

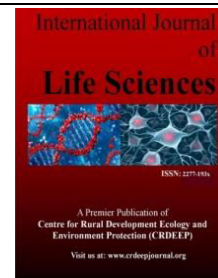
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Full Length Research Paper

## Prevalence of Intrauterine Adhesions after Bipolar Hysteroscopic Myomectomy

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### ABSTRACT

**Background:** Uterine myomas are the most common benign tumors of female reproductive system. Although usually asymptomatic, myomas can affect patient fertility and other adverse events. Operative hysteroscopy gaining wide acceptance over the last time. However, an accurate estimation of postprocedure adhesion are needed. Aim of the work: To detect incidence of intrauterine adhesions after doing hysteroscopic myomectomy with bipolar resectoscope. **Patients and methods:** This Retrospective observational study was conducted in December 2016 at Obstetrics and Gynecology Department of Al-Azhar University hospital (Damietta) and included 200 women undergoing hysteroscopic myomectomy with bipolar resectoscope for different reasons. Eligible patients were submitted to full history taking, general examination and special investigations such as transvaginal ultrasonography. Fibroid grade was defined. Then office hysteroscopy was done after 2 months of the procedure an any pathology especially intrauterine synechiae is reported and classified according to American fertility society. **Results:** 17 females (8.5%) had uterine adhesions. There was no significant difference between adhesion and non-adhesion groups as regard to myoma size, myoma grade. However, there was significant increase of post-myomectomy adhesions in posterior position, and significant increase of multiple myomas in cases with synechiae. The duration of hysteroscopic myomectomy ranged from 22 to 55 minutes; and there was no significant difference between groups. The hysteroscopic myomectomy was complete in 88.0% and incomplete in 12.0%; and there was significant increase of incomplete excision in females developed adhesion (29.4% vs 10.4% respectively). The only reported complications were volume overload, which was reported in 3 patients (1.5%). Duration of hospital stay ranged from 3 to 12 hours with no significant difference between groups. The grade of adhesion was mild in 10 out of 17 females (58.8%); and moderate in 41.2%. Finally, no significant difference was found between mild and moderate grades of adhesion as regard to age, myoma size, duration, hospital stay, indication, myoma grade, resection outcome and fluid overload. **Conclusion:** Bipolar hysteroscopic myomectomy is associated with intrauterine adhesion, prevalence of postsurgical intrauterine adhesions that appears to be comparable to those reported in the literature.

### Introduction

Uterine fibroids are the most common benign gynecological tumors, and it has been estimated that 30% to 70% of women will develop uterine fibroids during their lifetime (Ciavattini et al., 2016). Uterine fibroids are frequently asymptomatic but can cause menstrual disorders, heavy menstrual bleeding, anemia, pelvic and/or back pain, and bowel disorders (Stewart et al., 2016). Moreover, uterine fibroids seem to be related to infertility and adverse obstetric events (Ciavattini et al., 2015). Operative hysteroscopy is gaining popularity as an ideal example of minimally access natural orifice endoscopic surgery as it omits laparotomy as well as hysterotomy incisions. Furthermore, it permits early recovery and rapid discharge from the hospital (Stamatello et al., 2007). Hysteroscopic

myomectomy to date represents the standard minimally invasive surgical procedure for treating fibroids located entirely or mainly within the uterine cavity (AAGL, Journal Minim Invasive Gynecol, 2012). The aim of this procedure is to improve symptomatology through complete removal of the fibroid mass, ideally without weakening the myometrium nor traumatizing the normal surrounding uterine tissue. The choice of hysteroscopic technique mainly depends on the intramural extension of the myoma, as well as on personal experience and available technique, Submucosal myomas localized entirely inside the uterine cavity (G0) are generally easily removed in a one-step procedure by means of traditional resectoscopic surgery (Di Spiezio et al., 2008).

Mini-hysteroscopes with bipolar electrodes with use of isotonic saline reduce the risk of electrical burns due to proximity of the electrodes and electrolyte imbalance (Garuti and Luerti, 2009). The introduction of bipolar instrumentation was a giant step forward for hysteroscopic surgery, as it allowed the use of normal saline as a distending medium, thus significantly reducing the risk of hyponatremia, allowing hysteroscopists to safely perform difficult procedures (Darwish et al., 2010).

Hysteroscopic myomectomy carries the risk of scarring the uterine cavity at the site of resection, with uterine adhesions forming postoperatively. One study reported a prevalence of postoperative uterine adhesions of around 30% (Taskin et al., 2000). The development of intrauterine adhesions is a significant potential fertility complication resulting from operative hysteroscopy (Touboul et al., 2009). Intrauterine adhesions can cause the obliteration of portions of the endometrial cavity, leading to hematometra and severe pelvic pain (Di Spiezio Sardo et al., 2011).

#### Aim of the work

To detect incidence of intrauterine adhesions after doing hysteroscopic myomectomy with bipolar resectoscope.

#### Patients

This Retrospective observational study was conducted in Obstetrics and Gynecology Department of Al-Azhar University hospital (Damietta) after obtaining an informed consent from the studied women. The study was done during the period from December 2016 to January 2019. The study included 200 women undergoing hysteroscopic myomectomy with bipolar resectoscope for different reasons (e.g. infertility, AUB) at different myoma sites. Patients were included if they had interstitial or submucous myoma G0, G1, G2, and the size of myoma  $\leq 3$  cm. On the other hand, patients were excluded if they had suspicion of malignancy, or active pelvic inflammatory disease, suspicion of pregnancy, severe vaginal infection, cardiac disease or the patient is under anticoagulant therapy.

Eligible patients were submitted to full history taking (personal, menstrual, obstetric and medical history), general examination and special investigations such as transvaginal ultrasonography. Fibroid grade was defined by the classification developed by Wamsteker et al. (1993) and adopted by the European Society for Gynecological Endoscopy (ESGE), which considers only the degree of myometrial penetration of the submucous fibroid. According to this classification, a fibroid G0 is completely within the uterine cavity and appears only jointed to the cavity wall by a thin pedicle; a fibroid G1 has its larger part (>50%) in the uterine cavity; and a fibroid G2 has its larger part (>50%) in the myometrium (Wamsteker et al., 1993; Salim et al., 2011). Then office hysteroscopy was done after 2 months of the procedure → any pathology especially intrauterine synechia is reported and classified according to American fertility society.

#### Technique of hysteroscopy

Patients received a single dose of prophylactic first generation cephalosporin (Cefamezine) at the beginning of surgery. All patients were operated under general anesthesia during the first part of their cycle. Hysteroscopic surgery was performed via electrosurgery. We have routinely used the bipolar resectoscope system, with normal saline solution for uterine distention, and flushed at a flow rate

of 250 mL/minute and a pressure of 80–100 mmHg, with a vacuum of -30 to -40 mmHg applied for suction. Fluid balance was recorded by measuring the infused and drained fluid from the continuous flow resectoscope and taking into account the fluid lost during the removal of the hysteroscope to collect the resected pieces of tumor from the operative field into a calibrated pouch. Neither fluid overload (more than 1000 mL) nor electrolyte imbalance was observed in any patient. The duration of the procedure and fluid defect was calculated in each procedure. Any complications were documented. An outpatient hysteroscopy was routinely performed 2 months after myomectomy to diagnose postoperative uterine synechia and assess the adhesion score according to the American Fertility Society recommendations. When identified, a 30° forward-oblique telescope was used to lyse them during the same procedure. For those with any residual myoma, a second and sometimes a third operative hysteroscopy were recommended. Each was followed by a postoperative diagnostic hysteroscopy 2 months later.

Statistical analysis: The collected data were coded, organized, tabulated and statistically analyzed using statistical package for social science (SPSS) version 22 (IBM®SPSS®, Chicaco, USA) running on personal computer with Microsoft windows 7 operating system. The numerical variables were presented as mean and standard deviation (SD), while categorical variables were presented as relative frequency (number) and percentage. Comparison between groups was done by independent samples student (t) test and chi square or Mann-Whitney test for categorical variables. P value < 0.05 was considered significant.

#### Results

The present study included 200 females who underwent hysteroscopic myomectomy; 2 months after myomectomy, another diagnostic hysteroscopy was done and revealed that, 17 females (8.5%) had uterine adhesions (Synechia).

In the present study, patient age ranged from 21 to 38 years, the mean age was 31.44; and there was no significant difference between group with adhesion and those without adhesion ( $30.05 \pm 3.05$  vs  $31.57 \pm 3.85$  years respectively). Ultrasound measurements revealed that, the anteroposterior ranged from 4 to 7 cm, the mean AP diameter was  $5.35 \pm 0.35$  cm. The fundal isthmic length ranged from 5.40 to 7.50 cm, the mean value was  $6.58 \pm 0.36$  cm. Finally, endometrial thickness ranged from 7 to 13 mm, the mean value was  $11.27 \pm 0.99$  mm; and there was no significant difference between both groups as regard to AP diameter, FIL or ET. The main clinical presentation (indication for myomectomy) was infertility in 42.0% of studied females, abnormal uterine bleeding (AUB) in 31.0%, pelvic pain in 25.5%, and recurrent pregnancy loss in 1.5% and there was significant difference between both groups (table 1).

Myoma size ranged from 1.5 to 3.0 cm, the mean value was  $2.40 \pm 0.39$  cm, and there was no significant difference between females developed adhesion and those not develop adhesion ( $2.54 \pm 0.37$  vs  $2.39 \pm 0.39$  respectively). Myoma grade in studied populations showed the following distribution: 27.5% were grade 0, 23.0% were grade 1 and 49.5% were grade 2; and there was no significant difference between both groups (the grades were 0, 1 and 2 in 23.5%,

17.6 and 58.8% respectively in group with adhesion, compared to 27.9%, 23.5% and 48.6% in group without adhesion respectively). The position of uterine myoma was anterior in 35%, posterior in 18% and fundal in 47%; and there was statistically significant increase of post-myomectomy adhesions in posterior position (47.1% of cases presented with synechiae were posterior compared to 15.3% in females without synechiae). In addition, 86.5% of studied females had single myoma; while 13.5% had multiple myoma; and there was statistically significant increase of multiple myomas in cases with synechiae when compared to those without synechiae (47.1% vs 10.4% respectively) (Table 2).

The duration of primary procedure (hysteroscopic myomectomy) ranged from 22 to 55 minutes; the mean time was 34.28±4.85 minutes; and there was no significant difference between patients developed adhesion and those not develop adhesion (35.88±8.24 vs 34.13±4.42 minutes respectively). The hysteroscopic myomectomy was complete excision of myoma in 88.0% of studied females and

incomplete in 12.0% of females; there was significant increase of incomplete excision in females developed adhesion when compared to those with no adhesion (29.4% vs 10.4% respectively). The only reported complications were volume overload, which was reported in 3 patients (1.5%), 1 in patients with development of adhesion and 2 in the other group (without synechiae). On the other hand, no uterine perforation, infection or air embolism was reported in any patient. Duration of hospital stay after primary procedure ranged from 3 to 12 hours, the mean time was 5.69±1.36 hours; and there was no significant difference between both groups. The grade of adhesion was mild in 10 patients out of 17 females, representing 58.8%; and moderate in 41.2% and no severe adhesion was reported (table 3).

As regard to relation between adhesion grade and other variables, no significant difference was found between mild and moderate grades of adhesion as regard to age, myoma size, duration, hospital stay, indication, myoma grade, resection outcome and fluid overload (Table 4).

**Table (1):** Patient age, ultrasound findings and indications for intervention of studied populations

Variables	With adhesion	No adhesion	Test	P value	
Age (year)	30.05±3.05; 25-36	31.57±3.85; 21-38	1.57	0.12(ns)	
US findings	AP diameter (cm)	5.45±0.61; 4.5- 7	5.33±0.32; 4-6.5	1.32	0.18(ns)
	Funal-isthmic length (cm)	6.73±0.33; 6.30 – 7.50	6.56±0.36; 5.40- 7.50	1.81	0.07(ns)
	Endometrial thickness (mm)	11.52±0.94; 10 – 13	11.25±1.0; 7 - 13	1.10	0.27(ns)
Indications (cause)	Infertility	6(35.3%)	78(42.6%)	33.02#	<0.001*
	AUB	6(35.3%)	56(30.6%)		
	Pelvic pain	2(11.8%)	49(26.8%)		
	RPL	3(17.6%)	0(0.0%)		

US: ultrasound; AP: anteroposterior; AUB: abnormal uterine bleeding; RPL: recurrent pregnancy loss; #= Chi square test, \* = significant

**Table (2):** Myoma characteristics in studied females

Variables	With adhesion	No adhesion	Test	P value	
Size	2.54±0.37; 1.8 - 3	2.39±0.39; 1.5- 3	1.53	0.12(ns)	
Myoma Grade	G0	4(23.5%)	51(27.9%)	0.66	0.71(ns)
	G1	3(17.6%)	43(23.5%)		
	G2	10(58.8%)	89(48.6%)		
Position of Myoma	Anterior	4(23.5%)	66(36.1%)	10.63	0.005*
	Posterior	8(47.1%)	28(15.3%)		
	Fundal	5(29.4%)	89(48.6%)		
Number of myomas	Single	9(52.9%)	164(89.6%)	17.91	<0.001*
	Multiple	8(47.1%)	19(10.4%)		

**Table (3):** Procedure characteristics in studied females

Variables	With adhesion	No adhesion	Test	P value	
Duration (minutes)	35.88±8.24; 22 - 55	34.13±4.42; 24- 50	1.42	0.15(ns)	
Myoma resection	Complete	12(70.6%)	164(89.6%)	5.33	0.021*
	Incomplete	5(29.4%)	19(10.4%)		
	Volume overload	1(5.9%)	2(1.1%)		
Complications	Uterine perforation	0(0.0%)	0(0.0%)	2.41	0.12(ns)
	Infection	0(0.0%)	0(0.0%)	-	-
	Air embolism	0(0.0%)	0(0.0%)	-	-
	Post procedure hospital stay (hours)	6.05±2.19; 3-12	5.66±1.26; 3 - 10	1.14	0.25(ns)
Adhesion grade	Mild (1-4)	10(58.8%)			
	Moderate (5-8)	7(41.2%)			

**Table (4):** Relation between adhesion grade and other variables

		Mild (n=10)		Moderate (n=7)		Test	p
		Mean	S. D	Mean	S. D		
Age		30.50	3.10	29.42	3.10	0.70	0.49
Myoma size (cm)		2.62	0.39	2.44	0.35	0.95	0.35
Duration (min)		34.70	6.79	37.57	10.30	0.69	0.50
Hospital stay(h)		6.70	2.58	5.14	1.06	1.49	0.15
Indication	Infertility	5(50.0%)		4(57.1%)		0.25	0.88
	AUB	4(40.0%)		2(28.6%)			
	pelvic pain	1(10.0%)		1(14.3%)			
Myoma grade	G0	2(20.0%)		2(28.6%)		2.55	0.27
	G1	3(30.0%)		0(0.0%)			
	G2	5(50.0%)		5(71.4%)			
Resection	Complete	7(70.0%)		5(71.4%)		0.004	0.94
	Incomplete	3(30.0%)		2(28.6%)			
Fluid overload		1(10.0%)		0(0.0%)		0.74	0.38

## Discussion

The aim of hysteroscopic resection of myomas is rebalancing the physiologic anatomy of the uterine cavity while avoiding both short-term and long-term complications (Di Spiezio Sardo et al., 2008). Resectoscopic myomectomy today represents the gold standard in the treatment of submucous myoma (Mazzon et al., 2014). Synechiae of the uterine cavity, the most common postoperative complication after resectoscopic myomectomy (Taskin et al., 2000), are related to the healing that follows the removal of myomas or possibly to perforation of the uterine wall. Despite the frequency of the latter episode, there are few examples available in literature that describes its prevalence (Shokeir et al., 2008; Touboul et al., 2009; Guida et al., 2004). Thus, the present study was designed to evaluate the incidence of uterine adhesion after hysteroscopic myomectomy. It was carried out at the Department of Obstetrics and Gynecology, Al-Azahr University hospital (New Damietta). It included 200 females who underwent hysteroscopic myomectomy for different causes, and reviewed for intrauterine adhesions 2 months after the primary procedure.

Regarding patient age and the main clinical presentation, results of the present work are in accordance with those reported by Bhandari et al. (2016) who included a total of 51 patients was considered in the study. The mean age of participants was  $32.76 \pm 5.26$  years. Most of the participants (37, 72.55%) were cases of primary infertility. In addition, Bahar et al. (2013) reported that, the most prevalent initial symptoms were irregular uterine bleeding (35.5%) and infertility (21.9%). About 20% of women had no symptoms and underwent a hysteroscopic procedure because of an abnormal finding at imaging during the routine annual check-up. This is quietly different from the present work and can be explained by different inclusion criteria.

In the present work, patients developed synechiae were 17 females (8.5%). This incidence is comparable to previous incidence reported with bipolar resection, as Touboul et al. (2009) reported an incidence of 7.5% with bipolar resection, while resection with monopolar electrodes was reported to be 35–45%. They attributed the low rate of synechiae to the use of bipolar energy, considering it safer, less prone to accidental electric fluxes, and therefore not damaging the healthy myometrium. Thus, it is recommended to do a diagnostic hysteroscopy between 6 and 8 weeks after the therapeutic procedure to ensure the absence of postoperative

synechiae. Outpatient office hysteroscopy also allows diagnosis of persistent myoma and fresh and fine synechiae can easily be removed before they organize into complex synechiae (Marret et al., 2012; Yang et al., 2008).

On the other hand, Mazzon et al. (2014) reported that, in 29 patients (4.23%), synechiae of the uterine cavity after resectoscopic surgery was found. This value is much lower than the present work, and it may be attributed to different inclusion criteria, where they included all myomas regardless of its size and included all females regardless of their age group. In 2008, Yang et al. (2008) reported a rate of 1.5% after resection of a single myoma and 78% in cases of myomas located one in front of the other. Multiplicity of myomas was considered the most important risk factor for development of postoperative adhesion. However, we could not investigate this risk factor as all included subjects were with single myoma. Far contradicted to the present work, in a retrospective analysis of a group of patients desiring pregnancy, Shokeir et al. (2008) reported a 60% rate of intrauterine adhesions with degree I, 10% with degree II, and 5% with degree III, 2–4 weeks after resectoscopic procedures for different endocavitary pathologies. Even though the study considered all hysteroscopic procedures and no detailed information was available regarding the prevalence after myomectomy, only 25% of the studied population showed an anatomically uninjured uterine cavity. A later follow-up evaluation at 12 months showed a significant difference in distribution, with a prevalence of vascular adhesions compared to filmy synechiae. In many other studies, the rate of intrauterine adhesions is variable from 1.07% to 78% depending on the use of electrocautery and adhesion preventive strategies (Gambadauro et al., 2012; Yang et al., 2008; Taskin et al., 2000). As regard to results of hysteroscopic myomectomy, it was comparable to previous works reported the effectiveness of bipolar resectoscope in resection of uterine myomas. For example, in 2000, Loffer reported a preliminary experience with the Versa Point bipolar resectoscope in gynecology, used in 15 patients, vaporizing electrode in saline solution distending medium and showing its effectiveness in the removal of submucous myomas. Golan et al. in 2001 reviewed outcomes of operative hysteroscopy, using bipolar electrical energy (Versa Point) in saline solution in 116 women with intrauterine pathology and they proposed this new technique to potential replacement of the monopolar resection. Comparable results were reported by Mazzon et al. (2014) who reported that, the persistence in the uterine cavity of myomas that were only partially removed during

resectoscopic surgery (residue myoma) may play a role in the development of long-term adhesions. The traumatized residual portion of the myoma in contact with the endometrium of the opposite side may facilitate the formation of columnar fibrous adhesions. Therefore, a follow-up evaluation after a resectoscopic procedure is important for evaluating the complete removal of a myoma with a new surgical treatment. In their study, during the follow-up phase, new myomas or residual myomas were detected in 56 patients (8.17%) (12% in the present study). As regard complications of the procedure, the only reported complications were volume overload. In 2007, Makris et al. reported an experience of 5 years with Gynecare Ethicon bipolar resectoscope in gynecology, which was used in 59 patients who underwent fibroid resection, evidencing the usefulness of bipolar current to remove small myomas. No complications were reported. These results are comparable to the present work.

In their work, with 688 resectoscopic myomectomies, Mazzon et al. (2014) reported a small percentage of intraoperative complications, as 8 (1.16%) intraoperative complications were reported, but only one related to the use of cold loop. In detail, one uterine perforation with Hegar and one with the cold loop (0.14% and 0.14% of cases, respectively), and two partial false passages in cervical dilation with Hegar (0.29%), not reaching the abdominal cavity. A vaginal laceration that did not require stitches was observed in 1 (0.14%) case; a cervical laceration occurred in 3 (0.42%) cases. No cases of hemorrhage, intravasation clinical syndrome, or perforation with the thermal loop were registered. The overall rate of complications in their work is comparable to that of the present study. However, there is no consistence between their study and current one as regard details of complications. Bahar et al. (2013) reported that, the complication rate in the study group was low, and there was no statistically significant difference between the bipolar and monopolar groups (4.1% and 2.8%, respectively). Procedure-related complications included excessive bleeding (1%) and perforation (0.6%). In most cases, the excessive bleeding was fully controlled during the hysteroscopic operation. However, in 5 patients (0.3%), conversion to laparotomy was necessary. Two of these 5 patients underwent hysterectomy. The rate of complication is comparable to the present work. However, the type of complication is quietly different, and can be attributed to different inclusion criteria, where their complications were reported in post-menopausal women, who not included in the present work.

Regarding the grade of adhesion, the results of the present work are partially comparable to those reported by Bhandari, et al. (2016) who reported that, of the 51 patients who underwent myomectomy, intrauterine adhesions were observed in consequent hysteroscopy in 11 cases (21.57% compared to 7.5% in the present work). They added, 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. The higher rate of adhesion in their work can be explained by the fact that, they included all myoma types and sizes, and the presence of multiple myomas in their study.

In the present work, we have not found a significant association between the size of fibroid and incidence of postoperative intrauterine adhesions. In a study similar to *International Journal of Life Sciences*

ours, Asgari et al. (2015) have found a non-significant relation between the two. The size of fibroid may be related to the degree of myometrial defect and consequent scar formation. The duration of primary procedure and postprocedure hospital stay were comparable to Touboul et al. (2009) who reported that, the duration of the procedure was  $36 \pm 19$  minutes (range, 17–69 minutes), which was measured from the beginning of the cervical dilatation to the completion of resection. No intraoperative complications were observed. The immediate postoperative course was uneventful, and all patients were discharged within 10 hours.

In short, intrauterine adhesions represents as an important problem as it can impair many important reproductive aspects such as menstruation, normal fertility, and pregnancy. It may cause recurrent pregnancy loss, placenta accreta, and intrauterine growth restriction. Results of the present work indicated that bipolar resectoscopic myomectomy of G0–G2 myomas is effective and safe, with a prevalence of postsurgical intrauterine adhesions that appears to be comparable to those reported in the literature.

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