Intraperitoneal Lidocaine for Decreasing Intra-Operative Pain during Postpartum Tubal Resection in Srinagarind Hospital

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Objective: *To evaluate the effectiveness and determine the minimal dosage of intraperitoneal lidocaine for pain relief during postpartum tubal resection in Srinagarind Hospital.*
Material and Method: *Sixty postpartum women, undergoing postpartum tubal resection performed by residents at the Department of obstetrics and gynecologic, were included in this randomized, double-blinded, placebo controlled study. They were randomly assigned to one of three groups. They all received 20 ml solution intraperitoneally. Group one received it as isotonic normal saline; group 2 received it with 100 mg of lidocaine; and group 3 received it with 200 mg of lidocaine. The intra-operative and post-operative pain was measured by using a numerical rating score (NRS, from 0-10).*
Results: *The mean of intra-operative NRS in the lidocaine groups (100 and 200 mg) were significantly lower than the isotonic normal saline group (3.40, 3.50 vs. 6.55, p-value 0.019 and 0.024). No significant difference was found in the intra-operative NRS between 100 and 200 mg lidocaine (NRS 3.40 vs. 3.50, respectively, mean difference 95% CI -2.41 to 2.21). There was no significant difference in the immediate post-operative pain among these three groups (p-value 0.613).*
Conclusion: *Intraperitoneal lidocaine instillation provides effective intra-operative pain relief in postpartum tubal resection under local anesthesia. 100 mg of lidocaine is effective in pain relief. This technique was not effective for relief of immediate post-operative pain.*

Keywords: *Intraperitoneal lidocaine, Postpartum tubal resection, Pain control, Srinagarind Hospital*

J Med Assoc Thai 2012; 95 (4): 477-81
Full text. e-Journal: *http://www.jmat.mat.or.th*

Postpartum tubal resection is an elective procedure that can be performed shortly and safely after delivery. The procedure is suitable for a postpartum woman who has had uncomplicated labor, is hemodynamically stable and understands the risks and benefits of surgery and anesthesia[1]. The procedure offers several advantages. Since the uterine fundus is so near the umbilical level, allowing easy access to the fallopian tubes using mini-laparotomy[1-4]. Anesthetic techniques for tubal resection vary from local anesthesia to epidural, spinal, or general anesthesia[1,5,6]. Using a local anesthetic technique is the most common approach in developing countries but often provides inadequate pain relief[7,8]. Intraperitoneal lidocaine instillation for postpartum tubal resection under local anesthesia was reported in 1973[9]: as 200 to 400 mg of lidocaine was able to control pain adequately[1,5,9,10]. The objectives of the study were to evaluate the effectiveness of intraperitoneal lidocaine and to determine the minimal dosage of intraperitoneal lidocaine needed for pain relief in postpartum tubal resection for use at Srinagarind Hospital in Northeast Thailand.

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Material and Method

The authors performed a randomized, double-blinded, placebo-controlled study. Included in the study were healthy women who (a) had no

contraindication for surgery (b) had an ASA physical status of I[11], and (c) had given consent for post-partum tubal sterilization, to be performed by any year of residents in the Obstetrics & Gynecologic Department. Excluded were women with (a) a body mass index (BMI) > 32 kg/m^2 (b) a history of pelvic inflammatory disease (PID) (c) liver disease (d) asthma (e) previous lower abdominal surgery, and (f) lidocaine allergy.

After the study was approved by the Ethics Committee of Khon Kaen University (HE521176), the authors random by drawing lots and put the sealed envelope. Informed consent was obtained from 60 women who were randomly assigned to one of three groups. All three groups received a solution intraperitoneally (a) Group 1: 20 ml of isotonic normal saline (NSS) (b) Group 2: 20 ml NSS containing 100 mg lidocaine and (c) Group 3: 20 ml NSS containing 200 mg lidocaine.

Before the operation, the women were asked to practice scoring aloud their pain using a numerical rating score (NRS, 0 = no pain; 10 = the most severe pain). Non-invasive monitoring of blood pressure and pulse oximeter was used before and during the operation. Every woman received 15 ml of 1% lidocaine with adrenaline (1:100,000) infiltration of the skin and beneath the rectus sheath. Numbness was checked prior to performing the subumbilical skin incision. After approaching the intraperitoneum, the 20 ml of solution (isotonic normal saline, lidocaine 100 mg or 200 mg) was instilled into the peritoneal cavity, 10 ml to each side of the adnexa, using a 20 ml syringe without a needle.

After waiting one minute, the surgeon began searching for the uterine tube and tubal resection was done by Pomeroy technique. When the second tube was clamped by the instrument, the woman was asked to rate the pain. Intravenous meperidine with or without diazepam was given if the pain score was more than 3 and the woman required a rescue drug or the surgeon could not perform the operation due to the patient's feeling severe pain (NRS = 10). Immediate after surgery, the patient was asked to rate her pain again and paracetamol was administered every 4 to 6 hour (2 x 500 mg tablets) for pain relief, as required. The side effects of lidocaine (*i.e.,* tinnitus, dizziness, perioral numbness) were observed and recorded post-operatively for 2 hours.

The continuous data are herein presented as a mean $\pm$ SD and the differences among variables tested using a one-way analysis of variance (ANOVA). A p-value < 0.05 was considered statistically significant. Multiple comparisons were conducted using the Bonferrini test. In the subgroup analysis, the t-test was used to determine the differences between groups. The results are presented as a mean and 95% confidence interval (95% CI).

Results

There were no significant differences in the demographic data among the three groups and the mean operative time was similar among groups (Table 1). The mean intra-operative NRS in both the lidocaine groups (100 and 200 mg) were significantly lower than in the isotonic normal saline group (NRS 3.40, 3.50 vs. 6.55; p-value 0.019 and 0.024, respectively. (Table 2) When analyzing the lidocaine group, no significant differences were found between lidocaine 100 and 200 mg groups (NRS 3.40 vs. 3.50, mean different of 95% CI -2.41 to 2.21) (Table 3).

Only three women required meperidine as a rescue drug to treat severe pain and difficulty in performing the operation (*viz.,* two patients in the isotonic normal saline group and one in the lidocaine 200 mg group). There was no significant difference in the post-operative NRS among the three groups

Table 1. Demographic data and duration of surgery

	Group 1 (normal saline) (n = 20)		Group 2 (lidocaine 100 mg) (n = 20)		Group 3 (lidocaine 200 mg) (n = 20)		p-value
	Mean	SD	Mean	SD	Mean	SD	
Age (years)	30.25	4.78	30.57	4.63	30.75	4.45	0.94
Weight (kg)	60.47	7.91	61.69	8.16	57.78	7.31	0.27
BMI (kg/m^2)	24.26	3.46	24.57	3.18	23.36	2.60	0.44
Duration of surgery (min)	29.65	14.53	24.55	7.35	30.75	16.21	0.57

Table 2. Intra-operative and post-operative NRS

	Group 1 (normal saline) (n = 20)		Group 2 (lidocaine 100 mg) (n = 20)		Group 3 (lidocaine 200 mg) (n = 20)	
	Mean	SD	Mean	SD	Mean	SD
Intra-operative NRS	6.55	3.28	3.40*	3.61	3.50**	3.60
Post-operative NRS	6.83	3.14	5.85	3.52	5.94	3.25

Analysis by ANOVA and Bonferrini
NRS = Numerical rating score
* $p < 0.019$, ** $p < 0.024$

Table 3. Intra-operative NRS between the lidocaine 100 and 200 mg groups

Group	Mean NRS	95% confidence interval	Mean difference (95% CI)
Lidocaine 100 mg	3.40	1.70-5.09	-0.1 (-2.41-2.21)
Lidocaine 200 mg	3.50	1.81-5.18	

Analysis by t-test
NRS = numerical rating score

(p-value 0.613) (Fig. 1). No serious side-effects vis-à-vis the lidocaine was observed in any of the women, although dizziness occurred in one patient in the lidocaine 100 mg group.

Discussion

The results of the present study demonstrated that intraperitoneal lidocaine instillation is effective for intra-operative pain relief for postpartum tubal resection under local anesthesia. The present study is similar to Visalyaputra et al[5] who reported that intraperitoneal lidocaine instillation either alone or combined with intramuscular morphine is effective for decreasing suffering in patients undergoing postpartum tubal ligation under local anesthesia. Cruikhank et al[9] reported that most of the patients slept through the operative procedure under intra-peritoneal lidocaine with heavy sedation.

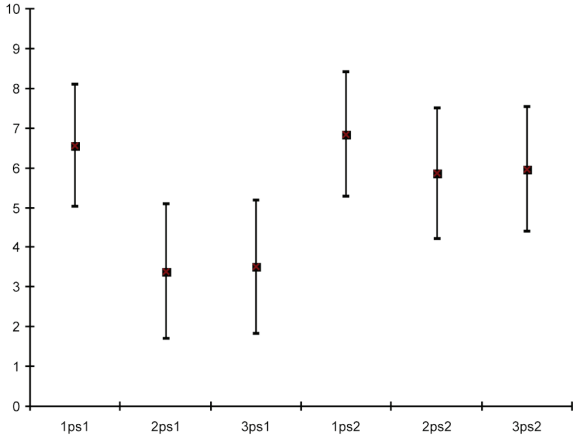

Fig. 1 Mean intra- and post-operative NRS and 95% CI for the three groups (*viz.,* PS1: intra-operative; PS2: post-operative; 1: NSS group; 2: lidocaine 100 mg group; 3: lidocaine 200 mg group)

The rationale for this route of administration is that the peritoneum is exposed so blockage of visceral nociceptive conduction is possible. Although optimal concentration and volume of lidocaine have not been studied well, previous research indicated use of 200-400 mg of lidocaine in a 20-80 ml volume[5,9,10]. The authors selected 100 and 200 mg of lidocaine in a 20 ml volume because the authors wanted to use the smallest dose that would provide pain relief as well as the smallest volume to obscure less of the operative field. The authors also wanted to reduce the dosage of lidocaine in order to minimize any side-effects and reduce costs.

The present study showed no significant difference between 100 and 200 mg of lidocaine suggesting that 100 mg of lidocaine is effective in pain relief as well as 200 mg of lidocaine. The intra-operative

use of a rescue drug did not depend only upon the NRS, as the authors were concerned about the patient's needs such that any additional drug use did not seem associated with the mean NRS. The immediate post-operative pain showed no difference in the pain score between the lidocaine (100 and 200 mg) and isotonic normal saline groups, suggesting that intraperitoneal lidocaine is not effective for immediate post-operative pain control. This was confirmed by Visalyaputra et al[5] who reported that the paracetamol requirement was not significantly different between groups. The reason may be that lidocaine has a short half-life and does not stop skin pain. The result contrasts with Cruikshank et al[9] who found that all patients given intraperitoneal lidocaine combined with intravenous diazepam and alphaproline for sedation had complete peritoneal anesthesia and little discomfort 24 hours post-procedure.

Many studies have tried to find a way to relieve pain after surgery. This involves the use of opioids, non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol, and local anesthetics[12]. Wittels et al[1,13] reported that infiltrating the incised skin, fallopian tubes, and mesosalpinx with 0.5% bupivacaine prevented pain and painful uterine clamping for both the immediate post-operative period and for seven days thereafter in 9 of 10 patients.

The limitation of the current study was (a) that the pain score depended on many subjective, individually-based factors and (b) that medical residents - with varying skill levels - performed the operations.

Conclusion

Intraperitoneal lidocaine instillation provides effective pain relief during postpartum tubal resection under local anesthesia. 100 mg of lidocaine is effective in pain relief. This technique was not particularly effective for relief of immediate post-operative pain.

Acknowledgement

The authors are grateful to the women for their participation. The authors to thank (a) the residents (b) the Department of Obstetrics and Gynecology and (c) the Faculty of Medicine at Khon Kaen University for their cooperation and support and (d) Mr. and Mrs. Hamman for their assistance with the English-language of the manuscript.

Potential conflicts of interest

None.

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การใส่ lidocaine เข้าช่องท้องเพื่อลดความเจ็บปวดขณะผ่าตัดทำหมันหลังคลอดในโรงพยาบาลศรีนครินทร์

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วัตถุประสงค์: เพื่อศึกษาประสิทธิภาพของการใส่ lidocaine เข้าช่องท้องและหาปริมาณที่เหมาะสมของ lidocaine เพื่อลดความเจ็บปวดขณะผ่าตัดทำหมันหลังคลอดในโรงพยาบาลศรีนครินทร์

รูปแบบการวิจัย: Randomized, double-blinded, placebo-controlled study

วัสดุและวิธีการ: สตรีหลังคลอดที่มีสุขภาพแข็งแรงและไม่มีข้อห้ามในการทำหมันจำนวน 60 ราย ที่ได้รับการทำหมันโดยแพทย์ใช้ทุน และแพทย์ประจำบ้านภาควิชาสูติศาสตร์และนรีเวชวิทยา ทำการสุ่มโดยแบ่งออกเป็น 3 กลุ่ม แต่ละกลุ่มได้รับสารละลายฉีดพ่นเข้าช่องท้องก่อนการค้นหาท่อนำไข่จำนวน 20 มิลลิลิตร กลุ่มที่ 1 ได้รับน้ำเกลือ (Normal saline) กลุ่มที่ 2 และ3 ได้รับ lidocaine 100 และ 200 มิลลิกรัมตามลำดับ ทำการวัดระดับความเจ็บปวดระหว่างและหลังจากทำหมันทันทีโดยใช้ Numerical rating scale (NRS โดยมีระดับคะแนน 1-10)

ผลการศึกษา: ค่าเฉลี่ยความเจ็บปวดในกลุ่มที่ได้รับ lidocaine (100 และ 200 มิลลิกรัม) มีค่าน้อยกว่ากลุ่มที่ไม่ได้รับ lidocaine อย่างมีนัยสำคัญ (NRS 3.40, 3.50 vs. 6.55, p-value 0.019 และ 0.024 ตามลำดับ) ไม่พบความแตกต่างในกลุ่มที่ได้ lidocaine 100 และ 200 มิลลิกรัม (NRS 3.40 vs. 3.50, Mean difference 95%CI -2.41 ถึง 2.21) ส่วนค่าเฉลี่ยความเจ็บปวดหลังจากทำหมันทันที พบว่าไม่มีความแตกต่างกันในทั้ง 3 กลุ่ม (p-value 0.613)

สรุป: การใส่ lidocaine เข้าช่องท้องมีประสิทธิภาพในการลดความเจ็บปวดขณะผ่าตัดทำหมันหลังคลอดโดยวิธีที่ใช้ยาชาเฉพาะที่ ปริมาณยาชา 100 มิลลิกรัม ก็เพียงพอในการระงับความเจ็บปวดได้ดี อย่างไรก็ตามวิธีนี้ไม่สามารถลดความเจ็บปวดหลังการผ่าตัดทำหมันได้