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COMPARISON OF PURSE STRING SUTURE VERSUS DOUBLE LAYER CONTINUOUS SUTURE FOR REPAIRING THE UTERINE INCISION DURING CESAREAN SECTION

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Abstract

Objectives: *To compare the outcomes of purse string suture versus double layer continuous suture for repairing the uterine incision during cesarean section.*
Study design: *Quasi-experimental study.*
Place and Duration of the study: *Combined Military Hospital, Peshawar from August-2024 to March-2025.*
Methodology: *A total of 42 women who underwent cesarean section were included. Based on the suture technique used for repairing uterine incision, patients were divided into Group-P (Purse string suturing) and Group-D (Double layer continuous suturing). Outcomes were compared between the groups. Data was analyzed using SPSS version 22.*
Results: *In this study, 42 women were included divided into two groups. Median age was 27.00 (7.25) years. Mean length of surgery was significantly longer in Group-P compared to Group-D, ($p < 0.001$). Mean time taken to close the uterus was significantly longer in Group-P compared to Group-D, ($p = 0.002$). Mean time taken to achieve hemostasis was significantly shorter in Group-P compared to Group-D, ($p < 0.001$). During the six weeks follow up period, in Group-P, SWI occurred in 2 (9.52%) while in Group-D ($n = 21$) it occurred in 3 (14.29%), ($p = 0.634$). At six weeks follow up, frequency of residual uterine defect in Group-P ($n = 21$) was 4 (19.05%) while in Group-D ($n = 21$), it was 11 (52.38%), ($p = 0.024$).*
Conclusion: *Purse string technique of suture application for the closure of uterine incision is significantly safer compared to double layer continuous suture application.*

INTRODUCTION

Cesarean section (CS) is a surgical procedure that delivers the fetus, placenta and membranes through an incision in the maternal abdomen and uterus. [1] Although the process of birth is a natural one, still due to continued advancements in the medical field and easy availability of the operative facilities, the trend of natural vaginal birth has seen a decline along side a rise in rate of CS. [1, 2] In fact, recent evidence have suggested that the rate of delivery by CS has surged to 21% which is much higher than

the general acceptable rate of this mode of delivery which ranges between 10% and 15%. [3]
Despite the fact that CS is a life-saving medical procedure for reducing unfavorable birth outcomes, it is associated with a certain set of complications that can adversely impact the outcomes of the patient. [4] Amongst these complications, surgical wound infection is the most common one with others including excessive blood loss, paralytic ileus, endometritis, pelviperitonitits, thrombophlebitis and post-surgical defect at the site of uterine incision. [5, 6] Therefore, it is highly important to take essential measures that can help reduce the complications related to CS to a minimum level.
One such measure is the type of suturing technique being used to close the incision of the uterus, particularly in the cases of presence of previous uterine scar. [7] When it comes to choice of the suturing technique that can be used to effectively close the uterine incision there are multiple options, however, which amongst these suturing techniques provides the ideal and best post-procedural outcomes is not yet determined due to conflicting evidence in previous studies. [8] As a result, the choice of best suturing technique is yet a debatable research question. Therefore, in order to answer this highly important and relevant research question, present study was conducted with the aim of comparing the outcomes of two different techniques of suturing, i.e., the purse string versus double layer continuous suturing, for repairing the uterine incision during cesarean section.

METHODOLOGY

This quasi-experimental study was conducted at Combined Military Hospital, Peshawar from August-2024 to March-2025 after getting approval from institutional ethical committee (Ref No: 00233/25). Sample size was calculated through World Health Organization (WHO) calculator and sample size was obtained through following formula:

$$n = \frac{\left\{z_{1-\alpha/2}\sqrt{2\overline{P}(1-\overline{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\right\}^2}{\left(P_1 - P_2\right)^2}$$

Sample size calculation was performed by using level of significance 5%, power of 95% and anticipated frequency of uterine incision defect at six weeks after CS with purse string and continuous suturing of 23.53% and 76.47%, respectively. [9] This gave a sample size of 42 (21 in each group). Study sample was selected by using non-probability consecutive sampling technique.

Inclusion criteria: Female patients, aged 18 years or more who were scheduled to undergo elective CS were included.

Exclusion criteria:
Patients with history of previous uterine surgery other than CS, more than three prior CS, placental abnormalities (placenta percreta or accreta) and emergency CS cases were excluded.
Before being included in the current research, a written consent form was signed by the patients and they were educated about the surgical procedure by the operating surgeon. After that baseline characteristics including age, body mass index (BMI) gravida and parity were documented. All the patients who were scheduled to undergo CS underwent same preoperative preparations as per institutional protocol to avoid any impact on the postoperative outcomes. All the surgeries were performed under spinal anesthesia which was administered by the consultant anesthesiologist with at least three years of experience. All the surgeries were performed while following similar standardized steps and protocols by the team of five obstetricians having minimum experience of five years. However, the difference was in the technique of closing the incision of the uterus based on which patients were divided into two groups. In Group-P (n = 21), uterine incision closure will be performed through the purse string technique of suture application, also known as the Turan technique, in which the incision in the uterus was sewn up in two layers. The first layer ran continuously across the gap between the decidua and the visceral peritoneum, where the inner and outer myometriums meet. The first string was then knotted at the beginning after being wrapped around itself. In order to close the hole in the center of the uterine incision, a single No. 1 Vicryl ™ figure-of-eight suture was utilized following the double-layered purse string closure. In Group-D (n = 21), uterine incision

was closed by continuous double-layer suturing technique by using Vicryl ™ number 1 in which the decidual layer and the uterine incision were sutured together in a continuous fashion. Finally the overlying skin closure was also performed through same standard approach in patients of both the groups. Allocation of patients in different groups is demonstrated below in CONSORT patient flow diagram (Figure-1):

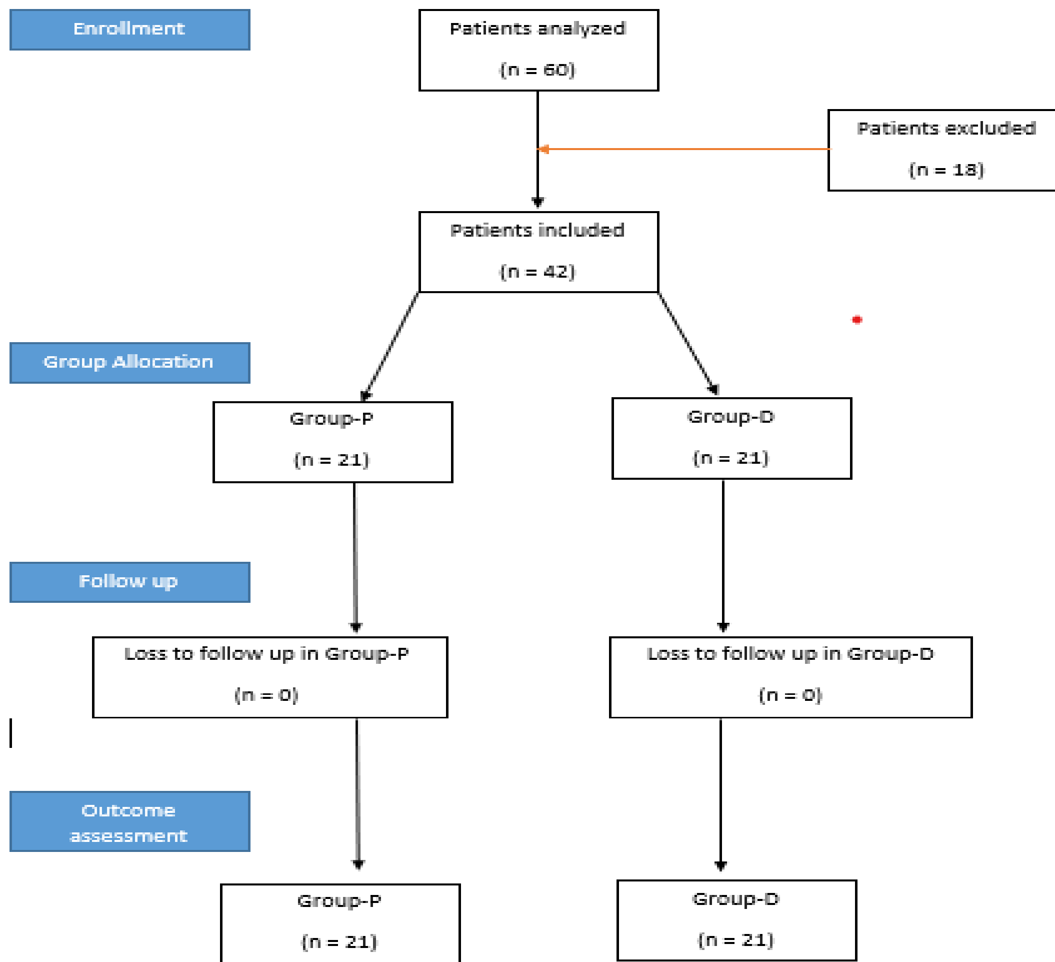

Figure-1: CONSORT patient flow diagram

Outcomes that were assessed between the two groups included the length of surgery, time taken to close the uterus, time taken to achieve hemostasis, hospitalization length, occurrence of surgical wound infection (SWI) during the six weeks post-procedure and presence of residual uterine defect at six weeks follow up. Presence of residual defect was detected by ultrasound pelvis with full bladder which was performed by consultant radiologist with minimum three years of experience.

To statistically analyze the collected data, Statistical Package for Social Sciences (SPSS) software version 22 was used. Normality of quantitative data was checked by Kolmogorov-Smirnov test which showed that among quantitative variables, age, BMI and hospitalization length were not distributed normally and were thus represented as median interquartile range (IQR) while length of surgery, time taken to close the uterus and time taken to achieve hemostasis were distributed normally and were thus represented as mean ± standard deviation (SD). Qualitative variables (gravida, parity, occurrence of surgical wound infection during the six weeks post-procedure and presence of residual uterine defect at six weeks

follow up) were presented as frequency and percentages. To compare age, BMI and hospitalization length between groups, Mann Whittney U-test was used. To compare length of surgery, time taken to close the uterus and time taken to achieve hemostasis between groups, independent t-test was used. To compare qualitative variables between groups, Chi-square test was used. A p-value of ≤ 0.05 was considered as statistically significant.

RESULTS

In this study, 42 women were included. Median age was 27.00 (7.25) years. Median BMI was 27.75 (2.80) kg/m2. Amongst included women, 16 (38.10%) were primigravida and 26 (61.90%) were multigravida. Regarding parity, 9 (21.43%) women were nulliparous, 15 (35.71%) were primiparous and 18 (42.86%) were multiparous. Baseline demographics of patients are compared between groups in Table-I:

Table-I: Comparison of baseline demographics of patients in two groups (n = 42)

Parameter	Group-P (n = 21)	Group-D (n = 21)	p-value
Median age	32.00 (8.00) years	27.00 (7.00) years	0.135
Median BMI	27.90 (3.50) kg/m2	27.50 (2.40) kg/m2	0.313
Gravida			
Primigravida	8 (38.10%)	8 (38.10%)	1.000
Multigravida	13 (61.90%)	13 (61.90%)	
Parity			
Nulliparous	4 (19.05%)	5 (23.80%)	
Primiparous	7 (33.33%)	8 (38.10%)	0.819
Multiparous	10 (47.62%)	8 (38.10%)	

Mean length of surgery in Group-P was 42.28 ± 3.24 minutes while in Group-D it was 35.09 ± 2.18 minutes, ($p < 0.001$). Mean time taken to close the uterus in Group-P was 18.33 ± 2.05 minutes while in Group-D it was 15.90 ± 2.66 minutes, ($p = 0.002$). Mean time taken to achieve hemostasis in Group-P was 4.76 ± 1.48 minutes while in Group-D it was 7.66 ± 1.52 minutes, ($p < 0.001$). Median hospitalization length in Group-P was 2.00 (1.00) days while in Group-D it was 2.00 (2.00) days, ($p = 0.163$). Perioperative outcomes are compared between groups in Table-II:

Table-II: Comparison of perioperative outcomes between groups (n = 42)

Parameter	Group-P (n = 21)	Group-D (n = 21)	p-value
Mean length of surgery	42.28 ± 3.24 minutes	35.09 ± 2.18 minutes	< 0.001
Mean time taken to close the uterus	18.33 ± 2.05 minutes	15.90 ± 2.66 minutes	0.002
Mean time taken to achieve hemostasis	4.76 ± 1.48 minutes	7.66 ± 1.52 minutes	< 0.001
Median hospitalization length	2.00 (1.00) days	2.00 (2.00) days	0.163

Overall frequency of SWI in present study was 5 (11.91%). During the six weeks follow up period, in Group-P (n = 21), SWI occurred in 2 (9.52%) while in Group-D (n = 21) it occurred in 3 (14.29%), ($p = 0.634$). At six weeks follow up, frequency of residual uterine defect in Group-P (n = 21) was 4 (19.05%) while in Group-D (n = 21), it was 11 (52.38%), ($p = 0.024$). Comparison of complications at six weeks follow up between groups is given in Table-III:

Table-III: Comparison of complications at six weeks follow up between groups (n = 42)

Complication	Group-P (n = 21)	Group-D (n = 21)	p-value
SWI	2 (9.52%)	3 (14.29%)	0.634
Residual uterine defect	4 (19.05%)	11 (52.38%)	0.024

DISCUSSION

Present study addressed an important aspect of CS delivery that influences the outcome of this surgical procedure which is the technique of application of the sutures to approximate the incised uterine wall. In this study, average age of the women who underwent CS was twenty seven years and their average BMI was approximately 28kg/m2 which lies in the range of overweight. This finding of higher BMI among women who underwent CS can be attributed to the association of higher chances of women with higher BMI to have delivery by CS instead of vaginal delivery. [10, 11] Contrarily, at the same time there is evidence which shows no significant association between CS delivery and higher BMI of the pregnant women, particularly in the elective cases. [12, 13] Another important finding of present study was high proportion of pregnant women being multigravida and multipara. Similar to this, previous studies conducted at national level have shown the similar trend of high proportion of pregnant women being multigravida and multipara. [14, 15] This trend in Pakistani population reflects the overall incremental population growth situation in Pakistan.

Upon comparative analysis of the outcomes of the two suturing techniques which were focus of present study, it was observed that application of sutures in purse string fashion significantly increased the length of surgery ($p < 0.001$) and time to completely close the open uterine incision ($p = 0.002$). This lengthening is attributable to the longer time being required for application of sutures in a specific and intricate fashion rather than being applied in a simplified way as in double layer continuous suturing technique. Similar to this trend, Shenishan et al. [16] reported that purse string suturing significantly reduced the time required for completely closing the uterine incision ($p < 0.001$) and finishing the surgery ($p = 0.002$). In another study conducted by Heraiz et al. [17] similar trend of longer CS length with purse string suture application on the uterus was observed. Contrary to this, Turan et al. [18] found that application of sutures to close the uterus during CS had no significant impact on the length of operation ($p = 0.975$). Similarly, Prabawa et al. [9] also reported that length of surgery was statistically similar in both the suturing techniques being studied in present study ($p = 0.177$).

Upon comparison of time which was taken to achieve complete hemostasis between study groups, it was observed that purse string suturing significantly reduced this time among women who underwent CS as compared to double layer continuous suturing ($p < 0.001$). Similar to this trend, Yazdani et al. [19] found that the overall time taken to achieve complete hemostasis was almost halved by the use of purse string suture application. Interestingly, the technique of application of uterine sutures had no significant impact on the hospitalization length ($p = 0.163$) or the frequency of SWI ($p = 0.634$). This trend was similar to what has been reported in previous literature showing no impact of suturing technique on hospitalization length. [9, 17]

Finally, upon comparison of frequency of presence of residual uterine defect after six weeks of CS it was observed that its frequency was significantly reduces by the utilization of purse string suturing ($p = 0.024$). Compared to this, Halouani et al. [20] found that this useful technique resulted in significant reduction of this complication after CS ($p = 0.018$). Similarly, Dimassi et al. [21] also reported this similar trend of significantly lower frequency of residual uterine defect with purse string suturing ($p < 0.001$). Contrary to this, Shenishan et al. 16 found no additional of this modern method of suture application on the frequency of residual post-operative uterine defect ($p = 0.252$).

Based on the results of present study, preferential use of purse string suturing technique for closing the incision of the uterus during CS over double layer continuous suturing is strongly recommended.

LIMITATIONS

There we no limitations of present study.

CONCLUSION

In conclusion, purse string technique of suture application for the closure of uterine incision is significantly safer compared to double layer continuous suture application.

CONFLICT OF INTEREST

None.

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