

Research Article**To Study the Effects of Closure Vs Non-Closure of Parietal Peritoneum on Adhesion Formation in Caesarean Section****Aravinda. K*, Ashiwini, Leela D., Murthy N.V.R., Aparna**

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Abstract: This study was done to evaluate the effects of closure versus non closure of parietal peritoneum at primary caesarean section on adhesion formation at repeat caesarean section. This study was conducted in St. Theresa's hospital Hyderabad from August 15th 2010- August 15th 2012. A total of 130 women were studied. Of them 64 women were included in non closure group and 66 women were included in the closure group. Of the 64 women in nonclosure group 36 women had adhesions. Of these 36 women 24 women had flimsy adhesions, 6 women had dense adhesions and 5 women had both flimsy & dense adhesions. Among these 36 women 34 women had emergency caesarean section and 2 women had elective caesarean section. Of the 66 women in closure group 30 women had adhesions. Of these 30 women 24 women had flimsy adhesions, 5 women had dense adhesions and 1 woman had both flimsy and dense adhesions. Among them 24 women had emergency caesarean section and 6 women had elective caesarean section. Adhesions in repeat caesarean section are not influenced by either the closure or non closure of parietal peritoneum in primary caesarean section. There is no significant difference with regards to severity of adhesions between both the groups. Adhesions in repeat caesarean section are not influenced by timing of caesarean section. There is no significant difference between both the groups regarding adhesions at single site and multiple sites. Carefully planned prospective studies in the future will be necessary to verify if indeed closure of the parietal peritoneum is better than, the same as or worse than non –closure.

Keywords: Adhesions, Caesarean section, Closure of parietal peritoneum, Non-Closure of parietal peritoneum, Flimsy, Dense.

INTRODUCTION

Cesarean section is the most common and most frequently performed surgery in Obstetrics. There has been a steady increase in the cesarean section rate globally. The last 30 years have witnessed the rise in the incidence of cesarean section from 5- 10 % to the present day figures of 20-40 %¹The increase in incidence of cesarean section can be because of the most frequent use of cesarean section in maternal high risk pregnancies like diabetes, severe pregnancy induced hypertension impending eclampsia, fetal mal presentations, bad obstetric history ,HIV infections, acute Herpes genitalis and patient insistence. Increase in the frequency of detecting fetal distress, increased use of elective cesarean section in fetal interest, IUGR, post datism, fetal macrosomia, premature rupture of membranes , breech presentations has led to increase in cesarean section rate [1]. The rate of primary cesarean delivery is increasing rapidly for women of all ages, races, and medical conditions, as well as for births at all gestational ages. This leads to increase in the frequency of pregnant women with previous cesarean section. Since a first cesarean section virtually

guarantees that subsequent pregnancies will be cesarean deliveries (the repeat cesarean delivery rate is now almost 91% [2]). Cesarean section has significantly helped in reducing maternal and fetal mortality and morbidity by preventing complications like uterine rupture, difficult instrumental delivery and its sequelae. A growing number of women are requesting delivery by elective cesarean section without an accepted "medical indication," and physicians are uncertain how to respond. This trend is due in part to the general perception that cesarean delivery is much safer now than in the past. Every surgeon knows that trauma or inflammation within the peritoneal cavity produces an outpouring of fibrin which sticks the abdominal viscera to each other. This fibrin may either be absorbed completely or become organised into fibrous adhesions. Adhesions form when fibrinolysis is suppressed and fibrin persists. Fibrin is then infiltrated by fibroblasts, which ultimately organize fibrin bands into adhesions.³ Tissue ischemia is known to suppress fibrinolysis [3]. The presence of adhesions during surgery results in longer operating time due to difficulty in approaching the lower segment, identifying previous uterine scar

because of altered anatomical relationships. Adhesions arising from cesarean delivery leads to increased intra operative complications, including damage to the bowel, bladder, and uterus and bleeding. Adhesions resulting from cesarean section can cause long term complications such as small bowel obstruction, chronic pelvic pain, infertility, ectopic pregnancies. When adhesions are formed, there is no efficient method, nowadays, to resolve them [4]. Closure of the peritoneum during cesarean section is also a controversial issue. Whereas some groups found that at cesarean section closure of the peritoneum helps prevent future adhesion formation, others proposed that closure of the peritoneum significantly increased the incidence of adhesion formation. Closure of the peritoneum during lower segment cesarean section (LSCS) has long been considered a standard procedure to:

- Restore the normal anatomy and approximate the tissue for healing,
- Reestablish the peritoneal barrier to reduce the risk of infection
- Reduce the risk of wound herniation or dehiscence, and
- Minimize adhesion formation [5].

Numerous human and animal studies have shown that there are no disadvantages to non-closure of the peritoneum.

The arguments against peritoneal closure involve the following

- That if the peritoneum is left open, a spontaneous reperitonealization will appear within 48 to 72 hours with complete healing after 5-6 days. Peritoneum has the innate ability to rapidly heal itself. Being a mesothelial organ with the capacity to initiate multiple sites of repair, the areas of denuded peritoneum heal spontaneously and that suturing of peritoneum actually increases the incidence of adhesions [6] due to tissue reaction [7].
- That there is no difference in postoperative complications between closure and non-closure.
- Non-closure of the peritoneum contributes to less adhesion. When injured, the peritoneum responds initially by producing a fibrin matrix and proceeds with fibrinolysis to break down the fibrin. Re-approximation of the peritoneal edges with suture material is suspected to result in tissue ischemia, necrosis, foreign body tissue reaction, suppression of fibrinolysis and thus increased risk in adhesion formation. Animal studies have shown that adhesion formation is a common consequence of peritoneal closure.
- Non-closure of the peritoneum reduces the amount of surgical intervention and saves on

valuable operating time and cost. The effect of leaving the peritoneum open at cesarean delivery on adhesion formation has not been well-studied. Adhesion-related complications, including bowel obstruction, chronic pelvic pain, infertility, and difficult repeat surgery, are estimated to cost \$1.2 billion annually [8].

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 the peritoneum at cesarean delivery [9].

Given the unanswered questions regarding the effect of peritoneal non closure at cesarean delivery on adhesions, we sought to examine whether closure of the peritoneum at time of primary cesarean delivery has an effect on adhesion formation.

Aims and Objectives

- To evaluate the effects of closure Vs Non closure of parietal peritoneum at primary caesarean section on adhesion formation at repeat caesarean section.
- To grade the severity of adhesions
- To identify any relation between timing of Caesarean section on adhesion formation

MATERIAL AND METHODS

This was a prospective observational study conducted at St. Theresa’s hospital, Sanathnagar, Hyderabad. The study was conducted for a period of 2 years from 2010 July 15 to 2012 August 15, after obtaining ethical clearance from Hospital Ethics Committee.

Inclusion Criteria

The practice of suturing parietal peritoneum in cesarean section was started in our hospital since August 2009. Women with primary caesarean sections done in St Theresa’s hospital was included in the study. They were divided into two groups –

Non Closure Group: The women with their first caesarean section done before 2009 August where both parietal & visceral peritoneum was not closed.

Closure Group: The women with their first caesarean section done after 2009 August where parietal peritoneum was closed.

Exclusion Criteria

- Women with history of any pelvic/abdominal surgery prior to or between 1st & 2nd section.
- Women with adhesions in first section were excluded.
- Women with wound infection or break down following the first surgery.

- Women with unavailable first operative notes.

Methodology

An informed consent was taken from all women included in the study. The operative notes of primary section of these women were retrieved and the details were noted down.

A standard technique was performed in all operations. All women underwent a Pfannenstiel incision under general or spinal anaesthesia. The transverse lower uterine segment incision was closed in two layers of continuous chromic catgut Number 1 suture. In the control group, both the visceral and parietal peritoneum was closed using a continuous absorbable suture, while both layers remained unsutured in the non-closure group. The rectus sheath was sutured using continuous absorbable suture. Skin was sutured with either interrupted mattress 2-0 Nylon sutures or with subcuticular sutures with vicrylrapide. The surgeon performing the second LSCS noted the operative findings concerning intra- abdominal adhesion, including the site and degree of adhesion.

Adhesions which were avascular, thin easily separated were classified as flimsy and those adhesions which were thick, vascular and needed to be clamped, cut and ligated were classified as dense adhesions. The exact site of adhesions was also noted down.

A comparison was done at the end of the study between both the groups. The effects of various factors like labour before caesarean section in primary caesarean section, maternal risk factors in primary caesarean section on adhesions in repeat section were analysed.

RESULTS

A total of 2546 women were delivered in St .Theresa’s Hospital during the study period from August 2010 to August 2012. Among them, 1132 (44.46%) women were delivered by Caesarean section. Of these 1132 Caesarean sections, 383 (33.8%) were repeat Caesarean sections. A total of 130 women whose primary Caesarean sections were done in our hospital were taken for the study.

Table 1: Shows Hospital statistics during study period

Group	Number	Percentage
Total deliveries	2546	100
Total Cesarean sections	1132	44.46
Repeat Cesarean sections	383	15.04
Study population	130	5.1

Among 130 women who were studied, 64 women came under Non closure group ,as their primary Caesarean section were done before 2009 , when parietal peritoneum was left unsutured. The rest of 66

women came under Closure group in whom parietal peritoneum was sutured in their primary Caesarean section.

Table 2: Shows study population and number in each of the compared groups

Group	Number	Percentage
Study population	130	
Group A	64	49.2
Group B	66	50.7

Table 3: Age distribution

Age group (Years)	Distribution (n=130)	
	Number	Percentage
18 to 22	40	30.77
23 to 26	52	40.00
27 to 30	28	21.54
30 to 34	9	6.92
> 34	1	0.77
Total	130	100.00

Table 4: The indications of these 130 repeat caesarean sections

Sl. No.	Indication	No. of Patients
1	Short Inter Delivary Interval	28
2	Pre Eclampsia	4
3	Gestational HTN	1
4	Preterm Labour	1
5	Oligamnios &IUGR	7
6	Non Descent of Head	1
7	Oblique Lie	3
8	Breech	6
9	Transverse Lie	1
10	Non Progress of Labour	1
11	Non Reactive CTG	2
12	MSL	2
13	Mobile Head	15
14	Hemiplegia	1
15	Failed Tolac	10
16	Fetal Distress	2
17	Cephalo Pelvic Dysproportion	9
18	At Request	31
19	Cord Prolapse	1
20	Cervical Dystosia	1
21	Preterm Rupture of Membranes	1
22	Scar Dehescence	1
23	Short Stature	1
	Total	130

Table 5: Comparison of demographic parameters like age, gestational age, parity in both the groups

	Mean maternal age (in years)	Mean gestational age (in weeks)	Mean Parity
Non Closure Group	25.5	39.13	2.45
Closure Group	24.1	38.8	2.37

Table 6: Adhesions between both the groups

	No Adhesions	Adhesions	Total
Non Closure (NCL)	28	36	64
Closure (CL)	36	30	66

$X^2=1.515$, $P= 0.2184$ (not significant)

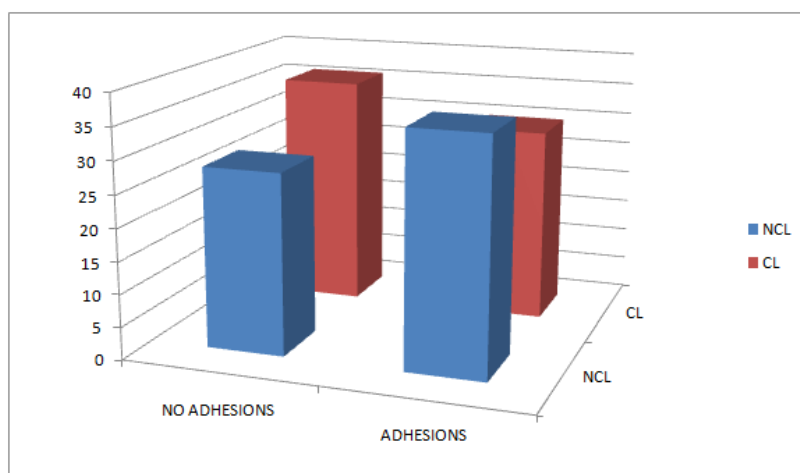


Fig. 1: Shows adhesions between both the groups

Comparing both the groups Non closure group has more adhesions than closure group but is of no statistical significance.

Table 7: Shows the status of adhesions between both the groups

	Nil	Flimsy	Dense	Flimsy & Dense	Total
Non Closure (NCL)	28	24	6	6	64
Closure (CL)	36	24	5	1	66

$X^2=1.515$, $P=0.2184$ (not significant)

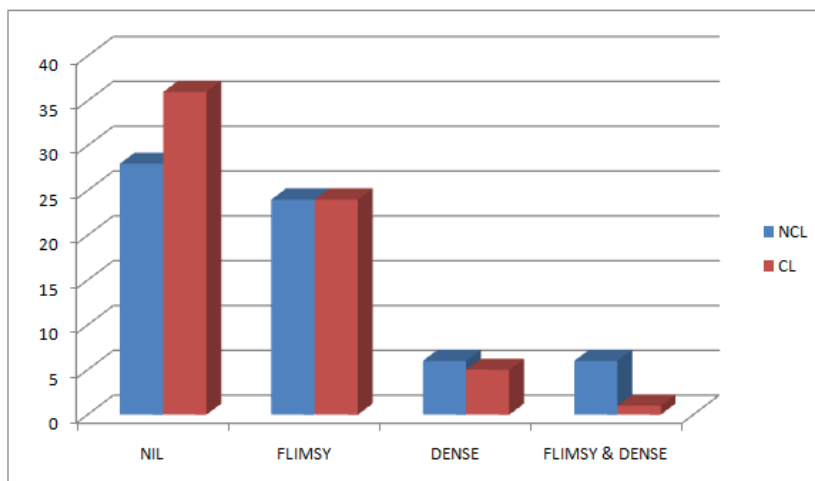


Fig. 2: Shows the status of adhesions between both the groups

Comparing Flimsy, Dense, Flimsy & dense adhesions in both the groups, there is more incidence of adhesions in Non closure group than closure group but is of no statistical significance.

Table 8: Adhesions between rectus sheath to rectus muscle

	Dense		Flimsy		Nil		Total		p value
	No	%	No	%	No	%	No	%	
Non Closure	4	6.3	12	18.8	48	75	64	100	0.01 Significant
Closure	0	0	2	3	64	97	66	100	
Total	4	3.1	14	10.8	112	86.2	130	100	

There were more adhesions in the Non closure group than the Closure group and p value (0.01) is significant.

Table 9: Adhesions between rectus muscle to parietal peritoneum

	Dense		Flimsy		Nil		Total		p value
	No	%	No	%	No	%	No	%	
Non Closure	5	7.8	17	26.6	42	65.6	64	100	0.20 Not Significant
Closure	2	3	12	18.2	52	78.8	66	100	
Total	7	5.4	29	23.3	94	72.3	130	100	

Compared to Closure group, Non Closure group had more adhesions but p value (0.2) is not significant.

Table 10: Adhesions between parietal peritoneum to anterior uterine wall

	Dense		Flimsy		Nil		Total		p value
	No	%	No	%	No	%	No	%	
Non Closure	7	10.9	4	6.3	53	82.8	64	100	0.178 Not Significant
Closure	2	3	3	4.5	61	92.4	66	100	
Total	9	6.9	7	5.4	114	87.7	130	100	

Non closure group had more adhesions between Parietal peritoneum and anterior wall of uterus but is not of statistical significance (p value 0.178).

Table 11: Omental Adhesions

	Dense		Flimsy		Nil		Total		p value
	No	%	No	%	No	%	No	%	
Non Closure	3	4.7	5	6.8	56	87.5	64	100	0.52 Not Significant
Closure	1	1.5	7	10.6	58	87.9	66	100	
Total	4	3.1	12	9.2	114	87.7	130	100	

Non closure group had more dense adhesions than closure group, Closure group had more flimsy adhesions than Non closure group and both were not of statistical significance (p value 0.52).

Table 12: Bladder Adhesions

	Dense		Flimsy		Nil		Total		p value
	No	%	No	%	No	%	No	%	
Non Closure	4	6.3	10	15.6	50	78.1	64	100	0.32 Not Significant
Closure	2	3	6	9.1	58	87.9	66	100	
Total	6	4.6	16	12.3	108	83.1	130	100	

Non closure group had more bladder to uterus adhesions than closure group with no statistical significance (p value 0.32).

There were no bowel adhesions between both the groups.

Table 13: Flimsy adhesions in both groups

	Emergency	Elective	Total
Non Closure (NCL)	23	1	24
Closure (CL)	18	6	24

$X^2 = 2.676$, $p = 0.1019$ (not significant)

Flimsy adhesions were same in both the groups and women who underwent emergency caesarean section had more flimsy adhesions in both the groups than in women who underwent elective caesarean section. On

comparing there is no significant effect of labour before caesarean section on flimsy adhesions between both the groups.

Table 14: Dense adhesions in both groups

	Emergency	Elective	Total
Non Closure (NCL)	6	0	6
Closure (CL)	5	0	5

$P = 1$ (not significant)

All women underwent emergency caesarean section and non closure group had slightly more dense adhesions than closure group but there is no statistical significance.

Some patients had flimsy adhesions at one site and dense adhesions at other site. They were tabulated below

Table 15: flimsy & dense adhesions in both groups

	Emergency	Elective	Total
Non Closure (NCL)	5	1	6
Closure (CL)	1	0	1

$p = 1$ (not significant)

Labour before caesarean section has no significant effect on adhesions at different sites in both the groups.

Table 16: Comparing the correlation of risk factors on flimsy adhesions in both the groups

	HTN	DM	Nil	Total
Non Closure (NCL)	6	3	14	24
Closure (CL)	0	2	22	24

$X^2 = 4.615$, $p = 0.0317$ (significant)

Table17: Comparing the correlation of risk factors on dense adhesions in both the groups

	HTN	Nil	Total
Non Closure (NCL)	2	4	6
Closure (CL)	0	5	5

P = 0.4545 (not significant)

Table 18: Comparing the correlation of risk factors on flimsy & dense adhesions in both the groups

	HTN	PROM	Nil	Total
Non Closure (NCL)	2	1	3	6
Closure (CL)	0	0	1	1

p = 1 (not significant)

DISCUSSION

The present study is done prospectively to compare the effects of closure and non closure of parietal peritoneum in primary caesarean section on adhesions in repeat caesarean section .this study was conducted from 15th August 2010 to 15th August 2012.

A total of 2546 women were delivered during the study period and 383 women had repeat caesarean section .Among them 130 women were included in the study according to the inclusion criteria.

Lyell *et al.* [9] in their prospective study included 173 women, in them among 67 women parietal

peritoneum was closed in their primary caesarean section and in 106 women parietal peritoneum was not closed⁹.

Bhat Parvathi *et al.* [10] included 402 women in their prospective study and parietal peritoneum was closed in 223 women and parietal peritoneum was not closed in 179 women.

Sood Atulkumar *et al.* [11] in his prospective study included 149 women and parietal peritoneum was closed in 78 women and not closed in 71 women.

Table 19: The demographic factors like age, parity, gestational age in comparison with other studies

		Lyell <i>et al.</i> [9]	Sood Atul Kumar [11]	Present Study
Age (Years)	NCL <35	88	26.5 (Mean)	25.5 (Mean)
	>35	18		
	CL <35	53	25.5 (Mean)	24.1 (Mean)
	>35	14		
Gestational Age (Weeks)	NCL		38.0 (Mean)	39.1 (Mean)
	CL		37.9	38.8
Parity	NCL		2.0 (Mean)	2.45 (Mean)
	CL		1.9	2.37

Maternal age is less in present study, women with advanced gestational age were included in the study and more parous women were included in the study

Table 20: Comparison of present study on adhesions in repeat caesarea section with other studies

Study	Group	Sample Size	Adhesions		p value
			Present	Absent	
Bhat Parvathi <i>et al.</i>	NCL	179	121	58	<.001
	CL	223	40	183	
LYELL <i>et al.</i>	NCL	106	77	29	<.006
	CL	67	35	32	
Present Study	NCL	64	36	28	0.218
	CL	66	30	36	

Bhat Parvathi *et al.* [10] and Lyell *et al.* [9] found that adhesions in Non closure group were more and also significant (p<.05). In the present study though the

adhesions were slightly more in non closure group, it is not of statistical significance.

Table 21: Comparison of the present study with Lyell *et al.* [9] in relation to adhesions at different sites

		Lyell <i>et al.</i> [9]	p value	Present Study	p value
Rectus sheath to rectus muscle	NCL	6	0.7	16	0.01
	CL	3		2	
Rectus muscle and parietal peritoneum	NCL	3	0.5	22	0.204
	CL	1		14	
Parietal peritoneum to anterior wall of uterus	NCL	7	0.1	11	0.178
	CL	1		5	
Omental	NCL	32	0.03	8	0.512
	CL	7		8	
Bladder	NCL	16	0.3	14	0.32
	CL	7		8	
Bowel	NCL	2	0.2	0	-
	CL	0		0	

Lyell *et al.* [9] and present study found no significant effect of non closure of parietal peritoneum on adhesions between Rectus muscle and parietal peritoneum, Peritoneum to uterus, bladder adhesions (p value < 0.05). There were no bowel adhesions in the present study.

In the present study adhesions between Rectus sheath and muscle were more in non closure group and also significant (0.01).

Lyell *et al.* [9] found more omental adhesions in non closure group and is also significant (0.03).

Table 22: Association between parietal peritoneal closure and type of adhesions in comparison with other studies

Study	Group	Flimsy	Dense	Both	p value
Bhat Parvathi <i>et al.</i> [10]	NCL	39	82		0.001
	CL	27	13		
Present Study	NCL	24	6	6	0.218
	CL	24	5	1	

Bhat Parvathi *et al.* [10] found that adhesions both flimsy, dense were more in non closure group also it was significant with p value (0.001). In the present study there was no significant difference in the adhesions

Summary

This study was done to evaluate the effects of closure vs non closure of parietal peritoneum at primary caesarean section on adhesion formation at repeat caesarean section.

This study was conducted in St. Theresa’s hospital Hyderabad from August 15th 2010- August 15th 2012.

A total of 130 women were studied. Of them 64 women were included in non closure group and 66 women were included in the closure group.

The findings are as follows

- Of the 64 women in nonclosure group 36 women had adhesions. Among these 36 women 34 women had emergency caesarean section and 2 women had elective caesarean section. Of these 36 women 24 women had flimsy adhesions, 6 women had dense adhesions and 5 women had both flimsy & dense adhesions.

- Of the 66 women in closure group 30 women had adhesions. Among them 24 women had emergency caesarean section and 6 women had elective caesarean section. Of these 30 women 24 women had flimsy adhesions, 5 women had dense adhesions and 1 woman had both flimsy & dense adhesions.

The status of adhesions was also compared between both the groups at different layers of abdomen.

Between Rectus sheath and Rectus muscle there were more adhesions in the non closure group (12 flimsy, 4 dense) than the closure group (2 flimsy, 0 dense).

Between Rectus muscle and Parietal peritoneum there were more adhesions in the non closure group (17 flimsy, 5 dense) than the closure group (5flimsy, 2 dense).

Between Parietal peritoneum and anterior wall of uterus, there were more adhesions in the non closure group (4 flimsy, 7 dense) than the closure group (3flimsy, 2 dense).

Omental adhesions were more in the non closure group (5 flimsy, 3 dense) than the closure group (7flimsy, 1 dense).

Bladder adhesions were more in the non closure group (10 flimsy, 4 dense) than the closure group (6flimsy, 2 dense).

Though there were slightly more adhesions in the non closure group than closure group there is no statistical significance.

Between rectus sheath and rectus muscle there were more adhesions in the non closure group than closure group and there is statistical significance for this.

There were no statistically significant differences in the adhesions between rectus muscle and parietal peritoneum, parietal peritoneum and uterus, omental adhesions, bladder adhesions.

CONCLUSION

Adhesions in repeat caesarean section are not influenced by the closure or non closure of parietal peritoneum in primary caesarean section. Adhesions are also not influenced by maternal risk factors like diabetes, hypertension, anaemia, PROM.

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