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Original Article

Combined cesarean section and myomectomy increases perioperative risks and affects postpartum recovery in women with uterine fibroids during late pregnancy

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Abstract: Background: Uterine fibroids present significant obstetric challenges, particularly in late pregnancy. This study compared the outcomes of cesarean section combined with myomectomy (CS+M) versus cesarean section followed by elective myomectomy (CS) in managing fibroids during late pregnancy. Methods: A retrospective analysis was conducted on 243 pregnant women with uterine fibroids between September 2019 and September 2023. Participants were divided into two groups: 134 underwent CS followed by elective myomectomy, and 109 underwent combined CS+M. Perioperative outcomes, recovery indicators, rates of infection and complications, lactation status, neonatal Apgar scores, umbilical artery blood gas and blood lactate levels, postpartum depression (Edinburgh Postnatal Depression Scale (EPDS) scores), perceived stress (Perceived Stress Scale (PSS) scores), and health-related quality of life (Short Form 36 Health Survey (SF-36) scores) were compared between the two groups. Results: Compared with the CS group, the CS+M group experienced significantly longer surgical duration ($P = 0.041$), greater intraoperative ($P = 0.006$) and postoperative blood loss ($P = 0.007$), and extended hospital stays ($P = 0.004$). Postoperative wound infections, abdominal distension, and intestinal obstruction occurred more frequently in the CS+M group ($P = 0.035$). The incidence of insufficient lactation was higher ($P = 0.035$), while Apgar scores at multiple time points were significantly lower ($P = 0.030$) in the CS+M group. Quality of life scores were consistently higher in the CS group, reflecting better postoperative recovery across various domains. Conclusion: CS+M, while advantageous for removing fibroids in a single procedure, is associated with increased perioperative risk, delayed recovery, higher complication rates, impaired lactation, and less favorable neonatal outcomes.

Keywords: Uterine fibroids, cesarean section, myomectomy, perioperative outcomes, postoperative recovery, maternal health

Introduction

Uterine fibroids, also known as leiomyomas, are benign smooth muscle tumors of the uterus that frequently occur during the reproductive years [1]. These non-cancerous growths vary significantly in size, shape, and location within the uterus and can adversely affect reproductive health, leading to complications during pregnancy [2]. The prevalence of uterine fibroids among pregnant women is estimated at 2-10%, often influencing pregnancy outcomes and obstetric management [3]. While many women with fibroids remain asymptomatic during pregnancy, fibroids can sometimes cause pain, miscarriage, preterm labor, or obstructed labor [4, 5].

Management of uterine fibroids during pregnancy remains challenging [6]. Conservative monitoring is usually preferred when fibroids do not threaten maternal or fetal health [6]. Surgical removal (myomectomy) is generally avoided during pregnancy due to concerns about intraoperative hemorrhage and pregnancy loss [7, 8]. However, improvements in surgical techniques and anesthesia have enabled the possibility of performing myomectomy safely during cesarean section (CS) when clinically indicated [9].

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CS is a common obstetric procedure, often needed when fibroids obstruct the birth canal or complicate labor [10]. Performing a myomectomy concurrently with CS may eliminate the need for a second surgery, reducing repeated anesthesia exposure and potential complications [11]. Nevertheless, this combined approach may increase perioperative complications [12].

This study aims to compare perioperative and postoperative outcomes between cesarean section combined with myomectomy (CS+M) and CS followed by elective postoperative myomectomy in women with uterine fibroids during late pregnancy. The findings may provide evidence to guide clinical decision-making and inform patients regarding the safety and practicality of these two management strategies.

Materials and methods

Case selection

This retrospective study included 243 pregnant women with uterine fibroids who received outpatient or inpatient care at Xijing Hospital, The Fourth Military Medical University, between September 2019 and September 2023. Based on treatment modality, patients were divided into two groups: 134 patients who underwent elective myomectomy following a standard CS were designated as the CS Group, while 109 patients who underwent concurrent myomectomy during CS were assigned to the CS+M Group. This study was approved by the Institutional Review Board and Ethics Committee of Xijing Hospital, The Fourth Military Medical University, with a waiver of informed consent.

Perioperative indicators, including operative time, intraoperative blood loss, and postoperative bleeding, were compared between the two groups. Postoperative outcomes such as infection rates, lactation status, neonatal Apgar scores, postpartum depression, and perceived stress were also evaluated.

Inclusion criteria: (1) Confirmed diagnosis of uterine fibroids through imaging and pathological examination [13]; (2) Singleton pregnancy with gestational age ≥ 28 weeks, indicated by uterine enlargement, regular and increased fetal movements, and fetal heart tones consistent with late pregnancy; (3) Availability of complete clinical data; (4) Normal cognitive function and basic communication skills; and (5) Age between 25 and 35 years.

Exclusion criteria: (1) Coexisting cervical cancer, other malignant tumors, or gynecological diseases; (2) History of uterine surgeries (e.g., previous CS or uterine septum resection); (3) History of abdominal surgeries (e.g., appendectomy or splenectomy); (4) Presence of uterine malformations or adenomyosis; (5) Psychiatric disorders (e.g., depression or schizophrenia); (6) Severe neurological diseases (e.g., Parkinson's disease or brain tumors); and (7) Any other conditions likely to cause severe physical illness or unstable health status.

Intervening method

CS Group: Patients in this group underwent standard CS. Routine preoperative preparations were performed, followed by combined spinal-epidural anesthesia. A transverse incision was made above the pubic symphysis, sequentially cutting through the skin, muscle, fascia, and uterus. After delivering the fetus and placenta, uterine massage was performed for hemostasis, and the lower uterine segment incision was sutured. The pelvic and abdominal cavities were irrigated, and the abdomen was closed in layers. Vital signs such as blood oxygen saturation, blood pressure, heart rate, and pulse were continuously monitored throughout the procedure. Postoperatively, patients received standard anti-infective treatment and obstetric care, with a scheduled uterine fibroid excision at a later stage.

CS+M Group: Before delivery of the fetus and placenta, surgical procedures were identical to those of the CS group. Concurrently, uterine fibroids were excised during the same operation. After placental removal, myomectomy was continued according to the location, number, and type of fibroids. Initially, 10 units of oxytocin were injected into the uterine myometrium to promote contraction and assist hemostasis. Depending on hemostatic needs, carbetocin (Hemabate) was used to enhance the effect.

For patients with subserosal and intramural fibroids, the uterine incision was sutured first. Then, based on the fibroid position, an incision was made along its longitudinal axis, and the fibroids with its pseudocapsule were excised.

Hemostasis was meticulously achieved before suturing the incisions. In cases of submucosal fibroids, the surgical approach was determined based on the measured width of the fibroid base to ensure complete removal. After successful excision, the lower uterine segment incision and fibroid cavity was closed, followed by layered closure of the abdominal wall. Postoperative care involved standard anti-infective treatments and routine obstetric nursing measures.

Data collection

<u>*Primary indicators*</u>

Perioperative and postoperative metrics: Medical records were reviewed to compare perioperative and postoperative metrics between the two groups. These included operative duration, intraoperative and postoperative blood loss, length of hospital stay, time to lochia cessation, time to resumption of menstruation, and time to first postoperative flatus. Additionally, postoperative complications such as wound infection, abdominal distention, and intestinal obstruction were also assessed.

Neonatal outcomes and umbilical artery blood gas analysis: Neonatal outcomes were evaluated using Apgar scores at 1, 5, 10, and 30 minutes after birth [14]. The Apgar score assesses five domains with each scored from 0 to 2, with a total possible score of 10. Scores of 8-10 indicate normal status requiring no special intervention, 4-7 suggest mild to moderate asphyxia necessitating supportive measures, and 0-3 indicate severe asphyxia requiring immediate resuscitation. Immediately after delivery, umbilical artery blood samples were collected for blood gas analysis, including arterial blood pH, partial pressure of oxygen (PaO_2), partial pressure of carbon dioxide ($PaCO_2$), bicarbonate ion (HCO_3^-), base excess (BE), and blood lactate (BLA) levels.

<u>*Secondary indicators*</u>

Evaluation of postpartum lactation status: Lactation status was assessed based on breastfeeding frequency and milk sufficiency. Adequate lactation was defined as breastfeeding more than six times a day without requiring formula supplementation. If milk supply exceeded the newborn's demand, leaving residual milk after each feeding, this was defined as sufficient. Conversely, milk output was insufficient to meet daily intake, requiring formula supplementation, this situation was classified as insufficient.

Postpartum depression symptoms in mothers: At the fourth week postpartum, maternal depression symptoms were assessed using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS consists of 10 items covering mood, sadness, anxiety, sleep, and enjoyment, with a total scores ranging from 0 to 30. Higher scores indicate more severe symptoms, with a score ≥ 10 suggesting probable postpartum depression. The scale's reliability was satisfactory (Cronbach's alpha = 0.84) [15].

The Perceived Stress Scale (PSS) was employed to assess nonspecific life stress at weeks postpartum. The PSS contains 10 items rated on a 5-point Likert scale (0 = never to 4 = very often), with a total score ranging from 0 to 40. Higher scores reflect greater perceived stress. The reliability of the scale was acceptable (Cronbach's alpha = 0.80) [16].

Postoperative quality of life: The Short Form 36 Health Survey (SF-36) was employed to assess patients' quality of life at four weeks post-surgery. Domains included overall health status, social functioning, emotional roles, and mental health. Each item was scored from 0 to 100, with higher scores indicating better quality of life. The scale demonstrated good reliability with a Cronbach's alpha coefficient of 0.814 [17].

Statistical analysis

Statistical analysis was performed using SPSS software version 29.0 (SPSS Inc., Chicago, IL, USA). Categorical variables were reported as frequencies and percentages [n (%)], and group comparisons were performed using the chi-square test. The normality of continuous variables was evaluated using the Shapiro-Wilk test. Normally distributed data were presented as means ± standard deviations (mean ± SD) and compared between groups using independent-samples t-tests. Non-normally distributed data were reported as median (Q1, Q3) and analyzed with the Wilcoxon rank-sum test. A p-value < 0.05 was considered statistically significant.

Table 1. Comparison of patient characteristics and baseline data between the two groups

Parameter	CS (n = 134)	CS+M (n = 109)	t/χ^2	P
Age (years)	27.86 ± 2.43	27.23 ± 2.59	1.969	0.052
Gestational weeks	40.12 ± 2.87	40.33 ± 2.56	0.592	0.554
Fibroid diameter (cm)	5.36 ± 1.12	5.42 ± 1.03	0.411	0.682
GDM [n (%)]	15	13	0.032	0.859
Hypertension [n (%)]	10	7	0.100	0.752
Education attainment [n (%)]				
Primary School and Below	41	30	0.275	0.600
Middle School	68	57	0.058	0.810
University and Above	25	22	0.090	0.764
Income (yuan)				
< 3000	35	26	0.164	0.685
3000-5000	68	59	0.276	0.600
> 5000	31	24	0.043	0.836
Disease duration (≥ 2 years) [n (%)]	17	15	0.061	0.805
Comorbidities [n (%)]	32	28	0.106	0.745
Tumor type [n (%)]				
Solitary uterine fibroid	73	61	0.054	0.817
Multiple uterine fibroids	61	48	0.054	0.817
Tumor site [n (%)]				
Intramural Fibroid	61	53	0.232	0.630
Subserosal Fibroid	38	30	0.021	0.885
Submucosal Fibroid	35	26	0.164	0.685

CS: cesarean section; CS+M: cesarean section combined with myomectomy; GDM: Gestational Diabetes Mellitus.

Table 2. Comparison of perioperative outcomes and recovery indicators between the two groups

Parameter	CS (n = 134)	CS+M (n = 109)	t	P
Surgical Duration/min	48.39 ± 6.12	50.12 ± 6.98	2.053	0.041
Time to Anal exhaustion/h	40.22 ± 6.59	43.02 ± 6.58	3.300	0.001
Intraoperative Blood Loss/ml	293.26 ± 46.23	309.89 ± 46.11	2.773	0.006
Postoperative Blood Loss/ml	219.28 ± 47.25	235.78 ± 47.19	2.708	0.007
Length of Hospital Stay/d	6.03 ± 2.18	6.86 ± 2.23	2.919	0.004
Time to Lochia Clearance/d	29.51 ± 2.46	30.28 ± 2.18	2.564	0.011
Menstrual recovery time/d	47.86 ± 8.51	50.56 ± 8.78	2.423	0.016

CS: cesarean section; CS+M: cesarean section combined with myomectomy.

Results

Participant characteristics and baseline data

There were no significant differences between the two groups in mean maternal age, gestational weeks, mean fibroid diameter, incidence of gestational diabetes mellitus (GDM), educational attainment, income level, disease duration, comorbidities, tumor type, or tumor location (all $P > 0.05$) (**Table 1**). Overall, demographic and baseline characteristics were comparable between the two groups.

Comparison of perioperative indicators between the two groups

As shown in **Table 2**, the mean surgical duration was notably longer ($t = 2.053$, $P = 0.041$), and the intraoperative and postoperative blood loss were higher ($t = 2.773$, $P = 0.006$) in the CS+M group compared to the CS group. Furthermore, anal exhaust time was notably extended in the CS+M group ($t = 3.300$, $P = 0.001$). The length of hospital stay was significantly longer for the CS+M group compared to the CS group ($t = 2.919$, $P = 0.004$). Moreover,

Table 3. Comparison of postoperative infection rates between the two groups [n (%)]

Parameter	CS (n = 134)	CS+M (n = 109)	χ^2	P
Wound infection	1	7	4.430	0.035
Abdominal swelling	2	9	4.895	0.027
Intestinal obstruction	2	10	7.556	0.006
Others	1	8	5.594	0.018

CS: cesarean section; CS+M: cesarean section combined with myomectomy.

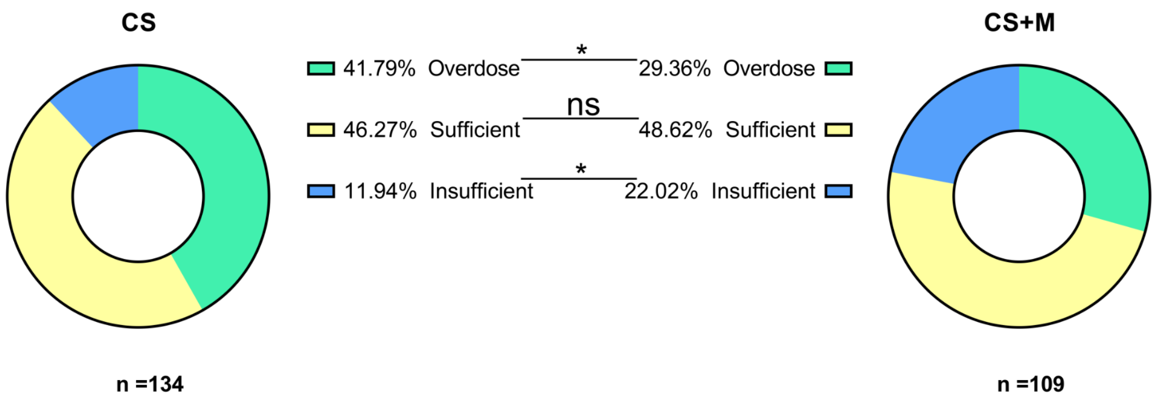

Figure 1. Postpartum lactation status [n (%)]. ns: not significant; *: $P < 0.05$. CS: cesarean section; CS+M: cesarean section combined with myomectomy.

Table 4. Comparison of neonatal Apgar scores between the two groups at different time points

Time	CS (n = 134)	CS+M (n = 109)	t	P
1 min	9.35 ± 0.21	9.29 ± 0.23	2.179	0.030
5 min	9.38 ± 0.22	9.31 ± 0.22	2.261	0.025
10 min	9.50 ± 0.20	9.42 ± 0.21	2.959	0.003
30 min	9.75 ± 0.24	9.65 ± 0.32	2.638	0.009

CS: cesarean section; CS+M: cesarean section combined with myomectomy.

time to lochia clearance (t = 2.564, P = 0.011) and menstrual recovery (t = 2.423, P = 0.016) were longer in the CS+M group compared to the CS group.

Table 3 shows postoperative complications. The incidences of wound infection (χ^2 = 4.430, P = 0.035), abdominal distension (χ^2 = 4.895, P = 0.027), intestinal obstruction (χ^2 = 7.556, P = 0.006) were significantly higher in the CS+M group compared to the CS group. Additionally, there were more cases categorized as "other" infections in the CS+M group (χ^2 = 5.594, P = 0.018).

Comparison of postpartum lactation status between the two groups

As shown in **Figure 1**, the incidence of lactation surplus was significantly higher in the CS group (56 cases) compared with the CS+M group (32 cases) (χ^2 = 4.022, P = 0.045). Conversely, insufficient lactation was more prevalent in the CS+M group (24 cases) than in the CS group (16 cases) (χ^2 = 4.440, P = 0.035). Adequate lactation was observed in 62 cases in the CS group and 53 cases in the CS+M group, showing no significant difference (χ^2 = 0.134, P = 0.715).

Comparison of newborn conditions

As shown in **Table 4**, the neonates in the CS group showed significantly higher mean Apgar scores compared to those in the CS+M group at all time points (1 min: t = 2.179, P = 0.030; 5 min: t = 2.261, P = 0.025; 10 min: t = 2.959, P = 0.003; and 30 min: t = 2.638, P = 0.009).

The mean pH level was significantly higher in the CS+M group (7.41 ± 0.57) than in the CS

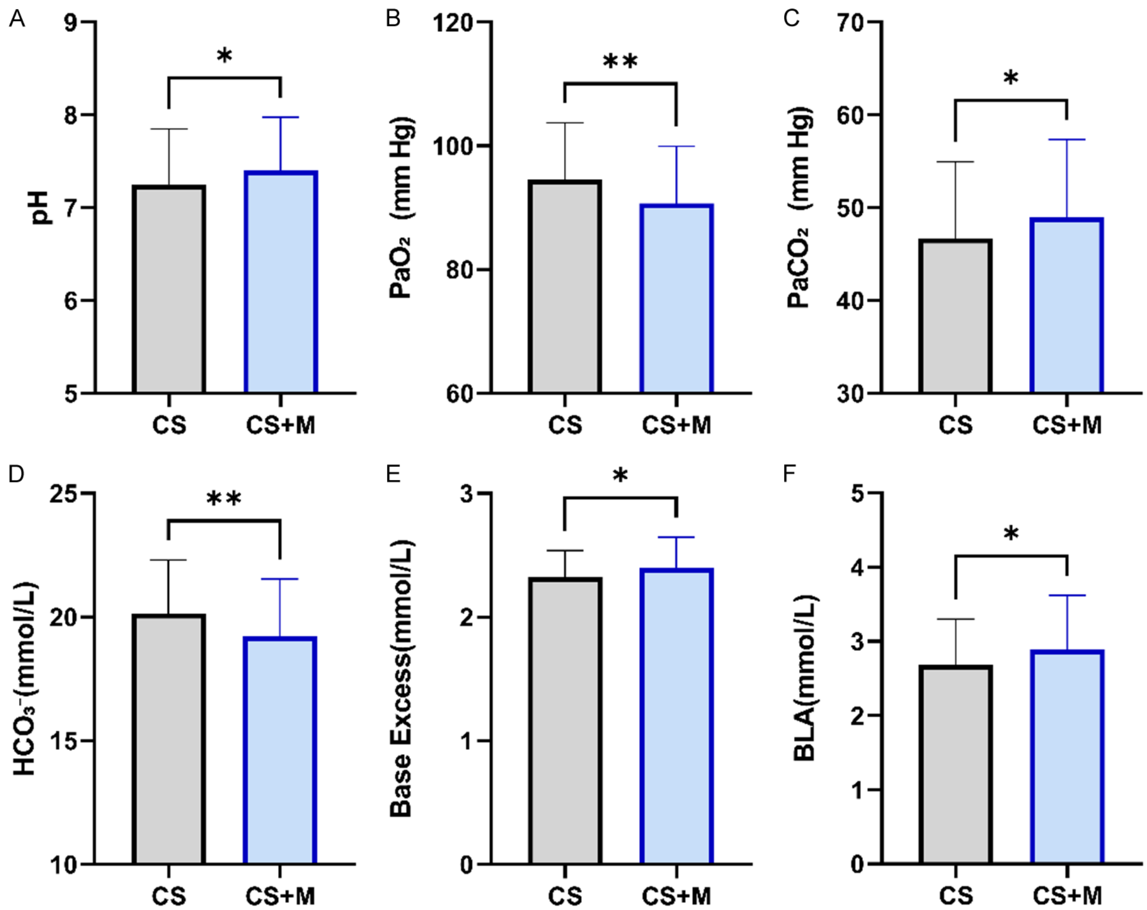

Figure 2. Comparison of umbilical artery blood gas and blood lactate between the two groups. A: pH; B: PaO_2 (mm Hg); C: $PaCO_2$ (mm Hg); D: HCO_3^- (mmol/L); E: Base Excess (mmol/L); F: BLA (mmol/L). *: $P < 0.05$; **: $P < 0.01$. CS: cesarean section; CS+M: cesarean section combined with myomectomy; PaO_2: partial pressure of oxygen; $PaCO_2$: partial pressure of carbon dioxide, HCO_3^-: bicarbonate; BLA: Blood lactate.

group (7.25 ± 0.60) (t = 2.060, P = 0.040; **Figure 2A**). PaO_2 was significantly lower (90.67 ± 9.25 mm Hg vs. 94.58 ± 9.14 mm Hg; t = 3.299, P = 0.001), while $PaCO_2$ was significantly higher (48.95 ± 8.41 mm Hg vs. 46.70 ± 8.27 mm Hg; t = 2.097, P = 0.037) in the CS+M group compared to the CS group (**Figure 2B**, **2C**).

For HCO_3^-, the CS group had higher levels at 20.16 ± 2.15 mmol/L versus 19.23 ± 2.32 mmol/L in the CS+M group (t = 3.255, P = 0.001; **Figure 2D**). Base excess (2.40 ± 0.25 mmol/L vs. 2.32 ± 0.22 mmol/L; t = 2.682, P = 0.008) and BLA level (2.89 ± 0.73 mmol/L vs. 2.68 ± 0.62 mmol/L; t = 2.403, P = 0.017) were significantly higher in the CS+M group compared to the CS group (**Figure 2E**, **2F**).

Postpartum depression and stress evaluation

The EPDS scores were significantly higher in the CS+M group (23.32 ± 2.38) than in the CS group (22.59 ± 2.51), indicating more severe postpartum depression symptoms (t = 2.304, P = 0.022) (**Figure 3A**). Preoperative PSS scores showed no significant difference between the groups (46.33 ± 2.12 vs. 46.23 ± 2.23; t = 0.347, P = 0.729) (**Figure 3B**). However, postoperative PSS scores were significantly lower in the CS+M group (41.68 ± 2.26) compared to the CS group (42.51 ± 2.15) (t = 2.917, P = 0.004; (**Figure 3C**), suggesting reduced perceived stress levels post-surgery in the CS+M group.

Comparison of postoperative quality of life between the two groups

Preoperative quality of life scores were similar between the CS+M group and the CS group across all domains (General Health, Social Functioning, Role-Emotional, Mental Health, Bodily Pain, Physical Functioning, Role-Physical,

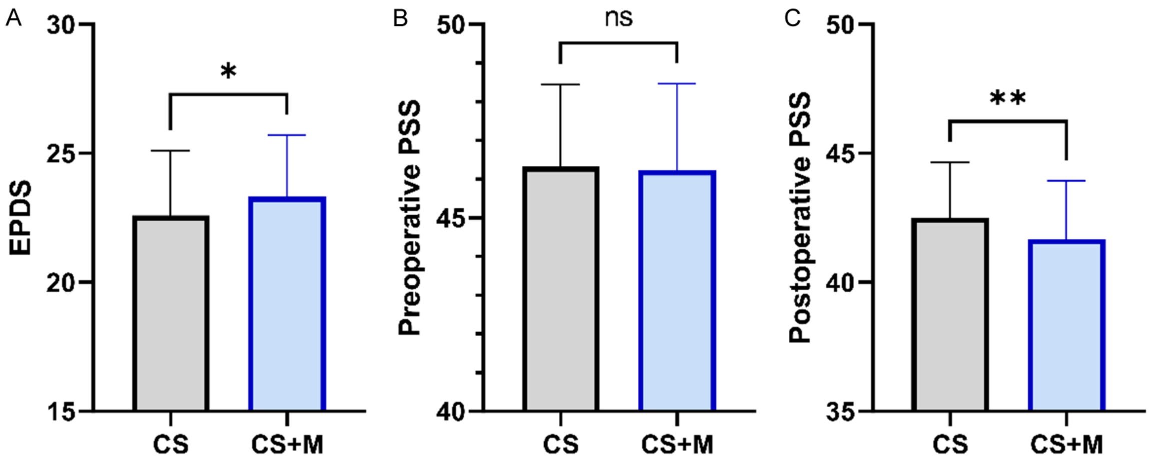

Figure 3. Assessment of EPDS and PSS scores. A: EPDE; B: Preoperative PSS; C: Postoperative PSS. Ns: no significant; *: $P < 0.05$; **: $P < 0.01$. CS: cesarean section; CS+M: cesarean section combined with myomectomy; EPDS: Edinburgh Postnatal Depression Scale; PSS: Perceived Stress Scale.

Table 5. Comparison of quality-of-life scores of patients before and after sections

Parameter	CS (n = 134)	CS+M (n = 109)	t	P
Preoperative				
General health	67.64 ± 8.47	67.27 ± 8.03	0.344	0.731
Social functioning	63.47 ± 7.35	64.15 ± 7.76	0.693	0.489
Role-emotional	70.07 ± 6.52	69.56 ± 6.55	0.601	0.549
Mental health	67.09 ± 6.61	67.14 ± 6.24	0.060	0.952
Bodily pain	65.44 ± 6.42	65.52 ± 6.39	0.095	0.925
Physical functioning	68.65 ± 6.45	68.19 ± 6.97	0.533	0.595
Role-physical	69.61 ± 7.85	69.03 ± 7.49	0.585	0.559
Vitality	66.41 ± 6.69	65.83 ± 6.93	0.663	0.508
Postoperative				
General health	72.12 ± 8.31	69.53 ± 8.25	2.424	0.016
Social functioning	71.56 ± 7.46	69.16 ± 7.44	2.491	0.013
Role-emotional	73.28 ± 6.42	71.25 ± 6.35	2.460	0.015
Mental health	72.35 ± 6.03	70.47 ± 5.81	2.453	0.015
Bodily pain	71.33 ± 7.16	69.25 ± 7.59	2.194	0.029
Physical functioning	73.42 ± 6.46	71.21 ± 7.25	2.512	0.013
Role-physical	72.53 ± 7.29	70.46 ± 7.33	2.198	0.029
Vitality	72.14 ± 6.18	70.33 ± 5.64	2.361	0.019

CS: cesarean section; CS+M: cesarean section combined with myomectomy.

and Vitality), with no significant differences observed ($P > 0.05$) (**Table 5**). These similarities provide a robust baseline for subsequent postoperative comparisons.

The general health score was significantly lower in the CS+M group compared to the CS group, with statistical significance (t = 2.424, P = 0.016) (**Figure 3**). Social functioning was higher in the CS group than in the CS+M group, reflecting a significant difference (t = 2.491, P = 0.013). Role-emotional and mental health scores were also higher in the CS group (t = 2.460, P = 0.015; t = 2.453, P = 0.015). Bodily pain scores were lower in the CS+M group versus the CS group, indicating more pain in the combined procedure (t = 2.194, P = 0.029). Physical functioning and role-physical were higher in the CS group (t = 2.512, P = 0.013; t = 2.198, P = 0.029). Vitality scores also favored the CS group over the CS+M group, with significance (t = 2.361, P = 0.019). These findings suggest that undergoing a CS alone was associated with better postoperative quality of life outcomes compared to when combined with myomectomy.

Discussion

In this study, we conducted a comprehensive comparative analysis of cesarean section (CS) combined with myomectomy (CS+M) versus elective myomectomy following CS in women with uterine fibroids during late pregnancy. The results offer unique insights into the clinical and physiological implications of these two surgical approaches. A key finding was that the CS+M was associated with longer surgical durations, greater blood loss, and delayed recovery.

The increased complexity of CS+M arises from the technical challenges of simultaneously performing neonatal delivery and fibroid excision [18]. Myomectomy during CS requires meticulous dissection and hemostasis, which substantially increases the risk of intraoperative hemorrhage [19]. The highly vascularized gravid uterus further amplifies this risk, complicating intraoperative management [20]. Large or subserosal fibroids may also impair uterine contractility after delivery, making hemostasis more difficult [21]. Although uterotonic agents such as oxytocin and carbetocin are routinely administered to facilitate contraction and reduce bleeding, their efficacy may be compromised in prolonged or anatomically complex procedures, which may explain the increased blood loss observed in the CS+M group [22].

The challenges of postoperative recovery reflected the additional complexity of combined procedures. Prolonged hospital stays and delayed recovery markers, such as lochia clearance and resumption to menstruation, may be attributed to the cumulative physiological stress of dual surgical interventions and the greater demands of wound healing [23, 24]. Each additional uterine incision requires extended healing time and increases susceptibility to complications such as infection, consistent with the higher incidence of wound infections observed in the CS+M group. Similarly, the increased rates of abdominal distension and intestinal obstruction may be linked to both surgical manipulation and altered intra-abdominal pressure during and after the procedure [25].

Furthermore, our findings also revealed group differences in lactation patterns. Insufficient lactation was more frequent in the CS+M group, likely related to the compounded physical stress from dual surgical interventions [26]. Stress-induced hormonal changes can impair lactogenesis, with delayed initiation of breastfeeding - often associated with prolonged recovery, further exacerbating this effect [27, 28]. These observations highlight the close interplay between physical recovery and psychological wellbeing, underscoring the broader physiological burden imposed by combined surgical procedures.

The influence of surgical approach on neonatal outcomes, as evidenced by Apgar scores and umbilical artery blood gas metrics, warrants further exploration. Although differences in Apgar scores were relatively small, they nevertheless suggest physiological impacts on neonates delivered via CS+M. Transient acid-base imbalances may reflect neonates' response to prolonged maternal surgery or surgical stress [29, 30]. These impacts, albeit moderate, could be associated with delayed postpartum stabilization, intraoperative fetal monitoring complications, or the influence of anesthetic agents [31].

Psychological wellbeing, assessed through the EPDS and PSS, also revealed group-specific differences. Mothers in the CS+M group exhibited higher higher EPDS scores, suggesting greater susceptibility to postpartum depressive symptoms. This may be linked to the compounded psychological burden of undergoing two major surgical procedures, heightened recovery demands, and the dual responsibilities of maternal recovery and neonatal care [32]. In contrast, lower PSS scores in the CS+M group may reflect adaptive coping mechanisms, a relative sense of relief following successful completion of complex surgery, or adjustment from previously elevated baseline stress levels [33].

Quality-of-life assessments provided clear evidence of the impact of surgical interventions on postpartum women. The CS group consistently reported higher scores across domains such as mental health, physical functioning, and vitality, indicating better postoperative recovery and adaptability. In contrast, the CS+M group reported lower scores, likely attributable to increased pain, reduced mobility, and impaired social functioning, which together intensified the perception of poorer quality of life.

Clinical implications of these findings highlight the importance of personalized treatment planning for patients requiring myomectomy during pregnancy. Careful selection of anesthesia and timely initiation of postoperative analgesia should be meticulously tailored to optimize recovery while minimizing stress impacts on maternal and neonatal outcomes. Moreover, enhanced psychological support and structured lactation counseling should be prioritized for CS+M patients to mitigate the compounded physical and emotional burdens of combined surgical interventions.

Further investigation is warranted to elucidate how specific fibroid characteristics, such as size, number, and location, affect outcomes across treatment modalities. Such stratifications may refine surgical algorithms and facilitate clinical decision-making, leading to more favorable maternal and neonatal outcomes [34, 35]. In addition, longitudinal follow-up studies assessing long-term maternal reproductive health and neonatal development are essential to provide a more comprehensive understanding of the lasting impacts of surgical interventions during late pregnancy.

This study has several limitations. First, its retrospective design may have introduced selection and information bias. Second, although the sample size was adequate, it may not fully represent the heterogeneity of the wider population, limiting generalizability. Third, detailed data on fibroid characteristics, including size, number, and location, were not consistently available, which may constrain interpretation of subgroup effects. Finally, the absence of long-term maternal and neonatal follow-up precluded evaluation of outcomes beyond the early postpartum period. Future prospective, multicenter studies with extended follow-up are needed to validate these findings and clarify the long-term differences between CS+M and CS.

Conclusion

In summary, while CS+M offers the practical benefit of a single surgical intervention, it is associated with increased perioperative risks and adverse impacts on maternal recovery, lactation, and neonatal outcomes. Clinical decision-making should be based on individual patient condition, symptomatology, and patient preferences. These findings underscore the importance of careful surgical planning and comprehensive counseling to optimize both maternal and neonatal health outcomes.

Disclosure of conflict of interest

None.

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