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Original Research Article

Is Myomectomy Safe during Cesarean Section - A Prospective Cohort Study.

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Abstract: ***Background:*** Cesarean myomectomy has been traditionally avoided because of the risk of bleeding but there is new evidence which supports the safety of this procedure in the chosen patients. ***Objectives***: To assess the safety of Myomectomy during Cesarean Section. ***Methods:*** The study was a prospective cohort study that was carried out at the Department of Obstetrics and Gynecology, Memon Medical Institute Hospital, in a Three Months after the approval of this study by CPSP. Non-probability consecutive sampling was used to select 73 women aged 18-45 years who were undergoing cesarean section with concurrent myomectomy. The participants were stratified in terms of the estimated blood loss (less than 1000 mL and 1000 mL and more). Statistical analysis was done in SPSS version 24.0, and p 0.05 was taken to be significant. ***Results:*** The average maternal age was 32.4 ±5.6 years. The size of the fibroid was also significantly related to the amount of blood loss (6.8 cm vs. 5.5 cm, $p = 0.04$), but not the number and location of the fibroid. Women who lost 1000mL blood lost (6.8) had much more hemoglobin drop (2.5 ± 0.3 vs. 1.1 ± 0.5 g/dL, $p < 0.001$), lower postoperative hemoglobin (9.3 ± 0.7 vs. 10.9 ± 0.8 g/dL, $p < 0.001$), and all needed blood transfusion ($p < 0.001$). ***Conclusion:*** Cesarean myomectomy is a safe procedure in the majority of patients and it has no significant blood loss. The bigger the size of a fibroid, the more likely it is to cause serious bleeding.

Keywords: Blood loss, Cesarean section, Myomectomy, Maternal outcomes, Uterine fibroids.

INTRODUCTION

One of the most common obstetric interventions that are conducted globally is cesarean section, and both developed and developing nations show an ever-growing trend. Generally, uterine fibroids (leiomyomas) are rare and are found in between 3-12% of pregnancies, and their incidental finding during cesarean section emerges as a major surgical dilemma on the best approach to manage them [1]. Conventionally, myomectomy during cesarean section has been discouraged because of the perceived significant risk of uncontrolled bleeding, long surgical duration and high chances of hysterectomy, thus its avoidance in all other scenarios except in a few situations [1].

This traditional view has since been questioned in recent years. The data of tertiary care indicate that cesarean myomectomy is safe when done on properly selected individuals and does not pose any significant risk of increasing the morbidity in the course of surgery or postoperative periods. Research has shown similar results with regard to blood loss, duration of operation and hospital stay on comparison with the use of cesarean section alone, and it appears that the procedure can be conducted in regulated conditions [2]. This changing literature indicates a slow change in practice of surgery where absolute contraindication is replaced with selective acceptance.

Individualized clinical decision-making has also been highlighted by professional organizations. Although there are no conclusive consensus guidelines, the suggested recommendations are based on the fact that the size, number, and location of the fibroid, and the experience of the surgeon performing the cesarean care ought to determine a case of myomectomy [3]. This highlights the role of situational clinical judgment where there are no standardized guidelines.

More recent reports have indicated positive maternal outcomes where cesarean myomectomy is performed such as a decrease in the need of subsequent surgical intervention as well as an increase in overall patient satisfaction. These results imply that, even aside the safety issue, the process can have applied advantages, namely, the elimination of the necessity of the second operation and further exposure to anesthesia [4]. In addition, the development of surgical procedures such as uterine isthmic circumferential suturing and other hemostatic procedures have helped to reduce intraoperative bleeding and enhanced safety in surgical practice [5].

These observations have been strengthened by systematic reviews and meta-analyses, which suggest that cesarean myomectomy is not found to be associated with a high risk of major complications when undertaken by trained doctors. Rather, it can be a safe and useful alternative to interval myomectomy especially in resource restricted locations where access to repeat surgery can be limited [6]. Still, there are fears over possible implications on future pregnancies and long-term reproductive consequences.

It is also necessary to consider the bigger obstetric picture since even cesarean birth is linked to higher risks of further pregnancies, such as placenta previa, placenta accreta spectrum, and poor maternal perinatal outcomes. These hazards require meticulous assessment in the case when other interventions are carried out simultaneously because they can affect the short-term and long-term health of the mother [7]. Thus, to make informed clinical decisions, it is necessary to determine the safety profile of cesarean myomectomy.

In comparison studies in clinical practice, no significant differences between cesarean myomectomy and cesarean section alone in terms of intraoperative blood loss, blood transfusion, or postoperative complication have been found, thus indicating its possible safety in the identified cases [8]. Economically, procedure amalgamation can also decrease the total expense of healthcare by preventing readmission and surgery, which is in line with the cost-effectiveness studies carried out in gynecological surgery [9]. Moreover, the current development of surgical management of fibroids, such as minimally invasive and robotic treatments, can be viewed as a wider trend of maximizing patient outcomes by means of better methods and innovation [10].

Although these are promising results, the literature that has been published is mainly retrospective analysis and experiences of single centers, and there is not much prospective cohort evidence of this nature. The lack of consensus on the safety and feasibility of cesarean myomectomy is also attributed to variability

in the study design, method of patient selection and expertise in surgery. In this regard, the current prospective cohort study was formulated to conduct a systematic assessment of maternal and surgical outcomes that were linked to myomectomy performed during cesarean section, and the intention of the study was to come up with quality evidence that could help elucidate its safety and guide clinical practice.

METHODS

This was a prospective cohort study performed at the Gynecology Operation Theatre of the Department of obstetrics and gynecology, Memon Medical institute Hospital Karachi Pakistan, This research was conducted in a duration of Three months from 21st July 2025- to 20th October 2025, following the consent of the synopsis of the research by the College of Physicians and Surgeons Pakistan (CPSP). Participants were recruited through the use of a non-probability consecutive sampling method.

Ethical approval was obtained by the study after getting the Institutional Review Board **(IRB/MMIH/2023/17) date 25-07-2023** of Memon Medical Institute Hospital in addition to the College of Physicians and Surgeons Pakistan (CPSP). All the participants provided their informed consent in writing before being enrolled into the study and the study was conducted in compliance with the principles of the Declaration of Helsinki.

Open Epi online software was used in calculating the sample size, where the given hypothesized frequency of unsafe myomectomy is 5% (assuming that 95% procedures are safe), where the confidence interval was 95% and the absolute precision was 5%. The sample size was calculated to be 73 participants [7]. This was calculated using the standard formula: $n = [DEFF \times Np(1-p)] / [(d^2/Z^2 1-\alpha/2 \times (N-1) + p(1-p)]$, with the design effect considered 1.

The study involved all women aged 18 to 45 years of any gravidity and parity who underwent myomectomy during the cesarean section (elective or emergency lower segment cesarean section) and were diagnosed with uterine fibroid during pregnancy through ultrasound. Women having known bleeding/ coagulation problems and those having seedling fibroids were not included.

Operationally, safety of myomectomy was defined on the basis of intraoperative and post operation parameters. Some of the intraoperative complications were perforation of the posterior uterine wall, pulmonary embolism, and bleeding. The extent of blood loss was measured intraoperative by the number of surgical sponges soaked and measured in milliliters in the form of a vacuum suction container since the time of surgery up to the time on discharge. The loss of less than 1000 ml of blood was deemed to be a safe procedure. The level of Hemoglobin was checked 24 hours after surgery to further determine safety.

The data were obtained among the eligible participants who were reported to the outpatient department and admitted to undergo cesarean section. Baseline demographic and clinical factors, such as age, gravidity, parity, gestational age, maternal weight and size, quantity and location of fibroids (based on ultrasound and clinical assessment) as well as comorbidity (high blood pressure and diabetes mellitus) were noted. Laboratory parameters such as hemoglobin, total leukocyte count, and platelet count before operative were recorded. Intraoperative information (duration of the operation (time taken after the uterine incision is closed after birth of the baby to removal of fibroid and abdominal), estimated blood loss, and intraoperative issues) were noted. The operating surgeon tested the level of hemoglobin 24 hours after the surgery at the hospital.

Statistical Package for the Social Sciences (SPSS) version 24.0 was used to input and analyze all the data. The quantitative variables like the maternal age, gestational age, weight-fibroid size, hemoglobin levels, total leukocyte count, platelet count, and blood loss were in the form of the mean and standard deviation when the variable was normally distributed. The Shapiro-Wilk test was used to test the normality. In the case of skewed data, median and the interquartile range were presented. Frequencies and percentages were used to present qualitative variables like site of fibroid and intraoperative complications. The outcomes were compared using various demographic and clinical variables and then adjusting them because of the potential effect modifiers. Chi-square test and independent sample t-test were used respectively, and p-value less than 0.05 is statistically significant.

RESULTS

A total of 120 adolescents were enrolled and randomized equally into two groups: the digital CBT group (n = 60) and the control group receiving standard counseling (n = 60). All participants completed the baseline assessments, and 112 (93.3%) completed the post-intervention follow-up. Demographic characteristics such as age, gender distribution, and baseline severity scores were comparable between both groups (Table 1).

Following the 8-week intervention, significant improvements were observed in the digital CBT group. The mean PHQ-9 score in the intervention group decreased from 15.4 ± 2.5 at baseline to 7.6 ± 2.2 post-intervention ($p < 0.001$).

In contrast, the control group showed a smaller reduction from 15.1 ± 2.3 to 12.2 ± 2.0 (p = 0.04). The between-group difference was statistically significant (p < 0.001) (Table 2).

Similarly, BDI-II scores dropped significantly in the intervention group (27.3 ± 4.5 to 13.4 ± 3.1), while the control group showed a modest reduction (26.9 ± 4.7 to 21.8 ± 3.8). The intervention group also reported improved anxiety scores on the GAD-7 scale (13.5 ± 2.6 to 6.9 ± 2.3), compared to the control group (13.1 ± 2.4 to 10.2 ± 2.5) (Table 2). Quality of life, as assessed by KIDSCREEN-27, improved more significantly in the digital CBT group (mean score increase from 58.4 ± 6.1 to 72.3 ± 5.5) than in the control group (60.1 ± 5.8 to 64.2 ± 5.1) (p < 0.01).

Table 1. Baseline Characteristics of Participants

Characteristic	dCBT Group (n = 60)	Control Group (n = 60)	p-value
Mean Age (years)	15.6 ± 1.4	15.8 ± 1.3	0.42
Gender (M/F)	28/32	30/30	0.69
PHQ-9 Score (baseline)	15.4 ± 2.5	15.1 ± 2.3	0.48
BDI-II Score (baseline)	27.3 ± 4.5	26.9 ± 4.7	0.57
GAD-7 Score (baseline)	13.5 ± 2.6	13.1 ± 2.4	0.44
KIDSCREEN Score (baseline)	58.4 ± 6.1	60.1 ± 5.8	0.39

Table 2. Pre- and Post-Intervention Outcome Measures

Outcome Measure	dCBT Group Pre	dCBT Group Post	Control Group Pre	Control Group Post	p-value (between groups)
PHQ-9 Score	15.4 ± 2.5	7.6 ± 2.2	15.1 ± 2.3	12.2 ± 2.0	<0.001
BDI-II Score	27.3 ± 4.5	13.4 ± 3.1	26.9 ± 4.7	21.8 ± 3.8	<0.001
GAD-7 Score	13.5 ± 2.6	6.9 ± 2.3	13.1 ± 2.4	10.2 ± 2.5	<0.01
KIDSCREEN Score	58.4 ± 6.1	72.3 ± 5.5	60.1 ± 5.8	64.2 ± 5.1	<0.01

These findings suggest that digital CBT significantly reduces depressive and anxiety symptoms and improves quality of life compared to standard counseling methods among adolescents (Table 2).

A total of 73 women meeting the inclusion criteria were enrolled. The mean maternal age was 32.4 ± 5.6 years, with a median gravidity of 2 (range 1–3) and median parity of 1 (range 0–2). (**Table I**).

Table I. Baseline Demographic and Clinical Characteristics by Blood Loss (n = 73)

Variable	Overall	Blood loss <1000 mL (n = 68)	Blood loss ≥1000 mL (n = 5)	p-value
Age (years)	32.4 ± 5.6	32.3 ± 5.7	33.2 ± 4.8	0.68
Gravidity	2 (1–3)	2 (1–3)	2 (1–3)	0.92
Parity	1 (0–2)	1 (0–2)	1 (0–1)	0.87
Hypertension	12 (16.4%)	10 (14.7%)	2 (40%)	0.12*
Diabetes Mellitus	9 (12.3%)	8 (11.8%)	1 (20%)	0.55*

*Chi-square test; continuous variables analyzed with t-test or Mann–Whitney.

The majority of women had a single fibroid, most commonly located on the anterior wall. Neither the number nor the location of fibroids was associated with higher blood loss (**Table II**).

Table II. Fibroid Characteristics by Blood Loss (n = 73)

Characteristic	Overall	Blood loss <1000 mL (n = 68)	Blood loss ≥1000 mL (n = 5)	p-value
Number of fibroids				0.45*
Single	49 (67.1%)	46 (67.6%)	3 (60%)	
Multiple	24 (32.9%)	22 (32.4%)	2 (40%)	
Location				0.52*
Anterior wall	33 (45.2%)	31 (45.6%)	2 (40%)	
Posterior wall	22 (30.1%)	21 (30.9%)	1 (20%)	
Fundal	18 (24.7%)	16 (23.5%)	2 (40%)	
Size of largest fibroid (cm)	5.6 (4–7)	5.5 (4–6.5)	6.8 (5–7.5)	0.04

*Chi-square test; continuous variables analyzed with t-test or Mann–Whitney.

Of the 73 procedures, 68 (93.2%) were classified as safe, defined by blood loss <1000 mL without major

intraoperative complications. Operative time was longer in unsafe procedures but did not reach statistical significance (p = 0.21). No intraoperative complications were reported in either group (**Table III**).

Table III. Intraoperative and Postoperative Outcomes by Safety (n = 73)

Outcome	Overall	Blood loss <1000 mL (n = 68)	Blood loss ≥1000 mL (n = 5)	p-value
Operative time (min)	38.5 ± 7.4	38.2 ± 7.3	42.0 ± 7.5	0.21
Estimated blood loss (mL)	620 ± 210	590 ± 180	1120 ± 90	<0.001
Blood transfusion	5 (6.8%)	0 (0%)	5 (100%)	<0.001*
Intraoperative complications	0	0	0	-
Hemoglobin drop (g/dL)	1.2 ± 0.6	1.1 ± 0.5	2.5 ± 0.3	<0.001

*Chi-square test for categorical, t-test for continuous variables.

Hemoglobin measured 24 hours postoperatively was significantly lower in Blood loss ≥1000 mL (n = 5). Total leukocyte count and platelet count did not differ significantly between groups (p = 0.42 and 0.28, respectively) (**Table IV**).

Table IV. Postoperative Laboratory Outcomes by Safety (n = 73)

Parameter	Overall	Blood loss <1000 mL (n = 68)	Blood loss ≥1000 mL (n = 5)	p-value
Hemoglobin 24h (g/dL)	10.8 ± 0.9	10.9 ± 0.8	9.3 ± 0.7	<0.001
Total leukocyte count (×10³/µL)	8.9 ± 2.1	8.8 ± 2.0	9.5 ± 2.3	0.42
Platelet count (×10³/µL)	240 ± 52	242 ± 50	225 ± 65	0.28

DISCUSSION

This prospective study of 73 women who received cesarean myomectomy showed that most of the women had one anterior wall fibroid, and the size of the largest fibroid was 5.6 cm in the median.

Our findings showed that bigger fibroid size had a significant correlation with greater blood loss but the number and location of the fibroid were not important. In general, the proportion of safe procedures was 93.2% and only 5 cases were associated with blood loss ≥1000 mL, increase in hemoglobin drop and need of blood transfusion. Intraoperative complications were not mentioned, which is in line with prior evidence about the safety of cesarean myomectomy with regard to the selected patients [11-12].

Sundermann et al. [11] noted that uterine fibroids have a role in preventing favorable obstetric outcomes, such as preterm birth, and the importance of clinical attention is evident. Brennan et al. [12] and Huang et al. [13] proved cesarean myomectomy could be performed in case of large fibroids with the help of the careful hemostatic techniques, which supports our results that the majority of procedures were safe despite the size of fibroids.

The study by Dey et al. [14] showed that there are few perioperative complications when appropriately selected patients have the corresponding zero intraoperative events. The reliability of our data could be enhanced by systematic reporting and standardized outcome assessment [15], which is part of the PRISMA 2020 statement.

Our low complication rates were supported by Mishra et al. [16] and Sharma et al. [17] who also reported positive maternal outcomes with cesarean myomectomy using tertiary care. The idea of personalized risk evaluation in the choice made between cesarean section and delayed myomectomy was discussed by Tinelli et al. [18], which is how we categorize safe and unsafe operations with regard to blood loss.

Ma et al. [19] highlighted perioperative risk in combined procedures with large or multiple fibroids, which follows our conclusion that the large size of the fibroid was related to unsafe outcomes. Lastly, Li et al. [20] affirmed that fibroids can cause adverse maternal outcomes but our study focused on the

intraoperative and immediate postoperative parameters thus pointing out that cesarean myomectomy can be safely conducted with proper planning.

Our study has strengths such as prospective data collection, straining by blood loss, and postoperative laboratory assessment. Our results suggest comprehensive preoperative evaluation of fibroid features, careful intraoperative hemostasis, and the accessibility of blood products in order to reduce the risk in the perioperative period. To perfect the choice criteria and maximize maternal outcomes, more extensive studies should be conducted.

Limitations of study: This research has a number of limitations. First, the sample size was quite small especially in the sample of unsafe procedures which could compromise the statistical power to identify association with infrequent complications. Second, the case under investigation was carried out in one tertiary care facility, and the results might not be applicable to other locations. Third, the maternal and neonatal outcomes were not evaluated in the long term, and it could be limited to intraoperative and postoperative parameters. Lastly, the observational study design is incapable of making a causal conclusion on how the fibroid attributes affected blood loss or operative morbidity.

CONCLUSION

Cesarean myomectomy is a safe procedure that can be implemented in well-selected women especially those with single and moderate-sized fibroids. An increased size of fibroids is linked to the high probability of excessive blood loss and transfusion. Most of the procedures can be performed without any intraoperative complications with a careful surgical procedure, proper hemostatic precautions taken, and with blood transfusion prepared. Risk stratification based on preoperative evaluation of fibroid characteristics is necessary and additional, multicenter, and large-scale studies are justified to enhance patient selection and perioperative outcomes.

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