ORIGINAL ARTICLE

Journal of Surgery and Trauma 2013; 1(1):6-10

www.Jsurgery.bums.ac.ir

The effect of Pre-incision skin infiltration with Lidocaine on postoperative pain following abdominal hysterectomy

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Received: 20 July 2013 ***Revised: 25 October 2013*** ***Accepted: 27 October 2013***

Abstract

Introduction: Several mehods have been proposed to alleviate pain after hysterectomy. Pre-emptive analgesia has been used to relieve pain following abdominal hysterectomy with conflicting results. This study was performed to evaluate the efficacy of pre-incision skin infiltration of Lidocaine in relieving postoperative pain in patients undergoing abdominal hysterectomy.

Methods: 60 pa ents with ASA class of I or II scheduled for abdominal hysterectomy were recruited for the study. The patients were randomly assigned to receive pre-incision skin infiltration of either lidocaine or normal saline. The patients were evaluated with respect to postoperative pain scores and analgesic requirements in the first two postoperative days. They were also asked for satisfaction regarding the pain relief intervention.

Results: The patients were similar with respect to demographic characteristics. Patients in the saline group complained of more pain than the lidocaine group in the recovery room($p<0.001$). However, the pa ents were similar with respect to postoperative pain scores and analgesic requirements. They were also similar regarding satisfaction rates during the first 24 hours postopera vely.

Conclusions: We conclude that pre-incision skin infiltration of lidocaine is not effective in reducing postoperative pain following abdominal hysterectomy and does not affect the patients' satisfaction.

Key Words: postoperative pain; preemptive analgesia; lidocaine; hysterectomy

Introduction

A great number of patients suffer from mild to moderate pain postoperatively [1]. Severity of postoperative pain depends on several factors such as type and duration of surgery, type of anesthesia and analgesia, and psychological and emotional status of the patients [2].

Administration of systemic opioids alone is not always effective to relive pain after surgery and

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might result in adverse effects that might prolong the patient's length of hospital stay. This has led to application of alternative methods such as administration of systemic non-steroidal anti-inflammatory drugs and local anesthesia alone or in combination with opioids to reduce the adverse effects and dose requirements of opioids [3]. Pre-emptive analgesia has been widely used to relieve postoperative pain based on the theory of "prevention of central pain sensitization" in different abdominal surgeries with controversial results [4-7].

A number of studies have evaluated the effect of preemptive analgesia on postoperative pain following hysterectomy.

Gabapentin [8] and magnesium [9] sulfate have been reported to reduce postoperative pain and analgesic requirements following vaginal and abdominal hysterectomy, respectively.

Pre-incision skin infiltration of local anesthetics has been associated with contradictory effects on postoperative pain following open abdominal surgeries [10].

Hanibal et al suggested that preoperative wound infiltration with bupivacaine reduced early and late opioid requirements after hysterectomy [11].

However, others did not show that application of preemptive analgesia is effective in reducing postoperative rescue analgesic requirements in spite of decreasing pain scores [12-14].

The aim of this study was to evaluate the efficacy of pre-incision skin infiltration of lidocaine on postoperative pain scores and rescue analgesic requirements following abdominal hysterectomy. The primary outcome was to compare the pain scores between the Lidocaine and the placebo groups. The secondary outcomes included the comparison of the postoperative rescue analgesic requirements and patients' satisfaction between the two groups.

Methods

After obtaining approval from Medical School Research Committee and patients' informed consent, 60 women of ASA class I or II scheduled for elective abdominal hysterectomy under general anesthesia due to non-malignant disorders at a teaching hospital, were recruited for a triple blind placebo controlled study. The patients, the surgeon, and the investigator who interviewed the patients were blind to the study.

The exclusion criteria were age over 60 years, body mass index more than 30, presence of cardiovascular and neurologic disorders, diabetes mellitus, history of previous abdominal surgeries, drug and alcohol abuse, and consumption of analgesics for 24 hours preoperatively.

After receiving a standardized anesthesia, the patients were randomly (by block of four randomization) allocated to receive pre-incision skin infiltration of either 20 ml of lidocaine 1% (n=30) or normal saline (n=30).

After preoxygenation with 100% oxygen for 3 minutes, patients were given intravenous midazolam 0.05mg/kg and fentanyl 2µg/kg. Anesthesia was induced with thiopental sodium 5mg/kg and cisatracurium 0.15mg/kg to facilitate endotracheal intubation. Anesthesia was maintained with 60% nitrous oxide in oxygen, propofol 4-6 mg/kg/hr to maintain cerebral state index (CSI) between 40-60 and fentanyl 1 µg/kg (at 30 minute intervals and as needed to maintain mean arterial blood pressure and pulse rates within 20% range from the baseline). After completion of the surgery, propofol and fentanyl were discontinued and the residual neuromuscular block was reversed with neostigmine 0.06 mg/kg and atropine 0.15 mg/kg. The endotracheal tube was removed while the patient was awake and met the extubation criteria. The patients were interviewed, when awake, with respect to the presence and severity of pain in the recovery room, and then at 2 hours intervals for 8 hours, and at 12, 36, and 48 hours postoperatively, using numeric rating scale (NRS) based on a 0 to 10 scores with zero indicating no pain and 10 meaning the most intolerable pain ever experienced. The patients received rectal indomethacine 50 mg, intravascular morphine 0.05mg/kg, and intravascular morphine 0.1mg/kg for pain scores of 1-4, 5-7, and 8-10, respectively when they requested for analgesic at the specified intervals. The patients were also inspected for analgesia satisfaction using Likert score in the ward by a nurse blind to the study.

Using SPSS software for Windows, version 11 (SPSS Inc, Chicago, IL, USA), arithmetic mean and standard deviation values for different variables were calculated and statistical analyses were performed for each group. We used independent student t- test to compare continuous variables

exhibiting normal distribution, Chi-square test for non-continuous variables and Man Whitney for satisfaction rate. P value less than 0.05 was considered significant

Results

The patients were similar in regard to age, weight, body mass index, duration of operation and hospital stay (table 1). Patients in the saline group suffered more pain than the lidocaine group in the recovery room (Table 2). Nevertheless, neither in the latter group requested rescue analgesic in the recovery room. However, there was no significant difference between the groups with respect to pain scores and analgesic requirements at 2, 4, 6, 8, 12, 24, and 48 hours postoperatively (Table 3, 4). The patients in both groups showed an increase in pain scores at 8 and 12 hours postoperatively that could be due to outliers (Table 2). Satisfaction rates were similar in both groups [3.43±1.13 and 3.62±1.62 in the Lidocaine and saline groups, respectively (P-value=0.65).

Table 1. Patients characteristics in both groups

variables	Lidocaine group	Saline group	P value
Age (years)	50.13 ±7.82	48.92±5.14	NS
Weight (kg)	65.09±12.58	63.83±12.35	NS
BMI (Cm/kg2)	25.51±3.50	24.77±3.81	NS
Duration of operation (minutes)	98.88±30.76	93.33±19.70	NS
Length of hospital stay (days)	2±0.0	1.92±0.29	NS

Values are presented as mean±SD

Table 2. Post-operative pain scores in the saline and lidocaine groups.

variables	Lidocaine group	Saline group	P value
NRS in the recovery room	0.00±0.00	1.5±0.58	<0.0001
NRS at 2 hours	4.46±2.44	4.91±1.70	NS
NRS at 4 hours	2.25±2.19	2.86±1.17	NS
NRS at 6 hours	2.91±2.86	2.66±2.33	NS
NRS at 8 hours	2.70±2.50	2.63±2.26	NS
NRS at 12 hours	2.68±2.08	2.18±1.83	NS
NRS at 24 hours	1.91±1.43	1.80±1.80	NS
NRS at 48 hours	1.80±0.64	1.73±1.50	NS

Values are presented as mean±SD

Table 3. Post-operative morphine requirements in the saline and lidocaine groups

variables	Lidocaine group	Saline group	P value
In the first 8 hours (mg/kg)	0.075±0.12	0.038±0.03	0.11
Between 9-24 hours (mg/kg)	0.006±0.17	0±0.0	0.87
On the second day (mg/kg)	0±0.0	0.004±0.14	0.91

Values are presented as mean±SD

Table 4. Postoperative endomethacine requirements in the saline and lidocaine groups

variables	Lidocaine group	Saline group	P value
In the first 8 hours	0.81±0.75	0.84±0.83	0.88
Between 9-24 hours	0.51±0.44	0.87±0.75	0.24
On the second day	0.60±0.31	0.49±0.33	0.92

Values are presented as number of endomethacine suppositories ±SD

Discussion

Our study revealed that pre-incision skin infiltration does not decrease post-operative pain and rescue analgesic requirements following abdominal hysterectomy. We also demonstrated that it does not affect the patients' satisfaction rate.

A number modalities have been proposed for pain relief after hysterectomy.

Preemptive analgesia is an antinociceptive treatment that prevents establishment of altered processing of afferent input, which amplifies postoperative pain. It prevents or reduces pathologic pain that is different from physiologic pain in several aspects. Pre-emptive analgesia was first described in 1980 based on experimental studies indicating that blunting noxious stimuli before injury prevents central hypersensitization and reduces post-operative pain intensity [14]. However, further studies reported contradictory results [6].

It has been reported that preemptive epidural analgesia is a reasonable approach for potentially controlling perioperative immune function and preventing postoperative pain in patients undergoing cancer surgery [15].

Kim HY et al evaluated the pre-emptive analgesic effects of a small dose of intravenous ketamine on postoperative pain in patients undergoing a hysterectomy. They found 0.3 mg/kg dose of ketamine given at approximately 5 min before surgery resulted in decreasing the number of times pressing the PCA and the administration of additional analgesics [16].

In contrast, it has been shown that preemptive opioid analgesia does not influence pain after abdominal hysterectomy [17].

Our findings are in agreement with those who revealed that either pre or post-incision wound infiltration with bupivacaine 0.5% had no clinically significant effect on the pain scores or analgesic requirements following abdominal hysterectomy [13, 18, 19]. Although they used a different local anesthetic, their methodology and results were similar to our study.

Leung et al in a double-blind placebo-controlled randomized trial compared the analgesic effect of preoperative 0.25% bupivacaine (n=21) skin infiltration with normal saline (n=19) in patients undergoing abdominal hysterectomy through a lower midline incision. They concluded that local anaesthetic infiltration is not effective in reducing pain after abdominal hysterectomy. Effective postoperative analgesia should aim to eliminate the visceral pain component [13].

Cobby and Reid investigated if wound infiltration with 20 ml of 0.5% bupivacaine after abdominal hysterectomy improved analgesia and reduced morphine requirements from a patient-controlled analgesia system during the first 6 h after operation. Morphine requirements in the first 6 h after operation were similar in both the control (30.3mg) and bupivacaine (29.0mg) groups. Cumulative hourly morphine requirements did not differ significantly between the two groups. Pain scores assessed by visual analogue were similar in both groups [18].

Victory et al compared the efficacy of preincision wound infiltration with bupivacaine to wound infiltration at the end of the operation. They showed Wound infiltration, either preincision or postincision, had no clinically significant effect on the pain scores or analgesic requirements following abdominal hysterectomy [19].

In contrast to our findings, other studies reported that subcutaneous lidocaine before skin incision in patients undergoing abdominal hysterectomy decreased postoperative pain and analgesic requirements [2, 20].

Failure of pre-emptive analgesia in pain reduction following abdominal hysterectomy as in our study, can be attributed to other perioperative factors in this context such as the duration and degree of pathology in the condition being operated; psychological characteristics; and intraoperative nociceptive, neuropathic, and visceral inputs contributing to sensitization. It may be assumed that intraoperative nociceptive inputs would be higher than that of the postoperative period. Furthermore, it might not be possible to completely block all possible pain signals originating from the surgical wound from the time of incision until final wound healing.

Conclusions

In summary, we conclude that pre-incision skin infiltration of Lidocaine is not effective in reducing pain intensity and analgesic requirements following abdominal hysterectomy. In addition, it has no impact on patients' satisfaction.

Acknowledgment:s

We would like to thank the nurses at operation room and surgical ward at Imam Ali hospital, Zahedan, Iran.

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