

## Nonclosure of Parietal and Visceral Peritoneum During Cesarean Section

Sood Atul Kumar,

Department of Obstetrics and Gynecology, Military Hospital, Jhansi - 284 001

**OBJECTIVE** - To assess intraoperative, early and late postoperative morbidity following nonclosure of parietal and visceral peritoneum during cesarean section as compared to usual peritonization. **METHODS** - This prospective randomized controlled study was carried out in an armed forces zonal hospital. One hundred forty nine consecutive women scheduled for lower segment cesarean section through Pfannenstiel or subumbilical midline incision were randomized to either closure (N=71) or non-closure groups (N=78). Perioperative, intraoperative and postoperative management decisions were made without reference to the nature of the groups. Statistical analysis compared intraoperative and postoperative outcome between the two groups. **RESULTS** - There was significant reduction in operating and anesthesia time, febrile morbidity, return of bowel function and period of hospitalization amongs the nonclosure group. There was no significant difference with regards to postoperative pain as assessed by Visual Analog Scale (VAS) score and number of analgesic doses, endomyometritis, cystitis and wound infection. Peritoneal adhesions and upward displacement of bladder were more frequently noted during subsequent cesarean in the closure group. **CONCLUSION** - Nonclosure of parietal and visceral peritoneum during cesarean section is a shorter simpler, cost effective procedure associated with lesser febrile morbidity and hospitalization period, early return of bowel function, reduced frequency of the postoperative adhesions and upward displacement of bladder.

**Key words** : nonclosure, parietal peritoneum, visceral peritoneum, cesarean section

### Introduction

Cesarean section is the most common intraperitoneal surgical procedure in obstetrics and gynecology. Over the years there is a wider recognition of the desire to reduce cesarean section rate, but there has been little debate on the operating technique. Traditionally suturing of the parietal and visceral peritoneum at cesarean section has been widely accepted despite lack of evidence establishing its benefits. Apart from aesthetic considerations, there is belief that closure of peritoneum can prevent adhesion formation. On the contrary theoretical considerations and animal experiments support the opposite view<sup>1</sup>. Suture peritonization tends to cause tissue ischaemia, necrosis, inflammation and foreign body reactions to the suture material. These factors may slow down the healing process and are considered important precursors of adhesion formation. On the other hand clean excision of peritoneal surfaces without suturing the cut edges provides for more rapid peritoneal repair and does not lead to tissue ischaemia and infection, decreasing the risk of development of adhesion formation<sup>2</sup>.

There have been a few randomized controlled trials comparing nonclosure of parietal<sup>3,4</sup>, visceral<sup>5,6</sup> or both

parietal and visceral peritoneum<sup>7,8</sup> during cesarean section as compared to suture peritonization. Most of these trials have addressed early postoperative morbidity. There has been one trial in which long term follow up was done<sup>9</sup>. In recent study late morbidity in the form of increased peritoneal adhesions and upper displacement of bladder during subsequent laparotomy were noted with the closure of visceral peritoneum<sup>6</sup>.

The present study was undertaken with the aim to assess intraoperative, early and late postoperative morbidity following nonclosure of both parietal and visceral peritoneum during cesarean section as compared to suture peritonization.

### Material and methods

In this prospective randomized controlled trial all consecutive women undergoing emergency or elective cesarean section were randomly allocated to either nonclosure or closure group. Between Aug 1997 to Jul 1998 a total of 149 women were recruited for the study; 71 were randomized to nonclosure group and 78 to the closure group. In the nonclosure group both the parietal and visceral peritoneum were left unsutured, as compared to suture peritonization with 2-0 polyglactin for visceral and parietal peritoneum in the closure group. Both Pfannenstiel and subumbilical midline incisions were used and all uterine incisions were low transverse type. Uterine incision was closed in two layers with No. 2 chromic catgut and rectus sheath with No. 2 polypropylene. Skin was

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Correspondence :

Dr. Atul Kumar Sood

Military Hospital, Jhansi - 284 001



proximated with subcuticular closure. Concurrent tubal ligation, when required, was done by modified Pomeroy's technique.

Day of operation was considered as day 0. Treatment allocation was disclosed neither to the nursing nor medical staff providing postoperative care, nor to the patients. In the absence of complications, patient was discharged on the sixth postoperative day. Perioperative, intraoperative and postoperative management decisions were made without reference to nature of the groups. The outcome measures noted were anesthesia time, operating time, postoperative pain as assessed by both Visual Analog Scale (VAS) and number of analgesic doses given in the first postoperative day, febrile morbidity, endomyometritis, cystitis, wound infection and period of hospitalization.

Postoperative pain was measured once administering 10 cm visual analog scale (no pain = 0, worst pain = 10) at approximately 24 hrs after surgery. Women were asked to indicate the average intensity of pain experienced during the last several hours. Analgesics were given as needed, and the number of doses of narcotic analgesics administered during the first postoperative day was recorded. Intestinal transit was

assessed by auscultation of bowel sounds. Febrile morbidity was defined as temperature more than 38°C on two occasions 12 hours apart, excluding the first postpartum day. Endomyometritis was diagnosed if uterine tenderness and fever were present. Cystitis was diagnosed by a positive urine culture growth. The presence of purulent discharge from the incision with erythema or induration, with or without fever indicated wound infection. Anesthesia time (general anesthesia) and operation time were abstracted from operation notes. The length of postoperative hospital stay was calculated from medical records.

Women were followed up at six weeks, six months and subsequently for one to three years. They were advised to report to the hospital in case of any complaints or late complications. Late morbidity was assessed in the form of chronic pelvic pain and incisional hernia. In women who conceived during the follow-up period and underwent repeat cesarean section peritoneal adhesions and upward displacement of bladder were recorded during subsequent operation. Student 't' test and Chi-square test were used for statistical analysis of the results, where appropriate, with a P<0.05 considered probability level to reflect significant differences.

Table I : Patient Characteristics and Procedure Statistics

	Nonclosure Group (N=71)	Closure Group (N=78)	Significance
Maternal age (yrs)	26.5 ± 4.4 <sup>a</sup>	25.5 ± 3.5 <sup>a</sup>	NS
Parity	2.0 ± 0.8 <sup>a</sup>	1.9 ± 0.6 <sup>a</sup>	NS
Gestational age (wks)	38.0 ± 1.6 <sup>a</sup>	37.9 ± 1.7 <sup>a</sup>	NS
<b>Cesarean</b>			
Primary	46(64.7)	52(66.6)	NS
Repeat	25 (35.3)	26 (33.4)	
Elective	46 (64.7)	54 (69.3)	NS
Emergency	25 (35.3)	25(30.7)	
<b>Anesthesia</b>			
General	58(81.6)	65 (83.3)	NS
Spinal	9 (12.6)	10 (12.8)	
Epidural	4 (5.8)	3 (3.9)	
<b>Abdominal incision</b>			
Pfannenstiel	48 (67.6)	52(74.3)	NS
Midline	23(32.4)	26(25.6)	
Tubal ligation	23(32.4)	21(26.9)	NS

Mean ± SD    Values in parentheses indicate percentage    NS - Not significant

Table II : Indications for Cesarean Section

	Nonclosure Group (N=71)	Closure Group (N=78)	Significance
Previous cesarean	25(35.3)	26(33.4)	NS
Dysfunctional labor	14(19.7)	19(24.4)	NS
Breech presentation	10(14.1)	7(8.9)	NS
Fetal distress	9(12.6)	7(8.9)	NS
Others	13 (18.3)	19 (24.4)	NS

Values in parentheses indicate percentage      NS - Not significant

Table III : High Risk Factors

	Nonclosure Group (N=71)	Closure Group (N=78)	Significance
Bad obstetric history	21 (29.5)	23 (29.4)	NS
Premature rupture of membranes	14 (19.7)	12(15.3)	NS
Hypertensive disorders	9(12.6)	6(7.6)	NS
Antepartum hemorrhage	2(2.8)	5(6.25)	NS
Intrauterine growth retardation	2(2.8)	4(5.1)	NS
Others	4(5.6)	6(7.6)	NS

Values in parentheses indicate percentage      NS - Not significant

Table IV : Operative Factors and Postoperative Morbidity

	Nonclosure Group (N=71)	Closure Group (N=78)	Significance
Anesthesia time (min)	40.8 ± 3.6	46.0 ± 3.5 <sup>a</sup>	P<0.001
Operating time (min)	30.9 ± 6.13	38.4 ± 6.3 <sup>a</sup>	P<0.05
Postoperative pain			
VAS Score	2.9 ± 0.4	3.0 ± 0.4 <sup>a</sup>	NS
No. of analgesic doses	3.3 ± 0.4	3.4 ± 0.5 <sup>a</sup>	NS
Opening of bowels (days)	1.16 ± 0.1	1.23 ± 0.1 <sup>a</sup>	P<0.01
Febrile morbidity	7(9.8)	18(23.0)	P<0.05
Endomyometritis	3(4.2)	7(8.9)	NS
Cystitis	2(2.8)	6(8.4)	NS
Wound infection	2(2.8)	5(6.4)	NS
Hospitalization (days)	6.1 ± 0.5	6.5 ± 1.0	P<0.01

<sup>a</sup> Mean ± SD Values in parentheses indicate percentage      NS - Not significant



Results

There was no significant difference between the two groups with respect to age, parity and gestational age. Both groups were also similar with respect to primary / repeat or elective emergency cesarean section. The two groups did not differ with respect to the type of anesthesia, abdominal incision or concurrent sterilization (Table I). There was no difference between the two groups with respect to the indication for cesarean section or various high risk factors (Tables II and III). The mean anesthesia time was 5.2 minutes shorter ( $P < 0.001$ ) in the non-closure group (Table IV). Operating time was also significantly shorter by 7.5 minutes ( $P < 0.05$ ) in the nonclosure group. There was no significant difference between the subjects and controls

with respect to postoperative pain as measured by both visual analog scale and the number of analgesic doses given. The mean return of bowel function in days was significantly earlier in the subjects than controls 1.16 (SD 0.1) days and 1.23 (SD 0.1) days respectively ( $P < 0.01$ ).

There was no significant difference with regards to incidence of endomyometritis, cystitis or wound infection between the two groups. Nonclosure group had a lower febrile morbidity of 9.8% as compared to 23.0% in the control group ( $P < 0.05$ ). The mean postoperative hospital stay was significantly shorter viz  $6.1 \pm 0.5$  days in the nonclosure group than  $6.5 \pm 1.0$  days in the control group ( $P < 0.01$ ). There were no women with pelvic pain or incisional hernia in either group during the follow up

Table V: Operative Findings during Subsequent Cesarean

	Nonclosure Group (N=14)	Closure Group (N=12)	Significance
Peritoneal adhesions	0	3(25.0)	$P < 0.05$
Upwards displacement of bladder	0	4(33.3)	$P < 0.01$

Values in parentheses indicate percentage

period during which 26 women underwent repeat cesarean of which 14 belonged to nonclosure and 12 to the closure group (Table V). There was significant increase in the peritoneal adhesions and upwards displacement of bladder noted at the time of repeat surgery in the closure group as compared to nonclosure group ( $P < 0.05$  and  $P < 0.01$  respectively)

Discussion

Peritoneum is replaced denovo from its underlying connective layer rather than by creeping from the cut mesothelial margins. Open peritoneal surfaces may actually speed removal from peritoneal cavity of bacteria and potential media through uncomplicated stromal contact. After 48-72 hours entire surface is remesothelialized simultaneously and not gradually from the cut edges as in case of skin wounds. Regeneration of peritoneal defects is completed in five to six days and large defects heal as fast as small ones. Adhesion formation after peritoneal closure is primarily the result of foreign body reactions to the suture material, ischaemia, tissue necrosis and inflammation<sup>1,10</sup>. It had been reported in rat experiments that it is not the serosal integrity but tissue ischaemia, which is important factor in the etiology of postoperative adhesions<sup>2</sup>. Therefore nonclosure of peritoneum may actually promote healing and reduce adhesion formation.

In the first reported randomized controlled trial involving nonclosure of both parietal and visceral

peritoneum, Hull and Varner<sup>7</sup> while assessing immediate postoperative morbidity, concluded that peritoneal nonclosure appeared to have no adverse effect on immediate postoperative recovery, may decrease post operative narcotic requirements, allows less complicated return of bowel function and provides a simplified and shorter surgical procedure. Iron et al<sup>8</sup> in their study assessing short term postoperative morbidity found no significant difference in the length of hospital stay, level of postoperative pain, number of analgesic doses given and febrile morbidity. Mean operating time was shorter in nonclosure group and postoperative ileus resolved later in closure group. Grundsell et al<sup>9</sup> in a long-term follow-up of atleast one-year reported that operating time, postoperative morbidity and wound infection and hospital stay were significantly lower in nonclosure group. The incidence of wound dehiscence, urinary tract infection and opening of bowels were similar in both groups. Woyton et al<sup>6</sup> in a study of nonclosure of visceral peritoneum reported no difference in regards to postoperative course between two groups. However, nonclosure of visceral peritoneum reduces frequency of postoperative adhesions and upward dislocation of urinary bladder. In Cochrane review by Wilkinson and Enkin<sup>11</sup> including four trials involving 1194 women, nonclosure saved operating time with no significant differences in postoperative morbidity, analgesic requirements and length of hospital stay. They found a consistent although insignificant trend for improved immediate postoperative outcome if the peritoneum was not closed.



In the present study, there was significant decrease in anesthesia and operation time as found in other studies<sup>3,5,7</sup>. Decrease in operating time is associated with lesser anesthesia exposure and diminished intraoperative anaesthetic requirements. Decreased postoperative pain has been reported with nonclosure of peritoneum<sup>5</sup>. It has been suggested that nonclosure may be associated with lesser postoperative pain, because no tension is placed on the peritoneal wound edges. In our study, there was no significant difference in the postoperative pain. This is similar to that reported by others<sup>8,9</sup>. Significantly higher febrile morbidity found in this study is similar to that reported by some<sup>5,9</sup>. But other studies have reported no difference<sup>3,7,8,12</sup>. Theoretically, higher febrile morbidity may be due to the formation of subperitoneal pockets resulting from the suture; which could fill with blood and wound secretions that serve as a media for bacteria growth. Faster return of bowel function in this study is similar to that reported by some<sup>8,9</sup>. However, one study has reported no difference<sup>7</sup>. No significant difference was found in respect of endomyometritis, cystitis and wound infection, which is similar to that reported in some studies<sup>3,8</sup>. Others have reported significantly higher incidence in the closure group<sup>5,7</sup>. Decreased hospital stay found in this study reflects short term postoperative morbidity and is similar to that reported by some<sup>5,9,13</sup>. But other studies have reported no difference<sup>3,7,8,12</sup>.

In the present study, there were no women with late postoperative complications such as chronic pelvic pain or incisional hernia in either group that could be attributed to complications associated with lower segment cesarean section. This is also reported by Grundsel et al<sup>9</sup>. Increased incidences of peritoneal adhesions and upward displacement of urinary bladder found in the closure group in this study are similar to that reported by Woyton et al<sup>6</sup>. It could be attributed to tissue ischaemia, necrosis, inflammation and foreign body reaction to the suture material. However, Tulandi et al<sup>14</sup>, studied the effect of peritoneum closure after reproductive surgery by Pfannenstiel incision clinically and by second look laparoscopy and found no difference in the postoperative complications, wound healing, and adhesions to previous laparotomy incision after laparotomy closure with or without peritoneal suturing. Although not specifically addressed by this study, potential economic benefits include decreased anesthesia, operating room costs, personnel time and suture expenses.

In the present study, the follow-up period was limited to one to three years because of migratory nature of the study population due to service conditions involving frequent separation of families and regular transfers every

two to three years. Further studies with larger sample size and longer follow-up are needed to assess the long-term morbidity following nonclosure.

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