

## Original Article

# Should parietal peritoneum be closed at primary cesarean section?

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### Abstract

**Objectives:** The main aim for undertaking this study was to determine the relationship between the closure of parietal peritoneum and subsequent adhesion formation. Our aim was also to find out the type of adhesions between parietal peritoneal closure and non closure. **Methods:** A retrospective study from the records of women who came for their repeat cesarean section was done for a period of five years from 1999 to 2003. **Results:** There were 402 women who met the inclusion criteria in the study. All the cases included in our study had Pfannenstiel incision during their primary cesarean section (CS). No muscle cutting incision was used in any case. Of the 402 cases 223 (55.47%) had peritoneal closure and 179 (44.52%) cases did not have peritoneal closure. Looking through the data we found that in peritoneal closure of 223 cases, 40 (17.9%) had adhesions, while 183 cases (82.06%) had no adhesions. In the non peritoneal closure group, out of 179 cases, 121 (67.59%) had adhesions, while 58 (32.40%) did not have adhesions. In the peritoneal closure group, out of 40 cases 13 (32.50%) had dense adhesions, while 27 (67.50%) had flimsy adhesions. In the peritoneal non closure of 121 cases, 82 (67.76%) had dense adhesions, while 39 (32.23%) had flimsy adhesions. Using statistical significance, Pearson chi square value =101.992,  $P < 0.001$  and odds ratio, we found a 9.5 fold increase in adhesions in the peritoneal non closure group and even dense adhesions were found to be increased by 3.6 fold ( $X^2=10.69$ ,  $P=0.001$  OR = (1:6;7.7) in the peritoneal closure group. **Conclusion:** As the adhesion formation is less in the peritoneal closure group, it is advisable to close the parietal peritoneum during primary cesarean section. The uterus was sutured in two layers with No.1 NW 2347 vicryl and peritoneum with No. 0 chromic NW 4242 with atraumatic needle.

**Key words:** cesarean section, parietal peritoneum closure, adhesion formation

### Introduction

Cesarean section is the commonest and most frequently performed surgery in obstetrics. This has significantly

helped in reducing maternal and fetal mortality and morbidity by preventing complications like uterine rupture, difficult instrumental delivery and its sequelae. A cesarean section often is the first surgery in a woman's life and it is possible that she may require other abdominal surgeries at a later date. Previously, abdominal closure was done in layers. However, various studies have showed that peritoneal nonclosure decreases the operating time. While nonclosure of parietal and visceral peritoneum did not affect post operative pain and data on return of bowel function are conflicting<sup>1-3</sup>, closure of visceral peritoneum alone has

*Paper received on 02/01/2007 ; accepted on 20/01/2009*

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been associated with increased operating time and more infectious morbidity<sup>4</sup>.

In gynecologic<sup>5</sup> and general surgical conditions<sup>6</sup> when the abdomen is opened for some pathological condition, the closure of parietal peritoneum has been associated with increased adhesions<sup>7,8</sup>. The paucity of data regarding the long term effect of nonclosure of the peritoneum at cesarean delivery originally prompted Cochrane Database reviewers to conclude in 2000 that “data are insufficient to warrant a change in practice,” supporting continued closure of peritoneum at cesarean delivery<sup>7</sup>. In this context we have conceived a study to explore the relationship between adhesion formation and nonclosure of parietal peritoneum in a primary cesarean section.

### Aims and Objectives

The prime objective of our study was to determine the relationship between parietal peritoneum closure and the adhesion formation and also to determine the type of adhesions flimsy or dense in relation to parietal peritoneal closure.

### Methods

A total of 402 women underwent cesarean section between January 1999 and 2003 for their second delivery at Dr. TMA Pai Rotary Hospital, Karkala, a Maternal and Child Health Centre (MHC) of Kasturba Medical College, Manipal, (Karnataka). Those who had a previous cesarean section (LSCS) at this hospital were recruited for the study. Medical charts of all these participants were reviewed for peritoneal closure / non closure during previous lower segment cesarean section, presence and type of adhesion if present. Those participants who were found to have adhesions during the first surgery were excluded.

### Results

There were 402 patients who met the inclusion criteria. The parietal peritoneum was not closed in 179 patients and was closed in 223 patients (Table 1). When we examined the presence or absence of adhesion in the closure groups, we found that adhesions were present in only 40 (17.93%) patients out of 223 patients, while adhesions were absent in 183 (82.06%) patients (Table 2). While in the peritoneal nonclosure group adhesions were present in 121 (67.59%) patients, it was absent in only 58 (32.40%) patients (Table 3). Further, the type of adhesions also was significantly different, in the

peritoneal closure group (Table 4), where there were 13 (32.5%) patients who had dense adhesion, while 27 (67.50%) patients had flimsy adhesions. While in non closure group there were 82 (67.76%) patients who had dense adhesions and 39 (32.23%) patients had flimsy adhesions (Table 5).

**Table 1. n=402 - shows the distribution of cases included in the study.**

Year	Peritoneal closure	Peritoneal non closure	Total
1999	35	33	68
2000	50	23	73
2001	31	26	57
2002	37	47	84
2003	70	50	120
Total	223	179	402

**Table 2. n=223 - Number of cases who had peritoneal closure.**

Year	Adhesions present	Adhesions absent	Total
1999	5	30	35
2000	7	43	50
2001	5	26	31
2002	9	28	37
2003	14	56	70
Total	40	183	223

**Table 3. n=179 - Number of cases who did not have peritoneal closure.**

Year	Adhesions present	Adhesions absent	Total
1999	25	8	33
2000	17	6	23
2001	16	10	26
2002	29	18	47
2003	34	16	50
Total	121	58	179

**Table 4. n=40 - Peritoneal closure and type of adhesions.**

Year	Dense	Flimsy	Total
1999	1	4	5
2000	6	1	7
2001	2	3	5
2002	3	6	9
2003	1	13	14
Total	13	27	40

**Table 5. n=121 - Peritoneal nonclosure and type of adhesions.**

Year	Dense	Flimsy	Total
1999	16	9	25
2000	10	7	17
2001	13	3	16
2002	17	12	29
2003	26	8	34
Total	82	39	121

**Table 6. Association between peritoneal closure and adhesions.**

	Adhesions	Non adhesions	Total
Peritoneal closure	40	183	223
Peritoneal nonclosure	121	58	179
Total	161	241	402

Using Pearson chi square: Value=101.992 P<0.001  
 Using odds ratio: The non closure group has a 9.5 fold increase in adhesion

**Table 7. Association between peritoneal closure and type of adhesions.**

	Dense adhesions	Flimsy adhesions	Total
Peritoneal nonclosure	13	27	40
Peritoneal closure	82	39	121
Total	95	66	161

X<sup>2</sup>=10.69, P=0.001 OR=3.6 (1:6;7.7)  
 The non closure group has 3.6 fold increase in odds of dense adhesion.

Table 6 shows the association between peritoneal closure and adhesions. Using Pearson’s chi square test,

the value is 101.992, P<001 which is highly significant and using odds ratio, the nonclosure groups have been found to have a 9.5 fold increase in adhesion.

As shown in table 7 it is observed that between the peritoneal closure and nonclosure, there is association in the type of adhesions. The non closure group has a 3.6 fold increase in odds of dense adhesions (X<sup>2</sup> = 10.69, P=0.001 OR = 3.6 (1:6;7.7).

**Discussion**

Parietal and visceral peritoneal nonclosure has been associated with reduced adhesions and decreased operating time in LSCS. However, there is no difference in postoperative pain management and return of bowel function is conflicting<sup>2,3</sup>. Results of the present study show that nonclosure of peritoneum during LSCS is significantly associated with adhesion formation with preponderance of dense adhesions. In our study, both dense and flimsy adhesions were less in the peritoneal closure group. Dense n=13, flimsy n=27 (total n=40) as against dense=82, flimsy n39 (total n=121) in the nonclosure group. Unlike other tissues, the peritoneum does not require to be approximated because the mesothelial cells migrate into a supportive matrix and rapidly initiate multiple sites of simultaneous repair, irrespective of the size of peritoneal defect. This may get impaired by suturing due to suture ischemia<sup>9,10</sup>. The anatomic and physiologic changes in pregnancy may alter this healthy process. The enlarged uterus postpartum may disrupt the supportive matrix normally created and necessary for reperitonization. Perhaps the pressure of enlarged uterus with the location of supportive matrix alters mesothelial cell migration, resulting in disordered healing and adhesion of the surrounding structures.

Adhesion forms when fibrinolysis is suppressed and fibrin persists. Fibrin is then infiltrated by fibroblasts, which ultimately organize fibrin bands into adhesions<sup>11</sup>. Tissue ischemia is known to suppress fibrinolysis<sup>11</sup>, and provide an explanation for increased adhesions when the peritoneum is sutured among nonpregnant patients. The intra amniotic environment and physiologic changes of pregnancy may provide a mechanism to explain our findings. Fibrinolytic activity has been demonstrated in amniotic fluid and increases significantly beyond 37 weeks of gestation<sup>12</sup>. Perhaps the suppressions of fibrinolysis normally seen with peritoneal suturing, is altered enough by amniotic fluid fibrinolytic activity

or in an unknown manner by pregnancy related changes such as maternal volume expansion or the presence of inflammatory cytokines, to favor peritoneal closure to reduce adhesions.

Several studies in literature examine the short term effect of peritoneal closure<sup>1-4</sup>, but data on long term effects are limited. To our knowledge only one other study by Myers and Bennette<sup>13</sup> has direct assessment of the relations between peritoneal closure at cesarean delivery and adhesions as judged at repeat cesarean delivery. Similar to our results, these authors identified an association between decreased adhesions with prior peritoneal closure. Roset et al<sup>14</sup> conducted an indirect assessment of adhesions and peritoneal closure following patients previously randomized in a trial of peritoneal closure at cesarean delivery.

Closure of peritoneum during the first LSCS has 0.1(95% CI, 0.06 to 0.17) times odds of developing adhesion in comparison with peritoneal nonclosure and 0.55 (95% CI, 0.12 to 0.66); times odds of adhesion being dense. This study reiterates the similar findings reported by Roset et al<sup>14</sup>. Peritoneal closure in abdominal surgeries in pathological condition has been associated with increased adhesions<sup>5-8</sup>. However, the results of this study may be explained by the physiological changes during pregnancy and parturition. The enlarged postpartum uterus may disrupt the supportive matrix normally created and necessary for reperitonization. Perhaps the pressure of enlarged uterus with the location of supportive matrix alters mesothelial cell migration, resulting in disordered healing and adhesion of the surrounding structures. Adhesion results when fibrinolysis is suppressed and fibrin persists. Fibrin is then infiltrated by fibroblasts, which ultimately organize fibrin bands into adhesions<sup>11</sup>. Tissue ischemia is known to suppress fibrinolysis<sup>11</sup> and could be implicated in increased adhesions when the peritoneum is sutured among non pregnant cases. Infact, the suppressions of fibrinolysis normally seen with peritoneal suturing, may be significantly altered by the fibrinolytic activity of amniotic fluid or by pregnancy related changes such as maternal volume expansion or the presence of inflammatory cytokines, to favor peritoneal closure to reduce adhesions<sup>12</sup>. In conclusion our study unequivocally shows that parietal peritoneal closure at cesarean section appears to protect against abdominal adhesions.

This was an observational study and the subject requires further study of the long term impact of surgical techniques.

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