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Laparoscopic-Assisted Vaginal Myomectomy: A Case Report and Literature Review

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ABSTRACT

The purpose of this article is to present a case of laparoscopic myomectomy (LM) that led to the identification of a new minimally invasive technique [laparoscopic-assisted vaginal myomectomy (LAVM)] for removing multiple transmural uterine myomas and facilitating uterine suturing. In addition, we reviewed the literature to (1) describe the history leading up to LAVM, (2) relate the benefits of this technique to other more widely performed myomectomy procedures [LM and laparoscopic-assisted myomectomy (LAM)], and (3) identify criteria for LM and LAVM.

Key Words: Laparoscopy, Myomectomy, Transmural myoma, Colpotomy.

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INTRODUCTION

Laparoscopic myomectomy (LM) is a minimally invasive surgical procedure for the removal of uterine myomas. It was first described in the late 1970s by Semm.[1] Subsequently, instruments have been developed to enhance the procedure. Laparoscopic myomectomy requires advanced laparoscopic skill and expertise in suturing and tissue removal.

Laparoscopic-assisted myomectomy (LAM), a procedure that combines operative laparoscopy and minilaparotomy, was described by Nezhat et al[2] in 1994. The procedure was initially developed to remove single and multiple large myomas. Nezhat reports that in addition to providing a route (via the minilaparotomy incision) for removal of the myoma(s), LAM is "technically less difficult than LM, allows better closure of the uterine defect, and may require less time to perform."[2]

Goldfarb and Pelosi, independently, have worked on a variant of this procedure in which the dominant myoma is removed laparoscopically, and the uterus is delivered (via colpotomy) into the vagina for removal of secondary uterine myomas and uterine closure. Pelosi's[3] laparoscopic-assisted transvaginal myomectomy (LATM) was described in 1997. This paper discusses Goldfarb's laparoscopic-assisted vaginal myomectomy (LAVM) technique.[4]

CASE REPORT

The patient was 26 years old (gravida 2, para 1) and complained of menorrhagia. A transvaginal ultrasound revealed three transmural myomas; the dominant myoma measured 7 cm. Because the patient was attempting pregnancy, myomectomy, rather than myolysis, was deemed the appropriate procedure.[5]

A routine laparoscopic myomectomy[6] was performed. A macro-morcellator was not available. Therefore, the decision was made to remove the myoma by colpotomy. A 5-mm myoma screw was inserted into the myoma and a grasper with locking mechanism was placed on the inferior edge of the wound. The myoma screw was used to direct the myoma toward the cul-de-sac. A colpotomy

was then performed in the routine manner. The myoma was grasped with a tenaculum and removed vaginally.

During this part of the procedure, it was noted that the dominant myoma extended into the uterine cavity, the uterus was mobile, and the vagina was parous. A 5-mm laparoscopic grasper was used to guide the uterus to the colpotomy site. T-clamps were placed on the edges of the wounds, and the fundus of the uterus was delivered, via the colpotomy incision, into the vagina. The 2 additional myomas were palpated digitally and removed transmurally by electrocautery and sharp dissection. The uterus was sutured in 3 layers (endometrial, myometrial, and serosal). The repaired uterus was returned to the abdominal cavity, and the colpotomy incision was sutured. The abdomen was re-explored laparoscopically and thoroughly lavaged. An oxycellulose barrier (Interceed) was placed on the uterus.

DISCUSSION

Since this case, Goldfarb has performed 11 additional LAVM procedures. The indications and outcomes are listed in **Table 1**. Four patients experienced minor postoperative complications–3 patients had urinary retention (Foley catheter remained in place for 1 week) and 1 patient was febrile (additional antibiotics were prescribed). One patient had a follow-up laparoscopy that revealed minimal adhesions. Follow-up has not been long enough to discuss fertility.

Table 1.
LAVM Procedure:* Indications† and Outcomes‡

	Average (Range)
Size of dominant myoma	6 cm (4-8 cm)
Number of myomas	3 (2-8)
Operative time	93 min (60-120 min)
Blood loss	125 cc (75-300 cc)
Hospital stay	1.3 days (1-3)
Return to normal activity	10 pts w/i 7 days

*This table represents data from 11 patients.
†All patients had symptomatic uterine myomas. The myomas were associated with excessive menstrual blood loss, were large or fast-growing, or caused significant pelvic pain.
‡Four patients experienced minor postoperative complications: three had urinary retention and one was febrile. One patient was found to have minimal adhesions by follow-up laparoscopy.

CRITERION FOR LM AND LAVM PROCEDURES

Dubuisson et al[7] cautions that LM can be a lengthy and difficult procedure and should be reserved for experienced surgeons with a thorough familiarity with endoscopic sutures. Parker[8] suggests that not all women with symptomatic myomas are candidates for LM. He notes that the procedure, in some cases, results in excessive blood loss, prolonged operating time, or the need to convert to laparotomy, or both. In addition, it has been reported[9] that laparoscopic suturing of the myometrium may contribute to uterine dehiscence.

Parker suggests the following criteria in deciding whether a patient is likely to be managed successfully by LM: (1) No individual myoma should be larger than 7 cm; (2) If there are multiple myomata are present, the uterine size should not be greater than 14 weeks; (3) No myoma should be near the uterine vessels or tubal cornua. At least 50% of the myoma should be subserosal. Operative hysteroscopy is the preferred procedure for removal of submucous myomas.

For success with LAVM, we suggest surgeons consider the following: (1) Removal of the dominant myoma must render the uterus mobile enough to be delivered to the colpotomy site; and (2) The vagina and cul-de-sac must be ample enough to allow for generous colpotomy (parous preferred).

LITERATURE REVIEW

Laparoscopic Myomectomy

Prior to Semm's description of laparoscopic myomectomy, laparotomy or hysterectomy were the main treatment options for uterine myomas. Since Semm, several clinicians[10-12] have reported success with LM. Nezhat et al[10] report that "laparoscopic myomectomy can be a safe and cost-effective alternative to laparotomy when performed by a skilled operative laparoscopist."

In this series, 154 women, with symptomatic uterine leiomyomata, underwent laparoscopic myomectomy. In total, 347 intramural or subserosal leiomyomata were removed, ranging in size from 2 to 15 cm. The majority of the myomas were morcellated and removed through a 10-mm suprapubic anterior abdominal wall trocar incision or the operating channel of the operative laparoscope. In about 20% of the cases, the myomas were

removed from the abdominal cavity via posterior colpotomy. The procedure ranged from 50 to 190 minutes (with a mean of 116 minutes), the blood loss was estimated at between 10 and 600 cc, and the duration of hospitalization ranged from 7 to 48 hours (with a mean of 19.6 hours).

The authors report 2 major perioperative complications. One patient developed fluid overload postoperatively. The authors attribute this to the hysteroscopic portion of the procedure. The other patient had intraabdominal bleeding that resulted from laceration of the epigastric vessels. The authors note that the damaged vessels were near the left suprapubic puncture, the site used for removal of the myoma.

Other important findings are that "sutured sites of intramural or deep subserosal leiomyomata healed more completely than the unsutured sites, but were associated with a greater incidence of adhesion formation."

The authors conclude that in selected patients (ie, those with few and relatively small myomas), LM can replace laparotomy for the treatment of uterine myomas. They caution that (1) LM can be a difficult endoscopic procedure, (2) the strength of the uterus following LM remains unknown, and (3) postoperative adhesion formation may impair fertility.

Comparison between LM and Laparotomy

In addition to Nezhat,[10] several clinicians[8,13-15] have compared LM with laparotomy, noting the advantages of the laparoscopic procedure. Stringer et al[15] compare the results of 49 open myomectomies (OM) with those of 49 laparoscopic myomectomies (LM). They report that uterine size at surgery ranged from 12 to 14 weeks in 43% of the OM group and 9 to 11 weeks in 51% of the LM group. The mean operating time for OM was 133 minutes as compared to 264 minutes for LM. Mean blood loss and hospital stay were 340 mL/5.6 days and 110 mL/0.6 days, respectively. The overall frequency of adhesions was lower in the LM group. The authors conclude that LM has a lower morbidity, shorter hospital stay, and fewer complications than OM.

Adhesion Formation

In response to concerns about postoperative adhesions following LM, Bulletti et al[16] conducted a case-control study, with 32 patients, to compare the frequency of adhesion formation after LM with that of laparotomy. The mean size of myomas was 7.4 cm for laparotomy versus 7.3 cm for laparoscopy. The authors found that the number of incision sites free of adhesions and the extent of adhesions were significantly lower in women who underwent laparoscopy. In addition, they found that suturing myomas with depth of myometrial penetration of less than 50% provided no advantage over not suturing them (ie, adhesion formation was not significantly reduced by suturing).

Laparoscopic Assisted Myomectomy

In 1994, Nezhat et al[2] describe laparoscopically-assisted myomectomy (LAM), a procedure that combines operative laparoscopy and minilaparotomy for the removal of single and multiple large leiomyomas. In this retrospective study of 57 patients, with uteri ranging from 8 to 26 weeks' gestational size and myomas ranging from 28 g to 998 g, the authors report that operative time ranged from 40 to 285 minutes (mean 127 minutes), and blood loss ranged from 50 mL to 1,600 mL (mean 267 mL). They conclude that LAM is a safe alternative to myomectomy by laparotomy. In addition, as compared with LM, they conclude that LAM is technically less difficult, allows better closure of the uterine defect and may require less time to perform.

Uterine Dehiscence and Laparoscopic Suturing

Uterine dehiscence during pregnancy is a concern after LM. Harris[9] was the first to suggest this complication. He reports that a 24-year-old woman, who conceived after laparoscopic myomectomy, experienced uterine dehiscence at 34 weeks' gestation. He notes that with laparoscopic suturing it is more difficult to reapproximate the layers of the uterus. This likely creates a weak spot in the uterus, which if stressed, as in pregnancy, causes the uterus to rupture.

Since Harris,[9] at least 3 other authors[17-19] have reported cases of uterine dehiscence following LM. In the most recent case report, Pelosi and Pelosi suggest that electrosurgical dissection, because it disrupts blood flow to the wound site, may also contribute to suboptimal healing of the myomectomy site, weaken the uterus, and lead to dehiscence. They suggest that electrosurgical dissection be used sparingly and sharp dissection used instead. In

addition, they advance the use of endoscopic suturing or suturing by minilaparotomy or colpotomy.

Also, since Harris,[9] more sophisticated laparoscopic suturing tools (eg, Endo Stitch laparoscopic suturing device[20,21] and laparoscopic cannula cone[22]) have been developed to aid surgeons in reapproximating the uterine layers and preventing the complication of uterine dehiscence.

In a retrospective chart review of 50 laparoscopic myomectomies, Stringer et al report that the Endo Stitch Laparoscopic Suturing Device (Auto Suture Company, division of US Surgical Corp, Norwalk, CT) combined with a running, locked suture technique enables the surgeon to achieve a secure multiple-layer closure of deep defects via laparoscopy. The authors suggest that repairing the uterine defect this way reduces the likelihood of uterine rupture.

LAVM

In 1997, Pelosi and Pelosi1[9] described laparoscopic-assisted transvaginal myomectomy. In their retrospective chart review, the authors report 21 cases in which they combine traditional laparoscopic myomectomy with posterior colpotomy. They conclude that this combination allows for digital repair and inspection of the uterus while maintaining the benefits of minimally invasive surgery.

CONCLUSION

The LAVM procedure offers advantages over both the LM and the LAM. Compared with the LM, LAVM provides the control and safety of direct suturing along with the advantages of digital palpation to detect and remove smaller, less obvious myomas. In comparison with the LAM, the LAVM requires a smaller incision and avoids cutting through several layers of fascia and muscle. It is less traumatic and requires less recovery time than LAM. In addition, the literature reports[16,23] fewer postsurgical adhesions following laparoscopy as compared with laparotomy.

As Pelosi points out in a 1996 editorial,[24] "operative colpotomy, an easily performed surgical option, in combination with laparoscopy permits a much greater number of patients to benefit from both minimally invasive surgery and a traditional layered uterine repair. The technique requires only standard laparoscopic and transvaginal instrumentation." Goldfarb agrees–colpotomy, rather than minilaparotomy, is a better way to remove large transmural myomas, inspect the myoma cavity, and repair the uterine defect. Furthermore, transvaginal uterine repair results in minimal blood loss because of the acute angulation of uterine blood vessels.

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