ORIGINAL RESEARCH ARTICLE

Intrauterine adhesions on second-look hysteroscopy after myomectomy with endometrial cavity breach: incidence and risk factors in a population in Kinshasa

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Abstract

Intrauterine adhesions are defined as abnormal attachment of the uterine cavity walls and are one of the main causes of infertility worldwide. Myomectomy can cause endometrial cavity breach and lead to postoperative intrauterine adhesions. The aim of this retrospective study was to determine the incidence and risk factors of intrauterine adhesions after myomectomy with endometrial cavity breach, including all patients that underwent myomectomy with endometrial cavity breach and second-look hysteroscopy, from January 2020 to December 2024. The incidence of intrauterine adhesions was 12.7%. History of abortion (p=0.015; aOR=6.9) and involvement of both uterine walls (p=0.000; aOR=27.3) emerged as risk factors. In conclusion, history of abortion or involvement of both the anterior and posterior uterine walls in patients undergoing myomectomy are risk factors for intra-uterine adhesions. Attention should then be paid to absolutely prevent this condition when dealing with these patients. *(Afr J Reprod Health 2026; 30 [3]: 51-58).*

Keywords: adhesions; breach; endometrium; hysteroscopy; myomectomy

Résumé

Les synéchies utérines sont définies comme une adhérence anormale des parois utérines et constituent l'une des principales causes d'infertilité dans le monde. La myomectomie peut provoquer une effraction endométriale et entraîner des adhérences intra-utérines postopératoires. L'objectif de cette étude rétrospective était de déterminer l'incidence et les facteurs de risque des synéchies utérines après une myomectomie. Elle a inclus toutes les patientes ayant bénéficié d'une myomectomie avec effraction endométriale et d'une hystéroscopie post-opératoire de contrôle entre janvier 2020 et décembre 2024. L'incidence des synéchies utérines était de 12,7 %. Les antécédents d'avortement (p = 0,015 ; aOR = 6,9) et l'atteinte des deux parois utérines (p = 0,000 ; aOR = 27,3) sont apparus comme des facteurs de risque. En conclusion, les antécédents d'avortement ou l'atteinte des parois utérines antérieure et postérieure chez les patientes subissant une myomectomie sont des facteurs de risque des synéchies utérines. Il convient donc de prévenir absolument les synéchies chez les patientes à risque. *(Afr J Reprod Health 2026; 30 [3]: 51-58).*

Mots-clés: Synéchies ; effraction ; endomètre ; hystéroscopie ; myomectomie.

Introduction

Intrauterine adhesions (IUA) are defined as abnormal attachment of the uterine cavity walls (Figure 1), which may be partial or complete, occurring non-physiologically following an endometrial trauma.[1] In many cases, they are asymptomatic, but some clinical manifestations include hypomenorrhea, amenorrhea, chronic pelvic pain, obstetrical complications and infertility.[2,3] IUA are one of the leading causes of secondary infertility worldwide, occurring in nearly 43% of cases.[4]

Conclusive diagnosis is currently made by hysteroscopy, although hysterosalpingography, hysterosonography and magnetic resonance imaging (MRI) can also diagnose the condition.[3,4]In both images, the black arrow (➚) shows dense IUA joining the two uterine walls (anterior and posterior)

Figure 1: Intrauterine adhesions on hysteroscopy

The exact prevalence or real incidence of IUA is unknown, and may be underestimated because of a lack of symptoms or the presence of unspecific symptoms, but it varies between 1% and 50%.[2,3] Capmas *et al.* (France), reporting on 2,402 diagnostic hysteroscopies, found that IUA were the third most common pathology in 17.7% of cases, after uterine fibroids and endometrial polyps.[5] In their series of 1,022 cases, Nzau-Ngoma *et al*. (Democratic Republic of Congo) noted the same sequence; IUA in the third position with a frequency of 14.3%.[6]

There are several risk factors for IUA, including infectious and traumatic factors. Traumatic factors are the most common, and any procedure resulting in the endometrial cavity breach can be the cause of IUA. Myomectomy is one of the most commonly performed gynecological procedures worldwide in women of reproductive age.[1-4] Several studies worldwide have evaluated the risk of IUA after myomectomy with the endometrial cavity breach. Bortoletto *et al.* (USA) reported 9.3 % of IUA in patients who underwent myomectomy with endometrial cavity breach whereas, in India, Bhandari *et al.* found a higher incidence of 21.6%.[7,8]

Considering the consequences of IUA on fertility, it is important to prevent their occurrence, and several methods are used.[1] However, the effectiveness of all these methods remains quite variable depending on the setting and the type of study carried out.[4]

Given the lack of formal evidence of the effectiveness of the usual preventive methods, postoperative hysteroscopy, known as second-look hysteroscopy, is recommended to assess the anatomical result and also to treat early intrauterine adhesions. [9-11]

IUA are not found in all patients who have undergone myomectomy with endometrial cavity breach. However, other factors could predispose some patients to this complication. Knowledge of these risk factors could improve the prevention of post-myomectomy IUA.

Myomectomy with the endometrial cavity breach presents a risk of IUA that, apart from any preventive method, has not yet been evaluated in the Democratic Republic of Congo (DRC), and few studies have been conducted on black people, who are at higher risk of fibroids and its burden on reproductive health.[12,13] The objective of this study is to determine the incidence and risk factors for IUA after myomectomy in a cohort of DRC women in order to identify patients at-risk who should be selected for appropriate preventive methods.

General objective

To determine the risk factors associated with intrauterine adhesions after myomectomy with endometrial cavity breach.

Specific objectives

The specific objectives of this study were to describe the sociodemographic, clinical and surgical characteristics of patients who underwent myomectomy with endometrial cavity breach; to determine the incidence of intrauterine adhesions in these patients; and to identify the factors associated with this condition.

Methods

This study was conducted at two medical facilities of the DAEMMI Berlinde Foundation called EndoConception Clinics, located in the city of Kinshasa, in DRC.

These facilities were selected because of the practice of systematic second-look hysteroscopy in patients undergoing myomectomy with endometrial cavity breach. The study period was from January 2020 to December 2024. The study consisted of medical records of all patients

underwent myomectomy with the endometrial cavity breach during the research period.This was a retrospective case series. It included patients who had pre- and post-operative hysteroscopy performed. Cases with postoperative pelvic infection (endometritis, peritonitis) prior to second-look hysteroscopy, and those who presented with IUA at pre-operative hysteroscopy were excluded. The second-look hysteroscopy was performed between the fourth and eighth postoperative week.The considered measurements of fibroids were from ultrasound and four machines were used throughout the period of study: Mindray Neuwa i9, Mindray Z60, SonoScape S2 and Toshiba Xario SSA-660A. The size of the endometrial cavity breach was estimated subjectively by the surgeon. All the second-look hysteroscopy were performed by vaginoscopy using a rigid Bettocchi hysteroscope (Karl Storz) with a 30°, 2.9 mm scope and the outer sheath diameter of 5 mm. Normal saline solution was the distending medium.

Operational definitions

Endometrial cavity breach was defined as an accidental or intended opening of the uterine cavity during enucleation of a fibroid. In that regard, hysteroscopic myomectomy was automatically considered as leading to an endometrial cavity breach. The severity of IUA was assessed according to the classification of the American Society for Reproductive Medicine, ASRM (formerly the American Fertility Society, AFS).[3]

Data analysis

The data were recorded and analyzed using SPSS software (Statistical Package for the Social Sciences, version 21.0). Qualitative variables are presented as proportions, quantitative variables as mean and standard deviation or median and interquartile range (IQR), as appropriate. The Kolmogorov-Smirnov test was used to determine the distribution normality of quantitative data. To compare proportions, the Chi-Square and Fisher's Exact tests were used, where necessary. Logistic regression analysis was used for identification of risk factors. Statistical significance was considered for a p-value <0.05.

Ethical considerations

This study was approved on April 11, 2025 by the Institutional Review Board (IRB) of the Kinshasa School of Public Health and the approval letter is referenced by the number ESP/CE/32B/2025.The database was anonymous and was treated and analyzed confidentially.All IUA diagnosed at second-look hysteroscopy were treated with the patient's consent.

Results

Sociodemographic features

A total of 134 patients were included. The mean age was 39 ± 5 years, and 70% were between 35 and 45 years' old.

Clinical features

In Table 1, showing obstetrical, gynecologic and surgical history of patients, it was found that 74.6% of them were nulliparous, and 29% had previously undergone a myomectomy.

Operative features

As shown in Table 2, the desire for childbearing associated with fibroid was the primary indication for myomectomy (53.7%), followed by abnormal uterine bleeding (32.8%).

Hysteroscopy was the most commonly used surgical approach for myomectomy, accounting for 50%, followed by laparotomy (26.1%), and laparoscopy (14.9%). The median number of removed fibroids was 3 (IQR =7), with a maximum of 55. The incidence of postoperative intrauterine adhesions was 12.7%. Regarding their severity, IUA were mild in most cases (82.4%).

Risk factors

In univariate analysis (Table 3), the occurrence of IUA was significantly associated with history of abortion (p=0.000), the largest submucosal fibroid ≥ 40 mm (p=0.019), the total size of break-in ≥ 5 cm (p=0.005), and involvement of both uterine walls simultaneously (p=0.000).

Table 1 : Obstetrical, gynecological and surgical history of patients

Variables	n (%)
Parity	n=134 (%)
0	100 (74.6)
1	15 (11.2)
2-3	11 (8.2)
≥ 4	8 (6.0)
Gravidity	n=134 (%)
0	56 (41.8)
1	29 (21.6)
2-3	30 (22.4)
≥ 4	19 (14.2)
Number of Abortion/miscarriage	n=134 (%)
0	70 (52.2)
1-2	50 (37.3)
≥ 3	14 (10.5)
Previous uterine surgery	n=134 (%)
None	84 (62.7)
Myomectomy	39 (29.1)
Curettage	8 (6.0)
Cesarean section	4 (3.0)
Intrauterine manual aspiration	2 (1.5)
Operating hysteroscopy	2 (1.5)
Polypectomy	1 (0.5)

Table 2 : Features of myomectomy

Variables	n (%)
Indication for myomectomy	n=134 (%)
Desire for childbearing	72 (53.7)
Abnormal uterine bleeding	44 (32.8)
Chronic pelvic pains	11 (8.2)
Feeling of pelvic mass	5 (3.7)
recurrent miscarriages	2 (1.5)
Approach	n=134 (%)
Hysteroscopy	67 (50.0)
Laparotomy	35 (26.1)
Laparoscopy	20 (14.9)
Laparohysteroscopy	10 (7.5)
Vaginal	2 (1.5)
Number of enucleated fibroids	n=130 (%)
< 10	102 (78.5)
10 to 20	11 (8.5)
> 20	17 (13.1)
Postoperative IUA	n=134 (%)
Yes	17 (12.7)
No	117 (87.3)
Severity of IUA (ASRM)	n=17 (%)
Stage 1 (mild IUA)	14 (82.4)
Stage 2 (moderate IUA)	3 (17.6)
Stage 3 (severe IUA)	0 (0.0)

Table 3 : Occurrence of intrauterine adhesions according to clinical and operating characteristics

Variables	Occurrence of intrauterine adhesions		p
Nulliparity (n=134)	Yes (%)	No (%)	
Yes	16 (16.0)	84 (84.0)	0.070*
No	1 (2.9)	33 (97.1)	
Age of patients (n=134)			
≤ 35 yo	4 (10.8)	33 (89.2)	0.780*
> 35 yo	13 (13.4)	84 (86.6)	
Previous myomectomy (n=134)			
Yes	0 (0.0)	11 (100.0)	0.336*
No	5 (12.8)	34 (87.2)	
History of abortion (n=134)			
Yes	9 (37.5)	15 (62.5)	0.000*
No	8 (7.3)	102 (92.7)	
History of miscarriage (n=134)			
Yes	14 (15.2)	78 (84.8)	0.267
No	3 (7.1)	39 (92.9)	
Diameter of the largest submucosal fibroid (n=109)			
< 40 mm	7 (9.3)	68 (90.7)	0.019
≥ 40 mm	9 (26.5)	25 (73.5)	
Total size of break-in (n=130)			
< 5 cm	9 (8.6)	96 (91.4)	0.005*
≥ 5 cm	8 (32.0)	17 (68.0)	
Uterine walls affected by the breach (n=128)			
One wall	8 (7.1)	104 (92.9)	0.000*
Both walls	9 (56.3)	7 (43.8)	

*Fisher's Exact test

Table 4 : Factors associated with postoperative IUA

Associated factors	p	aOR	CI (95%)	
			Inferior	Superior
History of abortion	0.015	6.860	1.443	32.603
Diameter of the largest submucosal fibroid ≥ 40 mm	0.251	2.732	0.492	15.182
Total size of the breach ≥ 5 cm	0.478	1.958	0.306	12.513
involvement of both uterine walls	0.000	27.314	5.192	143.691

In logistic regression analysis as shown in Table 4, history of abortion (p=0.015; aOR=6.9) and involvement of both uterine walls (p=0.000; aOR=27.3) emerged as risk factors of IUA, multiplying the risk by 7 and 27 respectively.

Discussion

In this study, the incidence of postoperative IUA was 12.7%, very close to the 13% found by Faye Dieme *et al.* in Senegal.[11] However, it is higher than that reported by Bortoletto *et al.* in USA (9.3%).[7] The low incidence in Bortoletto's study may be explained by the fact that some patients (3%) benefited from preventive methods (hormones and intra-uterine balloon) before undergoing second-look hysteroscopy. Finally, the incidence found in the present study is far lower than that found by Laganà *et al.* in Italy (19.4%).[14] The high incidence in the Laganà study may be due to failure to perform preoperative hysteroscopy in this study. Patients with preoperative IUA were therefore not excluded. History of abortion was an identified risk factors of IUA after myomectomy (p=0.015; aOR=6.9) . It should be noted that since the study was a retrospective, the method used for the abortion was

not always mentioned in the medical records whether it was by medication, curettage or manual intrauterine aspiration. However, abortion by curettage may still dominate, as it is still one of the most commonly used methods, as described by Mukendi *et al.* in their study on complications of unsafe abortion in Lubumbashi, DRC.[15] Abortion can weaken the endometrium and provide synergy to the trauma due to endometrial cavity breach at the time of myomectomy. Especially in the environment where this study was conducted, many abortions are still performed by curettage, and this is not always reported by patients. This weakening of the endometrium occurs through two mechanisms. One is the endometrial atrophy caused by previous curettages.[16,17] A new traumatic lesion on the endometrium in a context of atrophy would considerably increase the risk of post-myomectomy IUA, since the endometrium does not have all its regenerative capacities. Secondly, chronic endometritis is one of the most frequent complications of surgical abortions, especially in the case of retention of trophoblastic debris.[15]

Another risk factor is the involvement of both uterine walls (p=0.000; OR=27). The endometrial injury, due to surgery initiates inflammation with fibrinous exudate and fibrin formation. Fibrin results from coagulation cascade activation, resulting in the formation of thrombin that triggers conversion of fibrinogen into fibrin.[18] The organization of the fibrin gel matrix is of major importance in adhesion formation. This matrix forms in several steps, beginning from fibrinogen to fibrin monomer, then to soluble fibrin polymer, and finally becomes insoluble fibrin polymer.[19] This last product interacts with proteins, including fibronectin, to form the fibrin gel matrix otherwise known as the extracellular matrix (ECM). This ECM can still be completely degraded by the proenzymes of matrix metalloprotease (MMP), leading to normal healing.[18] Generally, if fibrinolysis does not occur within seven days of the injury, the temporary fibrin matrix persists and gradually becomes organized with collagen-secreting fibroblasts. The balance between fibrin deposition and degradation is crucial in determining normal endometrium tissue healing or adhesion formation. If fibrin is completely degraded, normal endometrium tissue healing may occur.[18,20] In contrast, incompletely degraded fibrin may serve as a scaffold for fibroblasts and capillary in growth to form adhesions.[18,20]

When the anterior and posterior uterine walls are both injured and the lesions face each other, there is a high risk of postoperative IUA.[21] This can be explained essentially by two mechanisms. Two damaged surfaces coming into apposition while covered with fibrin gel matrix may form an adhesion by “fibrin bridges”. fibrin establishes bridges between the injured surfaces. These bridges will be colonized by fibroblasts and myofibroblasts and will therefore persist even during the remodeling process. Once the fibrin bridge is organized into collagen, it becomes a more solid and fibrous adhesion.[2,3,22,23] Another mechanism is molecular co-stimulation. The proximity of the injured surfaces allows a higher level of paracrine communication of pro-fibrotic factors such as TGF-β (Transforming Growth Factor Beta) and inflammatory cytokines, reinforcing the bilateral fibrotic response. [2,3,22,23].

Study strengths and limitations

This study has several strengths, including being among the first in Africa to assess, using hysteroscopy, the risk of IUA after myomectomy with endometrial cavity breach. And highlighting second-look hysteroscopy, which is now recommended for postoperative control after myomectomy with endometrial cavity breach.However, a limitation of this study is its retrospective nature. The fact that the data were collected beforehand would not have allowed for the precise collection of all the desired variables.

Conclusion

History of abortion or involvement of both the anterior and posterior uterine walls in patients undergoing myomectomy are risk factors for intra-uterine adhesions.The main strength of this study lies in highlighting the importance of second-look hysteroscopy which is a new recommended postoperative control strategy. However, its retrospective nature remains a limitation, as it did not allow for exhaustive and accurate collection of all necessary variables. Despite this constraint, the

results obtained reinforce the clinical relevance of second-look hysteroscopy in this specific surgical context. One of the implications should be the standardization of postoperative control hysteroscopy for all patients with endometrial cavity breach, especially those with the identified risk factors.

Conflict of interest

Authors declare no conflict of interest regarding this research.

Contribution of authors

Esaïe Muanda-Mbaki and Emmanuel Nzau-Ngoma conceptualized this study. Esaïe Muanda-Mbaki and Christian Ndesanzim conducted the literature review. Esaïe Muanda-Mbaki, Amos Kusuman and Jules Odimba collected and organized the data. Esaïe Muanda-Mbaki and Emmanuel Nzau-Ngoma worked on the data analysis and interpretation of results. All authors contributed to the discussion of the findings. Esaïe Muanda-Mbaki and Damien Mamanisini worked on the final redaction. All authors read and approved the final manuscript

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