IJMS
Vol 34, No 1, March 2009

Brief Report

Effect of Incisional Site Infiltration of Bupivacaine on Postoperative Pain and Meperidine Consumption after Midline Laparotomy

Ali Ghafouri[1], Ali Movafegh[2], Mohammadreza Hakimian[1], Farhad Mehrkhani[1], Alipasha Meysamie[3]

Abstract

The purpose of the current study was to determine whether infiltration of bupivacaine in the incision site of midline laparotomy reduces postoperative pain and opioid consumption. Fifty-six, 30-60 year-old patients who were undergoing midline laparotomy were enrolled in the present study. The patients were randomly assigned into two groups of control (group C, n = 28) or bupivacaine (group B, n= 28). Just before suturing, the incision sites were infiltrated by 20 ml epineprinated bupivacaine 0.25% (group B) or 20 ml normal saline as placebo (group C). The patients were asked to score their pain at 6, 24, and 48 hours after surgery. Demographic characteristics of the patients were similar in the two groups. There was no significant difference in the mean of visual analogue scale pain scores measured over time between the two groups. There was a significant difference in post operative meperidine consumption between the two groups, and in the bupivacaine group, meperidine request was less (90.53±13.36 mg in bupivacaine group *v*127.5±23.14 mg in the control group, P<0.05). After midline laparotomy, incisional site infiltration with 20 ml epineprinated bupivacaine 0.25% causes a significant decrease in postoperative meperidine consumption.

Iran J Med Sci 2009; 34(1): 65-67.

Keywords ● Bupivacaine ● analgesia ● meperidine

[1]Department of General Surgery,
[2]Anesthesiology, Shariati Hospital,
[3]Iranian Board of Community Medicine,
Tehran University of Medical Sciences,
Tehran, Iran.

Correspondence:
Ali Movafegh MD,
Associate professor of anesthesiology,
Department of Anesthesiology and Critical Care,
Dr Ali Shariati Hospital,
Tehran University of Medical Sciences,
Tehran, Iran.
Tel: +98 912 3021389
Fax: +98 21 88026017
Email: movafegh@sina.tums.ac.ir
Submitted: 10 March 2008
Revised: 6 October 2008
Accepted: 4 December 2008

Introduction

Clinical evidence suggests that surgical trauma may induce prolonged changes in both the peripheral and central nervous system (CNS), which together amplify the postoperative pain. Peripheral sensitization seems to occur through a reduction in the threshold of nociceptor afferent peripheral terminals, whereas an activity dependent increase in the excitability of spinal neurons underlies the shift to CNS hypersensitivity.[1] Opioids are frequently administered to patients undergoing major surgery to alleviate postoperative pain, however these medications cause adverse effects such as nausea and vomiting, pruritus, urinary retention, and respiratory depression.[2] Since the analgesic action and the side effects of opioids are dose dependent, a multimodal offset may enhance analgesia while minimizing the side effects. A variety of postoperative anesthetic strategies to combat this pain has been sought.[3-7]

The purpose of the current study was to determine whether incision site infiltration of bupivacaine reduces postoperative pain and opioid consumption.

Patients and Methods

The protocol of the study was approved by the Institutional Ethics Committee of Tehran University of Medical Sciences and informed written consent was obtained from the patients. Fifty six patients, 30-60 year-old, who were undergoing midline laparotomy for intestine surgery were enrolled in this randomized, double-blinded, and placebo-controlled study.

Patients who received opioids within 48 hours after surgery, those with a history of addiction, and those with any contraindication to bupivacaine or meperidine administration were excluded from the study. All drug solutions were prepared by an anesthesiologist who was not involved in anesthesia administration or in management of patients. The patients were randomly assigned into two groups of control (group C, n = 28) or bupivacaine (group B, n= 28) using a computer-generated randomization list.

In all patients, anesthesia was induced and maintained with similar protocol. Just before suturing, the incision sites were infiltrated by 20 ml epineprinated bupivacaine 0.25% (maximum 1 $mg.kg^{-1}$ in bupivacaine group) or 20 ml normal saline as placebo (in control group). Continuous suture technique with nylon loop surgical string was used for closing the fascia. The skin was sutured by simple interrupted technique. Both surgery and nerve block sites were covered postoperatively for all the patients in both groups in order to mask the control and treatment groups. The severity of postoperative pain was measured and recorded using a 10-cm visual analog scale (VAS), where 0= no pain, and 10= the worst possible pain. The patients were asked to score the pain during coughing or movement at 6, 24, and 48 hours after surgery. The patients were able to request rescue analgesia at any time after surgery. Meperidine (25 mg; intravenous injection) was given as a rescue analgesic at 6-hour intervals.

The VAS score, the operation time, length of surgical incision, and the amount of analgesic consumption were recorded for each patient.

According to the previous studies, a sample size of 28 for each group would be sufficient to detect a difference of three scores in the mean of pain score, estimating a power of 80%, and a significance level of 5%. Statistical analysis was performed using SPSS software version 13 (SPSS Inc., Chicago, IL, USA). For statistical analysis of demographic data and for comparison between the two groups, one way ANOVA, repeated measure analysis of variance, Mann-Whitney U-test, Fishers exact or Chi-square tests were performed.

Results

Demographic characteristics, ASA physical status class, length of surgical incision, and the duration of surgery were similar in the two groups (table 1).

There was no significant difference in the mean of VAS pain scores measured over time between the two groups (7.17±2.32, 4.43±2.88, 2.14±2.27 in bupivacaine group *v* 8.25±2.36, 6.40±0.89, 3.67±1.21 in control group respectively, repeated-measures analysis of variance, between subjects effects) (table 2).

There was a significant difference in postoperative meperidine consumption between the two groups. In the bupivacaine group, meperidine request was less (90.53±13.36 mg in bupivacaine group *v* 127.5±23.14 mg in the control group; P= 0.04; table 2.).

Table 1: The patients' characteristics in the two groups.

	Bupivacaine group Mean ±SD	Control group Mean ±SD	P value
Age (years)[ab]	38±11	33±6	0.33
Sex (male/female)	19/9	22/6	0.49
Duration of surgery (min)[ab]	162±24	138± 30	0.23
Length of surgical incision (cm)[ab]	21±6	19±6	0.43

a: Values are expressed as mean ± SD, b: There are no significant differences between the groups.

Table 2: VAS pain scores at various intervals and 24 hours meperidine consumption.

	Bupivacaine group (n=28)	Control group (n=28)	P value
VAS at 6 h[a]	7.17± 2.3	8.25±2.3	0.061
VAS at 24 h[a]	4.83±2.8	6.40±1.8	0.27
VAS at 48 h[a]	2.14±2.2	3.67±3.2	0.38
24-h Meperidine consumption (mg)[ab]	90.53±13.36	127.5±23.14	0.04

VAS: Visual analogue scale, a: Values are expressed as mean ± SD, b: $P < 0.05$ (Student *t* test)

Discussion

The present study demonstrated that patients who were infiltrated 20 mL epineprinated bupivacaine 0.25% at the incision site of midline laparotomy had a significant decrease in postoperative meperidine consumption compared with patients who received placebo.

A variety of infiltration techniques has been used for pain reduction and opioid sparing effect during various surgical procedures.[8-10]

Neural blockade is used in various conditions of acute and chronic pain affecting the thorax and upper abdomen including postoperative pain of thoracotomies and open cholesystectomies.[7] This technique has been recommended as a complement to systemic morphine injections in the latter.[4] Its advantages include superior analgesia, opioid sparing, improved pulmonary mechanism, reduced central nervous system depression and avoidance of urinary retention. The disadvantages of this technique include the need for expertise and local anesthetic toxicity with multiple levels of blockade. There is also a need for supplemental systemic analgesia.[10]

Our results were consistent with the most previous studies.[11-13] However, in other studies bupivacaine administration did not decrease the pain or analgesic requirements when compared with placebo.[14-15] We postulate that the dosage, timing of bupivacaine administration, and the site of injection contributed to the negative results.

In conclusion, after midline laparotomy, incisional site infiltration of 20 ml epineprinated bupivacaine 0.25% can cause a significant decrease in postoperative meperidine consumption.

Conflict of Interest: None declared

References

1 Reuben SS, Sklar J, El-Mansouri M. The preemptive analgesic effect of intraarticular bupivacaine and morphine after ambulatory arthroscopic knee surgery. *Anesht Analg* 2001; 92: 923-6.

2 Movafegh A, Soroush AR, Navi A, et al. The effect of intravenous administration of dexamethasone on postoperative pain, nausea, and vomiting after intrathecal injection of meperidine. *Anesth Analg* 2007; 104: 987-9.

3 Schulte-steinberg H, Weninger E, Jokisch D, et al. Intraperitoneal versus interpleural morphine or bupivacaine for pain after laparoscopic cholecystectomy. *Anesthesiology* 1995; 82: 634-40.

4 Maidatsi P, Gorgias N, Zaralidou A, et al. Intercostal nerve blockade with a mixture of bupivacaine and phenol enhance the efficacy of intravenous patient-controlled analgesia in the control of post-cholecystectomy pain. *Eur J Anaesthesiol* 1998; 15: 526-34.

5 Vieira AM, Schnaider TB, Brando ACA, Neto JPC. Comparative study of intercostal and interpleural block for post-cholecystectomy analgesia. *Rev Bras Anestesiol* 2003; 53: 346-50.

6 Wilmore DW, Kehlet H. Management of patients in fast track surgery. *BMJ* 2001; 322: 473-6.

7 Takamori S, Yoshida S, Hayashi A, et al. Intraoperative intercostals nerve blockade for postthoracotomy pain. *Ann Thorac Surg* 2002; 74: 338-41.

8 Bryans JS. Novel treatments for pain. *IDrugs* 1999; 2: 1170-82.

9 Dahl V, Raeder JC. Non-opioid postoperative analgesia. *Acta Anaesthesiol Scand* 2000; 44: 1191-203.

10 Richardson J, Lönnqvist PA. Thoracic paravertebral block. *Br J Anaesth* 1998; 81: 230-8.

11 Eriksson-Mjöberg M, Kristiansson M, Carlström K, et al. Preoperative infiltration of bupivacaine--effects on pain relief and trauma response (cortisol and interleukin-6). *Acta Anaesthesiol Scand* 1997; 41: 466-72.

12 Pourseidi B, Khorram-Manesh A. Effect of intercostals neural blockade with Marcaine (bupivacaine) on postoperative pain after laparoscopic cholecystectomy. *Surg Endosc* 2007; 21:1557-9.

13 Zohar E,Fredman B, Phillipov A, et al. The analgesic efficacy of patient-controlled bupivacaine wound instillation after total abdominal hysterectomy with bilateral salpingo-oophorectomy. *Anesth Analg* 2001; 93: 482-7.

14 Victory RA, Gajraj NM, Van Elstraete A, et al. Effect of pre-incision versus post-incision infiltration with bupivacaine on postoperative pain. *J Clin Anesth* 1995; 7: 192-6.

15 Leung CC, Chan YM, Ngai SW, et al. Effect of pre-incision skin infiltration on post-hysterectomy pain--a double-blind randomized controlled trial. *Anaesth Intensive Care* 2000; 28: 510-6.