Original Article

Peritoneal closure in caesarean section; a step to omit or to continue?

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Abstract

Objective: To compare advantages and disadvantages of non-closure and closure of parietal and visceral peritoneum during caesarean section intra operatively and immediate post operatively. **Study Design:** This was randomized control trial conducted in department of Obstetrics and Gynaecology, Krishna Institute of Medical Sciences, Karad; during period of 6 month from 1 July 2012 to 1 Jan 2013. **Material and Methods:** A total of 300 women undergoing caesarean section were randomly allocated to standard routine closure (control group c=150), and non-closure of both peritoneal layers (study group nc=150). Parameters compared were operative time, intraoperative blood loss, postoperative febrile episodes, wound infection and postoperative pain, requirement of analgesic dose, time taken for returning bowel functions, ambulation and duration of hospital stay and cost effectiveness. Statistical analysis done for above mentioned parameters. Preoperative, intra and postoperative management decisions were made without reference to either group specifically. **Results:** Operating time, anesthesia time and time of ambulation were significantly shorter in non-closure group ($p<0.0001$). There was less postoperative pain, analgesic requirement and febrile morbidity in non-closure group; however it was not statistically significant. **Conclusion:** Peritoneal non-closure is recommended during caesarean section because it results in significantly shorter operative time and hospital stay, decreased anesthetic dosage, quicker return of bowel activity and thus conferred significant patient and economic benefit.

Keywords: Peritoneal closure, caesarean section.

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INTRODUCTION

Caesarean section is a one of the most commonly done surgical procedure worldwide. Rate of caesarian section varies from 5 to 25% of total deliveries1 depending on place and facilities available. There are various controversies regarding suturing the peritoneal layers at caesarean section. Over the years there is little information relating to the optimum operative technique. Traditionally, suturing of the visceral and parietal peritoneum at cesarean section has been widely accepted, despite the lack of evidence establishing its benefits. Reasons noted for closure of the peritoneum include restoring anatomy and re-approximating tissues, reducing infection by re-establishing an anatomical barrier, de-creasing wound dehiscence, reducing hemorrhage. Apart from aesthetic consideration, there is a belief that closure of peritoneum can prevent adhesions[2]. On the contrary, theoretical consideration and animal experiment support the opposite view[3]. Suture peritonization tends to cause ischemia, necrosis, inflammation and foreign body reactions to the suture material. On the other hand clean incision of the peritoneal surface without suturing the cut edges provides more rapid peritoneal repair, leading to less postoperative pain, fever, lesser risk of paralytic ileus and better wound healing. And soreasons cited for non–closure of include: reduction of operation duration, shortening of hospitalization admission, use of less analgesic, earlier return of bowel function, reduction of urinary bladder adhesion following next CS, and immediate post-operative recovery. Traditionally various gynaecologist from various parts of world believe in suturing of peritoneum and many generations of students

have been taught the same but there has been a need to evaluate whether this step should be omitted or not. Non-closure of parietal and visceral peritoneum is recommended in RCOG Green Top Guidelines July 2002 – 2005 because of operative and postoperative benefits and cost effectiveness. This routine peritoneal closure may not confer any real benefit and at present there is no evidence to justify its time and cost. Various studies have infact demonstrated non closure to be associated with reduced operative time, less postoperative pain, fever and wound infection. There is significant reduction also in the need for analgesics[4]. The aim of the present study was to evaluate objectively whether to omit or accept this step in our operative procedures.

MATERIALS AND METHODS

This randomized double blind trial was conducted in department of Obstetrics and Gynaecology, Krishna Institute of Medical Sciences and Deemed University Karad Hospital from 1 July 2012 to 1 Jan 2013. Three hundred women undergoing elective and emergency caesarean section were recruited for study. Exclusion criteria were history of previous lower abdominal surgery, severe anemia, presence of pelvic infection and adhesions, morbid obesity and foul smelling vaginal discharge. After detailed history, examination and investigations, informed written consent was obtained from each patient for participation in the study and they were randomly allocated in two groups, closure (control) or non-closure (subject) group with a computer-generated random number list. Operating surgeon was informed about operative method (closure or non closure of parietal and visceral peritoneum), just before the start of the surgery. On call consultants or third year postgraduate students supervised by consultants performed all operative procedure. All patients received spinal anesthesia and underwent lower segment caesarian section through pfannenstiel incision. In control group, both the visceral and parietal peritoneum was closed, whereas in the study group both peritoneal layers were left unsutured. Uterus was closed with continuous number 1 polyglactin. In the control group, both the layers of peritoneum were sutured with continuous 1-0 chromic catgut. Rectus sheath was closed with a continuous number 1 polyglactin. The skin was approximated by continuous subcuticular suture with number 3-0 polyglactin. Subject group had similar procedure of cesarean section but without reapproximation of visceral and parietal peritoneum. Both group received injection cefotaxim 1 gm BD for two days and then oral tab200 mg BD for rest of 5 days. The time of skin incision and surgery end time were recorded. Intra operative factors measured otherthan mean operative time were quantity of anesthetic agents and the amount of blood loss. Hemoglobin and hematocrit levels of all patients were assessed prior and 12 hours following operation. At the end of surgery, 100 mg diclofenac suppository kept per rectally in all patients and 75 mg diclofenac intramuscularly or injection tramadol intravenously were given patients as per pain complaints. The end of surgery was taken as zero hours and pain was assessed thereafter at 6-, 12- and 24- hour intervals by visual analogue scale (0 mm = no pain, 100 mm = unbearable pain) by a nurse who was unaware of the surgical technique used. Mild (score < 30) and moderate pain (score 31 -70) were managed with rectal diclofenac and severe pain (score > 70) was treated with intramuscular ediclofenac(75 mg) or intravenous tramadol 50 mg in drip. Both the rectal and injection's analgesics were recorded for two days postoperatively. After the operation, all patients were managed in the same postoperative ward. The consultants and postgraduate students who did not perform the surgery were blinded to the study and made all postoperative assessment and management. Patients were discharged on the fifth day following the operation. In cases with morbidities like fever, flatulence and complications of spinal anaesthesia like headache and backache, the patient was not discharged and the reasons why were followed up and recorded. Other aspects of immediate postoperative period under comparison included, restoration of bowel function, rate of febrile morbidity, wound infection/dehiscence and haematoma formation, time taken for ambulation. There were no differences in anesthetic methods, operative indications or peripartum analgesic use. Data was analyzed using SPSS 10.0. Student t - test and chi-square were used for statistical analysis with p–value <0.05 considered as significant.

OBSERVATIONS AND RESULTS

Three hundred women undergoing elective and emergency caesarean section under spinal anesthesia were randomly allocated in two equal groups, closure or non-closure. No significant differences were noted between the study groups with respect to age, parity, gestational age and reasons for CS (Table 1).

Table 1: Clinical Characteristics of the Patients Undergoing Cesarean Delivery by Either Closure or Non-Closure Technique)

Variables	Closure(n= 150)	Non closure(n= 150)	P value
Age- mean+/- SD Maternal age,yrs Gestational age wks	26.1+/-5 38.2+/-0.30	24.5+/-5.2 38.4+/-0.70	NS
Parity-no/ % Primipara Multipara	120(80) 30 (20)	114(76) 39 (24)	NS
Indication for lscs Fetal cause Maternal cause Maternal fetal causes	52(34.6) 61 (40.6) 37 (24.8)	55 (36.6%) 46 (30.6)) 49 (32.8)	NS

NS: Not Significant

Table 2: The outcome data

Parameter	Non-closure n=150	Closure n=150	Statistical Significance
Operative time Minutes mean±SD	31.02±4.9	42.24±4.61	t=16.74,p<0.0001 Significant
Anesthesia time Minutes mean±SD	42.8±5.03	52.09±4.67	t=16.06,p<0.0001 Significant
Total Pain score Mean±SD	35.58±3.30	36.56±3.91	t=1.83, p=0.06
Febrile morbidity (no. of patients)	10	14	χ^2=0.004,p=0.57
Time of oral intake (days) Mean±SD	1.34±0.47	1.61±0.49	t=1.30,p=0.19 Not Significant
Time of ambulation (days) Mean±SD	1.39±0.51	2.28±0.56	t=11.22, p<0.0001 Significant
Wound infection (no. of patients)	6	8	χ^2=0.35, p=0.55 Not significant
Hospital stay (days) Mean±SD	5.17±0.75	6.29±1.00	t=1.10, p=0.27 Not significant
Pain score [a]			**p value**
Mild	72(48%)	8(5. 4%)	
Moderate	64 (42.7)	85(56.6%)	0.0003
Severe	14 (9.3)	57(38%)	
Analgesic Requirements	**Non Closure Group**	**Closure Group**	**p value**
Rectal diclofenac[b] (no. of supp[c])	123(82%)	72(48%)	0.0003
Injdiclofenac IM[d] (No. of INJ)	21(14%)	63 (42%)	
Tramadol (No. of injections)	6(4%)	15(10%)	

a=Pain score: Mild < 30, Moderate = 31 - 70, Severe > 70, b=100 mg rectal, c=Abbreviation: supp, suppository, d=75 mg intramuscular

The average duration of operation and anesthesia were less by 11.2 minutes and 10.2 minutes respectively in the subject group. Women in subject group requiring additional analgesics, either oral or parenteral, were less than that in the control group.27 subjects and 78 controls required additional dose of analgesic. However, the difference was not significant. Patients in the experimental group demonstrated lower pain scores (P = 0.0003). The febrile morbidity was high in peritoneal closure groups. As compared to that in the subjects; however it was not statistically significant. Febrile condition was recorded as[10] 6.6% in the study group and[14] 9.3% in the control group. This difference was not significant. One patient in the closure group developed endometritis and one patient in the non-closure group was diagnosed with mastitis which responded to antibiotics. 6 subjects had wound infection as compared to 8 controls. This difference was statistically insignificant. The mean hospital stay in subject group was 5.12 days as compared to 6.29 days in controls. 9 subjects in subject group and 13 in control group stayed in the hospital for more than 5 days because of either wound infection or febrile illness. Non-closure also led to quicker return of full bowel activity and decreased frequency of paralytic ileus, due to lesser duration of peritoneal cavity exposure per operatively but these differences are statistically insignificant. In our study, mean time to positive auscultation of bowel sounds was between 22-24 hrs is non-closure group compared to 24–28 hour in closure group. The difference is not statistically significant but has slight clinical significance in favour of non-closure none of the patients needed blood transfusions or a return to the operation theatre for any further surgery. No difference in intra operative blood loss was observed between two groups.

DISCUSSION

Surgical tradition advocates the operative technique of peritoneal closure at Cesarean section, presumably to restore normal anatomy and prevent postoperative adhesion formation between intestines and fascia, between uterus and fascia, and reduce risk of wound infection, herniation, dehiscence and haematoma formation[5]. This technique has not been proved advantageous by randomized control trials and experimental studies have shown that in un-sutured

peritoneum, spontaneous re-peritonealization will occur within 48-72 hours with complete healing in five to six days[6,7,8], whereas suture peritonealization tends to cause tissue ischaemia, necrosis, inflammation and foreign body reaction to suture material. This may lead to delayed healing as well as adhesion formation. Large number of randomized control trials[9-12] which was included in a Cochrane systematic review[13] found that peritoneal non-closure at caesarean section saved operating time and lessened anesthesia exposure, and is associated with lower postoperative febrile and infectious morbidity. A systemic review by Bamigboye and Hofmeyer revealed reduction in operative time (7.33 minutes) in women who had both peritoneal surfaces unsuturedin comparison with sutured peritoneum by analyzing a total of 6 studies with 947 participants1. However, in the present study, surgical time was more than 10 minutes shorter, probably because both visceral and parietal peritoneum were left unsutured; where asPietrantoni *et al*[14], left only parietal peritoneum open and Nagele *et al*[15], left only visceral peritoneum open. The decrease in operative time reduced the duration of anesthesia exposure and that of exposure of wound to the environmental contaminants. This is reflected in decreased incidence of febrile morbidity. Non-closure of the peritoneum might reduce the intensity of postoperative pain due to less manipulation of parietal peritoneum, which is sensitive to pain. In addition, ooze or clots in the closed peritoneal space behind uterovesical fold could be the significant factor for postoperative pain in peritoneal closure groups. Nagele *et al*[14], Hojberg *et al*[16], and others, found reduced usage of oral analgesics in the subjects. Rafique *et al*. in a randomized controlled study of 100 women[17] and Nagle *et al*. in a randomized trial of 549 women[14] reported less postop- erative analgesia when the peritoneum was not sutured at CS. In the former study, pain was the primary outcome measure and investigators found no overall difference in pain scores between the two groups, although there was a trend of lower pain scores in non-closure group. In the latter study, analgesic use only was measured and authors found lower narcotic use in non-closure group. According to Cochrane systematic review by Wilkenson and Enkin[13], there is no statistically significant differences in short term postoperative morbidity and analgesic requirements. Present study did not show statistically significant difference in the pain medication requirements in the two groups. Grundsell[18], showed a decreased incidence of wound infection. The present study showed decreased incidence of wound infection in the subject group, which was statistically significant and was comparable with the findings of Hull[19] andNagele *et al*[14]. Several studies did not show any significant difference regarding wound infection, endometritis, and fever between the closure and non-closure groups1[20,21] Grundsell *et al*[18] reported that in their randomized control trial, hospital stay was one day less in non-closure group. In another retrospective study comparing closure vs. non-closure, McNelly *et al*[22] found that full bowel activity occurred significantly later in the peritoneal closure group. The outcome of peritoneal closure at LSCS was evaluated prospectively in our study and results are comparable to above mentioned studies. In present study, difference between pre- and post-operative hemoglobin level in both groups was not significant and neither set of cases required a blood transfusion. Malvasi *et al*. during the retrospective study of 2576 cases showed a significant increase of blood loss and transfusion in non-closure group 23.On the other hand, Nabhan reported significantly lower hemoglobin levels between preoperative and postoperative cases in the non-closure group versus the standard technique group while the blood transfusion rates in the two groups was comparable[24]. A randomized controlled trial by Galaal and Krolikowski showed that estimation blood loss and mean drop in hemoglobinwere notstatistically significant between closure and non-closure groups[25]. Many factors may contribute to the discrepancy between the results of our study and Nabhan's and Galaal's studies on one side and Malvasi's study on the other side. Malvasi's study is a retrospective study with a large sample size; howeverour study and others are clinical trials with low sample sizes. Larger trials maybe required to compare the effects of bleeding in two different methods of surgery as one of the major complications of CS Cost analysis to determine possible savings with peritoneal non-closure amounts to Rs. 67500/- if one suture is saved at each operation at a caesarean section rate of 20 % with more than 4800 deliveries per annum. This calculation is independent of operation theatre time, decreased anesthesia and hospital expenses of a shorter post operative stay, so actual saving to health care system would be even greater. This economic benefit from non-closure of peritoneum at caesarean section has important implications in a resource limited set up like ours. Any small improvement in postoperative morbidity will have important implications in clinical practice in terms of clinical satisfaction. At present, no data supports any hazards of peritoneal non-closure and there is clear evidence of benefit in intra operative and postoperative outcome in favour of this technique. Short-term postoperative morbidity and pain are not increased because of a shorter and simpler surgical procedure, in which visceral and parietal layers are left unsutured. Other distinct advantages to non-closure are shorter operation duration and reduced cost. No disadvantage to non-closure could be proved in our study, so we suggest

that routine closure can safely be abandoned since it has no proven. The limitations of the present study should be recognized. For example, because of short duration of the study, long- term complications like adhesions were not considered and were outside of the scope of this study. A long-term evaluation of morbidity regarding adhesions is necessary to investigate the long-term complications of this approach of non closure.

CONCLUSION

We agree with the conclusion of Cochrane's database that there is no significant difference in short term morbidity from peritoneal non-closure at caesarean section. In fact, non-closure is a simpler operative technique, more cost effective, associated with fewer postoperative complications and lower febrile morbidity and provides a shorter surgical procedure. Long term studies following caesarean section are limited but data from other surgical procedures suggests that there may also be less postoperative adhesion formations. Thus it is fair to conclude that at present there is no evidence to justify the extra time and cost of peritoneal closure.

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