

Comparison of The Postoperative Analgesic Effects of Wound Infiltration with Tramadol and Levobupivacaine in Children Undergoing Inguinal Hernia and Undescended Testis Surgery

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ABSTRACT

The aim of this study was to compare the effects of wound infiltration with levobupivacaine and tramadol in reducing postoperative pain in children undergoing unilateral inguinal hernia and undescended testis surgery. Under general anesthesia for elective unilateral inguinal hernia and undescended testis underwent surgery, ASA I-II, 80 children between the ages of 1-6 records in the patient's file was reviewed. The patients who were given 2mg.kg⁻¹ tramadol in saline solution as prepared 0,2 ml.kg⁻¹ into the surgical incision area by the surgeon at the end of the operation were accepted as Group T, who were given 0.25% levobupivacaine as 0.2 ml.kg⁻¹ were accepted as Group L. Hemodynamic parameters, CHEOPS pain scores, additional analgesic consumption, adverse effects were recorded from the files. Patients' CHEOPS were significantly higher in Group L compared to Group T at 4 and 6 hours (p<0.01). In respect to supplementary analgesic administration, paracetamol consumption in Group T was lower than in Group L during home period (p<0.05). We observed that wound infiltration of tramadol provided longer-lasting analgesia compared to levobupivacaine in children undergoing unilateral inguinal hernia repair and undescended testis surgery, and that the requirement for additional analgesic was lower.

Key words: Levobupivacaine, postoperative pain, tramadol, wound infiltration, children

Çocuklarda Levobupivakain ile Tramadolun Yara Yeri İnfiltrasyon Yöntemiyle Postoperatif Ağrıyla Azaltmadaki Etkinliklerinin Karşılaştırılması

ÖZET

Biz çalışmamızda inguinal herni ve inmemiş testis operasyonu geçiren çocuklarda levobupivakain ile tramadolun yara yeri infiltrasyon yöntemiyle postoperatif ağrıyla azaltmadaki etkinliklerini karşılaştırmayı amaçladık. Genel anestezi altında elektif inguinal herni ve inmemiş testis operasyonu geçiren, ASA I-II risk grubunda, 1-6 yaş arası 80 çocuk hastanın dosya kayıtları retrospektif olarak incelendi. Cerrahi bitiminde, cilt kapanmadan önce yara dudaklarına 2 mg/kg tramadol içeren solusyondan 0.2 ml/kg olacak şekilde yapılanlar T Grubu, %0.25' lik levobupivakain solusyondan 0.2 ml/kg olacak şekilde yapılanlar L Grubu olarak kabul edildi. Hemodinamik parametreler, CHEOPS ağrı skoru, ek analjezik tüketimi ve yan etkiler dosyalardan incelenerek kaydedildi. Hastaların CHEOPS skoru L grubunda T grubu ile kıyaslandığında 4. ve 6. saatte daha yüksek saptandı (p<0.01). Ek analjezik tüketimi bakımından, Grup T'de ev periyodu dönemi parasetamol tüketimi Grup L'den daha düşüktü (p<0.05). Sonuç olarak biz çalışmamızda; inguinal herni onarımı ve inmemiş testis operasyonu geçiren çocuklarda yara yerine infiltre edilen tramadolun levobupivakaine göre daha uzun analjezi süresi sağladığını ve ek analjezik ihtiyacının daha az olduğunu bulduk.

Anahtar kelimeler: Levobupivakain, postoperatif ağrı, tramadol, yara infiltrasyonu, çocuk

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INTRODUCTION

Inguinal hernia and undescended testis operations are outpatient surgical procedures widely performed in children. One of the most important factors in the safe discharge of a child undergoing outpatient surgery is the providing of postoperative analgesia. The target in postoperative pain management is the use of approaches that involve fewer side effects and faster recovery. In addition to being simple, reliable and inexpensive, wound infiltration with local anesthetic is also becoming increasingly popular because of positive outcomes such as reducing the use of opioid, duration of hospitalization and complications (1).

Levobupivacaine, the *s*-enantiomer of bupivacaine, is one of the first choice local anesthetics in children because of its low cardiotoxicity (2,3). Wound infiltration with levobupivacaine provides safe and effective postoperative analgesia in children undergoing inguinal hernia repair (4) and has a similar efficacy to that of bupivacaine (5). Opioids have been shown to have local anesthetic effects in animal and clinical studies (6,7). Tramadol, a weak opioid, has a local anesthetic property in peripheral nerves (8). Comparison of the postoperative analgesic effect of tramadol using various techniques has shown that the infiltration technique is both more effective and involves fewer side-effects (9-11).

The present study was performed to show whether tramadol is more effective with less side effects compared to the routinely used local anaesthetic levobupivacaine, using the wound infiltration technique, in children undergoing unilateral inguinal hernia and undescended testis surgery.

MATERIALS AND METHODS

Ethical approval for this study (Ethical Committee No 2010/85) was provided by the Karadeniz Technical University Faculty of Medicine Research in Scientific Review Commission, Trabzon, Turkey (Chairman Prof. A. Cinel) on 04 December 2010.

Once local ethical committee approval had been obtained we performed a retrospective investigation of the patient records of 80 children aged 1-6 who underwent unilateral inguinal hernia or undescended testis surgery and formed part of the American Society of Anesthesiologists (ASA) I-II risk group. Patients with neurological, neuromuscular or psychiatric disease or

clotting impairment or with allergies to any drug were excluded from the study. File of 98 patients were examined between 2007 and 2010. Eighteen subjects were excluded due to inadequate data file.

Examination of patient data revealed that mask induction had been performed with 8% sevoflurane and a 60%/30% nitrous oxide/oxygen mixture and that maintenance anesthesia had been established using a laryngeal mask and patients being administered intravenous fentanyl 1 µg/kg and 2%-2.5% sevoflurane in 60/30 nitrous oxide /oxygen mixture. Electrocardiogram, heart rate, blood pressure, SpO₂ and end-tidal CO₂ were included in the intraoperative monitoring.

At record examination, the study population were divided into two groups (n=40 for each group). The patients who were given 2mg.kg⁻¹ tramadol in saline solution as prepared 0,2ml.kg⁻¹ into the surgical incision area by the surgeon at the end of the operation were accepted as Group T, who were given 0,25% levobupivacaine as 0,2ml.kg⁻¹ were accepted as Group L.

Patients were transferred to the post anesthesia care unit (PACU) after surgery. Throughout 1 hour the patient's vital findings (mean arterial blood pressure=MAP, heart rate) and pain levels were monitored. Postoperative analgesia level was evaluated using the Children's Hospital of Ontario Pain Scale (CHEOPS) (12). One hour later the patients were transferred to the ward. The first 6 h after surgery was accepted as the postoperative observation period and data were recorded from the files for 15-min intervals for the first hour and every hour during the first 6 h. In the postoperative observation period, when CHEOPS was >4 patients were given iv meperidine 0.5 mg/kg during the PACU monitoring and iv 0.5 mg/kg tramadol during the pediatric surgery ward monitoring period. Amount of supplementary analgesic drugs used, observation of nausea-vomiting, itching and local allergic reactions and subjects observed with these side-effects were investigated from the files and recorded.

We observed from the records that parents were informed about a simple pain scale (0= no pain/child calm; 1= minimum pain/child irritable; 2= mild pain/child consolable; and 3= severe pain/child inconsolable) for analgesia management following discharge from the department. Parents were told to administer oral paracetamol (estimated by the body weight of (15 mg/kg)) not more often than every 6 h when the pain score reached 2 or 3. An anesthesiologist contacted the fami-

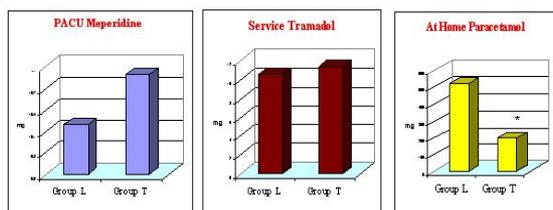


Figure 1. Amount of total additional postoperative analgesic required

lies to enquire about the amount of supplementary analgesic given and whether any complications had arisen. Means and standard deviations were used for definitive statistics. Compatibility of data with normal distribution was evaluated using the Kolmogorov-Smirnov test. T-test was used in those with parametric conditions and Mann Whitney U test analysis of variance in those without. $p < 0.05$ was accepted significance.

RESULTS

No statistically significant difference was determined between the groups in terms of age, sex, body mass index (BMI), ASA, operation and anesthesia durations or type of surgery ($p > 0.05$). No statistically significant difference were observed between the groups in terms of MAP values and heart rates in any monitoring period ($p > 0.05$). Patients' CHEOPS scores were significantly higher in Group L compared to Group T at 4 and 6 hours ($p < 0.01$). The amount of supplementary analgesic administered to patients in the first 6 h (PACU, ward) of the 24-h postoperative period was no difference between the groups, while during the monitoring at home period the amount of oral paracetamol administered was lower in Group T compared to the Group L ($p < 0.05$) (Figure 1). At evaluation of postoperative parameters, itching or local allergic reactions were observed in any patients. There were no difference between the groups in terms of nausea and vomiting.

DISCUSSION

We determined that tramadol provides longer-lasting analgesia compared to levobupivacaine, and that less additional analgesic is required.

The most important factor in inguinal hernia and undescended testis operations, frequent forms of outpatient surgery in children, is to establish effective postoperative analgesia and early mobilization. The analgesic technique employed should be reliable, effective and have minimal side-effects. Wound infiltration is one of the frequently used technic for this reason.

Although there are studies showing that infiltration anesthesia with local anesthetics provides effective postoperative analgesia, local anesthetics must be administered with care due to the risk of cardiovascular and central nervous system toxicity (13). The reason for most toxic reaction in wound infiltration is frequently undesired intravascular drug injection during the injection procedure. For that reason, levobupivacaine, with its lower cardiotoxicity and neurotoxicity compared to bupivacaine, is currently preferred (2). These properties of levobupivacaine provide various advantages for pediatric regional anesthesia. Levobupivacaine may be used in relatively reliable than bupivacaine in pediatric surgery.

Nielsen et al. (5) observed that racemic bupivacaine and its S-enantiomer levobupivacaine possess similar analgesic efficacy in infiltration anesthesia in the repair of inguinal hernia. However, only limited data are available regarding the application of levobupivacaine in wound infiltration in children. Matsota et al. (4) compared wound infiltration with 1.25% levobupivacaine and rectal 30 mg/kg paracetamol in terms of postoperative analgesia following inguinal hernia repair in children. They observed that levobupivacaine postincisional wound infiltration had similar effects to rectal paracetamol, but that postincisional levobupivacaine infiltration prolonged the duration of postoperative analgesia and provided early mobilization. Similarly, Surhan et al. (14) compared the postoperative analgesic effect of pre- and postincisional 0.25% levobupivacaine wound infiltration and postoperative blood stress hormone levels in inguinal hernia repair in children. They showed that pre- or postsurgical wound infiltration with levobupivacaine was a good choice in postoperative analgesia and reduced stress response to postoperative pain. Our study also showed that postincisional wound infiltration with 0.25% levobupivacaine is effective in pain management.

Studies have shown that tramadol, with a low cardiovascular toxicity risk (15), also possesses peripheral local anesthetic properties (16,17,18). Tsai et al. (18) showed

that the local anesthetic effect was observed with the direct application of tramadol to the sciatic nerve in rats. Pang et al. (17) observed that tramadol administered intradermally has similar effects to the local anesthetic lidocaine. In another study, Altunkaya et al. (8) compared tramadol and lidocaine as subcutaneous local anesthetics in patients undergoing minor surgery. They investigated the postoperative analgesic consumption of tramadol and its effect on degree of postoperative pain. They concluded that because of its antinociceptive effect tramadol prolongs the duration of postoperative analgesia and can represent a good choice as local anesthetic in minor surgery.

Kaki et al. (11) compared 0.25% bupivacaine and 1 mg/kg tramadol in infiltration anesthesia in the treatment of pain following adult inguinal hernia repair. They showed that tramadol provided better analgesia compared to bupivacaine and that it prolonged analgesia duration. Similarly, Demiraran et al. (19) compared wound infiltration of tramadol or bupivacaine with the intramuscular administration of tramadol in terms of postoperative analgesic efficacy in following herniotomy in children. They showed that wound infiltration with tramadol prolonged analgesic duration in children undergoing inguinal hernia repair and involved less requirement for additional analgesic.

We also found that wound infiltration of tramadol following inguinal hernia and undescended testis surgery reduced the need for additional analgesic and therefore prolonged analgesia duration. Oral paracetamol consumption in tramadol group is lower than in levobupivacaine group, especially at home period.

Tramadol is frequently used for postoperative analgesia intravenously. The major side-effect of tramadol is nausea and vomiting (20). The incidence of these is correlated with peak serum tramadol concentration. In Shipton's study observation of this side-effect rises following 3 mg/kg intravenous loading doses rather than patient-controlled analgesia or split doses (21). In the literature comparison of the postoperative analgesic efficacy of tramadol in outpatient surgery showed that wound infiltration is better than application by the intravenous and intramuscular routes, and has fewer side effects (9,10).

Khajavi et al. (9) compared tramadol administered by wound infiltration or intravenously in patients undergoing pyelolithotomy surgery. They determined that nau-

sea and vomiting in the tramadol infiltration group were less frequent. In another study Kaki et al. (11) used tramadol versus bupivacaine for wound infiltration, and observed no nausea and vomiting in all patients. Therefore, recently, wound infiltration with tramadol has often preferred. We also used wound infiltration technic and none of these side-effects were observed in our patients.

Although we obtained good outcome there were some limitation in our study. The parents conducted postoperative analgesia at home period. They may not be reliable for administer post ambulatory analgesia to their children for a variety of reasons. The other limitation is the matter of neurotoxicity of wound infiltration with tramadol. Although efficacy of wound infiltration and peripheral nerve blocks with tramadol is reported with good outcome in the literature there are no preclinical safety studies. In fact, animal studies suggest tramadol may cause neuronal toxicity (22,23). Further studies are carried out on this topic.

In conclusion, we observed that wound infiltration of with tramadol provided longer-lasting analgesia compared to levobupivacaine in children undergoing inguinal hernia repair and undescended testis surgery, and that the requirement for additional analgesic was lower.

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