

Original Article

Single Layer Versus Double Layer Closure of Uterus during Caesarean Section – A Prospective Study in Index and Subsequent Pregnancy

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ABSTRACT

Background: Suturing of caesarean incision leads to reduction in maternal mortality, suturing can be done in either single layer or double layer. Many studies have shown both of them to be effective, with no conclusive evidence of preference of any one of them. The objective of this study was to compare method of uterine closure by single-layer and double-layer closure keeping in mind the intraoperative and postoperative morbidity in index pregnancy and risk of uterine rupture in future pregnancy. **Methods:** This prospective randomized controlled study was done from March 2007 to January 2009, a total of 357 women were enrolled for lower segment caesarean section either to single layer (n=188) or double layer (n=169) closure of uterine incision. Primary outcome measures studied were operating time, intraoperative blood loss, and febrile morbidity in index pregnancy and chances of uterine rupture in subsequent pregnancy. Secondary outcome measures were cystitis, wound infection and hospital stay. Results were compared by Chi-square test. **Results:** Patients with single layer closure had significantly (p<0.05) less operative time and estimated blood loss as compared to double layer closure. There was also a statistically significant (p<0.05) difference in febrile morbidity and hospital stay in single layer closure of uterus. There was however no significant difference in other variables also, in subsequent pregnancy with previous caesarean section there was no difference in pregnancy outcome in both groups was not statistically significant (p-value>0.05). Operative findings in subsequent pregnancy don't differ much. **Conclusions:** Single layer closure was associated with lesser operating time, intra-operative blood loss, febrile morbidity and hospital stay in index pregnancy as compared to double-layer closure.

Key words: Single layer closure, double layer closure, caesarean section, morbidity, uterine incision.

Section – Gynaecology

INTRODUCTION

Caesarean section is the second most common surgery performed after episiotomy in obstetrics and gynaecology and trend of caesarean section is increasing day by day as neither the patient, nor the obstetrician wants to take any risk for the baby or mother. Concept of suturing the uterine incision in caesarean section was given by Sanger in 1882,

he used silver suture which produced minimal tissue retraction. It was an important milestone in history of evolution of caesarean section and later in 1926 Kerr first advocated two layer closure of low transverse uterine incision.^[1] Traditionally suturing is done as closing the first layer by continuous interlocking followed by second layer with continuous imbricating layer, but there is a gap for scientific justification of the same. As compared to double layer closure, single layer closure takes lesser operating time, causes less tissue trauma, ischemia and necrosis, less foreign material and less blood loss. Single layer closure also allows better wound healing and lesser scarring of myometrium and thus carries better prognosis in subsequent pregnancy.^[2] Basic purpose of suturing the uterus is to co-apt the tissues and achieve haemostasis. Though single layer closure has demonstrated better healing and lesser operative time but a few retrospective studies have shown higher rates of subsequent uterine rupture in women with previous single layer closure in lower section caesarean section (LSCS).^[3,4]

Access this article online	
Website: www.iabcr.org	Quick Response code 
DOI: 10.21276/iabcr.2017.3.1.14	

Received:01.01.17| **Revised:**02.02.17| **Accepted:**05.02.17

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The various techniques used for closure are continuous locking,^[5] continuous –non-locking,^[6] simple interrupted,^[7] figure of eight^[8] and special sutures^[9] with commonly used suture material being chromic cat-gut and delayed absorbable synthetic sutures like polyglactin (Vicryl).^[10] Hence this present study was undertaken to assess intra-operative and postoperative morbidity following single layer closure of low-transverse uterine incision at caesarean section in index and subsequent pregnancy as compared to that with double layer closure.

Aims and objectives:

1. To compare intra-operative morbidity in terms of time, blood loss, during LSCS in single layer versus double layer in current pregnancy.
2. To compare postoperative morbidity in terms of hospital stay, febrile morbidity, wound sepsis and cystitis in current pregnancy in both groups.
3. To compare intraoperative findings in subsequent pregnancies in both the groups in terms of adhesions, bladder trauma, extension, operative time, uterine rupture or windows.
4. To compare the labour outcome in both the groups when given trial of labour.

METHODS

A total of 357 pregnant women were enrolled in this study from March 2007 to January 2009, for this prospective randomized controlled study at Mohan Dai Oswal Cancer Treatment and Research Centre, Ludhiana. All patients participating in the study gave written informed consent prior to enrolment. Women undergoing emergency or elective caesarean section were randomly allocated as per random number table to either single or double layer closure. One hundred and eighty eight women were allocated to single layer closure and 169 to double layer closure. Randomization was done by random numbers and the randomized allocations were kept secure in sealed envelopes, which were opened in the operation room. All women were eligible for the study, regardless of indication of caesarean delivery, type of skin incision, medical complications, high risk factors, and history of previous caesarean section. Women with history of previous caesarean were evaluated from intra-operative notes already there in records for single or double layer closure. All the enrolled patients underwent both Pfannenstiel and sub-umbilical midline incisions and all uterine incisions were low transverse type. To remove bias of hospital stay due to type of skin incision sub-cuticular closure was done in both cases.

All women received prophylactic parenteral Injection Ceftriaxone 1 g after cord clamping and prior sensitivity to antibiotic was done before shifting the patient to OT for caesarean. Placenta was removed by controlled cord traction after spontaneous separation. Uterus was exteriorized after delivery of placenta. In the single layer group, uterine closure was done with continuous non-locking No.1 polyglactin, while in the double layer group

an additional imbricating non-locking suture of the same material was employed. Visceral and parietal peritoneums were not closed. Rectus fascia was approximated with No. 1 polyglactin. Skin was approximated with subcuticular closure. Tubal ligation if requested by the women was done by modified Pomeroy's technique with No.1 chromic catgut.

Intraoperative blood loss was calculated by measuring blood on sterile drapes, and by evaluating the blood in abdominal swabs and gauzes after delivery of the baby and placenta to remove the bias in calculating fluid in suction apparatus and blood of placental separation. Treatment allocation was disclosed neither to the nursing or medical staff providing postoperative care, nor to the women. Day of operation was considered as day 0. Peri-operative, intraoperative and postoperative management decisions were made without reference to treatment groups.

The outcome measures noted were operating time, intra-operative blood loss, febrile morbidity, cystitis, wound infection, and period of hospitalization. In the absence of complications, women were discharged on the 6th postoperative day. Febrile morbidity was defined as temperature more than 38⁰ C on two occasions 12 hours apart, excluding the first postoperative day. 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. Operation time was noted by a stop watch. The length of postoperative hospital stay was calculated by following the patient till her discharge day. Data was collected on a standardized data form designed for the study. Women were followed-up after 2 weeks and 6 weeks, and were advised to report to the hospital in case of any complaints or complications. Statistical analysis was done by Chi square test.

RESULTS

A total of 357 pregnant women were enrolled in this study, out of which 188 were allocated to single layer closure and 169 to double layer closure. The maternal and peri-operative characteristics are shown in Table 1. All the parameters were comparable in both groups except a significantly higher estimated blood loss in closure by double layer (550+80.5 vs. 610+92.5 ml, P=0.0001). There was also lesser requirement of blood transfusion in single layer group and had a significantly higher parity and lesser operative time (51.4±6.3 vs. 52.6±4.5 minutes, P=0.04). There was no significant difference between the two groups with respect to maternal demographics or procedure statistics. The postoperative complications in index pregnancy are shown in table 2. There was a significant lesser febrile morbidity and hospital stay in single layer closure of uterus. Febrile morbidity was 7 % in the single layer group as compared to 14.79 % in the double layer group (P=0.025), period of hospitalization was significantly shorter with single layer closure (6.5 + 0.82 vs. 7.3 ± 0.83 days, P=<0.001).

The labour characteristics and pregnancy outcome of women undergoing a trial of labour in second pregnancy is shown in table 3. There was no significant difference in both the groups. Proportion of cases with hospital stay beyond 7 days was less with single layer closure ($P=0.018$). There was no significant difference in pregnancy outcome in patients given trial of labour.

Table 1 –Maternal Characteristics and Peri-operative complications in Index pregnancy

Maternal Characteristics	Single Layer(n=188)	Double Layer(n=169)	p-value
Age in years	23.2	24.5	
Parity	2.1±0.6	1.9±0.9	0.013*
Gestational Age(weeks)	38.1±1.5	37.8±1.8	0.086
Pre-operative Hb(gms)	10.2±0.74	10.4±0.83	0.0166
Anaesthesia-spinal General	120(64%) 68(36.1%)	109(65%) 60(36%)	0.983
Abdominal Incision-Pfannestiel	142(75.5%)	129(76.3%)	0.958
Midline- Vertical	46(24.4%)	40(24%)	
Operative-time mins)	51.4±6.3	52.6±4.5	0.04*
Estimated blood-loss(ml)	550±80.5	610±92.5	<0.05*
Postpartum-haemorrhage	5(2.6%)	5(3%)	0.864
Blood Transfusion	2(1.06%)	3(1.7%)	0.904

*Patients with single layer closure had significant difference

Table 2-Postoperative Complications in Index Pregnancy

Complication	Single Layer (n=188)	Double Layer (n=169)	p-value
Wound Infection	12(6.4%)	15(8.8%)	0.4909
Cystitis	13(7%)	14(8.2%)	0.773
Febrile Morbidity	13(7%)	25(14.79%)	0.0252*
Postoperative-Stay(days)	6.5±0.82	7.3±0.83	<0.05*

*Patients with single layer closure had significant difference

Table 4 demonstrates the operative findings in subsequent pregnancy with or without trial of labour. There was no significant difference in subsequent pregnancy when patients were opened for caesarean section.

DISCUSSION

The questions raised by any method departing from a set template include those of safety, efficacy and complications both immediate and delayed. The proponents of single layer closure with polyglactin often cite advantages of this method being efficient, quick, safe, less cumbersome and reduced bleeding as compared to the double-layered closure. The main areas of focus were reduction in operating time, blood loss, wound infection and cost in index pregnancy and strength of the scar and risk of scar rupture in subsequent pregnancy is another important concern.

In our study there was no significant difference between two groups with respect to demography which is quite similar to observations made by Atul Kumar Sood in 2005.^[2] In our study there was significant reduction in operating time in single layer closure as compared to double-layered closure with similar trend observed in many other studies.^[2,5,6,7,11,12] Increased operating time has been

associated with increased infectious morbidity rate at caesarean delivery, entails the use of longer acting agents for regional anaesthesia resulting in the use of supplemental general anaesthesia, prolonged exposure of abdominal contents and possibly more blood loss.

Table 3-Labour Characteristics & Pregnancy Outcomes of Women Undergoing a Trial of Labour in Second Pregnancy

Labour Characteristics	Single Layer(n=133)	Double Layer(n=121)	p-value
Gestational Age(weeks)	38.1±1.5	38.4±1.4	0.691
Induction	30(22.5%)	23(19%)	0.588
Oxytocin Use	25(19%)	23(19%)	0.965
Labour duration(hrs)	8.6	9	
Meconium	33(25%)	27(22.3%)	0.748
Uterine rupture suspected	2(1.5%)	1(0.8%)	1
Caesarean indication	50(37.5%)	43(35.5%)	
Foetal distress	41(31%)	30(24.8%)	2.105
Labour arrest	9(6.7%)	7(6%)	
Others	7(5.2%)	4(3.3%)	0.647
PPH	7(5.2%)	4(3.3%)	
Blood Transfusion	5(3.7%)	3(2.4%)	0.724

Table 4-Operative Findings in Second Pregnancy With or Without Trial of Labour

Findings	Single Layer(n=100)	Double Layer(n=80)
Adhesions	47(47%)	33(42%)
Bladder Trauma	1(1.2%)	0
Extension	6(6%)	10(12.3%)
Operative Time(Mins)	56±6.3	56.8±4.5
Estimated Blood Loss(ml)	660±90.5	682±100.5
Uterine rupture	1(1%)	1(1.25%)
Uterine windows	2(2%)	1(1.25%)

There was significant reduction in blood loss in single layered closure in our study as compared to double layered closure. Estimated mean blood loss in single-layered closure was 550 ml±80.5 and in double layered closure was 610ml±92.5 with p-value <0.0001 that is statistically significant which has similarly been observed by other authors.^[2,5,6,7,11,12] Haemostasis is achieved mostly after first layer closure. Second layer suturing prolongs operating time and increases the no of needle punctures in uterine wall and cost of suture also increases with double-layered closure. Incidence of postpartum-haemorrhage and need for blood transfusion was similar in both the groups. Postpartum morbidity in terms of fever and hospital stay was less in single layered closure as compared to double-layered closure though p-values for wound infection and cystitis were not statistically significant, with quite similar observations in other studies.^[2,5,6,7,11,12] Decreased febrile morbidity in single-layered closure is due to reduced operative time. Length of hospital stay was less in single

layer as observed in other studies.^[7,12] According to some authors^[5,13] there appears to be no advantages or disadvantages for routine use of single layer closure compared to double layered closure except perhaps a shorter operation time.

As shown in subsequent pregnancies with previous caesarean section difference in pregnancy outcome was not statistically significant with most of other studies also observed that type of uterine closure doesn't significantly affect complication rate in next pregnancy.^[12,14,15]

Locked but not unlocked single layer closure was associated with higher uterine rupture risk than double layer closure in women attempting a trial of labour.^[15,16] As shown in present study there was increased number of benign windows and there was one case of bladder trauma in previous single layered closure and no case of bladder trauma in double layered closure in previous pregnancy. Same was said by other authors.^[12] There are certain limitations to our study, there is a small sample size so as to validate the superiority of single layer uterine closure over double layer closure larger multicentre prospective studies are needed aimed at assessing late morbidity with particular reference to scar integrity during subsequent labour and delivery along with maternal and perinatal outcome, with standardized protocols regarding type of suture material and suturing technique.

CONCLUSION

To conclude single layer closure was associated with lesser operating time, intra-operative blood loss, febrile morbidity and hospital stay in index pregnancy as compared to double-layer closure. Although whatever the methodology of closure the main objectives that must be met are safe haemostasis and an assurance against rupture uterus in a future trial of labour.

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How to cite this article: Jindal M, Gupta M, Goraya SPS, Tanjeet, Matreja PS. Single Layer Versus Double Layer Closure of Uterus during Caesarean Section – A Prospective Study in Index and Subsequent Pregnancy. *Int Arch BioMed Clin Res*. 2017;3(1):50-53.Doi:10.21276/iabcr.2017.3.1.14

Source of Support: Nil, **Conflict of Interest:** None