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ORIGINAL ARTICLE

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# Hysteroscopic management in submucous fibroids to improve fertility

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**Abstract** *Objective*: To evaluate prospectively the reproductive performance following hysteroscopic myomectomy in women with submucous fibroids and wishing a pregnancy. *Study design*: Twenty-nine consecutive women wishing a pregnancy with a previously diagnosed submucous fibroid as a sole cause for reproductive failure were treated by hysteroscopic myomectomy. Fourteen women suffered from primary infertility and 15 women had previous pregnancies with a poor obstetric outcome. The myomas were intracavitary ($n=25$) and intramural class 1 ($n=4$). None of the patients had type 2 or multiple submucousal fibroids. Myoma size was not larger than 5 cm (the mean was 13.3 mm). Before myomectomy, the outcome reproductive data were recorded prospectively. Following myomectomy, the cumulative rate of first pregnancies, live birth rate and the hysteroscopic anatomical results were assessed and compared with that before surgery. *Results*: The mean duration of follow-up before and after myomectomy was comparable. Twenty-one women (72.4%) experienced 30 pregnancies after myomectomy. Thirteen women gave birth to16 live infants. Compared with previous pregnancies, the rate of deliveries increased from 3.8% to 63.2% and the abortion rate decreased from 61.6% to 26.3%. No complications occurred during myomectomy. The hysteroscopic anatomical results were good in the majority of cases. *Conclusions*: This prospective study demonstrates that hysteroscopic myomectomy at present is the method of choice to improve the cumulative pregnancy rate as well as the live birth rate in selected women with submucous myomas and a history of reproductive failure.

**Keywords** Submucous myoma · Hysteroscopic myomectomy · Pregnancy outcome

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## Introduction

Submucous fibroids can be associated with reproductive failures such as recurrent abortion and preterm births. Infertility has also been linked to submucous myomas [1]. Although the exact incidence rates of infertility, pregnancy wastage, and other gynecological problems caused by this condition are still unkown, it has been estimated that intrauterine abnormalities are present in 5–10% of infertile women and in up to 33% of those with recurrent pregnancy loss; submucous fibroids being much less frequent. Second trimester losses are more likely to be caused by congenital anomalies and submucous myomas [2, 3].

Like a number of other intrauterine abnormalities, submucous myomas can now be treated successfully by means of operative hysteroscopy, thus making it possible to avoid laparotomy. The efficacy of treatment of such lesions can be estimated by the anatomic correction of the uterine cavity, or by improvement in the patient's symptomatology [4–7]. Previous publications have stressed on the reproductive performance as one of the main parameters for estimation of the efficacy of treatment of submucous myomas [8–13]. However, most of these studies were retrospective, dealing mainly with infertile patients rather than those with previous pregnancies associated with poor obstetric outcome. Furthermore, there is lack of prospective, randomized, controlled trials. We designed this prospective study to evaluate the efficacy and the reproductive outcomes of hysteroscopic myomectomy in women with submucous fibroids and wishing a pregnancy.

## Materials and methods

Between January 1998 and May 2001, 29 women wishing a pregnancy, with a previously diagnosed submucous fibroid as the sole cause for reproductive failure were treated by hysteroscopic myomectomy at a tertiary

university infertility clinic. Fourteen women suffered from primary infertility and 15 women had previous pregnancies with a poor obstetric outcome, namely recurrent abortion and/or preterm birth. Recurrent abortion was defined as two or more sequential first or second trimester spontaneous abortions. Preterm birth was defined as delivery before 37 weeks gestation.

For the 29 women, the mean age was 31.4 years (range 27–38.5 years) and the mean duration of infertility was 27.2 months (range 12–60 months). For the 14 women with primary infertility, the mean duration of infertility was 33.3 months (range 12–60 months). Patients with past history of sporadic spontaneous and/or artificial abortions were excluded from our study. This study was approved by the hospital's committee on human investigation, and all candidates gave written informed consent.

Before myomectomy, the mean duration of follow-up was 27.1 months (range 12–61 months). By that time, all myomas were amenable for hysteroscopic resection but patients were refusing to do such intervention and the outcome reproductive data were recorded prospectively. They were asked by phone or regular visits to complete a health questionnaire. This questionnaire concerned pregnancies including their number, results (live birth, legal abortion, miscarriage and ectopic pregnancies), gestational age at delivery, mode of delivery and the use of assisted reproductive techniques.

The 15 women with previous spontaneous pregnancies totalled 26 pregnancies with only one live birth at 30 weeks gestation (Table 1). Thereafter, they were subjected to surgery at their request following clinical re-evaluation and thorough investigations to exclude other causes of recurrent pregnancy losses. Each woman served as her own control.

For the 14 patients with primary infertility, evaluation consisted of hormonal assays, confirmation of tubal patency (hysterosalpingography and/or laparoscopy), a post coital test and assessment of ovulation by serum progesterone assay, and where indicated, by timed endometrial biopsy. A semen analysis was performed on all male partners, and the World Health Organization criteria were used to confirm normal values. Patients with abnormal parameters were excluded from the study. Except for submucous fibroid, no concurrent causes of infertility were identified in any patient.

The myoma was classified by means of pelvic examination, hysterosalpingography, transvaginal ultrasound, and hysteroscopy. According to the European Society of Hysteroscopy (ESH) [14], in our series, the submucous myomas were intracavitary type 0 ($n = 25$), intramural type 1 ($n = 4$) and none were type 2 or multiple submucousal fibroids.

The indication for hysteroscopic myomectomy was a submucous myoma in combination with a history of primary infertility if the lesion was thought to be the only contributing factor to infertility. Other indications included those lesions in combination with recurrent abortion and/or preterm delivery before 37 weeks of gestation with or without live birth after exclusion of other possible factors.

Hysteroscopic myomectomy was limited to submucous myoma not larger than 5 cm (the mean myoma size was 13.3 mm), of type 0 or type 1 (according to the classification of ESH), and the length of the uterine cavity was less than 10 cm. A detailed explanation of the procedure was discussed with each patient.

Surgery was scheduled to be done in the early follicular phase. The surgical procedure was performed under general anesthesia by a senior surgeon after cervical dilatation, with an operative resectoscope 26 French (Karl Storz, Germany) fitted with right angle wire loop electrode and a blended diathermy current with a setting of 80–120 W. Distension was achieved with glycine 1.5% (Adwic, Nasr Chemical Camp., Cairo, Egypt), the flow of which was controlled electronically (Hysteromat, Karl Storz, Germany).

The loop electrode was passed superior to the myoma to be resected and withdrawn back toward the insulated sheath of the resectoscope. The tumor was progressively shaved down to the level of the endometrium, until the uterine cavity was flat. Once the procedure was

**Table 1** Reproductive outcomes before and after hysteroscopic myomectomy

| | Women with previous pregnancies ($n = 15$) | | Women with primary infertility ($n = 14$) |
|---|---|---|---|
| | Pregnancies before myomectomy | Outcome after myomectomy | Outcome after myomectomy |
| No. of pregnancies | 26 | 19 | 11 |
| No. of pregnant women | 15 | 12 | 9 |
| Ectopic pregnancies | 3 (11.5) | 0 | 1 |
| Miscarriage before 12 weeks | 16 (61.6) | 5 (26.3)* | 4 |
| Miscarriage between 12 and 26 weeks | 3 (11.5) | 0 | 0 |
| Death in utero | 3 (11.5) | 0 | 0 |
| Live birth | 1 (3.8) | 12 (63.2)** | 4 |
| Term deliveries | 0 | 8 | 4 |
| Preterm deliveries (32–37 weeks) | 0 | 4 | 0 |
| Preterm deliveries (before 32 weeks) | 1 | 0 | 0 |

Values are given as $n$ or $n$ (%)
*$P < 0.02$; **$P < 0.01$

complete, the resected pieces of the myoma were removed from the uterine cavity using a blunt curette or ring forceps and sent for histopathologic examination. Finally, the uterine cavity was reinspected to check for haemostasis and adequacy of resection. A single intravenous dose of an antibiotic (Ampicillin 2 gms) was given during the surgical procedure. All women were discharged on the following day of surgery with postoperative medications including doxycycline in an oral dose of 100 mg at 12-h intervals for 5 days and premarin 2.5 mg/day for 2 months.

In all cases, diagnostic hysteroscopy was repeated 2 months post-operatively to identify any partially excised myomas and to evaluate the configuration of the uterine cavity. The criteria for second procedure was the presence of a partially resected myoma and/or regrowth of the excised one.

To assess reproductive performance, the women were asked by phone or regular visits to complete a health questionnaire. This questionnaire concerned pregnancy data similar to that collected before surgery as well as any postoperative complications. For women requiring a second hysteroscopic myomectomy, follow-up dates are derived from the time of the second procedure.

The Kaplan–Meier estimator was performed to calculate cumulative pregnancy rate. According to the fertility studies, we studied the first pregnancy after the surgical procedure, regardless of its implantation, and also the first normally intrauterine pregnancy. Statistical analyses were performed using the Fisher's exact test. For all statistical analyses, Statview Version 4.57 Software (Abacus Concepts, Berkely, CA, USA) was used, and differences at $P < 0.05$ were considered statistically significant.

## Results

Subsequent fertility and pregnancy outcome were evaluated in all women. The mean follow-up following myomectomy was 40 months (range 13–67 months). Three women, who initially want to become pregnant, had no longer any pregnancy desire after the surgical procedure and were excluded from the study (two women with previous pregnancies and one with primary infertility). Figure 1 illustrates the distribution of the first pregnancies and live birth over the time after the surgical procedure.

Twenty-one women (72.4%) experienced 30 pregnancies after myomectomy (Table 1). Twelve of these were in cases with previous pregnancy losses and 12 became pregnant without the use of assisted reproductive techniques. The mean time of the first conception was 14.6 months (range 2–41 months) after the myomectomy. Nine women with primary infertility experienced 11 pregnancies, leading to 4 live born babies. These pregnancies were spontaneous except in 6 cases, 4 after in vitro fertilization and 2 after intrauterine insemination. At the time of the follow-up following

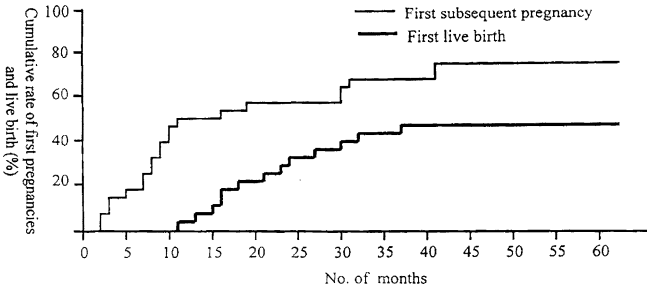


**Fig. 1** Cumulative rate of first pregnancies and live birth after hysteroscopic myomectomy

myomectomy and by time of writing of this paper, four women were pregnant in the second trimester (2 women with previous pregnancies and 2 with primary infertility).

After exclusion of the three women who initially want to become pregnant, among the 26 women wishing a pregnancy, 13 (50%) gave birth to 16 live births. Among these 13 women, 9 cases conceived spontaneously (3 women had given birth to two live infants) and nine of them delivered 12 viable term neonates, requiring 6 cesarean sections for five women. Among those with previous poor obstetric outcome, comparison regarding the course and the outcome of pregnancies before and after treatment revealed that the rate of deliveries increased from 3.8% to 63.2% ($P < 0.01$) and the abortion rate decreased from 61.6% to 26.3% ($P < 0.02$) (Table 1).

Cesarean section was the modality of term pregnancy deliveries in 50% of the cases. The neonatal courses were good in all cases and the mean birthweight was 3.196 kg (range 2.100–4.170 kg).

Hysteroscopic anatomical results were good in the majority of cases. No complications occurred during myomectomy. Two women needed readmission because of a partially excised myoma was observed after myomectomy and needed a second hysteroscopic procedure at 2 months (time of follow-up diagnostic hysteroscopy for all women). The first patient experienced two pregnancies 8 months after the first hysteroscopic procedure (one pregnancy ended in miscarriage and one ended in preterm delivery). The second patient did not want to become pregnant.

## Discussion

In the case of uterine submucous fibroid, infertility and obstetric complications are believed to be common compared with those with a normal uterine cavity. Over the last few years, hysteroscopy has allowed the transvaginal removal of submucous fibroids that are either prolapsed or located within the uterine cavity. Given the numerous advantages of the hysteroscopic approach over the transabdominal one, hysteroscopic myomectomy has become very popular [1–4].

Our results are encouraging in terms of the reproductive outcome. Twenty-one women (72.4%) became pregnant after myomectomy. Thirteen women gave birth to 16 live infants. Nine of them delivered 12 viable term neonates. Although the number of patients is small, our results are in accordance with other studies using hysteroscopic myomectomy to improve subsequent reproductive performance in women with submucous myomas [8–13]. Bernard et al. [12] reported that 11 out of 31 infertile women (35.5%) became pregnant following hysteroscopic myomectomy with 9 term deliveries. A difference in delivery was found between patients with one submucous myoma resected than those with 2 or more. In the same way, Varasteh et al. [13] concluded that hysteroscopic myomectomy appears to enhance fertility compared with infertile women with normal uterine cavity. The more recent study concerning 41 women reported by Giatras et al. [10] demonstrated that 25 women (60.9%) became pregnant with 48.7% live birth rate. Therefore, these results suggest that an improved uterine contour may result in an improved pregnancy outcome and term deliveries in women with prior spontaneous pregnancy losses or primary infertility.

The possible role of submucous myomas in the causation of infertility is as yet unclear. It may be that in this case the cause of infertility is multifactorial [15, 1–3]. Meta-analysis has suggested also that removal of such tumors may be indicated in infertile women where no other factor has been identified [3]. Our prospective data support these guidelines and does provide some information on the reproductive performance of selected women who have undergone hysteroscopic myomectomy for submucous myomas. The relatively lower incidence of abortions and the fact that the rate of deliveries of live births in their first pregnancies increased significantly following treatment of the myomas, emphasize the major role of such fibroids as a cause of recurrent abortions and/or pregnancy losses and demonstrate the efficacy of the treatment.

Postoperative reproductive outcome is adversely affected by the presence of additional infertility factors. Fernandez et al. [9] reported in their retrospective series that the pregnancy rate was 41.6% when the myoma was the only apparent cause, compared with 26.3% with the presence of one factor and 6.3% with two or more additional factors. In the current prospective study, none of our selected patients had additional infertility factors and this could explain the higher pregnancy rate reported in our series. This observation probably reinforce the fact that myomas could be a cause of infertility.

The initial size of the myoma also influenced the pregnancy rate. In the current series all myomas were ≤50 mm, with dramatic improvement in the cumulative pregnancy rate and live birth rate compared with previous pregnancies. Similar results were obtained by another group [13] with a cumulative pregnancy rate of 25% for myomas $<20$ mm, and 75% for those $>30$ mm. These results offer indirect proof that large myomas are a valid cause of reproductive failure mainly because of the mechanical distortion and the dystrophy that they cause.

Resection of the tumor is easier and successful when myomas were small and most of the tumor was bulging into the uterine cavity. Larger myomas require longer time and are associated with more bleeding and increased complication rates. Similarly, submucous myomas with deep intramural portion cannot be resected easily. We believe that it is wise to treat such types of myomas by other available operative techniques because of the higher chance of long-term failure in addition to the increased operative risk. Others [16, 17] advised concomitant laparoscopy to minimize complications.

A shortcoming in our study is that we do not have a control group of asymptomatic women from gynecologic or infertility clinics with submucous myomas. The occurence of such lesions in otherwise healthy women who had no difficulty in conceiving is not known, nor are such data easily obtained. However, in our study, each woman served as her own control. Nevertheless, the current study does provide some prospective information on the reproductive performance of a select cohort of patients who had previous pregnancies associated with poor obstetric outcome. The study also confirm results of previous published retrospective ones.

In this series, the cesarean section rate of the term pregnancies was high, although we are expecting it to be lower, because the resected uterus is likely to be satisfactory place of pregnancy and confirmed by the rate of preterm delivery being low. Indeed, in 7 cases the indication for a cesarean section was neither the myomectomy itself nor an obstetric indication, but the preciousness of the pregnancy after a long personal history of infertility.

Although delivery can be safe per vagina after hysteroscopic myomectomy, and uterine rupture has never been reported following this procedure, the obstetric management should be very careful [18]. In our series, only 7 women of term pregnancies delivered vaginally, without complications. Many investigators [4, 11] believe that cesarean section as a mode of delivery is the best whenever you are dealing with type "1" or type "2" submucous myomas hysteroscopically. Probably this type of surgery induces a fragility in the uterine wall. We are in agreement with such recommendation although there is no evidence for that in our study since myomas dealt with were almost intracavitary type "0" (25/29).

In our series, the post-operative diagnostic hysteroscopy showed that hysteroscopic myomectomy gives good anatomical results in the majority of cases. This observation has been also supported by others [8–11].

In conclusion, our prospective results show that hysteroscopic myomectomy clearly improves the rate of live birth for selected women with submucous myomas and history of primary infertility, recurrent abortion and/or preterm delivery. Ideally, in order to evaluate the efficency of this technique, randomized studies should be undertaken in multiple centers, taking into account a

larger number of women suffering from this type of abnormality.

## Summary

Hysteroscopic myomectomy at present is the method of choice to improve the live birth rate for selected women with submucous myomas and a history of primary infertility, recurrent abortion and/or preterm delivery.

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