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A COMPARATIVE ANALYSIS OF SINGLE LAYER VS. DOUBLE LAYER UTERINE SUTURING IN LOWER SEGMENT CAESAREAN SECTION (LSCS): A RANDOMIZED CONTROLLED TRIAL

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ABSTARCT: Lower segment caesarean section (LSCS) remains a prevalent obstetric procedure globally, particularly in scenarios where vaginal delivery is contraindicated. The technique for uterine closure during LSCS, specifically the choice between single layer and double layer uterine suturing, has been a topic of debate among healthcare providers. This randomized controlled trial aimed to compare the outcomes of these two techniques in 200 pregnant women undergoing emergency or elective caesarean section. The study revealed that while single-layer closure demonstrated shorter operative times and reduced blood loss compared to double-layer suturing, the latter exhibited a notably higher residual myometrial thickness post-surgery. These findings emphasize a trade-off between procedural efficiency and preserving tissue integrity. Notably, the choice between these approaches may play a crucial role in future uterine health. Postoperative complications and neonatal outcomes showed no significant differences between the two techniques. The decision between single-layer and double-layer closure hinges on weighing the swiftness of the procedure against the imperative need to safeguard tissue integrity for potential future pregnancies.

Key words: Caesarean section, Pregnancy, Single layer suturing, Double layer suturing, Residual myometrial thickness

INTRODUCTION

Lower segment caesarean section (LSCS) is a commonly performed surgical procedure in obstetrics, providing a safe delivery option for mothers and their infants when vaginal birth is contraindicated or not feasible. The rate of Caesarean sections (CS) has been on the rise worldwide in recent years, reaching as high as 25% of all deliveries in developing countries. In India, the percentage of C-sections performed rose from 17.2% in 2016 to 21.5% in 2021.¹

Every aspect of surgical technique has changed throughout time, including peritoneal closure as opposed to non-closure, uterine closure, skin incision, and uterine incision. One critical aspect of LSCS, which has been a subject of ongoing debate and investigation in the field of obstetrics, is the technique used for uterine closure. Specifically, the choice between single layer and double layer uterine suturing during LSCS has garnered significant attention among healthcare providers, researchers, and clinicians.²

Either a single layer or two layers can be used for uterine closure. Traditionally, single layer uterine suturing, involving the approximation of the uterine serosa and myometrium in a single layer, has been the preferred method for uterine closure during LSCS. This technique has been widely adopted due to its simplicity and expediency, making it particularly appealing in emergency cesarean sections. However, in recent years, there has been a growing interest in the adoption of double layer uterine suturing during LSCS. This alternative approach involves suturing both the uterine serosa and the underlying myometrial layer separately, potentially offering a more robust closure.³

In a 2014 Cochrane study, single layer uterine closure is compared to double layer closure, and the single layer closure group has a statistically significant decrease in mean blood loss, surgery time, and postoperative pain.⁴ A previous study by Bujold et al.⁵ found that the probability of uterine rupture was four times higher in the single layer closure group than in the double layer closure group. There is currently no agreement on the best surgical approach for uterine closure after Caesarean delivery, despite evidence to suggest that it affects the healing of the scar.

In underdeveloped nations like India, where female education is not as valued and pregnant women are taken to hospitals in labour from far-flung villages, the risk of difficulties with a second pregnancy is crucial. The period of time between the start of labour and receiving hospital care is considerable. This study was therefore conducted to compare the effects of uterine closure techniques (Single vs. Double Layer) on maternal and neonatal outcomes.

OBJECTIVES:

1. To compare the surgical outcomes [operative time, blood loss, and need for additional interventions] between single-layer and double-layer suturing in LSCS.
2. To compare the incidence rates of postoperative complications between single-layer and double-layer suturing
3. To compare the neonatal outcomes between both groups.

METHODOLOGY:

A randomized clinical trial was conducted in department of obstetrics and gynaecology, Dr. DY Patil Medical College Pimpri Pune among 200 pregnant women undergoing emergency or elective caesarean section. Ethical committee clearance was obtained from Institute's, Ethics Committee, Dr. DY Patil Medical College Pimpri Pune. Term pregnant women with indications for caesarean section and who are willing to participate were included in the study.

Women diagnosed with severe anaemia, coagulation disorders, multiple pregnancy, history of antepartum haemorrhage, history of classical or inverted T incision and history of vaginal birth following caesarean section were excluded from the study. A total of 200 women (randomized into 2 groups with 100 participants in each group) with singleton pregnancies undergoing primary caesarean delivery who satisfied the inclusion and exclusion criteria were taken for the study. Each subject is allocated to either group by simple random technique using computer-generated random numbers. One group received single layer uterine suturing during LSCS, and the other group received double layer uterine suturing.

Single Layer Uterine Suturing Group: Patients in this group underwent LSCS with single layer uterine suturing, where the uterine serosa and myometrium are sutured together in a single layer using appropriate suturing techniques and materials.

Double Layer Uterine Suturing Group: Patients in this group underwent LSCS with double layer uterine suturing. The uterine serosa will be sutured in a separate layer followed by suturing of the underlying myometrial layer.

Using a semi-structured questionnaire socio-demographic details, present pregnancy details, beginning of labour discomfort, haemorrhage per vagina or vaginal drainage, monthly history, past history, and prior obstetric history were recorded. Anaemia and pedal oedema were

discovered during a general and systemic examination. An examination of the abdomen was done to verify the fetus's position, presentation, lay, and gestational age. Cervical effacement, dilatation, membrane status, station of the presenting portion, and pelvic assessment are noted during the per-vaginal examination. Blood typing, Hb gm%, HIV, and HbsAg were performed. Every woman is asked for her informed permission.

Consent for the procedure is taken from all the participants. All the intra operative details were noted. Postoperative outcomes are monitored and noted in both the groups. The subjects were asked come after 6 weeks of c-section for ultrasonography to measure residual myometrial thickness.

Any complications during neonatal period were documented. The results were compared and statistical analysis was done by SPSS trail version 26 and proportions were compared by chi-square test, mean differences by unpaired t-test. P-value less than 0.05 was considered as the level of significance.

RESULTS:

One hundred patients (group I) had single layer uterine incision closure without peritoneal closure with vicryl, whereas another one hundred patients (group II) underwent double layer uterine incision closure. The mean age was similar between two groups (single vs double: 24.3 ± 3.1 vs 25.7 ± 2.3 years). Other baseline characters (BMI, socioeconomic status and gestational age at the time of delivery) were similar between two groups.

In the single layer group (group I), PIH (14%) is the most common risk factor, followed by anaemia (5%) and PROM (3%). In the double layer group (group II), PIH was detected in 22% of cases, anaemia in 6%, and PROM in 2% of cases.

Table 1: Comparison of sociodemographic and risk factors between two groups

		Double layer suture [n = 100]	Single layer suture [n = 100]	p-value
Age (years)		25.3 ± 2.3	24.7 ± 3.1	0.122 [#] [NS]
BMI (kg/sq.mt)		26.4 ± 3.7	25.6 ± 2.9	0.090 [#] [NS]
Socio-economic status	Upper	27 [27%]	31 [31%]	0.809* [NS]
	Upper middle	38 [38%]	37 [37%]	
	middle	35 [35%]	32 [32%]	

Gestational age (weeks)		38.9 ± 1.5	39.2 ± 1.2	0.119 [#] [NS]
Risk factors	PIH	22 [22%]	14 [14%]	0.535* [NS]
	Anemia	6 [6%]	5 [5%]	
	PROM	2 [2%]	3 [3%]	
	HD	NIL	1 [1%]	
# - Unpaired t-test, * - Chi-square test, NS – Not significant, Sig. – Significant.				

The mean operative time was high in double layer closure group (35.56 ± 1.6 mins) when compared to single layer suturing group (38.90 ± 2.83 mins) with a statistical significant difference between two groups [$p < 0.05$]. The amount of blood loss in double layer group was 325.7 ± 70.4 ml and in the single layer group was 307.4 ± 80.1 ml with no statistical significant difference between two groups [$p > 0.05$]. The requirement of additional haemostatic sutures was similar between two groups. The residual myometrial thickness after 6 weeks of surgery was high in double layer closure group (7.8 ± 1.1 mm) when compared to single layer suturing group (6.1 ± 1.7 mm) with a statistical significant difference between two groups [$p < 0.05$].

Table 2: Comparison of surgical details among both groups

	Double layer	Single layer	p-value
Operative time [mins]	38.90 ± 2.83	35.56 ± 1.61	0.0001 [#] [Sig.]
Estimated amount of blood loss (ml)	325.7 ± 70.4	307.4 ± 80.1	0.0877 [#] [NS]
Needed additional haemostasis sutures	11 [11%]	9 [9%]	0.637* [NS]
Hospital stay [days]	2.1 ± 0.4	2.2 ± 0.5	0.119 [#] [NS]
Residual myometrial thickness after 6 weeks of surgery [mm]	7.8 ± 1.1	6.1 ± 1.7	0.0001 [#] [Sig.]
# - Unpaired t-test, * - Chi-square test, NS – Not significant, Sig. – Significant.			

Post-operative complications were compared in both the groups [$P>0.05$]. Only 1 case in double layer group and 4 in single layer group required secondary suturing. One patient had cystitis double layer group while in single layer group 2 had cystitis. Two patients each had paralytic ileus in both the groups. Febrile morbidity was 8% in single layer groups compared to 4% in double layer closure group.

Table 3: Comparison of post-operative complications in both the groups

	Double layer suture suture [n = 100]	Single layer suture [n = 100]	p-value [χ^2 test]
Fever	4 [4%]	8 [8%]	0.233 [NS]
UTI	1 [1%]	2 [1%]	0.561 [NS]
Paralytic Ileus	2 [2%]	2 [2%]	1
Wound Infection	4 [4%]	5 [5%]	0.733 [NS]
Secondary Suturing	1 [1%]	4 [4%]	0.174 [NS]

Out of 200 cases, majority (84.5%) of new-born had no complication. 6.5% (7% in single layer and 6% in double layer) had NICU admission, 7% (6% in single layer and 8% in double layer) were IUGR. 1.5% (1% were seen in single layer and 2% neonatal deaths were seen in double layer) and 1% in double layer group had IUD. As p-value is >0.05 , the neonatal outcome was not significantly different among two groups.

Table 4: Comparison of neonatal complications in both the groups

Neonatal Complication	Double layer suture [n = 100]	Single layer suture [n = 100]	p-value
IUGR	6 [6%]	8 [8%]	0.845 [NS]
IUD	1 [1%]	Nil	
NICU	7 [7%]	6 [6%]	
Neonatal deaths	1 [1%]	2 [2%]	
No complications	85 [85%]	84 [84%]	

DISCUSSION:

A clinical trial was conducted among 200 term pregnant women, to study the uterine closure techniques in LSCS. The mean age of the single layer group was 24.7 years and that of the double layer group was 25.3 years which was similar to studies conducted by Mohapatra K et al.⁶ and Yildiz E et al.⁷ Other socio-demographic factors were comparable between two groups and was similar to studies conducted by Mohapatra K et al.,⁶ Garg N et al.⁸ and Yildiz E et al.⁷

In the present study the mean duration of surgery was 35.56 ± 1.61 mins in the single layer suture group and 38.90 ± 2.83 minutes in the double layer suture group. Similar to study findings Hauth et al.⁹ reported a slightly higher mean duration of surgery (39.2 minutes in the single layer suture group and 44.8 minutes in the double layer suture group). Another study by Kumar SA et al.¹⁰ these durations were 31.3 and 33.4 minutes, respectively.

The amount of blood loss was slightly high in double layer group (325.7 ml) when compared to single layer group (307.4 ml) with no statistical significant difference between two groups [$p > 0.05$]. Garg N et al.⁸ had also reported similar findings, whereas Khamess RE et al.¹¹ reported that the amount of blood loss was high in double layer group when compared to single layer group. The residual myometrial thickness after 6 weeks of surgery was significantly high in double layer closure group when compared to single layer suturing group and it was similar to study conducted by Khamess RE et al.¹¹ and Garg N et al.⁸

Sujatha V et al.¹² study reported that less number of extra haemostatic sutures in single layer groups when compared to double layer closure groups, while in the present study, 11% in double layer closure group and 9% in single layer group required extra haemostatic sutures. In an RCT done by Qayum K et al.¹³ Comparable healing ratios, readmission rates, and hospital stays were seen with both closure procedures. Additionally, there was comparable blood loss with both procedures.

The rate of wound infection was comparable between two groups (4% - double layer and 5% -single layer), similar to the Naegle et al.¹⁴ study. Grundsell et al.¹⁵ study had findings similar to the present study, with wound infection rates of 2.2% and 3.2% in study and control groups, respectively. Roberge et al.,¹⁶ in their meta-analysis also reported no significant difference among two groups regarding wound infection. However, Kumar et al.¹⁰ reported a higher incidence of wound infection (3.9% and 8.5% in single and double-layer suture groups, respectively) when compared to the present study.

In the present study out of 200 delivers, 84.5% of new-born had no complication. 7% in single layer group and 6% in double layer group had NICU admission while 6% in single layer and 8% in double layer group had IUGR babies. 1% neonatal deaths were seen in single layer and 2% in double layer group. In a similar study done by Mahopatra.K et al.⁶ the complications in the neonates were also not statistically different in both the groups. In a study by Kumar et al.¹⁰ neonatal morbidity in the single layer suture group was 11.8% and 23.6% in the double layer suture group, higher than the present study.

CONCLUSION:

In conclusion, the single-layer uterine closure method for LSCS had shorter operating durations, diminished blood loss, and a decreased requirement for haemostatic sutures. Yet, the comparison reveals a distinct advantage in double-layer closure—manifesting a higher residual myometrial thickness. This discrepancy underscores the pivotal consideration between efficacy and structural integrity in surgical approaches. While single-layer closure offers swiftness and reduced complications, the double-layer technique presents a potential advantage in preserving myometrial thickness. Deciding between these approaches hinges on striking a balance: considering the swiftness of the procedure against the critical need to safeguard tissue integrity for future uterine health.

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