

Closure or nonclosure of the peritoneum at gynecological operations

Effect on postoperative pain

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ABSTRACT

Objective: To compare the analgesic requirement and pain scores in the postoperative period between closure and nonclosure of the peritoneum in women undergoing gynecological abdominal surgery.

Methods: We conducted this study as a 2 parallel grouped, double blind, randomized, controlled trial between February 2002 and March 2003. The current study consists of 79 eligible women who were enrolled and completed baseline assessments. We carried out this study at the Cumhuriyet University Hospital, Sivas, Turkey.

Results: When the age, gravidity, parity, body mass index, type of surgery, operative time and length of

hospital stay were compared, between the 2 groups, no statistically significant difference was found ($p>0.05$). The postoperative pain was found higher in the closure group than the nonclosure group ($p<0.05$) when the pain with visual analog scale (VAS) scores compared.

Conclusion: There was no significant difference in analgesic requirements between the 2 groups in the postoperative period. However, less pain and low VAS scores were evident especially after postoperative 2nd and 48th hours in the nonclosure group. We recommend non-closure of peritoneum at abdominal gynecologic procedure as the method of choice.

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The closure of the peritoneum at laparotomy has been a standard practice for restoring anatomy, reducing infection, wound dehiscence, and preventing adhesions.¹ Many obstetricians still follow the traditional procedure of suturing the visceral and parietal layers of the peritoneum. However, operative techniques have been rarely evaluated in the context of randomized controlled trials. One of the techniques that had been submitted to such an evaluation is nonclosure of the peritoneum.²⁻⁵ Suture of the peritoneum may

increase ischemia, tissue necrosis and foreign body reaction, all of which may increase the risk of adhesion formation.⁶ Peritoneal adhesions have been reported to be associated with abdominal pain and bowel obstruction.^{7,8} There is controversial suggestions regarding the effect of leaving the peritoneum open on postoperative pain. Some studies have found beneficial effects at laparotomy on postoperative pain while others have found no benefit.⁹ We decided to evaluate this concept in a randomized controlled trial with a standardized

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anesthetic and surgical technique and postoperative conditions. The aim of this study was to evaluate whether non-closure of peritoneum has any effect on postoperative pain and analgesic requirements.

Methods. This study was a prospective, parallel group, double blind, randomized, controlled trial which we conducted at the Department of Obstetrics and Gynecology, Cumhuriyet University Hospital, Sivas, Turkey between February 2002 and March 2003. The study was approved by the Local Ethics Research Committee and written informed consent was obtained from all recruited patients. Participants were randomly allocated in blocks of varying size to one of 2 groups (closure or nonclosure). The randomization sequence was generated by computer generated random numbers.¹⁰ Each continuous numbered envelope contained a note instructing the surgeon to leave the peritoneum open or to close it. The data recording form and all the paperwork in the envelope had the same code. The envelopes were opened in sequence in the operating theater just before the start of surgery, and the note was shown to the surgeon. Neither the attending midwives, nor the patients knew of the group allocation. Sample size was calculated by a difference in visual analogue scale (VAS) of 1.0 cm with a standard deviation of 1.5 cm and $\alpha = 0.05$, $\beta = 0.95$. This gives a minimum size of 40 in each group. Our groups comprised of 40 women in each. One participant was excluded from the analysis due to postoperative hemorrhage. The excluded patient was from the closure group. The current study consists of 79 eligible women who were enrolled and completed baseline assessments. A standard anesthesia was performed. All operations have been performed by the same surgeon to eliminate the differences in the operational procedure. All patients were premedicated with intravenous (IV) midazolam 0.1 mg/kg the night before surgery. With standard monitoring, anesthesia was induced with thiopental 5 mg/kg IV, and vecuronium 0.1 mg/kg IV was used to facilitate tracheal intubation. Anesthesia was maintained with 66% nitrous oxide and 1-2% isoflurane (inspired concentration) in oxygen. Supplements of vecuronium were administered in required dosages. None of the patients were given narcotic analgesia during the last half hour of the operation. Pfannenstiel abdominal incisions were performed in the classic technique as described by Pfannenstiel.¹¹ A 10-15 cm transverse abdominal incision, slightly concave upwards extending through the subcutaneous fat to the level of the rectus fascia was made. The fascia was then incised in a transverse fashion and separated from the rectus muscles superiorly and inferiorly. The rectus muscles were split, the peritoneum grasped, and the abdomen entered

sharply. Pfannenstiel incisions were employed in all cases. A single prophylactic IV antibiotic dose was given (sefazolin 1000 mg/IV) to all patients at the time of surgery. A similar intraabdominal surgical technique was used both in the closure and the nonclosure group. Visceral peritoneum was left unsutured in all cases. In the closure group, parietal peritoneum was reapproximated using continuous running delayed absorbable sutures (2/0 catgut); the rectus sheath was closed with continuous absorbable (2/0 polyglactin, Ethicon, Somerville, NJ, USA) sutures in all patients. The subcutaneous layer was left unsutured, and skin edges were approximated with mattress sutures (3/0 silk). All patients were managed in the same postoperative unit of the gynecology ward. The nursing staff, an assistant physician who measured the pain and the patients were blind to the study groups. The day of the surgery was considered as day 0 (operation day). For postoperative analgesia, Pethidine HCl 100 mg parenterally (for operation day); dipyrone 1g parenterally (for 1st day) and Naproxen sodium 275 mg orally (for 2nd and 3rd days) was administered to all participants. Postoperative analgesics were given when requested by the patient and recorded daily. On a questionnaire, the age, gravidity, parity, body mass index (BMI), type of surgery, operative time, length of hospital stay, indication of surgery (myoma uteri, menorrhagia, adnexial pathologies), other systematic diseases (diabetes, chronic obstructive lung disease, hypertension, cardiac problems), prior abdominopelvic surgery and operative time of all patients were recorded. Pain was evaluated for the first 15 minutes after arrival in the post anesthesia care unit (PACU) with a behavioral score defined as: 1 = calm patient with no behavioral manifestation of pain; 2 = behavioral expression of pain; 3 = intense behavioral manifestation of pain (cry, extreme agitation). This behavioral pain score (BPS) was performed at 5, 10 and 15 minutes after the arrival in the PACU. Postoperative 60th, 90th and 120th minutes and 4th, 24th, and 48th hour pain was assessed by administering a 10 cm VAS (no pain = 0, worst pain ever = 10). At 60th, 90th, 120th minutes and 4th hours after awakening, pain was measured in patients firstly during resting and immediately after that measurement, patients were told to move 90 degree to their left and right and then they were told to cough (movement mode) and the second pain measurement was performed. In addition at 24 and 48 hours, movement was performed by walking of the patients. All postoperative assessments and management were made by staff who did not perform the surgery.

The Statistical Package for the Social Sciences 10.0 software was used to tabulate the data. The age, gravidity, parity, BMI, operative time, length of hospital stay, quantity for postoperative analgesia

(for operation and 1st day) and pain score of the study groups was evaluated with use of the Student t test, ² analysis for indication of surgery, other systematic diseases and prior abdominopelvic surgery.

Results. The current study consists of 79 eligible women who were enrolled and completed baseline assessments; 40 women were randomized to the "closure" group and 40 to the "non-closure" group (we excluded one of the women who was in closure group because of complications). The groups were similar with respect to age, BMI, gravidity and parity (Table 1). Mode of the anesthesia, intra abdominal surgical technique and experience of the surgeon were also the same in both groups. The mean±SD operative time was similar in both groups. Operative times were 91.93±23.4 minutes in the nonclosure group and 88.10±19.90 minutes in the closure group ($p>0.05$) (Table 1). The mean postoperative hospital stay was 7.83±2.5 days in the nonclosure group and 8.23±1.55 days in the closure group. We could not find any statistically significant difference ($p>0.05$) between the 2 groups (Table 1). A repeated measured analysis of variance yielded no difference in the BPS by 10th and 15th minutes immediately after awakening in the PACU ($p>0.05$). But, there was statistically significant difference in the BPS by 5th minutes immediately after awakening in the PACU ($p<0.05$) (Table 2). There were statistically significant differences at 2nd and 48th hours in resting mode, and 48th hour in moving mode between the groups when the VAS scores were compared ($p<0.05$) (Table 2). There were no clinically meaningful differences between the groups when the average doses of analgesics on the operation day (pethidine HCl 100 mg) and on the first day (dipyrone 1 g) were compared ($p>0.05$) (Table 3). There was also no difference between the 2 groups with respect to amount of oral naproxen sodium requirements on the 2nd and 3rd postoperative days ($p>0.05$) (Table 3). Therefore, we did not find any significant differences in the overall use and doses of oral analgesics between the groups. There was no difference between the 2 groups when the operation indications such as myoma uteri, abnormal uterine bleeding and benign adnexial masses were compared ($p>0.05$). The ratios of other systematic diseases in the closure and nonclosure groups are 32.5% and 53.3%, and the ratios of prior surgery are 35% and 40%. These ratios were also not significantly different ($p>0.05$). The data were normally distributed according to Levene statistical results ($p>0.05$).

Discussion. Although closure of peritoneal layers has been standard practice for many years,

Table 1 - Baseline characteristics of study population.

Characteristics	Nonclosure group (n = 40)	Closure group (n = 39)	Significance
Age (year)	45.03±12.1	48.38±11.66	>0.05
Gravidity	4.93±3.1	5.95±3.36	>0.05
Parity	3.60±2.5	4.44±2.74	>0.05
BMI (kg/m ²)	28.19±5.4	28.20±5.31	>0.05
Operative time (min)	91.93±23.4	88.10±19.90	>0.05
Length of hospital stay (day)	7.83±2.5	8.23±1.55	>0.05
Data are presented as mean ± SD. BMI - body mass index			

Table 2 - Behavioral pain score (BPS) and visual analogue scale (VAS) scores of study population.

Measurement time	Nonclosure group (n = 40)	Closure group (n = 39)	Significance
BPS (minute)			
5	1.64±0.67	1.95±0.50	0.023
10	1.87±0.52	2.00±0.39	0.220
15	1.95±0.56	2.05±0.45	0.378
VAS pain (mm) (rest)			
60 minutes	5.53±1.48	5.85±1.16	0.288
90 minutes	5.00±1.50	5.44±1.21	0.160
2 hours*	4.40±1.41	5.08±1.49	0.042
4 hours	3.73±1.84	4.10±1.52	0.324
24 hours	2.28±1.48	2.79±1.54	0.131
48 hours*	1.27±1.26	1.85±1.27	0.046
VAS pain (mm) (movement)			
60 minutes	6.15±1.75	6.67±1.59	0.168
90 minutes	5.57±1.64	6.28±1.47	0.134
2 hours	5.30±1.64	5.44±1.37	0.691
4 hours	4.33±1.82	4.56±1.33	0.506
24 hours	2.98±1.46	3.28±1.49	0.357
48 hours*	1.80±1.40	2.49±1.47	0.036
Data are presented as mean ± SD. *Statistically significant difference.			

Table 3 - Data of postoperative analgesic use.

Analgesic drugs	Nonclosure group (n = 40)	Closure group (n = 39)	Significance
Pethidine HCl 100 mg*	140.82±42.13	153.75±45.49	0.194
Dipyrone 1 g†	2.90±1.10	2.98±1.21	0.776
Naproxen sodium 275 mg‡	440.00±277.11	528.85±364.53	0.226
Naproxen sodium 275 mg§	281.88±237.03	359.62±334.75	0.236
Data are presented as mean±SD. *parenterally, for operation day. †Parenterally for 1st day. ‡Orally, for 2nd day. §Orally, for 3rd day			

the literature claims important advantages for non-closure of the peritoneum.^{2,12} Nonclosure is also supported by the animal and clinical data, which demonstrates that the peritoneum, being a mesothelial organ, heals differently to epithelial tissue. Mesothelial cells initiate multiple sites of repair and defects heal spontaneously, within 48-72 hours.^{13,14} It is important in modern surgery to have shorter operation time that indicates less anesthesia exposure. A study performed with cesarean section confirmed a similar reduction in operative time of 6 minutes.¹⁵

Gupta et al¹⁶ reported a study on women who had undergone abdominal hysterectomy with either closure (n=76) or nonclosure (n=68); and found no difference in pain scores and postoperative requirements for analgesia but shorter operative time. Roset et al¹⁷ in a follow-up study reported 144 participants; 69 in the nonclosure and 75 in the closure group who had undergone cesarean section. They found no difference in comparing pain scores, length of hospital stay, and postoperative requirements for analgesia but shorter operative time when the peritoneum was left unsutured. Chanrachakul et al,¹⁸ in a study reported 60 patients; 30 in the nonclosure and 30 in the closure group who had undergone cesarean section. They found no difference in comparing pain scores, operative times and length of hospital stay. A study by Højberg et al,¹⁹ where 40 patients were evaluated and no statistically significant difference was found in postoperative pain scores between the 2 groups, however, the non-closure group used significantly less oral analgesia.

Hull and Varner² and Nagele et al¹ reported less use of postoperative analgesia when the peritoneum was not sutured at cesarean section, but in both of these studies pain was not the primary outcome measure, and anesthetic technique was not standardized. Similar criticism can be applied to a study by Irion et al¹⁵ which found no difference in the number of analgesic doses required postoperatively in their study of 280 patients. Again, no standard anesthetic technique was used. There are few studies which evaluated postoperative pain as the primary outcome measure following closure or non-closure of the peritoneum.^{9,18,20}

A shorter duration of operation was documented in previous studies^{2,3,5,9,15,16,19} whereas Chanrachakul et al¹⁸ showed no differences between the closure and the non-closure groups neither in operative time, nor in postoperative complications.

One of the objective measure of short term maternal morbidity is the length of postoperative hospital stay. This main outcome was similar in the closure and the non-closure groups as claimed by others authors.^{4,5,9,15} All of which were similar in the present study that there were no statistically significant differences in length of hospital stay. In

our study there was no statistically significant difference in analgesic usage in the postoperative period claimed by Irion et al¹⁵ and Chanrachakul et al,¹⁸ in contrast to other authors.^{2,4,16,19}

Benefits of non-closure on postoperative pain remains controversial. This controversy probably stems from the fact that only few published studies^{9,18,20} were designed specifically to look at this important outcome measure. In contrast to Rafique et al,⁹ Gupta et al,¹⁶ Højberg et al¹⁹ and Chanrachakul et al,¹⁸ we found statistically significant differences in the postoperative pain between the groups. There was statistically significant difference in the BPS by 5th minutes immediately after awaking in the PACU ($p<0.05$) and the VAS score in resting mode at 2 and 48 hours and VAS score in moving mode at 48 hours after the operation ($p<0.05$). Tulandi et al¹ concluded that the non-closure of peritoneum had more advantages than disadvantages following a wide scale comparison of literature on this subject.

In conclusion, less pain in the non-closure group demonstrates that not suturing the peritoneum for the abdominal gynecologic operation has beneficial effects on postoperative pain. Thus, we recommend non-closure of peritoneum for abdominal gynecologic procedures as the method of choice.

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