

Sezaryen sonrası ağrı tedavisinde epidural %0.2 Ropivakain ile %0.2 Ropivakain ve 0.75 µg mL-1 Sufentanil kombinasyonunun karşılaştırılması

Tahsin Kaya*, Ünase Büyükköçak*, Hülya Başar*, Nevin Sağsöz**

ÖZET

Sezaryen operasyonları sonrası uygulanacak analjezi teknikleri, annelerin bebeklerinin bakımına izin verecek erken mobilizasyon ile birlikte etkin analjezi sağlamalıdır. Bu çalışmada, hasta kontrollü epidural analjezide (HKEA) kullanılan yalnız %0.2 ropivakain ve %0.2 ropivakain+0.75 µg mL-1sufentanilin karşılaştırılması amaçlandı.

50 kadın olgu (ASA I) çalışmaya dahil edildi. Tüm hastalara kombine spinal-epidural anestezi uygulandı. Duyu bloğu 2 dermatom gerileyince analjezik solüsyonların infüzyonuna başlandı. Hastalar randomize olarak 2 gruba ayrıldı (n=25). Grup-I'de %0.2 ropivakain ve 0.75 µg mL-1sufentanil, Grup II' de yalnız %0.2 ropivakain kullanıldı (yükleme 1.25 mL, kilit süresi 30 dakika, 2.5 mL saat-1 infüzyon ile). Ameliyat sonrası 24 saat süresince ağrı (vizuel analog skala), motor blok (bromaj skalası) ve sedasyon (four-point skala) değerlendirildi. Hemodinamik ve solunumsal parametreler, yan etkiler, total ilaç tüketimi ve ek analjezik gereksinimi kaydedildi. İstatistiksel analizde student-t, chi-square ve Mann Whitney U testleri kullanıldı.

Demografik veriler, sedasyon skalaları, hemodinamik ve solunumsal parametrelerde gruplar arasında fark saptanmamıştır. Motor blok ve ağrı skorları 2 ve 4. saatte Grup-II'de anlamlı şekilde yüksek bulunmuştur. Total ilaç tüketiminin Grup-I'de 65.24±4.20 mL, Grup II'de 81.1±6.44 mL olduğu gözlenmiştir (P<0.05). Grup-I'de 4 hasta, Grup-II'de 21 hasta ek analjezik kullanmıştır. Kaşıntı Grup-I'de daha fazla gözlenmiştir.

Sezaryen sonrası HKEA'de %0.2 ropivakaine 0.75 µg mL-1 sufentanil eklenmesi ropivakaine göre, özellikle erken postoperatif dönemde daha etkin analjezi ve daha az motor blok sağlamıştır.

Anahtar Kelimeler: Ropivakain, Sufentanil, Sezaryen, Hasta kontrollü Epidural Analjezi (HKEA)

SUMMARY

Comparison of Epidural Ropivacaine 0.2% and Ropivacaine 0.2% in Combination with Sufentanil 0.75 µg mL-1 for Post-caesarean Analgesia

Analgesic techniques after c-section must be effective producing early mobilisation to enable mothers to care effort their babies. In this study, the comparison of ropivacaine 0.2% alone, with ropivacaine 0.2%+sufentanil 0.75 µg mL-1 for patient controlled epidural analgesia (PCEA) was aimed.

Fifty women (ASA-I) were enrolled in the study. All patients had combined spinal-epidural anaesthesia. Infusion of analgesic solutions was started when sensory level decreased by two dermatome levels. The patients randomly assigned, into two groups (n=25). In Group-I, ropivacaine 0.2% and sufentanil 0.75 µg mL-1, in Group-II, ropivacaine 0.2% alone were applied (bolus 1.25 mL, lockout 30 min, with 2.5 mL b-1 background infusion). Pain (Visual Analog Scale), motor blockage (Bromage scale) and sedation (Four point scale) were evaluated during 24 hours after Caesarean, using the scales of visual analogue, bromage, and four-point, respectively. Haemodynamic and respiratory parameters, side effects, total drug consumption and additional analgesic need, were recorded. Statistical analysis included student-t, chi-square, and Mann Whitney U tests.

There was no difference in demographic data, sedation scores, haemodynamic and respiratory parameters, between the groups.

Motor block and pain scores were significantly higher in Group-II than in Group-I at 2 and 4. h. Total drug consumption was 65.24±4.20 mL for Group-I and 81.1±6.44 mL for Group-II, (P<0.05). Four patients in Group-I and 21 patients in Group-II received additional analgesic. Pruritus was observed more frequently in Group-I.

The addition of sufentanil 0.75 µg mL-1 to ropivacaine 0.2% for PCEA after Caesarean led to more effective analgesia and less motor weakness when compared to ropivacaine 0.2% alone, especially during early postoperative period.

Key words: Ropivacaine, Sufentanil, Caesarean section, Patient Controlled Epidural Analgesia (PCEA)

* Kırıkkale Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon AD

** Kırıkkale Üniversitesi Tıp Fakültesi, Kadın Hastalıkları ve Doğum AD

Başvuru Adresi:

Doç. Dr. Ünase Büyükköçak
KÜTF Hastanesi 71100 Kırıkkale - Türkiye
e-posta: unaseb@yahoo.com
Tel.: 0.318 225 24 85

* Kırıkkale University School of Medicine, Department of Anaesthesiology and Reanimation

** Kırıkkale University School of Medicine Department of Obstetrics and Gynaecology

Correspondence to:

Ünase Büyükköçak MD,
KÜTF Hastanesi 71100 Kırıkkale - Turkey
email: unaseb@yahoo.com
Tel.:+90.318 225 24 85

Başvuru tarihi: 31.01.2008, Kabul tarihi: 24.06.2008

Giriş

The effective treatment of acute postoperative and posttraumatic pain is important for modern health service. The selection of drug and technique in postoperative pain management depends on the surgical field (type of surgery), systemic disease accompanying the patient, hospital equipment, and physician's experience. Additionally, drugs with fewer side effects and analgesic techniques providing early mobilization of mothers to take care of their babies, without deterioration in consciousness and motor activity are required in Caesarean section (Erdine 2000).

Continuous epidural analgesia with local anaesthetics, opioids or with the combination of these agents has been commonly used for postoperative pain therapy providing optimal analgesia (Hodgson and Liu 2001, Turk and Akiki 2001, Scott et al 1999).

In obstetric patients, local anaesthetics providing sufficient analgesia, minimum side effects and early ambulation, are preferred. Ropivacaine, a relatively new amide local anaesthetic, has similar physicochemical properties with bupivacaine except that it is half as lipid-soluble. In spite of lower potency, ropivacaine provides less motor block producing a differential block with higher selectivity for sensory nerves rather than motor nerves, and less severe cardiac dysrhythmias and central nervous toxicity. These advantages make ropivacaine suitable for obstetric patients and epidural infusion of ropivacaine is used in labour and postoperative analgesia (Ozyalcın 2005, Onal 2004, Hug 2002, Asik et al 2002).

Opioids have been used for epidural analgesia for 20 years. High lipid solubility increases the effectiveness of epidural application. Sufentanil, a lipophilic opioid, is used in the epidural space with safety. Although sufentanil has similar pharmacokinetics properties with morphine it has potency about 100 times that of morphine (Hug 2002, Erdine 2000). Combination of local anaesthetic with opioid greatly enhances the intensity and the duration of the block without adverse effects, leading to synergistic action at dorsal horn of medulla spinalis. By this way small-dose of local anaesthetic produces fewer side effects than large-dose of local anaesthetic (Ozyalcın 2005, Michael and Brian 2001).

The aim of this study was to compare the efficacy

of low volume epidural infusion of ropivacaine alone, and the combination with sufentanil for postoperative pain management. There are several studies related to the use of sufentanil in addition to ropivacaine for labour (Bachmann-Mennenga et al 2005, Gogarten et al 2004, Boselli et al 2003, Debon et al 2001, Fischer et al 2000), and caesarean section (Bachmann-Mennenga et al 2005) or postoperative analgesia (Berti et al 2005, Tuncel et al 2005, Kampe et al 2003, Brodner et al 2000) but, to our knowledge this combination and this combination with low volume epidural infusion for post caesarean section analgesia have not been studied. Therefore we performed this study to compare lumbar epidural ropivacaine 0.2% alone versus ropivacaine 0.2% plus sufentanil $0.75 \mu\text{g mL}^{-1}$ during the first 24 h of caesarean section in respect to the analgesia (pain scores, analgesic drug consumption), haemodynamic and respiratory parameters, motor block, sedation scores and side effects.

Material and Method

Fifty term parturients with American Society of Anesthesiologists physical status classification I (ASA I) scheduled for elective caesarean section under combined spinal-epidural (CSE) technique, were enrolled in the study after obtaining Local Hospital Ethics Committee approval and informed consent. Exclusion criteria were patient refusal and other contraindications to neuraxial blockade, and history of adverse reaction to any study medications (Hug 2002).

All patients were instructed for the use of the visual analogue scale (VAS, 0: no pain, 100: the worst possible pain imaginable) and for the management of the patient controlled epidural analgesia (PCEA) technique and pump (Abbott Pain Management Provider™ Abbott Laboratories, North Chicago, IL,60064, USA) preoperatively.

Patients did not receive preoperative medication. Routine intraoperative monitoring included heart rate, non-invasive arterial blood pressure, respiratory rate, and pulse oximetry, using Datex monitor (Datex Ohmeda Cardiocap/5 Louisville, CO, USA) was applied to all patients. After insertion of intravenous (i.v.) cannula all patients received the infusion of 10 mL kg^{-1} Ringer's lactate solution.

A combined spinal-epidural anaesthesia using combined spinal-epidural catheter was applied to

Table 2. . Mean arterial pressure (MAP), Heart rate (HR), Respiratory rate (RR) values of the patients. Data are mean±SD.

Time (h)	MAP		HR		RR	
	Group I	Group II	Group I	Group II	Group I	Group II
0	85.6±6.73	83.1±8.30	80.7±5.39	82.6±6.85	18.8±1.64	18.9±1.42
2	81.7±6.50	81.8±4.41	79.7±4.11	79.1±5.04	18.8±1.73	18.1±1.73
4	82.6±6.47	84.4±7.73	80.2±5.78	79.3±6.05	19.4±1.41	18.8±3.60
6	81.6±7.53	82.1±7.21	81.8±4.35	79.7±5.38	19.3±1.49	19.2±1.52
8	80.3±6.15	82.7±5.72	81.1±4.69	80.2±5.80	18.8±2.00	19.0±1.54
10	81.7±5.24	81.7±6.40	81.7±3.86	78.4±5.77	18.7±1.60	19.0±1.17
12	82.8±6.66	83.5±5.86	80.4±4.49	79.0±4.33	18.6±1.49	18.8±1.29
16	82.4±7.76	82.5±6.09	80,9±3.51	79.0±4.11	18.6±1.38	19.0±1.30
20	81.1±5.72	82.8±6.20	79.2±4.65	78.6±3.25	18.8±1.41	18.9±1.16
24	81.1±7.08	81.8±4.47	80.5±4.38	78.1±3.13	18.4±1.29	18.9±1.01

all patients. Patients were placed in left lateral decubitus position to minimize the risk of aorto-caval compression and an 18 G Tuohy needle (Espocan®+Docking System+Perifix® Soft Tip, B. Braun Melsungen AG, D-34209 Melsungen, Germany) was inserted through the L3-4 intervertebral space in a midline approach. Epidural space was identified by the loss of resistance to saline. Epidural needle was placed in the epidural space and spinal needle was introduced through epidural needle and advanced further into the subarachnoid space. After free flow of clear cerebrospinal fluid, hyperbaric bupivacaine 0.5% (Marcaine® Spinal heavy; Eczacıbaşı, Turkey) of 2.6 mL was injected into subarachnoid space. After the intrathecal injection of bupivacaine and withdrawal of the spinal needle, the epidural catheter was inserted 2-3 cm through Tuohy needle into epidural space and then the epidural needle was withdrawn, and the patient was returned to supine position with a left lateral tilt.

T4 sensory block was ensured before the onset of surgery (Brown and Gottumkkala 2004). Sensory block to pinprick (bilateral mid-clavicular line using needle) was assessed at every minute until it reached T4 dermatome and then every 15 min until regression of the two dermatomes. At

this time (regression of two segments from the maximum block height, before the surgery was completed), infusion of analgesic solutions was started. Study medications were prepared and applied by an anaesthesiologist who was blinded to the study. Data of the patients were recorded by the same blinded investigator.

Patients were randomized in a double blinded manner, by a sealed envelope technique, into one of the two groups (n=25). In Group I, the patients received ropivacaine 0.2% (Naropin®; Astra-Zeneca, Sweden) and sufentanil 0.75 µg mL⁻¹ (Sufenta®; Janssen Pharmaceutica, Belgium) (bolus 1.25 mL, lockout 30 min, with 2.5 mL h⁻¹ background infusion) via PCEA. Group II received ropivacaine 0.2% without sufentanil, at identical settings of Group I (bolus 1.25 mL, lockout 30 min, with 2.5 mL background infusion).

Haemodynamic and respiratory parameters, pain scores on VAS in rest state, motor block (bromage scale; 0: no motor block, 1: ability to flex knees, but not hips, 2: unable to flex knees, but no problems in ankle movement, 3: no movement possible in any lower extremity) and sedation (four-point scale; 0: fully alert, 1: drowsy, eyes closed occasionally, 2: asleep, but roused easily

Table 3. Bromage scale scores of the patients.

Time	0	2*	4*	6	8	10	12	16	20	24
Group score	I/II	I/II	I/II	I/II	I/II	I/II	I/II	I/II	I/II	I/II
0	0/0	5/2	17/6	20/19	24/23	25/25	25/25	25/25	25/25	25/25
1	3/5	13/8	8/10	5/6	1/2	0/0	0/0	0/0	0/0	0/0
2	3/1	6/12	0/9	0/0	0/0	0/0	0/0	0/0	0/0	0/0
3	19/19	1/3	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0

(0: no motor block, 1: ability to flex knees, but not the hips, 2: unable to flex knees, but no problem in ankle movement, 3: no movement possible in any lower extremity).

* The levels of motor block in Group II were significantly higher than the results of Group I ($P<0.05$).

by speaking to the patient, 3: profoundly sedated, roused by physical stimulation) (Erdine 2000) were assessed at 0 (at the end of the operation), 2, 4, 6, 8, 10, 12, 16, 20 and 24 h after operation.

Patients with inadequate analgesia (VAS>30) after study medication, received meperidine 1 mg kg⁻¹ intramuscularly. Total volume of drug consumption applied via PCEA pump and additional analgesic requirement in 24 h, and side effects such as nausea, vomiting, pruritus, sedation, hypotension (MAP<15%), bradycardia (HR<60 beats min⁻¹) and respiratory depression (RR<10 breaths min⁻¹ and oxyhaemoglobin saturation was <95%) were recorded.

Statistical analysis was performed with the SPSS for Windows 11.0 statistical program. Data related to the age, weight, height, surgery time, MAP, HR, RR, and total drug consumption were compared using Student's t tests. Gravity, parity, Apgar scores, motor block, sedation scores, side effects and additional analgesic needs were analysed by chi-square test. Mann Whitney U test was used to compare VAS pain scores. Group size (25 patients in Group I and Group II) was selected by using power analysis (power: 80%, α 0.05) to detect a 35% difference in motor block and 20% difference in VAS, between groups. Statistical significance was considered at $P<0.05$.

Results

There was no statistical difference between the groups in respect to the age, weight, height, gravity, parity, Apgar scores of neonate (1 and 5

min) and, duration of the operation (Table 1). Similarly, no difference was observed between the patients with regard to the mean arterial pressure, heart rate and respiratory rate (Table 2).

Table 1. Patient variables and Apgar scores. Data are mean±SD.

	Group I (n=25)	Group II (n=25)
Age (year)	26.9±4.5	28.6±5.77
Weight (kg)	77.8±14.4	83.4±12.3
Height (cm)	163±4.17	162.6±5.0
Gravity (2/3/4/5)	5/13/4/3	2/14/5/4
Parity (1/2/3/4)	6/16/1/2	3/13/7/2
Apgar (8/9/10)		
1. min	10/11/4	8/11/6
5. min	1/4/20	1/5/19
Duration of operation (min)	55±7	57±8

Group I: The group that received ropivacaine 0.2% and sufentanil 0.75 µg mL⁻¹ (bolus 1.25 mL, lockout 30 min, with 2.5 mL b-1 background infusion) via PCEA pump.

Group II: The group that received ropivacaine 0.2% alone, at identical settings of Group I.

Analysis of VAS scores and motor block resulted in significant difference between the two groups at 2 and 4 h postoperatively. VAS scores and the levels of motor block in Group II were significantly higher than the results of Group I at 2 and 4 h after operation ($P<0.05$) (Figure 1 and Table 3).

The total volume of solution used for PCEA during 24 hours was more in Group II when compared with Group I (for Group I: 65.24±4.20 mL and for Group II: 81.1±6.44 mL) ($P<0.05$).

The use of additional analgesic was higher in Group II than Group I during the first four hours postoperatively. Additional analgesic requirement was observed in 4 patients (16% of the patients) in Group I, and 21 patients (84% of the patients) in Group II, ($P<0.05$). No supplemental analgesic was used after fourth hour postoperatively.

There was no significant difference between the groups in respect to the sedation scores.

The incidence of side effects such as nausea, vomiting, hypotension, bradycardia and respiratory depression was similar in both groups with the exception of pruritus. We observed higher incidence of pruritus in the group that received sufentanil, but it was mild in intensity and lasted for a short duration requiring no treatment (Table 4).

Table 4. The incidence of side effects in the groups.

Group	I	II
Nause	6	4
Vomiting	0	0
Pruritus*	7	1
Hypotension	5	6
Bradycardia	2	3
Respiratory depression	2	1

* $P=0.049$

Hypotension was treated with the administration of supplemental fluid loading. Ephedrine intravenously was required in 2 patients in Group I and in 3 patients in Group II. Bradycardia was associated with hypotension and heart rate was recovered after ephedrine application. Oxyhaemoglobin saturation decreased below 95% in 2 patients in Group I and 1 patient in Group II. But this decrease was transient and disappeared after talking with the patient and applying oxygen with mask. There was no need to interrupt the epidural analgesia. No patients required antiemetic treatment during the postoperative period.

Discussion

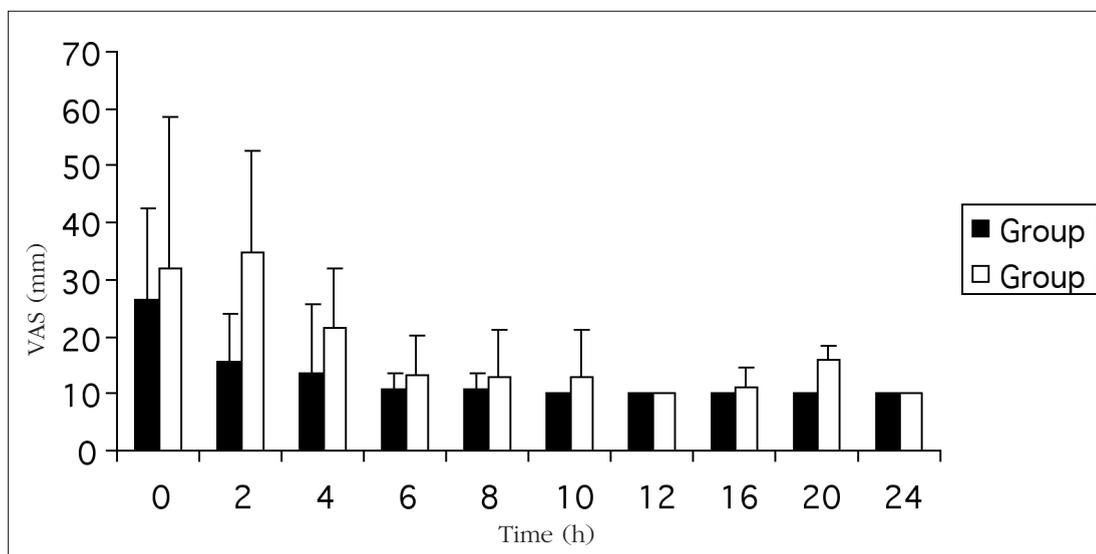
Regional anaesthetic techniques for caesarean section have gained popularity nowadays. CSE technique provides the speed of spinal anaesthesia with the advantage of a continuous catheter technique and adequate analgesia during and after section. The use of local anaesthetic for postoperative epidural analgesia produces efficient analgesia but may result in motor block delaying postoperative recovery, so the decrease in the potency of motor block is important (Gogarten et al 2004, Turk and Akiko 2001).

Epidural administration of opioid in combination with local anaesthetic has been widely used in obstetric. By this way, the decrease in doses of drugs provides the decrease in adverse effects and the risk of toxicity besides supplying sufficient analgesia. These advantages with additive effect during labour were showed in several studies (Boselli et al 2003, Pirbudak et al 2002, Debon et al 2001, Fischer et al 2000, Chestnut et al 1988).

The use of ropivacaine for epidural analgesia in labour has increased and has become more popular, because of some advantages of ropivacaine like less motor block and cardio-circulatory and central nervous toxicity, when compared with bupivacaine (Fischer et al 2000). Contrarily, Gogarten et al. reported that bupivacaine and ropivacaine provided equi-effective analgesia at equal doses without a difference in side-effects (Gogarten et al 2004).

There were several studies related to different concentrations of lumbar epidural ropivacaine changing from 0.05% to 0.2%. Although fewer concentrations and volumes of epidural local anaesthetics have been advised (Hodgson and Liu 2001), this application is conflicting. Low concentrations may decrease the rate of adverse effects but with insufficient analgesia (Desborough 1999). But Boselli and co-workers compared ropivacaine 0.15%+sufentanil 0.5 µg mL⁻¹ with ropivacaine 0.10%+sufentanil 0.5 µg mL⁻¹ using PCEA to determine whether a decrease in concentration of ropivacaine could produce the same effective analgesia or not. They could not find any difference in motor block and side effects, between the two concentrations (Boselli et al 2003).

If ropivacaine was selected as the sole local ana-

Figure 1. Visual analogue scale (VAS) scores of the patients

* VAS scores in Group II were significantly higher than the results of Group I ($P < 0.05$).

esthetic for epidural analgesia in labour, the recommended minimal concentration would be 0.2% (Asik et al 2002). Upper sensory block levels for pain relief after caesarean section and during labour are similar and should encompass T10 (Santos et al 2006, Brown and Gottumkalla 2004). In the literature, the recommendations related to ropivacaine concentration for postoperative analgesia, were as ropivacaine 0.2% (Berti et al 2005, Tuncel et al 2005, Brodner et al 2000, Berti et al 2000, Scott et al 1999). For these reasons mentioned above, ropivacaine 0.2% for PCEA via lumbar catheter was chosen in our study. We did not reduce the concentration of ropivacaine, after the addition of sufentanil trying to provide a balance between analgesia and motor block (sufficient analgesia with minimal motor block), by this concentration.

The infusion rate was 2.5 mL h⁻¹, in the present study, because the aim of our study was to investigate whether the addition of opioid changed the activity of low volume epidural infusion of ropivacaine or not. But higher infusion rates (6-10 mL h⁻¹) might be used as proposed for application of ropivacaine 0.2% into epidural space (Kayaalp 2002).

Although VAS scores were higher in patients receiving ropivacaine 0.2% alone than in patients receiving ropivacaine 0.2% plus sufentanil during the measuring periods, statistical significance was

observed at 2 and 4 hours postoperatively, in the present study. Contrary to previous studies (Berti et al 2005, Lorenzi et al 2002, Berti et al 2000), ropivacaine 0.2% alone did not provide sufficient analgesia. The reason may be explained by the lower doses of basal infusion (instead of 4, 4-6 and 10 mL h⁻¹, respectively). Similar results were observed in Buggy and co-workers' study (Buggy et al 2000). In their study, VAS scores of the patients receiving ropivacaine alone were found higher than that of the patients receiving ropivacaine plus fentanyl, similarly higher incidence of motor block was found after 8 h in ropivacaine group. There was no difference in adverse effects with the exception of pruritus. We used sufentanil instead of fentanyl and found higher VAS scores after 2 and 4 h in patients receiving ropivacaine alone. Higher incidence of motor block was observed in this group. The incidence of adverse effects was similar to Buggy and co-workers' study.

Sufficient analgesia was provided by the addition of sufentanil 0.75 µg mL⁻¹ to ropivacaine, in our study. Berti et al. compared epidural ropivacaine 0.2% alone and ropivacaine plus sufentanil 0.5 µg mL⁻¹ for PCEA, after anterior cruciate ligament repair (Berti et al 2005). Similarly, they demonstrated that ropivacaine plus sufentanil led to better control of pain resulting in lower VAS scores. There were two studies in patients undergoing abdominal surgery with general anaesthesia to

determine the best dose-combination of sufentanil with ropivacaine 0.2% for postoperative thoracic epidural analgesia (Brodner et al 2000, De Cosmo et al 2004). The combination of ropivacaine 0.2% and 0.75 µg/mL sufentanil resulted in an appropriate cost: benefit ratio between analgesic efficacy and minor side effects resembling our study.

Although no toxic reaction occurred, we observed increased motor block with ropivacaine 0.2% alone when compared with the former studies related to ropivacaine 0.2%. The reason of increased motor block may be explained with the cross reaction between bupivacaine injected into spinal space (hyperbaric bupivacaine 0.5% for spinal anaesthesia) and ropivacaine injected into epidural space. Unpredictable prolongation of the motor block occurred in an experimental study of profound nerve block under spinal anaesthesia with combination of amide local anaesthetics. However the exact mechanism was not known, it was postulated that local anaesthetics could affect sodium channels leading to longer activity (Buggy et al 2000). Two cases of prolonged, profound motor block with patient-controlled epidural analgesia using 0.1% ropivacaine following spinal bupivacaine for caesarean section had been reported by the same author, previously (Buggy et al 1999). After administration of ropivacaine using PCEA technique, late recovery was observed. Since there was no evidence of inadvertent intrathecal ropivacaine administration or neurological injury, it was hypothesised that epidural ropivacaine might interact with intrathecal bupivacaine prolonging its effect.

A study performed by Tuncel et al showed that continuous thoracic epidural analgesia by using ropivacaine 0.2% with 0.75 µg/mL sufentanil provided optimum pain relief with minor adverse effects after thoracotomy (Tuncel et al 2005). Contrary to this study, there was a study suggesting no improvement in the quality of epidural anaesthesia with sufentanil addition (Bachmann-Mennenga et al 2005a). Although they did not found any benefit with sufentanil addition to ropivacaine 1%, in their another study it was suggested that the addition of sufentanil improved the epidural anaesthesia with ropivacaine 0.75 % for caesarean section (Bachmann-Mennenga et al 2005b). Debon and co-workers studied the analgesic effects of three different doses of sufentanil

(5 µg, 10 µg, and 15 µg) to titrate the lowest dose for acceptable labour analgesia. They found no difference in analgesic effect suggesting the lowest dose to decrease the risk of adverse effects on mother and child (Debon et al 2001).

Post operative analgesic efficacy of ropivacaine alone or in combination with sufentanil was investigated in patients undergoing major knee surgery by Lorenzini and et al (Lorenzini et al 2002). After 12 h, analgesic efficacy was significantly greater in the patients who received ropivacaine with sufentanil. But considering the higher incidence of side-effects (pruritus, nausea and vomiting) of ropivacaine and sufentanil, the use of single ropivacaine was advised for postoperative analgesia after major knee surgery. The significant increase in adverse effects with sufentanil considering our study may be originated from infusion rate and concentration of sufentanil (10 mL h⁻¹ and 1 µg mL⁻¹, respectively).

In conclusion, the addition of sufentanil 0.75 µg mL⁻¹ to ropivacaine 0.2% used for PCEA with low infusion rate, after caesarean section provided sufficient analgesia with less motor block. The use of this combination appears preferable considering safety and quality of analgesia after caesarean section, especially during early postoperative period.

Acknowledgements

We wish to thank Prof. Dr. Osman Çağlayan (Department of Biochemistry, Kirikkale University School of Medicine) for his contributions in the statistical analysis and the preparation of this paper.

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