

Single Layer Versus Double Layer Uterine Closure in Lower Segment Cesarean Section: A Comparative Study

Bolleni Navya¹, Batte Manasa²

¹Assistant Professor, Department of Obstetrics and Gynaecology, Niloufer Hospital

²Assistant Professor, Department of Obstetrics and Gynaecology, Mediciti Institute of Medical Sciences

Received: 25-08-2023 / Revised: 28-09-2023 / Accepted: 30-10-2023

Corresponding author: Dr. Bolleni Navya

Conflict of interest: Nil

Abstract:

Aim: To compare single layer versus double layer uterine closure in lower uterine segment in terms of duration of surgery, amount of suture material used, amount of blood loss, number of extra hemostatic suture needed, to assess immediate postoperative complications and duration of hospital stay.

Materials and Methods: The study is prospective and comparative study of single layer closure of uterus without visceral and peritoneal closure versus double layer closure of uterus with both visceral and parietal peritoneal closure in the lower segment caesarean section in the Department of Obstetrics and Gynaecology in Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar. The present study was undertaken in 100 cases where they were randomised into study group (Group A) and control group (Group B). Cesarean section performed according to the indication. Patients were followed up postoperatively until discharge. Results were analysed using Chi square test or Fischer's exact test using Microsoft excel 2010 and SPSS software.

Results: The incidence of caesarean section was 25.3%. Mean duration of surgery in single layer group was 29.56 mins and double layer group was 38.02 mins with average reduction in operating time of 8.46 mins in single layer group with a significant p value of 0.0000. The amount of suture material used was less in single layer group when compared with double layer group with a significant p value -0.001. The amount of blood loss which was calculated as average perioperative hemoglobin fall was 0.75 in single layer group and 0.904 in double layer group with significant p value of 0.0000. Number of extra-hemostatic sutures needed were less in single layer group when compared to double layer group with a significant p value. The average duration of hospital stays in 7.92 days in group A and 8.92 days in group B with a significant reduction in 1 day between the two groups with p value – 0.0000 which is significant statistically. There were no cases of uterine rupture or scar dehiscence in the subsequent pregnancy who were followed among both the groups.

Conclusion: On conclusion, single layer uterine closure without peritonisation was having several advantages over double layer closure with peritonisation at Lower Segment Cesarean Section.

Keywords: Double Layer Uterine Closure, Single Layer Uterine Closure, Extra Hemostatic Suture, Post Operative Complications And Blood Loss.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Caesarean delivery is defined as birth of the fetus through incisions on the abdominal wall (laparotomy) and the intact uterine wall (hysterotomy). This definition does not include removal of fetus from the abdominal cavity in case of rupture of uterus or in the case of an abdominal pregnancy.[1] Caesarean section is a part of standard care in modern obstetrics. Its practicality, disponibility and apparent safety have placed caesarean section, a first line procedure in many clinical scenarios.

The awareness of perinatal mortality and morbidity associated with safety of caesarean, expert anaesthesia, potent antibiotics blood transfusion facilities and better neonatal care have increased

incidence of caesarean section very fast [2]. Caesarean delivery has become a safer operative technique with a fall in maternal mortality from 0.3% in late 1950 to 12.8 per 100,000 deliveries in 1990's [1]. In 1950s in India the incidence of caesarean delivery rate was 1.6% and has increased to 19.8% in 1990s.[3]

A study by the Indian council of Medical Research (ICMR) in 33 tertiary care institutions noted the average caesarean section rate increased from 21.8% in 1993-94 to 25.4% in 1988-99 (Kambo et al).[2] According to NFHS data sets at all India level, the rate of caesarean section has increased from 2.9% of the childbirth in 1992-93 to 7% in 1988-99 and further to 10.2% in 2005-2006.[4]

In 2018-2019, India conducted 20% of total institutional caesarean deliveries, against 18.7% in the previous year. Thus, there is fast, steady and definite rise in incidence of caesarean section everywhere.

Common factors responsible for increase in caesarean section rate are the following [5]:

- Rising maternal age
- High levels of maternal education
- Previous caesarean section
- Obstetric complications
- Maternal request
- High income level and social class
- Prevention of pelvic floor injury
- Fear of litigation

Uterus was closed in double layer and peritoneum was closed till 1980's, single layer closure of uterus and non-closure of visceral /parietal peritoneum came in to use since 1990's.

Some of the theoretical advantages of single layer uterine closure over double layer are:

- Less operating time
- Less introduction of foreign material and less tissue disruption
- Better hemostasis
- Lesser blood loss

Less scarring of myometrium and hence a better prognosis in next pregnancy.

In 1926, Kerr advocated the closure of both visceral and parietal peritoneum and described the lower segment transverse incision for caesarean delivery.

The arguments for peritoneal closure are:[6]

- Restoration of anatomy and re-approximation of tissues for healing
- Re-establishment of peritoneal barrier to reduce infection
- Reduced risk of wound dehiscence and adhesions

The arguments against closure are:

- Peritoneum heals rapidly without re-approximation.
- Presence of suture and additional tissue handling contributes to adhesion formationless Postoperative pain and hence reduced need of analgesics.
- The current study is to evaluate and compare the outcomes of single layer uterine closure without Peritoneal closure versus double layer uterine closure with peritoneal closure.

Methodology

It is a prospective and comparative study conducted

in all pregnant women undergoing elective or emergency lower segment caesarean section at term gestation during the study period from December 2018 – May 2020, in the obstetrics and Gynaecology Department of Chalmada Anand Rao Institute of Medical Sciences, Karimnagar. Total 100 cases were studied, and they were randomly divided into two groups:

Group A: Study Group

In this group, 50 pregnant women were included who will undergo lower segment caesarean section with single layer uterine closure without peritoneal closure.

Group B: Control Group

In this group, 50 pregnant women were included who will undergo lower segment caesarean section with double layer uterine closure with peritoneal closure.

All pregnant women who were undergoing emergency or elective lower segment caesarean section at term gestation regardless of parity, type of skin incision, indication of caesarean section, and number of previous LSCS were included in the study.

Extension of incision into uterine angles, inverted T incision, visceral injuries like bowel, bladder and ureter injuries, caesarean hysterectomy, complications like anemia, diabetes mellitus, placenta previa, obstructed labour, bronchial asthma, dengue complicating pregnancies...etc. which may increase the chance of infection and dehiscence are excluded from the study.

Detailed history including obstetric, menstrual, past, family and personal history was taken. A complete general physical examination including height, weight and BMI was calculated.

Relevant Respiratory and cardiovascular examination was done. Per abdominal examination was done - height of the uterus, presentation, FHS, uterine activity and presence of any previous scars noted.

Per vaginal examination was done – cervical dilatation, consistency, effacement, station of the presenting part, position and pelvic assessment was done.

Decision for LSCS was taken according to indication. Routine pre-operative blood investigations were done.

Hemoglobin percentage before LSCS and second post-operative day were taken into consideration. Once the patient is shifted to the operation theatre, the following parameters were noted: type of anaesthesia, type of skin incision, presence or absence of uterine rupture or dehiscence, total

duration of surgery, total duration from uterine closure to skin closure, type of uterine closure, number of extra hemostatic sutures added, time taken for tubal ligation, peritoneal closure done or not, and number of foils of suture material. Post-operatively patients are followed up until the day of discharge from the hospital and following are noted: any upper respiratory tract infection, abdominal distension, fever, urinary tract infections, paralytic ileus, endometritis, wound infection, any fall in hemoglobin percentage, and duration of hospital stay. Oral fluids were started once the bowel peristalsis were heard. Antibiotics and analgesics were given parenterally until oral fluids are started and then switched over to oral

antibiotics. Urinary catheter was removed on first or second post-operative day depending on the condition of the patient.

Statistical Analysis

The statistical analysis was performed using mean and standard deviation, calculation of percentage and student T test, Z test were applied accordingly to calculate P value for any statistical significance.

Where required Chi square test or Fischer's exact test was performed by using Microsoft excel 2010 and SPSS software.

Results

Table 1: Total Number of Deliveries and Mode of Delivery

Mode of Delivery	Number of Cases	Percentage
Vaginal	7044	74.7%
Cesarean Section	2382	25.3%
Total	9429	100%

The incidence of caesarean section in the present study was 25.3%, consisting of 2382 Caesarean sections out of total 9429 deliveries.

Table 2: Type of Surgery

Type of Surgery	Group A	Group B
Elective	6 (12%)	8 (16%)
Emergency	44 (88%)	42 (84%)
Total	50 (100%)	50 (100%)
Chi Square Value – 0.332 P Value – 0.564 (Not Significant)		

In Group A 12% cases underwent elective caesarean section and 88% cases underwent emergency caesarean section, in Group B 16% underwent elective and 84% underwent emergency caesarean section which shows statistically non-significant.

Table 3: Duration of Surgery

Duration of surgery	Type of Suturing	N	Mean	Std. Deviation	Std. Error Mean
	Single Layer	50	29.56	3.770	0.533
	Double Layer	50	38.02	1.790	0.253
P Value -0.0000 (Significant) By Using Student T Test					

The total mean duration of surgery in group A is 29.56 mins and in group B was 38.02 mins which is statistically significant.

Table 4: Indications of Cesarean Section

Indication for Cesarean Section	Group A	Group B	P Value
Previous C-Section	20 (40%)	20 (40%)	1.000
CPD	10 (20%)	11 (22%)	1.000
Fetal Distress	11 (22%)	12 (24%)	1.000
Breech	5 (10%)	4 (8%)	1.000
Failed Induction	4 (8%)	3 (6%)	1.000
Total	50 (100%)	50 (100%)	

In both the groups previous c-section is the common indication. On comparison between the two groups, there was no statistical significance found.

Table 5: Suture Material

Suture Material (No. of Foils)	Group A	Group B	Statistical Significance
1	43 (86%)	26 (52%)	P Value –0.000 (Significant) By using Fischer exact test
2	7 (14%)	20 (40%)	
3	0	4 (8%)	
Total	50 (100%)	50 (100%)	

86% cases among group A and 52% cases among group B used 1 foil of suture material, 14% cases among group

A and 40% among group B used 2 foils, and 8% among group B used 3 foils of suture material. On comparison between the 2 groups P value is 0.000 Which is statistically significant.

Table 6: Number of Extra Hemostatic Sutures

Number of extra-hemostaticsutures	Group A	Group B	Statistical Significance
0	8 (16%)	1 (2%)	P value -0.000 (significant) By using Fischer extract test
1	25 (50%)	12 (24%)	
2	15 (30%)	20 (40%)	
3	2 (4%)	16 (32%)	
4	0	1 (2%)	
TOTAL	50 (100%)	50 (100%)	

On comparison between the two groups, number of extra hemostatic sutures needed was more among the group B with P value 0.000 which is statistically significant.

Table 7: Postoperative Complications

Postoperative Complications	Group A	Group B	P Value
Fever	2 (4%)	8 (16%)	0.046 (significant)
URTI	1 (2%)	2 (4%)	1.000 (non-significant)
Abdominal Distension	0	1 (2%)	1.000 (nonsignificant)
UTI	1 (2%)	6 (12%)	0.05 (significant)
Wound Infection	1 (2%)	4 (8%)	0.362 (non-significant)
Paralytic Ileus	0	0	
Endometritis	0	0	
PPH	0	0	

In this study, febrile morbidity in group A was 4% and group B was 16% which is statistically significant with P value – 0.046. Upper respiratory tract infections are seen in 2% of cases in group A and 4%of cases in group B in this study with p value -1.000, which is non-significant.

Abdominal distension was seen in 1 case in group B is no significant P value, -1.000 in the

present study.

Urinary tract infections or cystitis were seen in 2% of cases in group A and 12% cases in group B which is significant statistically with p value – 0.05. In the present study 2% cases had wound infections in group A and 8% cases in group B, which not significant with p value -1.000 and compared with other studies.

Table 8: Duration of Hospital Stay

Duration of hospital stay in days	Type of Suturing	N	Mean	Std. Deviation	Std. Error Mean
	Single Layer	50	7.92	0.528	0.075
	Double Layer	50	8.92	1.140	0.161
P value – 0.000 (significant) By using student t test t value – 5.628					

The average duration of hospital stay is 7.92 days in group A and 8.92 days in group B which is statistically significant with p value – 0.000.

Discussion

The incidence of caesarean section in this study was 25.3%. In this study, there was no significant difference between the two groups with respect to demographic factors like maternal age, booking status, type of anaesthesia, type of operation, parity which is quite similar to other studies like Sood Atul Kumar in 2005.[11] In this study, the common indication of caesarean section is previous caesarean section accounting 40% in group A and 40% in group B with no statistical significance between two groups. Other indications of caesarean section were cephalopelvic disproportion, fetal

distress, breech presentation, failed induction.

In Bhindewadi Hyath et al (1990) Previous caesarean section was the common indication accounting 19.9%.

In Sood Atul Kumar et al [11](2005) study, common indication of caesarean section was previous LSCS which was similar to this study.

Duration of Surgery

In this study, the mean duration of surgery in group A was 29.56-minute s and in group B was38.02 minutes. P value of mean duration of surgery between both the groups is 0.000 which is

statistically significant calculated by student t test.

Table 9: Various studies comparing duration of surgery among both groups

Various Studies Comparing Duration of Surgery Among Both Groups			
Studies	Single Layer Group (Mins)	Double Layer Group	Statistical Significance (P Value)
Jindal M Et Al (2017)[7]	51.4	52.6	0.04
El Gharib Et Al (2013)[50]	43.86	47.68	0.035
Sood Atul Kumar Al (2005) [11]	31.3	33.1	0.024
Hauth C Et Al (1992)[8]	43.8	47.5	0.0003
Durnwald C Et Al (2003)[47]	46	52	<0.001
Present Study	29.56	38.02	0

Intraoperative Findings

Comparison of Extrahemostatic Sutures

In the present study, a greater number of extra-hemostatic sutures were needed in double layer closure group when compared to single layer uterine closure.

The number of extra-hemostatic sutures needed in group A ranges from 0-3 (50% needed 1 suture, 30% needed 2 sutures, 4% needed 3 sutures) and in group B (24% needed 1 suture, 40% needed 2 sutures, 32% needed 3 sutures, 2% needed 4 sutures) with a statistically significant P value - 0.000.

The study by Hauth c et al [8], 21.7% needed extra-hemostatic suture material for single layer and 22.6 % needed extra-hemostatic suture for double layer. The study by Tischendorf et al [9], 21 % needed extra-hemostatic suture material for single layer. And 22.6% needed extra-hemostatic suture for double layer.

Amount of Suture Material

In this study, chromic catgut no.2 was used as suture material. The number of foils used in group A were less when compared to the number of foils used in group B with a significant P value – 0.001. 86% cases of group A and 52% of group B used 1 foil, whereas 14% of cases in group A and 40% cases of group B used 2 foils, and 0 cases of group A and 8% cases in group B used 3 foils.

Amount of Blood Loss

Since it is technically difficult to measure the amount of blood loss due to mixture of blood and amniotic fluid in the suction apparatus and the spillage of blood, perioperative hemoglobin fall is calculated from average preoperative hemoglobin and average postoperative hemoglobin.

In the present study, the average perioperative hemoglobin fall in group A was $0.75 + 0.147$ and group B was $0.904 + 0.195$. The amount of blood loss or perioperative hemoglobin fall is less in group A when compared to group B with a statistical significance of p value 0.000 which was

similar to the study done by Sood Atul Kumar et al in 2005.

Comparing Amount of Blood Loss

Jindal M et al (2017), blood loss was calculated in terms of milliliters with loss 550 ml in single layer group and 610 ml in double layer group with statistical significance. Bennich et al (2016), loss of blood was 416 ml in single layer and 409 ml in double layer group with statistical significance.

Immediate Postoperative Complications

In this study, febrile morbidity in group A was 4% and group B was 16% which is statistically significant with P value – 0.046. The febrile morbidity in study by Jindal M et al [49], with single layer uterine closure was 7% and 14.79% with double-layer closure with P value of 0.0252. The febrile morbidity in study by Sood et al [11], with single layer uterine closure was 11.8% and 23.6% with double layer closure with P value of 0.025. Upper respiratory tract infections were seen in 2% of cases in group A and 4% of cases in group B in the present study with p value -1.000, which is non-significant. Abdominal distension was seen in 1 case in group B is no significant p value - 1.000, in this study.

Urinary Tract Infections

In this study, urinary tract infections or cystitis were seen in 2% of cases in group A and 12% cases in group B which is significant statistically with p value – 0.05.

Urinary tract infections or cystitis were compared with other studies like Sood Atul Kumar (2005), which showed no significant difference. Peritoneal closure was associated with urinary tract infections when compared to non-closure group, according to Nagele et al [10] study.

Wound Infections

In this study 2% cases had wound infections in group A and 8% cases in group B, which was not significant with p value -1.000 and compared with other studies.

Table 10: Various studies comparing wound infection

Various Studies Comparing Wound Infection			
Uterine Closure	Single Layer	Double Layer	P Value
Jindal M et al (2017) [7]	6.40%	8.80%	0.49
Sood Atul Kumar (2005) [11]	3.90%	8.50%	0.17
Peritoneal closure	Non closure	Closure	P value
Nagele et al [10]	1.90%	4.90%	>0.05
Grundsell et al [13]	2.20%	3.20%	<0.05
Galalet al (2000)[12]	4%	7%	0.506
Present Study	2%	8%	1

Mahdi et al [14] (2019) study showed no cases of wound infection between the peritoneal closure and non-closure groups.

In this study, there were no cases of endometritis, paralytic ileus, postpartum hemorrhage.

Endometritis

According to Sood Atul Kumar (2005) [11], there were 7.8% cases of endometritis in single layer group and 17.9% cases in group B which is statically significant with p value -0.03, which is not similar to the present study. There are no cases of postpartum hemorrhage in the present study, but according to Jindal M et al (2017)7, 2.6%

cases are seen in single layergroup and 3% cases are seen in double layer closure group which is not significant statistically.

There are no cases of paralytic ileus in the present study which was similar tothe Grundsell et al [13] study, but there are 2% of cases seen in Nabendu et al study. And there are 2 cases noted in Mahdi et al [14] (2019) study in peritoneal closure group.

Duration of Hospital Stay

In the present study, the average duration of hospital stays in 7.92 days in group A and 8.92 days in group B with p value – 0.000 which is significant statistically.

Table 11: Various studies comparing duration of hospital stay

Various Studies Comparing Duration of Hospital Stay			
Studies	Single Layer	Double Layer	P Value
Jindal M Et Al [7]	6.5 + 0.82	7.3 + 0.83	0.0252
Sood Atul Kumar [11]	6.67 + 0.81	7.19 + 0.85	0.00005
Peritoneal Closure/Non-Closure	Non-Closure Group	Closure Group	
Grund Sell Et Al [13]	5.3	6.4	<0.01
Manvi Et Al [15]	7.09	7.13	>0.05
Present Study	7.92 + 0.58	8.92 + 1.14	0.000

Duration of hospital stay is less in group A when compared to group B, which is similar to other studies. There is no evidence that second layer suture gives increased strength to the wound.

Additional suture material may result in more foreign tissue in the body, which is a potential nidus for infection, thus impairing wound healing. Among group A, 11 cases followed up for the subsequent pregnancy and 9 cases followed among group B, none of them had uterine rupture or scar dehiscence.

Conclusion

On conclusion, single layer uterine closure without peritonisation is having several advantages over double layer closure with peritonisation in terms of reduced duration of surgery, reduced amount of suture material, reduced amount of blood loss, fewer extra-hemostatic sutures, reduced immediate postoperative morbidity and reduced duration of hospital stay. All these translate into a simple and cost-effective procedure of single layeruterine

closure without peritonisation at Lower Segment Cesarean Section.

References

1. Cunningham et al. Cesarean delivery and peripartum hysterectomy in Williams obstetrics; 22nd ed, USA; Mc Graw-Hill companies. 2005:588-598.
2. Patel BS, Kedia N, Shah SR, Agarwal SP, Patel VB, Patel AB. Changing trends in cesarean section: from 1950-2020. Int J Reproduction Contracept Obstetrics Gynecol.2020 May; 9(5):2222-2226.
3. Ratnam SS, Rao Bhaskar, ArulKumaran. Changing trends in caesarean section. In Obstetrics and Gynecology for postgraduates: 1996;1:134-140.
4. Ghosh S. Increasing trends in cesarean section delivery in India: role of medicalization of maternal health. Bangalore: Institute for social and economic change; 2010. Available at: Handle: Re PEC: sch: wpaper:236.
5. Lynch CM et al Eur J Obstet Gynaecol

- Reproduction Biol. 2002; 432:1-4.
6. Duffy DM, di Zerega GS. The Peritoneal closure necessary? Obstetrical and Gynecological survey 1994; 49(12): 817-822.
 7. 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.
 8. Hauth JC, Owen J, Davis RO. Transverse uterine incision closure: one versus two layers. Am J Obstet Gynecol. 1992; 167:1108-11.
 9. Tischendorf D. The single-layer uterine suture in cesarean section. A comparative Study. Geburtshilfe Frauenheilkd. 1987; 47:117-20.
 10. Nagele F, Karas H, Spitzer D, Staudach AI, Krasegh S, Beck A, et al. closure or nonclosure of the visceral peritoneum at caesarean delivery. American J Obst Gyn.1996; 174(4): 1366-70.
 11. Sood Atul Kumar. Single versus double layer closure of low transverse uterine incision at cesarean section. J Obstet Gynecol India. 2005; 55:231-6.
 12. Galaal KA. Krolikowski. A randomized controlled study of peritoneal closure in CS. Saudi Med J. 2000;21;759-61.
 13. Grundsell Hs Rizk Dec. Randomised study of non-closure of peritoneum in Cs. Acta obstet Gyeco. 1998,77;110-15.
 14. Mayyadah H. Mahdi, Iftikar Hamzah, Huda Khalid. Peritoneal closure versus non-closure at caesarean section. International Journal of contemporary Medical Research. 2019; 6(3): C22-C24.
 15. Manvi RS, Bhavi SB, Leelavathi BA. Non closure or closure of visceral and parietal peritoneum at caesarean section- A Comparative study. J Obstet Gynecol India. 2000; 50(6): 62-64.