# Effect of myomectomy on endometrial cavity: A prospective study of 51 cases

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Received: 28.09.2015
Review completed: 28.12.2015
Accepted: 12.04.2016

**Access this article online**
Quick Response Code:

Website: www.jhrsonline.org

DOI: 10.4103/0974-1208.183509

## ABSTRACT

**CONTEXT:** Fibroids are the most common tumors of the uterine cavity. Most of them are diagnosed during the reproductive age when the fertility is an important concern for the female. However, complications can occur after removal of fibroid (myomectomy) too for future pregnancy. Though myomectomy has been sighted as a cause of intrauterine adhesions data regarding the effect of myomectomy on endometrial cavity is lacking. **AIMS:** Evaluate the incidence of intrauterine adhesion formation after myomectomy and to identify the associated factors. **MATERIALS AND METHODS:** In this prospective observational study, hysteroscopy was done in 51 infertile patients who had undergone myomectomy 3 months before in a tertiary care center from 2012 to 2015. The presence of intrauterine adhesions noted on hysteroscopy was investigated on the basis of size, number, location and type of fibroid removed, along with intraoperative breach of the uterine cavity. **STATISTICAL ANALYSIS:** Chi-square test was used for the calculating significant difference in frequency of discrete variables in two groups. $P < 0.05$ was considered significant. **RESULTS:** Intrauterine adhesions were seen in 11 out of 51 (21.57%) cases. No significant relationship between intrauterine adhesions and type, size or number of fibroid was observed. No statistical difference in the rate of adhesion formation was seen irrespective of breach of the uterine cavity during myomectomy. **CONCLUSION:** Intrauterine adhesion formation after myomectomy is not related to the type of surgery or the nature of fibroid. However, in all cases desiring fertility postoperative hysteroscopy is highly recommended to diagnose and treat these adhesions early.

**KEY WORDS:** Endometrial lining, intrauterine adhesions, myomectomy

## INTRODUCTION

Uterine fibroids are the most common benign tumors of the uterus. Fibroids are considered to be solely responsible for impaired fertility in 2–3% of cases of infertility.[1,2] Minimally invasive myomectomy by hysteroscopy or laparoscopy, as opposed to hysterectomy, is the prefered surgical procedure for patients who wish to preserve fertility. The advantages of the laparoscopic approach against laparotomy are well established.[3] Although the efficacy of myomectomy *per se* on restoring fertility has never been proven by a randomized clinical trial, fibroids are held responsible for infertility in various studies.[4] The size, number, and location of these fibroids affect women's fertility as a result of distortion of the endometrial cavity, which causes abnormal endometrial receptivity and hormonal milieu.[5] The effect of fibroid on endometrial receptivity has been the subject of numerous studies.[6] The exact mechanism by which fibroids affect endometrial receptivity and the role of myomectomy, if any in improving it is still a matter of debate. It is however beyond doubt that myomectomy in itself being a major invasive procedure runs the risk of damage to uterine myometrium as well as endometrium.

Intrauterine trauma, especially to the basal layer of endometrium is responsible for



**How to cite this article:** Bhandari S, Ganguly I, Agarwal P, Singh A, Gupta N. Effect of myomectomy on endometrial cavity: A prospective study of 51 cases. J Hum Reprod Sci 2016;9:107-11.

intrauterine adhesions. Very few previous studies[7,8] have mentioned the possible role of myomectomy in causing intrauterine adhesions. In the preservation of uterus for the purpose of future fertility, it is essential to also understand the impact of myomectomy on endometrium and thereby on implantation.

The purpose of the present study is to evaluate the frequency of uterine adhesions following myomectomy and the impact of number, size, and location of fibroid and intraoperative breach of the endometrial cavity on the same.

## MATERIALS AND METHODS

This prospective study was conducted in the Department of Reproductive Medicine and Surgery, of a tertiary care center from 2012 to 2015. Infertile patients requiring myomectomy prior to *in vitro* fertilization (IVF) were considered for the study. Patients were excluded from the cohort in the presence of any of the following (1) presence of any other uterine anomaly (2) history of previous uterine surgery. (3) The presence of intrauterine adhesions prior to myomectomy.

The preoperative patient profile including ultrasonography findings and details of type of fibroids, size, location, and number were recorded. Sonography was performed by a single experienced operator (Pallavi Agarwal) on IU-22 (Phillips) with a transvaginal probe 5 Hz or a transabdominal probe 3-5 Hz. Fibroids were classified according to the International Federation of Gynecology and Obstetrics classification system and the location as described on the transvaginal scan. Patients with a hybrid of fibroid types (i.e., both intramural [IM] and subserosal [SS] fibroids) were placed into the IM category, and patients with both submucous (SM) and other fibroids were placed into the SM category. The single largest diameter of fibroid was measured to note size.

Myomectomy was done by a single operator (Shilpa Bhandari). The laparoscopic approach was used in cases of IM and subserous fibroids, while hysteroscopic myomectomy was done in submucous fibroids. Hysteroscopy was performed intraoperatively in order to determine the type of myoma and detect the intrauterine pathology, if any. Concerning closure of myoma bed two-layer closure was done with vicryl 1/0 (polyglactin 9467; Ethicon, Neuilly, France). When uterine cavity was opened, the defect was closed separately. Injecting methylene blue transcervically identified uterine defect. Patients were given a high dose of oral contraceptive pills in dose of ethinyl estradiol (50 mg), to prevent spontaneous conception for a period of 1–3 months.

Three months after myomectomy, all patients were subjected to diagnostic hysteroscopy in their postmenstrual phase. Findings of hysteroscopy, especially presence of any adhesions were noted and graded as mild, moderate, and severe based on extend and type of adhesions found on hysteroscopy and according to following Table 1.[9]

Eventually, the occurrence rate and severity of intrauterine adhesions and its relationship with type (SS, IM, and submucous), size, and number of myoma and also the opening condition of endometrium were investigated. Statistical analysis was done using Chi-square test. A $P < 0.05$ was considered significant.

No specific approval for this study was required from the Institutional Ethical Committee as the technique used was standard surgical procedure and hysteroscopy is routinely performed for all patients undergoing IVF at our center. However, detailed consent was taken from all patients for operative procedures.

## RESULTS

A total of 51 patients were considered in the study. The mean age of participants was 32.76 ± 5.26 years. Most of the participants (37, 72.55%) were cases of primary infertility. Of the 14 patients of secondary subfertility, 5 had previous live births while 2 had more than 3 abortions, and rest[7] had 1–3 abortions. The patient profile is summarized in Table 2. Thirty-one (60.78%) were solitary fibroids and 78.43% were IM. The average single largest diameter was 7.58 cm.

Of the 51 patients who underwent myomectomy, intrauterine adhesions were observed in the consequent hysteroscopy in 11 cases (21.57%). Of these 11 adhesion cases, mild adhesions were noted in seven cases, while moderate adhesions were present in three cases. Severe type of adhesion was observed in only one patient.

When the type of fibroid (IM, submucous, or subserous) was considered, we observed that in cases of submucous fibroids (undergoing hysteroscopic myomectomy) postoperative intrauterine adhesions were seen in 40% of cases. No significant association of type of fibroid with postoperative intrauterine adhesion was observed [Table 3].

In the present case series [Table 3], seven patient had fibroids >10 cm. The incidence of intrauterine adhesion formation is highest (28.57%) in this group when compared to cases where fibroid was <10 cm. The percentage of intrauterine adhesions was also higher than the average in cases with fibroid >10 cm. However, the difference in the rate of adhesion formation in different groups based on single largest diameter does not reach statistical significance.

Patients with submucous fibroid were not considered when an intraoperative breach of the endometrial cavity was considered to investigate the presence of postoperative intrauterine adhesions. We also did not observed any association of degree of severity of adhesion with the cavity breach [Table 3].

Majority of the fibroids in our series were solitary. The incidence of intrauterine adhesions was highest in cases with more than five fibroids removed during the surgery (50%). However, no significant difference in the incidence of adhesion was observed in groups according to numbers of fibroids present [Table 3].

Table 3 shows hysteroscopy findings according to SM and IM group. No significant difference was observed in terms of degree of adhesion, location of fibroids, size of fibroids, and presence of cavity breech in two groups [Table 4].

## DISCUSSION

Myomectomy causes trauma due to visceral peritoneal incision, opening of myometrium, removal of fibroid, and closure of muscle margin by suture. This tissue trauma leads to classical inflammatory reaction and either a regenerative response or a fibrotic response for tissue healing. The over all risk of myomectomy is low, but the heterogeneity of fibroid and the variability in surgical procedure makes it difficult to study the association between myomectomies and risk of adhesions.

Numerous studies have studied the incidence of peritoneal adhesions after myomectomy[10] but very few which have evaluated intrauterine adhesions after myomectomy.[7,8] Indeed, reasonable evidence exists on the risk of development of adhesions following uterine surgery such as cesarean section or myomectomy.[11-13] In a large observational study of 91 patients, Fauconnier *et al*.[14] found a cumulative probability of conception after myomectomy to be lower when uterine sutures were required. They postulated adhesions to be responsible for lowered fertility. It is possible that apart from peritoneal adhesions, intrauterine adhesions may also occur, secondary to ischemia of myoma bed or direct endometrial injury.

The incidence of intrauterine adhesions was 21.57% in our series which is similar to that reported by Asgari *et al*.[8] In a prospective study,[12] uterine adhesions were diagnosed in 2 out of 32 (6.25%) patients by hysterosalpingography after myomectomy. This study did not consider confirmation of postoperative findings with hysteroscopy nor did it take into consideration any variables pertaining to

**Table 1: Classification of severity of intrauterine adhesion**

| Classification | Condition |
|---|---|
| Mild | Filmy adhesion occupying <1-quarter of the uterine cavity. Ostial areas and upper fundus minimally involved or clear |
| Moderate | One-fourth to three-fourth of cavity involved. Ostial areas and upper fundus partially involved. No agglutination of uterine walls |
| Severe | More than three-fourth of cavity involved. Occlusion of both Ostial area and upper fundus. Agglutination of uterine walls |

**Table 2: Patient profile**

| | Average/*n* (%) |
|---|---|
| Age | 32.76 |
| Previous conception | |
| Yes | 14 (27.5) |
| No | 37 (72.5) |
| Location of fibroid | |
| Fundal | 19 (37.2) |
| Lateral | 3 (5.8) |
| Anterior | 16 (31.2) |
| Posterior | 13 (25.4) |
| Number of fibroid | |
| Single | 31 (60.7) |
| 2-4 | 14 (27.4) |
| >5 | 6 (11.7) |
| Type of fibroid | |
| Intramural | 40 (78.4) |
| Subserous | 5 (9.8) |
| Submucous | 6 (11.7) |
| Size of fibroid (cm) | |
| <5 | 10 (19.6) |
| 6-10 | 34 (66.6) |
| >11 | 7 (13.7) |

**Table 3: Hysteroscopic findings**

| Preoperative findings | Postoperative intrauterine adhesions | | | | |
|---|---|---|---|---|---|
| | Normal, *n* (%) | Mild, *n* (%) | Moderate, *n* (%) | Severe, *n* (%) | *P* |
| Type of fibroid | | | | | |
| Subserous | 5 (83.3) | 1 (16.66) | 0 | 0 | 0.055 |
| Intramural | 32 (80) | 6 (150) | 2 (5) | 0 | |
| Submucous | 3 (60) | 0 | 1 (20) | 1 (20) | |
| Size of fibroid (cm) | | | | | |
| <5 | 8 (80) | 2 (20) | 0 | 0 | 0.668 |
| 6-10 | 27 (79.4) | 3 (8.8) | 3 (8.8) | 1 (2.9) | |
| >11 | 5 (71.4) | 2 (28.6) | 0 | 0 | |
| Number of fibroid | | | | | |
| Single | 25 (80.6) | 3 (9.6) | 2 (6.4) | 1 (3.2) | 0.213 |
| 2-4 | 12 (85.7) | 1 (7.1) | 1 (7.1) | 0 | |
| >5 | 3 (50) | 3 (50) | 0 | 0 | |
| Cavity breach | | | | | |
| Yes | 15 (83.3) | 2 (13.3) | 0 | 1 (6.6) | 0.079 |
| No | 25 (80.6) | 5 (16.1) | 3 (9.6) | 0 | |

**Table 4: Hysteroscopic findings according to submucous and intramural group**

| | Intramural, *n* (%) | Submucous, *n* (%) | *P* |
|---|---|---|---|
| Size (cm) | | | |
| <5 | 10 (2.17) | 0 (0.0) | 0.498 |
| 6-10 | 30 (65.2) | 4 (80.0) | |
| >11 | 6 (13.0) | 1 (20.0) | |
| Location | | | |
| Fundal | 17 (37.0) | 2 (40) | 0.882 |
| Lateral | 3 (6.5) | 0 (0) | |
| Post | 13 (28.3) | 2 (40) | |
| Other | 13 (28.3) | 1 (20) | |
| Past conception | | | |
| No | 33 (71.7) | 4 (80) | 0.694 |
| Yes | 13 (20.3) | 1 (20) | |
| Adhesion | | | |
| Normal | 37 (80.4) | 3 (60) | 0.055 |
| Mild | 7 (15.2) | 0 (0) | |
| Moderate | 2 (4.3) | 1 (20) | |
| Severe | 0 (0) | 1 (20) | |
| Cavity breach | | | |
| No | 33 (71.7) | 5 (100) | 0.168 |
| Yes | 13 (28.3) | 0 (0) | |

fibroid. In a prospective study of 36 women undergoing open myomectomy incidence of intrauterine adhesions was found to be 50%. The authors concluded that open myomectomy in itself represents an important cause of intrauterine adhesions.

Hysteroscopic myomectomy is an important risk factor for intrauterine adhesions. In a prospective study by Taskin *et al*.,[15] a second-look diagnostic hysteroscopy showed mild intrauterine adhesions in the 37.5% of patients after monopolar resection of a single fibroid and in the 45% after resection of multiple fibroids. This incidence is similar to our own (2/5, 40%). In many other studies, the rate of intrauterine adhesions is variable from 1.07% to 78%[7,15,16] depending on the use of electrocautry and adhesion preventive strategies. In our studies, though the sample size is very small, we have not found a difference in the incidence of intrauterine adhesions in cases operated for submucous mommas and IM/subserous types. Larger randomized trials are required to further evaluate the relationship between the type of fibroid and intrauterine adhesions.

Damage to endometrium is considered to be a significant factor in the causation of intrauterine adhesions. However, we have found that formation of intrauterine adhesions is not statistically associated with the opening of endometrium intraoperative. In a retrospective analysis, Gupta *et al*.[17] found a 30% incidence of intrauterine adhesions in cases of abdominal myomectomy where the uterine cavity was breached. However, the cases where intrauterine adhesions were diagnosed were historical controls that had undergone myomectomy in past and wherein uterine cavity was opened. The authors have not elaborated on the technique of closure nor have eliminated bias due to prolonged interval between myomectomy and hysteroscopy. Gambadauro *et al*. in 2012[7] also found a significantly higher occurrence of synechiae when the endometrium was opened. In cases where the endometrium was not opened the possibility of necrosis and fibrosis secondary to tissue ischemia can be responsible for the formation of intrauterine adhesions. Intrauterine adhesions have been reported in cases undergoing uterine artery embolization for fibroid[18] too. These findings demonstrate that surgical trauma is not essential for the development of synechiae.

We have not found a significant association between the size of fibroid and incidence of postoperative intrauterine adhesions. In a study similar to ours, Asgari *et al*.[8] have found a significant relation between the two. However, this difference was found to be significant only in the severe type of intrauterine adhesions. The size of fibroid may be related to the degree of myometrial defect and consequent scar formation. Larger sample size is required to clearly correlate fibroid size and incidence of intrauterine adhesions. Conforti *et al*.[19] in a small prospective study too did not find a significant association between size and number of fibroid with adhesion formation.

Asgari *et al*.[8] found a positive correlation between number of fibroids and intrauterine adhesions in their studies. In our series, though the incidence of adhesions was higher than average in large fibroids (>10 cm), the relation was not statistically significant. In one of the largest series of myomectomy,[20] complications rates were significantly associated with the size of fibroid. However, the major complications mentioned in this series are intraoperative and postoperative surgical complications. Intrauterine adhesions are not specifically mentioned.

We have not used any adhesion barriers such as hyaluronic acid-carboxymethylcellulose film (Seprafilm®), dextran 40 (10% dextran 40 Low Injection®), factor 13 with fibrinogen (Beriplast®), or various pharmacological agents such as high dose of estrogen and progesterone, gonadotropin-releasing hormone agonist as adhesion preventive agents in our study to reduce financial burden on the patients[21,22] and to find out true incidence of postoperative adhesions in the absence of use of any adhesion barriers.

Long-term follow-up with larger sample size is required to understand the true impact of myomectomy on intrauterine adhesions and consequently on implantation, pregnancy, and live birth rates.

## CONCLUSION

Myomectomy is a commonly performed surgery in women of reproductive age group desiring fertility. Myomectomy in itself represents a possible cause for intrauterine adhesions irrespective of nature, type, and location of fibroid and whether or not the uterine cavity was opened during surgery. Therefore, in patients planning for pregnancy, hysteroscopy should be done postoperatively to diagnose and rule out intrauterine adhesion.

### Financial support and sponsorship
Nil.

### Conflicts of interest
There are no conflicts of interest.

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