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Effects of Closure vs Non-Closure of the Visceral and Parietal Peritoneum at Cesarean Section: A Prospective Randomized Study

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ABSTRACT

Objective: To determine the effect of closure and non-closure of the visceral and parietal peritoneum during cesarean section on short-term postoperative morbidity.

Subjects and Method : A prospective randomized trial was conducted of 398 women undergoing primary cesarean section;191 were classified as a closure and 207 as a non-closure of the peritoneum group in Trang Hospital, Trang province, Thailand. Perioperative outcome measures,such as analgesia dosage and morbidity measures were compared.

Result : There was no significant difference between the non-closure and closure groups in the mean narcotic analgesia doses (1.09+ 1.2 vs 1.05+ 1.0, p = 0.63), mean non-narcotic analgesia doses (4.69 + 2.7 vs 4.65 + 2.8, p = 0.89), number of postoperative fever > 38°C (14 vs 11, p = 0.37), number of wound infection (22 vs 26, p = 0.54) and mean of hospitalization days (4.16 + 0.91 vs 4.14 + 0.71, p = 0.78).

Conclusions: Closure or non-closure of the peritoneum at cesarean section has no significant impact on postoperative analgesic usage and short-term morbidity.

Keywords: cesarean section, morbidity, peritoneum closure, non-closure

Introduction

Cesarean delivery is one of the most frequently performed obstetric surgical procedures worldwide, with the rate generally ranging from 5% to over 20% of all deliveries. Closure of the peritoneum at laparotomy has been a part of standard surgical practice. During cesarean delivery, these peritoneum surfaces have to be breached before the uterus can be incised. Cited reasons for closure of the peritoneum include restoration of anatomy and re-approximatation of tissues, reduction of infection by re-establishing an anatomical barrier,reduction of wound dehiscence, reduction of hemorrhage, minimization of adhesion and continuation of what was thougth of as standard.[1,2] In contrast, non-closure of peritoneum is associated with reduced operative time.

The short-term effects of closure vs non-closure of the peritoneum were subject to several randomized prospective studies. Analyzing the results of this studies shows conflicting results regarding postoperative fever,

wound infection, pain, and other important outcome parameters.[3-7] A recent Cochrane meta-analysis suggested that there was an improved short-term postoperative outcome if the peritoneum was not closed.[8]

Giving the preponderance of cesarean delivery, it is of utmost importance to offer recommendations regarding its technique base on high quality evidence. Therefore, additional data derived from high quality randomized controlled trials is valuable. The aim of our study was to analyse short-term results of closure vs non-closure of the peritoneum in a large randomized controlled trial.

Methods

The study was a randomized controlled trial comparing the effect of closure with non-closure of the visceral and parietal peritoneum on the short-term clinical course following cesarean section. Of the 1,350 women undergoing primary cesarean delivery between January, 2011 and December, 2011, 398 consented to participate and were randomly allocated to be the closure or non-closure group. Of the 398 women, 207(52%) women were randomized to the closure group, and 191(48%) women to be the non-closure group. All the staff (seven board obstetricians) who recorded the operative data performed the procedures. The randomization sequence was computer generated, instructing the surgeon to leave the peritoneum open or close it.

A standard technique was performed in all operations. All women underwent a Pfannenstiel incision under general anesthesia (same anesthetic agent used throughout). A transverse lower uterine segment was closed into two layers of continuous chromic catgut Number 1 suture. In the control group, both the visceral and parietal peritoneum were closed using a continuous absorbable suture (polyglactin 2-0), while both layers remained unsutured in the non-closure group. The rectus sheath was sutured using continuous absorbable suture (polyglactin 1). The skin was approximated by interrupted subcutaneous absorbable sutures (polyglactin 2-0), then skin suture with continuous 4-0 polyglactin sutures. All patients received intraoperative prophylactic intravenous ampicillin 1 gm. Timing of skin incision, delivery and end of surgery were recorded.

Patients were following up in the hospital. Clinical data retrived from the charts included postoperative analgesia usage by quantifying narcotic and non-narcotic administration. For the first 18-24 hr following operation the patients received analgesia upon demand, intramuscular meperidine 75 mg with promethazine 25 mg, and on the following days IM diclofen sodium 75 mg. Febrile morbidity was defined as a temperature of 38 °C or more, excluding the first 24 hr. after operation. Wound infection was diagnosed when erythema, induration or purulent discharge were observed. Patients were routinely discharged on the third post-delivery day; re-hospitalization were recorded if indicated.

Sample size was calculated based on the primary outcome measure that was the administration of non-narcotic analgesia. Pilot data on administration of non-narcotic analgesic, without specification as to whether or not the peritoneum was closed, showed a mean number of four doses with a standard deviation of 2.8. Sample size was calculated for a mean difference in dose of 0.8 (20%) with a standard deviation of 2.8 doses, an alpha of 0.5, and a beta of 0.9. The sample size was 75 patients in each group. For statistical analysis Student' s t-test and the Chi-square test were used as appropriate; $p < 0.05$ was considered significant.

Results

Patients characteristics are shown in Table 1: The groups were similar with respect to age, weight, parity and proportion of urgent operations. The mean duration of the operation was significantly shorter in the non-closure group. Each surgeon separated the women by running number into 2 groups (Table 2).

Table 1. Characteristics of women in the closure and non–closure group

Parameter	Non-closure group (191 patients)	Closure group (207 patients)	p
Mean age (years)	29.4+5.6	29.2+5.4	0.68
Mean weight (kg)	81.2+15.8	80.1+15.1	0.41
No.urgent operations	108 (56.5%)	115 (55.5%)	0.86
Mean operation time (min)	40.8+13.3	42.8+12.8	0.04
No. operations lasting > 40 min	103 (53.9%)	130 (62.8%)	0.02

Table 2. Number of closure and non-closure cases in each Obstetricians

Obstetricians in Trang Hospital	Non-closure group (191 patients)	Closure group (207 patients)
No. 1	25	29
No. 2	27	30
No. 3	26	30
No. 4	30	31
No. 5	27	33
No. 6	28	25
No. 7	28	29

Table 3. Outcome measures of closure and non-closure groups

Parameter	Non-closure group (191 patients)	Closure group (207 patients)	p
Women receiving > 1 dose of narcotic analgesia	126 (65.9%)	131 (63.2%)	0.53
Narcotic analgesia doses (mean ± SD)	1.09+1.2	1.05+1.0	0.63
Women receiving > 4 doses of non-narcotic analgesia	122 (63.8%)	123 (59.4%)	0.37
Non-narcotic analgesia doses (mean ± SD)	4.69+2.7	4.65+2.8	0.89
Women with postoperative fever > 38 °C	14 (7.3%)	11 (5.3%)	0.37
Women hospitalized > 4 days	18 (9.4%)	14 (6.8%)	0.34
Duration of hospitalization (days, mean ± SD)	4.16+0.91	4.14+0.71	0.78
Women with wound infection	22 (11.5%)	26 (12.5%)	0.54
Women re-hospitalized due to complication	3 (1.5%)	1 (0.4%)	0.20

Table 3. shows the postoperative course of the women in both groups. There was no difference in the use of narcotic or non-narcotic analgesia between the groups. In addition, no difference was also found in the rate of postoperative fever, wound infection or duration of hospitalization. All patients with fever or wound infections responded to antibiotic treatment. None of the patients from either group was subject to a re-laparotomy. Three patients in the non-closure group and one in the closure group were re- hospitalization. The indications for readmission were endometritis (two patients), wound infection (one patient) and hematoma (one patient).

Discussion

Reports on short-term effects of non-closure of the peritoneum have focused on several outcome measures, including duration of operation, analgesic usage, postoperative fever, endometritis and duration of hospital stay. The Cochrane review concluded that there was an improved short-term postoperative outcome if the perineum was not closed[8]. In the current randomized trial, closure or non-closure of the peritoneum at cesarean delivery had no significant impact on postoperative analgesic usage and short-term morbidity, warranting discussion.

Analgesic usage

The effect of leaving both layers of the peritoneum open on pain and analgesia requirements have shown conflicting results in pervious studies. No difference in postoperative pain between closure and non-closure of the peritoneum was reported by several investigators. Irion et al[7] and Hojberg et al[9] found no difference in postoperative pain as measure by visual analogue scale or with respect to number of doses of analgesics required.

Partial benefit of peritoneum non-closure was noted by other researchers. Hull and Varner[4] randomized 113 women to either closure or non-closure of both peritoneal layers. There was no difference in the number of doses of postoperative parenteral narcotics, but less use of oral narcotics when the peritoneum was not closed. Rafique et al[6] performed a double-blind randomized study of 100 women. They analyzed post-cesarean pain by visual analogue scales. The results showed no statistically significant difference between the groups. The researchers used a standardized procedure for pain relief. It included a spinal anesthetic, and later non-opioid analgesia. They found that non-closure of both layers of the peritoneum was associated with a significant reduction in postoperative use of patient controlled analgesia pump morphine. They did not find a statistically significant difference in the use of oral analgesia. They noted a significantly higher patient satisfaction at 24 hr. postoperatively in the non-closure groups. Nagele et al[5] in a randomized trial of 549 women reported less use of narcotic analgesia when the visceral peritoneum was not closed. It is important to note that a significant greater proportion of patients in the closure group received general anesthesia. In all participants the parietal peritoneum was closed. Hojberg et al[9] evaluated postoperative pain as the primary outcome in 40 patients. They were randomized to closure vs non-closure of the parietal peritoneum. In this study, the non-closure group used significantly less oral analgesia. In the study that reported a beneficial effect of non-closure of the peritoneum a statistical significant association was related to partial and different aspects of pain. The Cochrane analysis that included four studies involving 622 patients suggested a 20% reduction in a analgesic doses required[8]. The diverse results of the studies suggest that non-closure of the peritoneum has no clear effect on post-cesarean pain. Taken together we conclude that leaving the peritoneum open does not significantly affect postoperative pain.

Infectious morbidity

The majority of the investigators found no significant differences between the closure and non-closure groups. Pietrantoni[10] randomized 248 women to closure vs non-closure of the parietal peritoneum. He found no difference in the rate of postoperative fever, endometritis or wound infection between the groups. Hull and Varner[4] randomized 113 women to either closure or non-closure of both peritoneal layers. There was no difference in the rate of fever, endometritis, wound infection or use of antibiotics. Irion et al[7] in a study of 280 patients (both layers) found no difference in the rate of febrile morbidity. Hull and Varner[4] studied 113 women, and left both layers unsutured. They found no difference between the groups in the rate of febrile morbidity. Two investigators reported a decrease in febrile morbidity in the non-closure group : Grunsell et al[11] studied 361 women who underwent cesarean section and were randomized to peritoneal closure or non-closure. They found a significant decrease in febrile morbidity in the peritoneal non-closure vs the closure group (7.8% vs 19.2%) . Yet, there was no difference in

the rate of endometritis (4.9% vs 5.0%). The increase in febrile morbidity was attributed to increase wound infection rate (3.2% vs 2.2%), and increase fever of unknown origin (FUO, 3.8% vs 1.7%) in the peritoneal closure group. Nagele et al[5] found increased rate of postoperative fever in the closure group, and a tendency towards more endometritis or wound infection in the closure group. These differences did not reach statistical significance. In the Cochrane analysis, postoperative fever was significantly reduced with non-closure, but there was no difference in postoperative endometritis and wound infection rates[8]. The results of the present study support the conclusion that peritoneal closure has no clinically significant effect on postoperative febrile morbidity or infection rate.

Operative time

It is logical that omitting a surgical step would decrease duration of surgery. The magnitude of this time however is variable. In the Cochrane review, non-closure of the visceral and parietal peritoneum reduced operating time by a mean of 6.05 min.[8] This was found when nine studies involving 1,521 women were analyzed. In our series, the shorter operative time in the non-closure group was of lesser magnitude and although statistically significant, the 2 – min difference lacks clinical significance.

Hospital stay

Length of hospital stay may be partly clinical and partly an administrative decision reflecting different policies. In the Cochrane analysis, duration of hospitalization was assessed in eight studies including 1,203 women. Length of stay was significant reduced in the non-closure group.[8] In the current study duration of hospitalization was not found to be related to peritoneal closure. Again, it may suggest a marginal effect that may be significant only while assessing a very large number of patients.

From the present study, it was suggested that closure of visceral and parietal peritoneum may be omitted in cesarean delivery. Peritoneal closure did not reduce the risks of infection, postoperative analgesic usage and number of hospitalization. When the peritoneum was left unclosed, tissue healing allowed for restoration of normal pelvic anatomy. A large clinical trial assessing the effect of peritoneal closure at cesarean among other surgical technique variations is currently ongoing[12].

Conclusion

The results of our randomized trial of closure vs non-closure of the peritoneum suggest that there is no significant difference in short-term outcome.

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การศึกษาแบบไปข้างหน้าแบบสุ่มถึงผลของการเย็บปิดและไม่เย็บปิดเยื่อบุช่องท้องในการผ่าตัดคลอดบุตร

จิรายุส ดุลยเกียรติ

วัตถุประสงค์ *: เพื่อเปรียบเทียบการเย็บปิดและไม่เย็บปิดเยื่อบุช่องท้อง ขณะทำการผ่าตัดคลอดบุตรถึงผลความแตกต่างในด้าน ภาวะแทรกซ้อนหลังการผ่าตัดในระยะสั้น*

วิธีการ *: ทำการศึกษาแบบไปข้างหน้าแบบสุ่มหญิงตั้งครรภ์แรกที่ได้รับการผ่าตัดคลอดบุตร จำนวน 398 ราย แบ่งเป็น 207 ราย ที่เย็บปิดและ 191 ราย ที่ไม่เย็บปิดเยื่อบุช่องท้องในการผ่าตัดคลอดบุตร ศึกษาเปรียบเทียบผลขณะทำผ่าตัด เช่น ปริมาณการใช้ยาแก้ปวดและภาวะแทรกซ้อน*

ผลการศึกษา *: ไม่มีความแตกต่างกันตามนัยสำคัญทางสถิติระหว่างกลุ่มที่เย็บปิดและไม่เย็บปิดในด้าน จำนวนครั้งเฉลี่ยของการใช้ยาแก้ปวดแบบ narcotic (1.09 + 1.2 vs 1.05 + 1.0, p = 0.63 ตามลำดับ), จำนวนครั้งเฉลี่ยของการใช้ยาแก้ปวดแบบ non-narcotic (4.69 + 2.7 vs 4.65 + 2.8, p = 0.89 ตามลำดับ), จำนวนหญิงมีไข้มากกว่า 38° ซ. หลังผ่าตัด (14 vs 11, p = 0.37 ตามลำดับ), จำนวนหญิงที่มีแผลอักเสบ (22 vs 26, p = 0.54 ตามลำดับ), และจำนวนวันเฉลี่ยนอนโรงพยาบาล (4.16 + 0.91 vs 4.14 + 0.71, p = 0.78 ตามลำดับ)*

สรุป *: การเย็บปิดเยื่อบุช่องท้องในการผ่าตัดคลอดบุตรไม่มีความแตกต่างกันตามนัยสำคัญทางสถิติในด้านการใช้ยาแก้ปวดหลังผ่าตัด และภาวะแทรกซ้อนหลังผ่าตัดระยะสั้นเมื่อเปรียบเทียบกับการไม่เย็บปิด*