reduces intraoperative sevoflurane and postoperative morphine consumption for abdominal surgeries with transverse incision in children.

Conflict of Interest

The authors declare no conflict of interests. This research was carried out without funding.

Ethics committee approval of this study was obtained from Ethics Committee of Clinical Drug

Research-II in Ministry of Health of Turkey (Reference Date/ Number:16.09.2010/ 33).

REFERENCES

1. Wong I, St John-Green C, Walker SM. Opioid-sparing effects of perioperative paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs) in children. Pediatr Anesth. 2013;23:475-95.
2. Engelhardt T, Steel E, Johnston G, Veitch DY. Tramadol for pain relief in children undergoing tonsillectomy: a comparison with morphine. Pediatr Anesth. 2003;13:249-52.
3. Howard R, Carter B, Curry J, Morton N, Rivett K, Rose M, et al. Postoperative pain. Pediatr Anesth. 2008;18:36-63.
4. Gelfand HJ, Ouanes JP, Lesley MR, Ko PS, Murphy JD, Sumida SM, et al. Analgesic efficacy of ultrasound-guided regional anesthesia: a meta-analysis. J Clin Anesth. 2011;23:90-6.
5. Isaac LA, McEwen J, Hayes JA, Crawford MW. A pilot study of the rectus sheath block for pain control after umbilical hernia repair. Paediatr Anaesth. 2006;16:406-9.
6. Wada M, Kitayama M, Hashimoto H, Kudo T, Kudo M, Takada N, et al. Brief reports: plasma ropivacaine concentrations after ultrasound-guided rectus sheath block in patients undergoing lower abdominal surgery. Anesth Analg. 2012;114:230-2.
7. Gurnaney HG, Maxwell LG, Kraemer FW, Goebel T, Nance ML, Ganesh A. Prospective randomized observer-blinded study comparing the analgesic efficacy of ultrasound-guided rectus sheath block and local anaesthetic infiltration for umbilical hernia repair. Br J Anaesth. 2011;107:790-5.
8. Ivani G, De Negri P, Lonnqvist PA, L'Erario M, Mossetti V, Difilippo A, et al. Caudal anesthesia for minor pediatric surgery: a prospective randomized comparison of ropivacaine 0.2% vs levobupivacaine 0.2%. Pediatr Anesth. 2005;15:491-4.
9. Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: a behavioral scale for scoring postoperative pain in young children. Pediatr Nurs. 1997;23:293-7.
10. Bhalla T, Sawardekar A, Dewhirst E, Jagannathan N, Tobias JD. Ultrasound-guided trunk and core blocks in infants and children. J Anesth. 2013;27:109-23.
11. Finnerty O, Carney J, McDonnell JG. Trunk blocks for abdominal surgery. Anaesthesia. 2010; 65:76-83.
12. Dingeman RS, Barus LM, Chung HK, Clendenin DJ, Lee CS, Tracy S, et al. Ultrasonography-guided bilateral rectus sheath block vs local anesthetic infiltration after pediatric umbilical hernia repair: a prospective randomized clinical trial. JAMA surg. 2013;148:707-13.
13. Willschke H, Bosenberg A, Marhofer P, Johnston S, Kettner SC, Wanzel O, et al. Ultrasonography-guided rectus sheath block in paediatric anaesthesia--a new approach to an old technique. Br J Anaesth. 2006;97:244-9.
14. Breschan C, Jost R, Stettner H, Feigl G, Semmelrock S, Graf G, et al. Ultrasound-guided rectus sheath block for pyloromyotomy in infants: a retrospective analysis of a case series. Pediatr Anesth. 2013;23:1199-204.
15. Fredrickson MJ, Abeysekera A, White R. Randomized study of the effect of local anesthetic volume and concentration on the duration of peripheral nerve blockade. Reg Anesth Pain Med. 2012;37:495-501.
16. Dolan J, Lucie P, Geary T, Smith M, Kenny GN. The rectus sheath block: accuracy of local anesthetic placement by trainee anesthesiologists using loss of resistance or ultrasound guidance. Reg Anesth Pain Med. 2009;34:247-50.
17. de Jose Maria B, Gotzens V, Mabrok M. Ultrasound-guided umbilical nerve block in children: a brief description of a new approach. Pediatr Anesth. 2007;17:44-50.
18. Sandeman DJ, Bennett M, Dilley AV, Perczuk A, Lim S, Kelly KJ. Ultrasound-guided transversus abdominis plane blocks for laparoscopic appendicectomy in children: a prospective randomized trial. Br J Anaesth. 2011;106:882-6.
19. Ozalevli M, Unlugenc H, Tuncer U, Gunes Y, Ozcengiz D. Comparison of morphine and tramadol by patient-controlled analgesia for postoperative

analgesia after tonsillectomy in children. Pediatr Anesth. 2005;15:979-84.

20. Doyle E, Mottart KJ, Marshall C, Morton NS. Comparison of different bolus doses of morphine for patient-controlled analgesia in children. Br J Anaesth. 1994;72:160-3.

21. Doyle E, Harper I, Morton NS. Patient-controlled analgesia with low dose background infusions after lower abdominal surgery in children. Br J Anaesth. 1993;71:818-22.

22. Morton NS, O'Brien K. Analgesic efficacy of paracetamol and diclofenac in children receiving PCA morphine. Br J Anaesth. 1999;82:715-7. PubMed PMID: 10536549.

23. Newman B, McCarthy L, Thomas PW, May P, Layzell M, Horn K. A comparison of pre-operative nerve stimulator-guided femoral nerve block and fascia iliaca compartment block in patients with a femoral neck fracture. Anaesthesia. 2013;68:899-903.

24. Ong CK, Lirk P, Seymour RA, Jenkins BJ. The efficacy of preemptive analgesia for acute postoperative pain management: a meta-analysis. Anesth Analg. 2005;100:757-73, table of contents.

25. Abrahams MS, Horn JL, Noles LM, Aziz MF. Evidence-based medicine: ultrasound guidance for truncal blocks. Reg Anesth Pain Med. 2010;35:36-42.

Yazışma Adresi / Address for Correspondence:
Dr. Ersel Güleç
Cukurova University Faculty of Medicine
Department of Anesthesiology and Reanimation
Tel: 0 322 338 6060/ 3289
E-mail: gulecersel@yahoo.com

Geliş tarihi/Received on : 20.01.2015
Kabul tarihi/Accepted on: 27.02.2015