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Predictors of Adverse Outcomes after Myomectomy in Low-Resource Settings: A Prospective Analysis from Douala, Cameroon

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Abstract

Introduction: Uterine fibroids are the most common benign tumors in women of reproductive age and often require surgical management. Myomectomy, the reference conservative treatment, nevertheless remains associated with a high risk of postoperative complications in resource-limited settings. **Objective:** To identify predictive factors of unfavorable outcomes after myomectomy in a resource-limited context. **Methods:** A longitudinal observational study with prospective data collection was conducted among 124 patients operated in referral hospitals in Douala, Cameroon. Sociodemographic, clinical, and operative characteristics were collected. Factors associated with postoperative complications were analyzed using multivariate logistic regression. **Results:** The mean age of patients was 39 ± 6 years. Laparotomy was the main surgical approach (95.2%). Unfavorable outcomes were significantly associated with surgical indication for menorrhagia (OR = 2.60 [1.30 - 5.10]; p = 0.006), operative duration >120 minutes (OR = 3.10 [1.50 - 6.30]; p = 0.002), removal of more than five fibroids (OR = 1.80 [1.10 - 3.00]; p = 0.021), absence of preoperative staff consultation (OR = 3.87 [1.65 - 9.05]; p = 0.002), and surgical experience <5 years (OR = 4.17 [1.33 - 13.03]; p = 0.014). Age ≥ 40 years and non-use of a tourniquet were not significantly associated. **Conclusion:** In resource-limited settings, unfavorable outcomes after myomectomy are mainly determined by surgical complexity and organization of care. Systematic implementation of preoperative staff consultations, assignment of complex cases to experienced surgeons, and adoption of blood-sparing protocols could significantly reduce postoperative morbidity.

Keywords

Myomectomy, Unfavorable Outcomes, Predictors, Uterine Fibroids, Resource-Limited Settings, Cameroon

1. Introduction

Uterine fibroids are the most common benign tumors of the female genital tract, with an estimated prevalence ranging from 20% to 40% depending on the population [1] [2]. In sub-Saharan Africa, their frequency is particularly high, and they are often symptomatic, leading to menorrhagia, pelvic pain, obstetric complications, and infertility [3] [4]. These clinical manifestations impair quality of life and frequently justify gynecological care. Myomectomy, defined as the surgical removal of fibroids while preserving the uterus, is the treatment of choice for young women wishing to maintain their fertility [5]. It is one of the most commonly performed gynecological procedures in Cameroon [6]. However, this surgery is not without risk: reported adverse outcomes include major hemorrhage, infections, the need for blood transfusion, visceral injuries, and, more rarely, maternal deaths [7]-[9]. In resource-limited settings such as sub-Saharan Africa, these complications are exacerbated by the limited availability of safe blood products, restricted access to minimally invasive surgical techniques, and variable quality of postoperative monitoring [10] [11]. Identifying predictive factors of post-myomectomy complications is therefore crucial to improve surgical safety and guide prevention strategies. While several international studies have investigated myomectomy complications [12], prospective data specifically analyzing their determinants remain scarce in Africa in general, and in Cameroon in particular [13] [14]. In this context, our study aimed to identify predictive factors of unfavorable outcomes after myomectomy in hospitals in the city of Douala.

2. Methods

2.1. Study Type and Setting

We conducted a longitudinal observational study with prospective data collection over a one-year period, from January 1 to December 31, 2024, in five hospitals in the city of Douala, Cameroon: Laquintinie Hospital of Douala (HLD), Douala General Hospital (HGD), Douala Gyneco-Obstetric and Pediatric Hospital (HGOPED), Nylon District Hospital, and Deïdo District Hospital. These facilities included tertiary referral hospitals and district hospitals, thereby reflecting the diversity of surgical care settings for uterine fibroids.

2.2. Study Population

Included in this study were all women aged 20 years and above who underwent myomectomy between January 1 and December 31, 2024, in the selected hospitals,

and who had a complete and usable medical record including sociodemographic, clinical, operative, and postoperative data.

Excluded were patients operated on by hysteroscopy, those who had undergone major associated surgery (hysterectomy, concomitant cesarean section), as well as those with incomplete or unusable files or who refused to participate in the study.

2.3. Sample Size Calculation

The sample size was determined using Lorentz's formula:

$N = [Z^2 \times p(1-p)]/d^2$

N is the minimum sample size,

Z is the Z-statistic value for a 95% confidence level (1.96),

d is the degree of precision (0.09),

P is the rate of complications after laparotomic myomectomy reported by Moustapha B. et al. in two hospitals in Douala, 10.8% [15].

For d = 0.09, Z = 1.96, p = 0.5245

Numerical application: $N = [1.96 \times 1.96 \times 0.108\ (1 - 0.108)]/(0.09 \times 0.09) = 76$ patients.

2.4. Procedure

After obtaining administrative authorizations and institutional ethical clearance, the study was carried out as follows: recruitment took place in outpatient clinics and among patients hospitalized for myomectomy. Data were collected using a pre-established survey form that included sociodemographic, clinical, paraclinical, and therapeutic data. These data were collected prospectively through analysis of patients' medical records during hospitalization, direct interviews with hospitalized patients, and review of all operative reports. Subsequently, the technical forms were completed.

2.5. Variables Studied

- **Dependent variable:** occurrence of a postoperative complication (yes/no). Complications included hemorrhage requiring transfusion, wound infections, visceral injuries, surgical reintervention, and postoperative death.
- **Independent variables:**
  - *Sociodemographic*: age, marital status, educational level, occupation.
  - *Clinical*: medical history, surgical indications (menometrorrhagia, pelvic pain, infertility), parity.
  - *Surgical practice*: presence or absence of a preoperative staff consultation for validation of surgical indications, years of experience of the gynecologists who operated on patients.
  - *Perioperative*: surgical approach (laparotomy or laparoscopy), number and volume of fibroids removed, operative duration, estimated blood loss, blood loss quantified by visual estimation based on the number of soaked compresses and the volume collected in the suction jar, use of a tourniquet,

intraoperative transfusion.

2.6. Data Collection

Data were collected using a standardized, pre-tested form. Information was obtained from patients, medical records, operative reports, and immediate postoperative follow-up until discharge, corresponding to a minimum of 2 days for laparoscopy and 5 days for laparotomy in the case of uncomplicated evolution.

2.7. Statistical Analysis

Data were entered and analyzed using SPSS software version 26.0.

- Quantitative variables were described as means ± standard deviation.
- Qualitative variables were presented as frequencies and percentages.
- The association between independent variables and the occurrence of complications was assessed using the Chi-square test (or Fisher's exact test if necessary).
- Variables significant in bivariate analysis ($p < 0.20$) were introduced into a multivariate logistic regression model to identify independent predictive factors of unfavorable outcomes.
- A significance level of $p < 0.05$ was considered statistically significant.

2.8. Ethical Considerations

Authorization to conduct this study was obtained from the Institutional Ethics Committee of the University of Douala, with ethical clearance number 4867CEI-Udo/04/2025/T. Confidentiality and anonymity were ensured for all participants, all of whom also provided written informed consent.

3. Results

A total of 134 patients consulted for symptomatic fibroids, of whom 07 received medical or radical treatment, 03 had therapeutic abstention, and 124 underwent myomectomy either by laparotomy or laparoscopy (**Figure 1**).

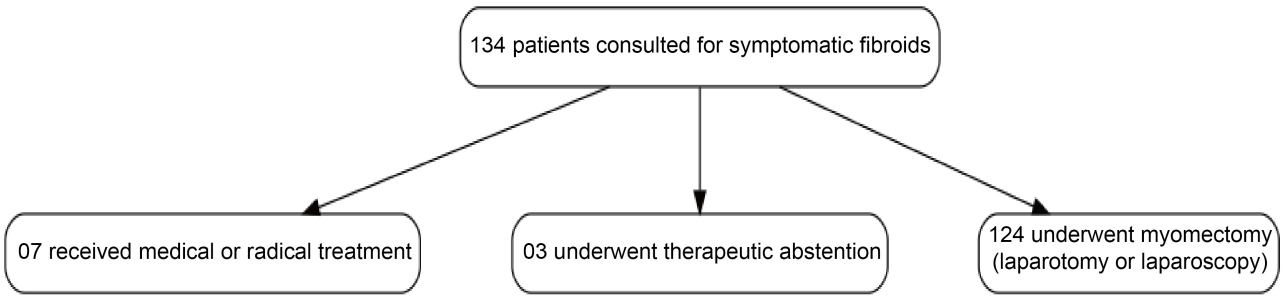

Figure 1. Flow diagram.

3.1. Sociodemographic and Clinical Characteristics

The mean age of operated patients was 39 ± 6 years, with a predominance in the

30–39 age group (46.0%), followed by women aged 40 years and above (37.9%). Women under 30 years accounted for only 14.5% of the sample. Regarding marital status, single women constituted the majority (66.9%), compared to 20.2% married women and 11.3% living in free union or other types of relationship. Concerning occupation, more than half of the patients (58.9%) were employed, while 41.1% were housewives or engaged in other activities. Higher education predominated (51.6%), followed by secondary (33.9%) and primary or none (14.5%). The most frequent surgical indications were menorrhagia and metrorrhagia (78.2% and 68.5%, respectively), followed by infertility (58.1%), and to a lesser extent, pelvic pain (27.4%) (Table 1).

Table 1. Sociodemographic and clinical characteristics of patients operated for myomectomy in Douala (N = 124).

Variables	Number (n)	Percentage (%)
Mean age (± SD)	39 ± 6 ans	–
< 30 years	18	14.5
30 - 39 years	57	46.0
≥40 years	47	37.9
Marital status		
Single	83	66.9
Married	25	20.2
Free union/others	14	11.3
Occupation		
Employed	73	58.9
Housewives/others	51*	41.1
Educational level		
Higher	64	51.6
Secondary	42	33.9
Primary or none	18*	14.5
Surgical indications		
Menorrhagia	97	78.2
Metrorrhagia	85	68.5
Infertility	72	58.1
Pelvic pain	34	27.4

3.2. Operative Characteristics of Patients Operated for Myomectomy in Douala

The surgical approach was largely dominated by laparotomy (95.2%), while laparoscopy was performed in only 4.8% of cases. A preoperative staff consultation had been held in 62.1% of cases. Most surgeries were performed by gynecologists

with more than five years of experience (84.7%). The number of fibroids removed varied: ≤3 in 31.5% of cases, 4 - 5 in 37.1%, and >5 in 31.5%, with a mean of 5 ± 3 fibroids. The mean operative time was 95 ± 28 minutes, with most surgeries lasting between 60 and 120 minutes (58.9%). A uterine tourniquet was used in 66.9% of procedures. Intraoperative blood loss was less than 500 ml in 62.1% of cases, between 500 and 1000 ml in 29.8%, and greater than 1000 ml in 8.1%. The mean blood loss was estimated at 540 ± 210 ml (Table 2).

Table 2. Operative characteristics of patients operated for myomectomy in Douala.

Variables	Number (n)	Percentage (%)
Surgical approach		
Laparotomy	118	95.2
Laparoscopy	6	4.8
Preoperative staff consultation		
Yes	77	62.1
No	47	37.9
Gynecologist experience		
<5 years	19	15.3
≥5 years	105	84.7
Number of fibroids removed		
≤3	39	31.5
4 - 5	46	37.1
>5	39	31.5
Mean (± SD)	5 ± 3 fibroids	–
Operative duration		
<60 minutes	25	20.2
60 - 120 minutes	73	58.9
>120 minutes	26	21.0
Mean (± SD)	95 ± 28 min	–
Tourniquet use		
No	41	33.1
Yes	83	66.9
Estimated blood loss		
<500 ml	77	62.1
500 - 1000 ml	37	29.8
>1000 ml	10	8.1
Mean (± SD)	540 ± 210 ml	–

3.3. Postoperative Complications after Myomectomy

The overall postoperative complication rate was 50%. Hemorrhage requiring

transfusion (19.7%) was the most frequent complication, followed by wound infections (13.1%) and pelvic or urinary infections (9.0%). Visceral injuries accounted for 4.1% of cases, while reoperations and deaths remained rare (2.5% and 1.6%, respectively) (Table 3).

Table 3. Postoperative complications after myomectomy in Douala.

Complications	Number (n)	Percentage (%)
Hemorrhage requiring transfusion	24	19.7
Wound infection	16	13.1
Pelvic / urinary infection	11	9.0
Visceral injury (intestinal / bladder)	5	4.1
Reoperation	3	2.5
Post-operative death	2	1.6
Total complications	61	50.0

3.4. Predictive Factors of Postoperative Complications

Multivariate analysis identified several factors independently associated with unfavorable outcomes after myomectomy. Patients who operated for menorrhagia had a significantly increased risk (OR = 2.60; 95% CI: 1.30 - 5.10; p = 0.006). Similarly, an operative duration greater than 120 minutes tripled the risk of complications (OR = 3.10; 95% CI: 1.50 - 6.30; p = 0.002). Removal of more than five fibroids was also predictive of unfavorable outcomes (OR = 1.80; 95% CI: 1.10 - 3.00; p = 0.021). In addition, the absence of preoperative staff consultation was a major risk factor, nearly quadrupling the risk of adverse events (OR = 3.87; 95% CI: 1.65–9.05; p = 0.002). Finally, limited surgeon experience (<5 years) was significantly associated with increased risk (OR = 4.17; 95% CI: 1.33 - 13.03; p = 0.014). Conversely, age ≥ 40 years and non-use of a tourniquet were not significantly associated with unfavorable postoperative outcomes (Table 4).

Table 4. Multivariate analysis of factors associated with postoperative complication.

Studied factors	OR (IC95%)	p-value
Menorrhagia as indication	2.60 (1.30 - 5.10)	**0.006**
Operative duration > 120 min	3.10 (1.50 - 6.30)	**0.002**
> 5 fibroids removed	1.80 (1.10 - 3.00)	**0.021**
Age ≥ 40 years	1.30 (0.70 - 2.50)	0.380
No tourniquet use	1.20 (0.70 - 2.20)	0.510
No preoperative staff consultation	3.87 (1.65 - 9.05)	**0.002**
Gynecologist's experience < 5 years	4.17 (1.33 - 13.03)	**0.014**

4. Discussion

In our population of 124 patients operated on in a resource-limited setting, unfa-

vorable outcomes after myomectomy were mainly determined by elements related to surgical complexity (menometrorrhagia, operative duration >120 minutes, removal of >5 fibroids) and organizational deficiencies (absence of preoperative staff briefing, limited surgeon experience). These findings confirm that beyond individual patient characteristics, the way care is planned and executed strongly conditions postoperative prognosis.

4.1. Surgical Complexity and Blood Loss

Prolonged operative time is a robust marker of complexity and is classically associated with increased blood loss, hypothermia, and team fatigue, all of which favor peri- and postoperative complications. Our results, showing a threefold increased risk for procedures lasting more than 120 minutes (OR = 3.10, 95% CI: 1.50 - 6.30, p = 0.002), are consistent with the literature highlighting the impact of operative time and fibroid burden on morbidity [1] [11] [15] [16]. Similarly, removal of more than five fibroids also increased the risk of adverse outcomes (OR = 1.80, 95% CI: 1.10 - 3.00, p = 0.021), probably due to the multiplication of myometrial incisions and hemostatic maneuvers, as documented in recent series and technical analyses [11] [17] [18].

4.2. Blood-Sparing Measures: Evidence and Pragmatism

The use of multimodal blood-sparing strategies is now supported by recent reviews and trials. Tranexamic acid (TXA) has demonstrated its ability to reduce blood loss and the need for transfusion during myomectomy, and several recent meta-analyses support its prophylactic intraoperative use [8] [10]. Local infiltration with vasopressin also reduces bleeding but requires caution and dilution as cardiovascular complications have been reported [12] [13]. In our context, the lack of significant association between non-use of the tourniquet and adverse outcomes suggests that the effectiveness of a tourniquet alone may be limited if not integrated into a global hemostatic protocol (TXA, meticulous closure, warming, transfusion plan) [8] [11]. Systematic adoption of a simple, reproducible, low-cost protocol (prophylactic TXA dose, diluted vasopressin if available, stepwise hemostasis control) thus appears to be a pragmatic, high-yield intervention.

4.3. Organization and Operator Effect

The absence of a preoperative staff briefing significantly increased the risk of adverse outcomes (OR = 3.87, 95% CI: 1.65 - 9.05, p = 0.002). This finding is consistent with data highlighting the importance of surgical briefings and checklists in improving communication, anticipating needs (blood, equipment), and team coordination [19] [20]. Establishing a standardized preoperative staff meeting before any myomectomy even a brief one (review of imaging, hemostatic plan, transfusion availability, role distribution) represents a low-cost, high-impact structural intervention in our settings. Furthermore, the strong effect associated with limited surgical experience (<5 years) (OR = 4.17, 95% CI: 1.33 - 13.03, p = 0.014) underscores the importance of the learning curve for this technically demanding sur-

gery; this supports assigning complex cases to senior operators, or at least implementing a system of cooperation/mentorship during high-risk interventions [11] [18].

4.4. Menometrorrhagia Indication and Preoperative Optimization

Myomectomies performed for menometrorrhagia are often accompanied by preexisting anemia and increased uterine vascularization, which raise perioperative vulnerability. The significant association observed (OR = 2.60) calls for preoperative optimization (iron supplementation, transfusion planning, consideration of medical alternatives when possible) and rigorous triage of the surgical approach [5] [15]. When laparoscopy is feasible and skills are available, minimally invasive approaches reduce bleeding and hospital stay; however, these techniques are restricted to selected cases and require appropriate equipment and expertise [11] [14] [18].

4.5. Practical Implications and Actionable Recommendations

Based on our results and the literature, we propose five priority and feasible measures: (1) Mandatory preoperative briefing for all complex myomectomies; (2) Assignment of complex cases (≥5 fibroids, large uterus) to experienced teams or dual operators; (3) Standardized blood-sparing protocols (prophylactic TXA, diluted vasopressin if available, intraoperative warming, transfusion plan); (4) Thresholds for intraoperative reassessment (strategy revision at 90 - 120 min); (5) Preoperative hematological optimization for patients with menometrorrhagia [8] [10]-[12] [19] [20].

4.6. Strengths and Limitations

Strengths: A multicenter study conducted under real-world resource-limited conditions, with multivariate analysis allowing identification of modifiable organizational and technical levers.

Limitations: Limited sample size, absence of precise cumulative volumetric measurements of fibroids, and reliance on intraoperative visual estimates of blood loss. These limitations temper generalizability but do not diminish the operational relevance of the recommendations.

5. Conclusion

Our results show that unfavorable outcomes after myomectomy are less the consequence of an isolated patient factor than the result of a conjunction of technical complexity and organizational shortcomings. The systematic implementation of preoperative briefings, blood-sparing protocols, and a case assignment policy would likely reduce surgical morbidity significantly in resource-limited settings.

Authors' Contributions

All authors contributed to the development of this work.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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