

Pregnancy outcome after laparoscopic myomectomy

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Summary

Purpose of investigation: Main purpose of this study was to analyze the reproductive and obstetrical outcome as delivery mode and incidence of major complications (uterine bleeding and uterine rupture) after laparoscopic myomectomy. **Materials and Methods:** The authors conducted an observational study in patients who underwent laparoscopic myomectomy. Inclusion criteria were: surgery performed for single and/or multiple myomas sized between five and 15 cm and pregnancy desire. Exclusion criteria were: surgery for pedunculated myomas and male or tubal infertility. Collected data on pregnancy desire, success in obtaining pregnancy, surgical interval time before pregnancy, performing assisted reproductive medicine, gestational weeks, mode of delivery, indicating a possible cesarean section, and complications. On collected data the authors calculated pregnancy and abortion rates. **Results:** Among patients aged between 19 and 42 years who answered a telephonic questionnaire, the authors selected 185 patients with pregnancy willing. A total number of 426 myomas were removed; 115 (62.2%) patients reported 151 pregnancies, nine in a total of 17 patients achieved it with reproductive assistance, 38 pregnancy ended in abortion, and two had an ectopic implantation. The authors finally reported 111 successful pregnancy, with seven preterm deliveries (6.3%). Mode of delivery had been cesarean section in 69 cases (63.4%) and vaginal delivery in 42 cases (36.6%), with a respective mean interval time between surgery and delivery of 24.6 ± 20.0 months and 19.2 ± 13.3 months. **Conclusion:** Laparoscopic myomectomy proved to be an effective procedure feasible for women who wish to become pregnant with a subsequent good reproductive outcomes, both in terms of pregnancy and abortion rates that were comparable with the literature. If laparoscopic suturing of the fovea myometralis is adequate, there are no contraindications for vaginal delivery, regardless of the patient's age, the number, size, and location of the myomas removed.

Key words: Fibroids; Laparoscopic surgery; Pregnancy outcome.

Introduction

Uterine fibroids (also called leiomyomas) represent the most common neoplastic disease in women. They affect the functions of the uterus producing uterine bleeding, anemia, defective implantation of an embryo, recurrent pregnancy loss, preterm labor, obstruction of labor, pelvic discomfort, and urinary incontinence. [1] Among middle-aged women the incidence of fibroids nearly reached 70% of white women and more than 80% of black women. Incidence of symptoms, moreover, affects 15% to 30% of this patient cohort. Approximately 200,000 hysterectomies, 30,000 myomectomies, and thousands of selective uterine artery embolizations and high-intensity focused ultrasound procedures are performed annually in the United States to remove or destroy uterine fibroids [2, 3].

As compared with other fibroids, submucous fibroids that extend into the uterine cavity are the most disruptive to endometrial integrity, implantation, and the capacity of the myometrium to contract and stop menstrual bleeding from the endometrial blood vessels; thus, even small submucous fibroids are associated with excessive or irregular bleeding, infertility, and recurrent pregnancy loss [4].

Regardless of their size or location, fibroids may have paracrine molecular effects on the adjacent endometrium that are extensive enough to cause excessive uterine bleeding or defective implantation [5, 6].

Surgery is the mainstay of therapy for leiomyomas and hysterectomy is the definitive procedure [7, 8]. In order to preserve patients fertility, however, there are other surgical techniques such as hysteroscopic or laparoscopic myomectomy [9-11]. While it is well established that hysteroscopic myomectomy improves long term outcome, reported as quality of life and reproductive result reported as pregnancy rate [12, 13], a debate remains in laparoscopic myomectomy, if this will affect in some way the outcome of patients eager to have children who underwent previous myomectomy [14]. Main purpose of this study was hence to analyze the reproductive and obstetrical outcome as delivery mode and incidence of major complications (uterine bleeding and uterine rupture) after laparoscopic myomectomy.

Materials and Methods

The authors conducted an observational study in which they selected patients admitted at Department of Women's and Children's Health, University of Padua between January 1996 and December 2010 and who underwent laparoscopic myomectomy. Surgery was performed by the same experienced operator in gynecological laparoscopic surgery.

Inclusion criteria were: surgery performed for single and/or multiple myomas sized between five and 15 cm, and pregnancy desire. Exclusion criteria were surgery for pedunculated myomas and male or tubal infertility.

Among the entire sample of patients, the authors selected women aged between 19 and 43 years to which had been admin-

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istered a telephone questionnaire. They collected general features data on age, weight, and parity indication for intervention. They also collected surgical data as myomas location, diameter, and number, (according to Munro's classification) [15] surgical duration, blood loss, complication occurrence, hospitalization days, and general satisfaction.

A telephone questionnaire collected data on pregnancy desire, success in obtaining pregnancy surgical interval time before pregnancy, performing assisted reproductive medicine, gestational weeks, mode of delivery, indicating a possible cesarean section, and complications. On collected data the authors calculate pregnancy and abortion rate.

Patients' satisfaction about surgical intervention was evaluated with a verbal numeric scale from 0 to 10, where 0 represented the worst possible satisfaction and 10 the highest degree of satisfaction. The degree of satisfaction was then categorized from 0 to 3 as poor, from 4 to 7 as good, and > 7 as excellent. Data on surgical procedure were hence grouped according to the patients' mode of delivery and had been compared in term of age, fibroids diameter, number and location, and type of myomectomy.

Surgical technique

All laparoscopic myomectomies took place under general anesthesia through a 10-mm telescope 0°-30° videolaparoscope. Umbilical trocar was placed through the umbilicus and ancillary trocars were placed two fingers above the anterosuperior iliac spines, the left one was size 12 mm permitting the procedures of myoma drilling and morcellation. Central and right lateral trocars were five mm in size. In enucleating myomas a harmonic scalpel (ten mm in size) was used. Correct hemostasis was performed through the same surgical instrument. According to type and size of myomas uterine wall was sutured, in one, two, or three layers with using a monofilament absorbable 0 PDS (PDS II, 3.5 Ph) plus CT-1 needle (36 mm, ½ circle) with interrupted sutures and intracorporeal knots. Particular attention was posed during the suturing time in order to avoid areas of excessive or low voltage. Myomas were extracted by a tissue morcellator (12 mm).

Statistical analysis

Statistical analysis were performed SPSS Statistics for Windows, version 21.0. Results were expressed in absolute number and percentage for categorical variables, average, and standard deviation for continuous variables. Categorical variables were compared using the Chi-square test or Fisher's exact test when necessary. Continuous variables were compared using the Mann-Whitney U test. The level of significance was set at $p < 0.05$.

Results

Among patients aged between 19 and 42 years who answered the telephone questionnaire, the authors selected 185 patients with pregnancy desire. At the time of surgery they reported a mean age of 34.7 ± 4.1 years and a mean BMI of 24.9 ± 3.5 kg/m². Data regarding parity showed 135 (73.0%) women without previous pregnancy, 29 (15.7%) with history of a previous pregnancy but with no children, 16 (8.6%) with only one previous child, and five (2.7%) with more than one previous child.

A total number of 426 myomas were removed, 89 (48.1%) patients underwent single myomectomy, 96 (51.9%) underwent multiple myomectomy, 30 (16.2%) had two fibroids removed, 42 (22.7%) had three to five fibroids

Table 1. — General features and surgical details.

	Number	Mean (SD)
Age (years)	185	34.7 (4.1)
Weight (kg)		54.9 (7.5)
Parity	Nulligravid	135 (73%)
	Nulliparous	29 (15.7%)
	Primiparous	16 (8.6%)
	Multiparous	5 (2.7%)
Surgical indication	Voluminous myoma	65 (35.1%)
	Menorrhagia	51 (27.6%)
	Infertility	24 (13.0%)
	Chronic pelvic pain	34 (18.4%)
Myoma site classified by Munro <i>et al.</i> [15]	6-7	72 (38.9%)
	4	106 (57.3%)
	8	6 (3.3%)
	2-5	1 (0.5%)
	Number	Mean / number (SD / percentage)
Blood loss (ml)	185	183.7 (233.7%)
Myoma weight (g)	185	158.2 (145.1%)
Surgery lasting (min)	185	81.2 (39.6%)
Hospitalization lasting (days)	185	1.8 (0.9%)
Opening endometrial cavity	185	2 (1.1%)
Postoperative complications	185	7 (3.8%)

removed, and 24 (13.0%) had six to 11 fibroids removed. No intraoperative complications were reported. Detailed data about surgical procedure are shown in Table 1.

Concerning patients' satisfaction degree of surgical intervention, the authors found only one case of low satisfaction (0.7%), five cases (2.8%) with mild satisfaction, while 179 patients (96.5%) reported high level of satisfaction.

Overall in the sample, 115 (62.2%) patients achieved pregnancy after surgery with a total number of 151 pregnancies, nine of which were achieved by assisted medical reproductive techniques over a total number of 17 patients that underwent the same procedure; 38 pregnancies ended in abortion and two had an ectopic implantation. Pregnancy rate (calculated as total number of obtained pregnancies / total number of desiring pregnancy patients) hence resulted in 80.6%, while abortion rate (total number of abortion occurred / calculated as total number of desiring pregnancy patients) result in 20.5%. The average interval time between surgery and pregnancy was 23.4 ± 17.9 months.

The authors finally reported 111 successful pregnancies, with seven preterm deliveries (6.3%). Mode of delivery was cesarean section in 69 cases (63.4 %) and vaginal delivery in 42 cases (36.6 %), with a respective mean interval

Table 2. — Correlation between surgical and anatomical population features in terms of mode of delivery.

	Mode of delivery		<i>p</i>
	Vaginal Mean / num (SD / %)	Cesarean section Mean / num (SD / %)	
Size	6.4 ± 2.0	6.5 ± 3.0	0.49
Number	1.7 ± 0.9	1.9 ± 1.1	0.51
Age	32.6 ± 3.2	33.5 ± 4.8	0.30
Single myomectomy	15 (45.5%)	15 (45.5%)	1.0
Multiple myomectomy	18 (54.5%)	18 (54.5%)	1.0
Myomas Munro 6-7	23 (69.7%)	19 (57.6%)	0.44
Myomas Munro 4	10 (30.3%)	14 (42.4%)	0.44

time between surgery and delivery of 24.6 ± 20.0 months and 19.2 ± 13.3 months.

The authors registered, as surgical indication for cesarean section, five cases (7.2%) of fetal pathology (one case of IUGR, two cases of acute fetal distress, and two cases with macrosomia), eight cases (11.5%) of previous cesarean section, two cases (2.8%) of placenta praevia, two cases (2.8%) of twin pregnancy, two cases (2.8%) of preeclampsia twins, ten cases (14.4%) of dystocia, and 40 (58.0%) cases of previous myomectomy.

Comparison between cohort of patients divided according to the mode of delivery in term of age, fibroids diameter, number, location, and type of myomectomy showed no significant differences. Detailed data are shown in Table 2.

Discussion

Abdominal myomectomy has been the treatment of choice in multiple myoma, where there is a total number > three of leiomyomas sized over five cm, or in a significantly enlarged uterus. Last advances in endoscopic techniques show that operative time, blood loss, and hospital stay are comparable to that with results for abdominal hysterectomy [16, 17]. With advances in laparoscopic suturing technique and instrumentation, most myomectomies can be performed by endoscopic technique, either hysteroscopically or laparoscopically and the results are comparable where they do not result better to those of myomectomy performed by laparotomy. Although the surgical procedure may last longer than laparotomic approach, laparoscopic myomectomy is a safe and effective procedure, even in case of large or multiple myomas or in women who desire future pregnancy [18-20]. Even if laparoscopic approach for fibroids is nowadays recommended, a good clinical practice imposes a correct diagnosis of abnormal uterine bleeding, that is the main fibroid's symptom, and is important to check, even with hysteroscopy and biopsy or polypectomy performed prior surgery [21, 22].

In the present sample the authors considered 185 women who attempted to get pregnant after a laparoscopic my-

omectomy. They found that mean duration of surgery was 81.2 ± 39.6 minutes with no intraoperative complications, and 3.8% of minor postoperative complications and overall duration of hospitalization was 1.8 ± 0.9 days. These results are in agreement with the current literature data reporting a surgery lasting of 107.71 ± 43.42 minutes, 1.99 ± 0.87 days of hospitalization, 2.2% of major complications, and 11.1 % of minor complications [23-25].

Laparoscopic myomectomy is in fact a minimally invasive procedure with a shorter recovery and a lower overall risk of complications than abdominal myomectomy, and some data suggest that a laparoscopic approach results in less severe adhesive disease, particularly fewer adnexal adhesions, which may impact fertility [24]. The chance of an improved fertility is an important task since leiomyomas are estimated to account for one to two percent of infertility [26], particularly those that impinge upon the endometrium, may affect fertility by interfering with implantation over the myoma site, rapidly distending the uterus in early pregnancy, or impairing uterine contractility [27-29].

Concerning obstetrical outcome, the authors report a total number of 151 pregnancies over 185 patients desiring children, with a calculated pregnancy rate of 81.6 % and an abortion rate of 20.5%. These data are in agreement with Campo *et al.* [30] that report a pregnancy rate of 63.6% and an abortion rate decreased from 61.5% to 13.8% after laparoscopic myomectomy. These data are confirmed by many authors [23, 31-35] and they improve the results of laparotomic surgical procedure reported by Li *et al.* [36] who reported a pregnancy rate of 57% and an abortion rate reduced from 60% to 24% after laparoscopic myomectomy.

The advent of endoscopic surgery hence seems to not have changed the pregnancy and abortion rates following myomectomy, which are comparable with that following laparoscopic myomectomy [37]. The debate is still open on the matter that the woman subjected to certain types of myomectomy (especially intramural) must not give birth vaginally because of the risk of uterine rupture during pregnancy or labor. In a retrospective study performed at the Trinidad Maternity, the observed rate of uterine rupture after laparoscopic myomectomy was 5.3% [38].

The present data report 37 (36.6%) vaginal deliveries and 64 (63.4%) cesarean sections. Intramural myomas were 69.7% among the patients who gave birth vaginally 57.6% among the patients who gave birth by cesarean section. Comparing the group of women who gave birth vaginally with the group of women who had undergone cesarean section, there were no statistically significant differences between age of patients, number, location and size of removed myomas. Since the present data is in accordance with the literature [39], the present authors analyzed the surgical indication applied in the choice of cesarean section and they found that the main indication was previous myomectomy 40 (58.0%). This seems to be inappropriate because it was well-demonstrated

that a woman who underwent previous laparoscopic myomectomy should have the possibility to deliver vaginally. Cesarean section is indicated only in the case of uterine cavity opening during surgical procedure [33, 34]; this is a currently used indication for cesarean section in the present Service. The present authors' follow up was via telephone and the questionnaire did not include the hospital where the patients gave birth. This may represent a bias in this study because there is not yet a clear agreement and different services may apply different protocols, but at the moment both valid indications for cesarean section. In the present sample the authors report no uterine rupture during pregnancy, labor, and postpartum nor silent dehiscence of sutures in the course of elective caesarean section. These results further confirm that vaginal delivery can be accomplished successfully without uterine rupture in women with a laparoscopic myomectomy history where the myometrial fovea is appropriately sutured regardless of the size, depth, location, and number of myomas removed; an appropriate suturing technique can be considered as equal as laparotomic ones [18,20].

In conclusion, laparoscopic myomectomy has proven to be an effective procedure feasible for women who wish to become pregnant. The study also recorded good reproductive outcomes, both in terms of pregnancy and abortion rates that were comparable with the literature and with the classical surgery [38]. What is important to point out is that an adequate laparoscopic suturing of the fovea myometralis does not represent an absolute contraindication for vaginal delivery, regardless of the patient's age, the number, size, and location of the myomas removed.

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