Clinical and Experimental Obstetrics & Gynecology

Clin. Exp. Obstet. Gynecol. **2026**; 53(6): 51432
https://doi.org/10.31083/CEOG51432

Original Research

Outcomes of Uterine Fibroid Treatment During Cesarean Section at Thai Binh Obstetrics and Gynecology Hospital

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Academic Editors: Sandro Gerli and Michael H. Dahan
Submitted: 3 March 2026 Revised: 28 April 2026 Accepted: 12 May 2026 Published: 23 June 2026

Abstract

Background: Uterine fibroids (UFs) are common benign tumors in women. Although traditional obstetric teaching discourages myomectomy during cesarean section (CS) due to the risk of hemorrhage, emerging evidence suggests that the procedure may be considered in selected cases to avoid subsequent interval surgery. **Methods:** We conducted a retrospective descriptive observational study based on medical records of 124 pregnant women with UFs who underwent CS at Thai Binh Obstetrics and Gynecology Hospital between October 2023 and September 2024. Clinical characteristics, intraoperative management strategy, operative time, categorized blood loss, and postoperative hospital stay were extracted and analyzed. As this was a retrospective observational study, clinical trial registration was not applicable. **Results:** Myomectomy was the most frequently performed intraoperative management strategy, performed in 73 cases (58.9%). In unadjusted descriptive analyses, parity and fibroid location differed between the no-intervention and myomectomy groups ($p = 0.001$ and $p = 0.032$, respectively). Within the myomectomy subgroup, larger fibroids (>5 cm) and intramural location were associated with higher blood loss categories ($p = 0.004$ and $p = 0.018$, respectively). Operative time and postoperative hospital stay are reported descriptively by the management group. No patients in the myomectomy group required intraoperative conversion to hysterectomy; the 2 hysterectomy cases represented primary intraoperative management decisions rather than rescue procedures after attempted myomectomy. **Conclusion:** This retrospective descriptive observational report describes the distribution of intraoperative management strategies for UFs during CS in this cohort and the observed blood loss categories within the myomectomy subgroup. Due to substantial selection bias, group non-comparability, incomplete reporting of key perioperative outcomes, and the absence of adjusted analyses, the present data do not support reliable comparative conclusions regarding the safety or effectiveness of different management strategies.

Keywords: uterine fibroids; cesarean section; cesarean myomectomy; retrospective study; Thai Binh Obstetrics and Gynecology Hospital

1. Introduction

Uterine fibroids (UFs) are common benign tumors in women of reproductive age, and their prevalence and disease burden vary substantially according to age, population, and diagnostic method [1,2,3]. During pregnancy, fibroids may be associated with miscarriage, malpresentation, placental abruption, preterm birth, and postpartum hemorrhage. Delayed childbearing may increase the frequency with which obstetricians encounter this condition [1,2].

Historically, myomectomy at the time of cesarean section (CS) was discouraged due to concerns about severe hemorrhage and the potential need for hysterectomy. Classical teaching generally limited fibroid removal to pedunculated lesions or those obstructing the uterine incision [4]. More recent observational studies and reviews have suggested that cesarean myomectomy may be considered in carefully selected cases, particularly when the fibroid is technically accessible, and the procedure is performed by experienced surgeons [5,6,7,8].

Although cesarean myomectomy has been proposed as a possible option in selected cases, interpretation of the available evidence remains challenging because reported outcomes are strongly influenced by patient selection, fibroid characteristics, and surgeon preference [6,7,8].

To contribute real-world data from a provincial hospital in Vietnam, we conducted this retrospective descriptive observational study to describe the intraoperative management of UFs during CS and to report short-term descriptive operative outcomes in this cohort.

2. Methods and Materials

2.1 Study Design and Participant Selection

We conducted a retrospective descriptive observational study using medical records from Thai Binh Obstetrics and Gynecology Hospital. The study population consisted of 124 pregnant women with UFs who underwent CS from October 1, 2023, to September 30, 2024.

Inclusion criteria were as follows: (1) singleton pregnancy with a live fetus and gestational age ≥28 weeks; (2) UFs diagnosed by prenatal ultrasound or confirmed intraop-

eratively; (3) CS performed at the study hospital during the study period; and (4) sufficiently complete medical records allowing extraction of key perioperative variables.

Exclusion criteria were as follows: (1) severe coagulation disorders likely to confound perioperative bleeding; (2) hysterectomy indicated for reasons unrelated to UFs, such as placenta accreta spectrum or placenta previa with uncontrolled hemorrhage; and (3) incomplete records for key study variables. Trial registration was not applicable as this was a retrospective observational study.

2.2 Sample Size and Sampling Method

Because this retrospective descriptive observational study relied on existing medical records, all eligible cases within the study period were included using a census approach. Therefore, the final sample size was determined by the number of available records meeting the inclusion criteria, yielding a total of 124 women.

2.3 Data Collection and Surgical Management

Clinical and paraclinical data were extracted from medical records using a structured data collection form. Extracted variables included maternal age, parity, obstetric history, timing of fibroid detection, fibroid size, number, location, intraoperative management strategy (no intervention, myomectomy, or hysterectomy), operative time, estimated blood loss category, and postoperative length of hospital stay.

Standard CS protocols were followed in all cases, including routine uterotonic administration after fetal delivery. Fibroids were identified primarily by prenatal ultrasound and, when applicable, confirmed intraoperatively. The decision to perform myomectomy was made intraoperatively by the attending obstetric surgeon based on fibroid accessibility, location, estimated bleeding risk, and overall operative conditions, rather than a predefined protocol. In selected cases, intra-myometrial vasopressin was used as a hemostatic adjunct.

Quantification of intraoperative blood loss was based on routine operative records and followed standard obstetric practice, including measurement of suction volume after subtraction of amniotic fluid, weight-based estimation of blood-soaked surgical materials, and subtraction of irrigation fluids when applicable [9]. Fibroid size was categorized as ≤5 cm and >5 cm, as the 5 cm threshold is commonly used in the literature to distinguish smaller from more surgically relevant myomas, particularly with respect to operative difficulty and bleeding risk [10,11].

2.4 Statistical Analysis

Data were analyzed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as frequencies and percentages for categorical variables and as mean ± standard deviation (SD) or median (range) for continuous variables, as appropriate. Normality of continuous variables was assessed using the Shapiro-Wilk test. For two-group comparisons, Student's *t*-test was used for normally distributed continuous variables and the Mann-Whitney U test for non-normally distributed variables. Categorical variables were compared using Pearson's chi-square test or Fisher's exact test, as appropriate. Table 1 presents the overall baseline characteristics of the study population. Tables 2,3 compare selected characteristics between the no-intervention and myomectomy groups after excluding the 2 hysterectomy cases because of insufficient subgroup sample size for meaningful comparison. No multivariable regression analysis was performed. An ordinal logistic regression model for blood loss category was considered but not fitted due to the small size of the myomectomy subgroup (n = 73), sparse and uneven distribution of outcome categories, and the risk that simultaneous adjustment for multiple covariates would produce unstable estimates and overfitting. Therefore, the observed associations should not be interpreted as independent effects or as evidence supporting comparative conclusions regarding safety or effectiveness. A two-sided p-value < 0.05 was considered statistically significant.

3. Results

3.1 General Characteristics of the Pregnant Women

Most fibroids were identified during pregnancy on routine ultrasound examination (64.5%), while 22.6% were known preconception. Notably, 12.9% were incidental intraoperative findings, highlighting the importance of intraoperative vigilance.

3.2 Management of UFs During CS

The outcomes of UF management during CS are shown in Fig. 1. Myomectomy was the predominant intervention, performed in 73 cases (58.9%). Conservative management without fibroid intervention was selected in 49 cases (39.5%), and hysterectomy was performed as the primary intraoperative management strategy in 2 cases (1.6%). Importantly, no patients in the myomectomy group required intraoperative conversion to hysterectomy.

A statistically significant association was observed between parity and the intraoperative management decisions (Table 2). Among patients who underwent myomectomy, women with one previous birth constituted the largest subgroup (52.1%), whereas nulliparous women represented the largest subgroup among those managed without UF intervention.

A statistically significant association was observed between UF location and intraoperative management decisions (Table 3). Among patients who underwent myomectomy, subserosal UFs constituted the largest subgroup (58.9%), whereas submucosal UFs were uncommon.

Fibroid size was significantly associated with blood-loss category within the myomectomy subgroup (Table 4). Lower blood-loss categories were more frequent among fi-

Table 1. General characteristics of the study population (n= 124).

Characteristic		n	%	*p*-value*
Age group	≤25 years old	10	8.1	<0.001
	26–30 years old	20	16.1	
	31–35 years old	48	38.7	
	36–40 years old	35	28.2	
	>40 years old	11	8.9	
	$\bar{X}$ ± SD (Min–Max)	32.5 ± 5.1 (21–42)		
Number of births	First time	31	25.0	0.016
	2nd time	56	45.2	
	3rd time or more	37	29.8	
Time of UF detection	Before pregnancy	28	22.6	<0.001
	During pregnancy	80	64.5	
	During cesarean section	16	12.9	
Obstetric history	Infertility	8	6.5	0.04
	Stillbirth	20	16.1	
	Miscarriage	16	12.9	
	Premature birth	8	6.5	
Fibroid size	≤5 cm	66	53.2	0.472
	>5 cm	58	46.8	
Number of fibroids	1	74	59.7	<0.001
	2	39	31.5	
	3 or more	11	8.9	
Location of fibroids	Submucosal fibroid	11	8.9	<0.001
	Intramural fibroid	49	39.5	
	Subserosal fibroid	64	51.6	

*Pearson's chi-square test or Fisher's exact test. UFs, uterine fibroids; SD, standard deviation.

Table 2. Association between parity and intraoperative management decisions (n = 122).

Parity	No interventionn (%)	Myomectomyn (%)	*p*-value
Nulliparous	21 (42.9)	10 (13.7)	0.001
1 previous birth	18 (36.7)	38 (52.1)	
≥2 previous births	10 (20.4)	25 (34.2)	
Total	49 (100)	73 (100)	

Table 3. Association between UF location and intraoperative management decisions (n = 122).

UF location	No intervention		Tumor removal		*p*-value
	n	%	n	%	
Submucosal	7	14.2	2	2.7	0.032
Intramural fibroid	21	42.9	28	38.4	
Subserosal	21	42.9	43	58.9	
Total	49	100	73	100	

broids ≤5 cm, whereas higher blood-loss categories were observed more often when the fibroid was >5 cm.

The distribution of blood loss categories differed significantly according to UF location (Table 5). Lower blood loss categories were more frequently observed in subserosal UFs, whereas intramural fibroids were more often associated with higher blood loss categories.

Operative time and postoperative hospital stay are summarized descriptively according to intraoperative management strategy (Table 6). These data should not be interpreted as evidence of statistically significant between-group differences because the hysterectomy subgroup was very small and the management groups were not comparable at baseline.

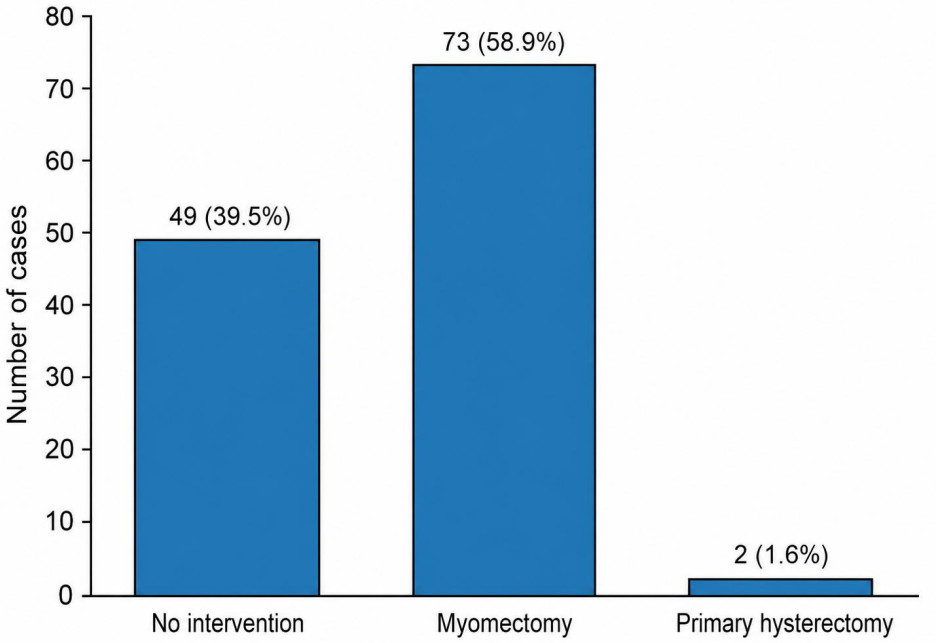

Fig. 1. Intraoperative management of UFs during CS. UFs, uterine fibroids; CS, cesarean section.

Table 4. Distribution of intraoperative blood loss categories according to UF size in the myomectomy group (n = 73).

Blood loss category	≤5 cm		>5 cm		*p*-value
	n	%	n	%	
<500 mL	30	83.3	18	48.7	0.004
500–750 mL	6	16.7	15	40.5	
751–1000 mL	0	0	4	10.8	
Total	36	100	37	100	

p = 0.004 by chi-square/Fisher's exact test, as appropriate.

4. Discussion

This manuscript should be interpreted as a retrospective, descriptive observational report of how UFs were managed during CS in a provincial hospital cohort. The management groups were not comparable at baseline because treatment decisions were made intraoperatively by the attending surgeon, and the myomectomy group included a higher proportion of technically more accessible subserosal fibroids and a different parity distribution [4,8]. Therefore, the present data do not support reliable comparative conclusions regarding safety or effectiveness between management strategies.

4.1 General Characteristics of Pregnant Women

The mean maternal age in our study was 32.5 ± 5.1 years, with the 31–35-year age group predominating. This pattern is consistent with the epidemiology of UFs and with the tendency for fibroid prevalence to increase with age. This age distribution is broadly consistent with the general epidemiology of UFs and with reports showing increasing fibroid prevalence with advancing reproductive age [3,12].

Most fibroids were detected during pregnancy by ultrasound, although 12.9% were identified intraoperatively. The predominance of solitary fibroids and the significant proportion of lesions >5 cm were also broadly comparable with previous domestic and international reports [5,13,14,15]. In our cohort, subserosal fibroids were the most frequent location, whereas other studies have reported a predominance of intramural fibroids, highlighting that case mix may vary considerably across institutions [11,16,17].

4.2 Management of UFs during CS

The observed distribution of management strategies in this cohort primarily reflects real-world intraoperative decision-making rather than comparable treatment allocation. As parity and fibroid location differed significantly between groups in Tables 2,3, respectively, and because more accessible subserosal fibroids may have been more frequently selected for removal, selection bias was substantial and directly limited comparability between the myomectomy and no-intervention groups [4,7,8,11,17]. Accordingly, differences observed between groups should be interpreted as descriptive findings from this cohort only.

Hemorrhage remains the principal concern during cesarean myomectomy. In our study, larger fibroids and intramural location were associated with higher blood loss categories within the myomectomy subgroup. These descriptive findings are broadly consistent with the peer-reviewed literature suggesting that larger fibroids may be associated with more technically challenging intraoperative management and increased bleeding burden, although the strength of evidence remains limited and context dependent

Table 5. Distribution of intraoperative blood loss categories according to UF location in the myomectomy group.

Blood loss category	Submucosal		Intramural		Subserosal		*p*-value
	n	%	n	%	n	%	
<500 mL	1	50.0	12	42.9	35	81.4	0.018
500–750 mL	1	50.0	13	46.4	7	16.3	
750–1000 mL	0	0	3	10.7	1	2.3	
Total	2	100	28	100	43	100	

Data are presented as n (%); $p = 0.018$ by Fisher's exact test because of small cell counts.

Table 6. Operative time and postoperative hospital stay according to intraoperative management strategy.

Outcome	No intervention	Myomectomy	Hysterectomy
Operative time, min (mean ± SD)	47.6 ± 6.3	53.2 ± 7.5	62.5 ± 3.5
Postoperative hospital stay, days (mean ± SD)	4.8 ± 0.6	5.1 ± 0.7	5.5 ± 0.7

Data are presented as mean ± SD. No inferential statistical comparison was performed for this table because the hysterectomy subgroup included only 2 patients and the management groups were not comparable.

[7,8,10,11]. These findings should be interpreted as unadjusted, exploratory subgroup observations only. Because blood loss was not directly compared between the myomectomy and no-intervention groups and because baseline characteristics differed between groups, the present data do not support robust inference on whether myomectomy influences bleeding risk relative to conservative management.

Operative time and postoperative hospital stay are herein reported as descriptive perioperative outcomes only [5,11,13,17]. Because key short-term safety outcomes, including transfusion, major postoperative hemorrhage, infection, hemoglobin decline, reoperation, and intensive care unit (ICU) admission, were not available in a sufficiently complete and standardized form, the present data should not be used to infer comparative safety or effectiveness between management strategies.

Recent literature also indicates that interpretation of cesarean myomectomy outcomes remains highly dependent on patient selection and study design [8,11]. In the context of the present retrospective descriptive cohort, these external data are cited solely to provide background context and should not be interpreted as supporting comparative conclusions drawn from the present dataset.

4.3 Limitations

This study has several important limitations. First, it was a single-center retrospective, descriptive observational study, which limits generalizability and precludes causal inference. Second, selection bias was substantial rather than incidental. Because the decision to perform myomectomy was made subjectively by the attending surgeon, and baseline fibroid location and parity differed between groups, the two management groups were not comparable. Third, key short-term perioperative safety indicators, including blood transfusion, postoperative hemorrhage, postoperative infection, hemoglobin change, reoperation, and ICU admission, were not consistently available in a standardized form. Fourth, no direct comparison of blood loss categories between the myomectomy and no-intervention groups was performed; even if attempted, such a comparison would have been severely confounded by indication and surgeon selection bias. Fifth, no multivariable regression analysis was performed. An ordinal logistic regression model for blood loss category was considered but not fitted because the myomectomy subgroup was small (n = 73), outcome categories were sparse and unevenly distributed, and simultaneous adjustment for multiple covariates would have increased the risk of unstable estimates and overfitting. Therefore, important confounding factors, including parity, age, fibroid number, fibroid location, and surgeon-related selection, could not be controlled. As a result, the analyses in Tables 2,3 should be interpreted strictly as unadjusted descriptive associations only. Finally, the hysterectomy subgroup was very small, and long-term outcomes such as uterine scar integrity, future fertility, and fibroid recurrence were not assessed.

5. Conclusions

This retrospective descriptive observational study describes intraoperative management of UFs during CS in a single provincial hospital cohort, and reports observed blood loss categories within the myomectomy subgroup. Due to substantial selection bias, group non-comparability, incomplete reporting of key perioperative outcomes, and absence of adjusted analyses, the present data do not support reliable comparative conclusions regarding the safety or effectiveness of the different management strategies. Accordingly, these findings should be interpreted strictly as descriptive observations from this cohort.

Availability of Data and Materials

The datasets underlying the results of this study are available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

Author Contributions

TMB and LTN designed the research study. TMB supervised the study and drafted the original manuscript. LTN performed data extraction, data processing, and statistical analysis. TMB and LTN interpreted the data and critically revised the manuscript for important intellectual content. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of Thai Binh University of Medicine and Pharmacy (Approval No. 448/QD-YTB). As this study was a retrospective review of existing medical records, the ethics committee waived the requirement for written informed consent. The study was conducted in accordance with the Declaration of Helsinki, and all extracted data were de-identified prior to analysis.

Acknowledgment

The authors thank the study participants and our colleagues for their support in completing this study.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT to improve grammar and language clarity. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

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