The Role of Laparoscopic-Assisted Myomectomy (LAM)

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ABSTRACT

Laparoscopic myomectomy has recently gained wide acceptance. However, this procedure remains technically highly demanding and concerns have been raised regarding the prolonged time of anesthesia, increased blood loss, and possibly a higher risk of postoperative adhesion formation. Laparoscopic-assisted myomectomy (LAM) is advocated as a technique that may lessen these concerns regarding laparoscopic myomectomy while retaining the benefits of laparoscopic surgery, namely, short hospital stay, lower costs, and rapid recovery. By decreasing the technical demands, and thereby the operative time, LAM may be more widely offered to patients.

In carefully selected cases, LAM is a safe and efficient alternative to both laparoscopic myomectomy and myomectomy by laparotomy. These cases include patients with numerous large or deep intramural myomas. LAM allows easier repair of the uterus and rapid morcellation of the myomas. In women who desire a future pregnancy, LAM may be a better approach because it allows meticulous suturing of the uterine defect in layers and thereby eliminates excessive electrocoagulation.

Key Words: Laparoscopy, Myomectomy, Uterine leiomyomata, Morcellation, Suturing.

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INTRODUCTION

Uterine leiomyomata, the most common solid pelvic tumors, occur in approximately 20% of women aged 35 years or more.[1] Because of the significant operative risk associated with abdominal myomectomy, the operation has been reserved for women who want to preserve or enhance their fertility potential.[2,3] However, with the general trend towards conserving the uterus and because many women currently choose delayed childbearing, patient demand for this procedure has increased.[4-6] Furthermore, with the improvement in laparoscopic techniques and their associated low morbidity, resection of myomas is now a valid alternative for women suffering from any serious symptoms related to the presence of myomas in the uterus. Such symptoms commonly include dysfunctional uterine bleeding, pain, and infertility.[6-9]

The only surgical treatment available for intramural and subserous myomas in the past was laparotomy.[2] This procedure was associated with a relatively high level of morbidity.[2] Laparoscopic myomectomy has since been shown to be an effective means of reducing postoperative morbidity, and it expedites recuperation. However, it quickly became apparent that the laparoscopic operation was associated with the prolonged time of anesthesia, increased blood loss, and possibly a higher risk of postoperative adhesion formation.[10,11]

Laparoscopic myomectomy was described 2 decades ago and has since been repeatedly shown to provide the recognized benefits of the laparoscopic approach.[12-15] However, with increasing experience, it has become apparent that the technique demands a high degree of training and skill from the laparoscopic operator.[10,16] It has been suggested that at present these factors limit the application of laparoscopic myomectomy.[16]

Despite significant improvements in endoscopic instrumentation, laparoscopic myomectomy remains a technically demanding and time-consuming procedure. In the easiest cases, pedunculated myomas may be simply transected, and some enucleated myomas will "pop out" through an incision in the uterine wall. However, in many instances, the incision of intramural myomas is technically challenging. Mastery of laparoscopic suturing is also a

crucial requirement for laparoscopic myomectomy.[17]

The operation is time-consuming,[10] usually because of the difficulty in morcellating and removing the myoma from the abdominal cavity through the laparoscopic trocar ports or a posterior colpotomy. The belief that the strength of the uterine scar may be compromised is based on 2 major considerations and is supported by 5 reports of uterine dehiscence during pregnancy.[18-22] First, the difficulty in adequately reapproximating the incision, as with meticulous multilayer suturing, may lead to the accumulation of an intramural hematoma. Second, use of the CO_2 laser and electrodesiccation, which could lead to thermal injury to surrounding tissue, may result in poor vascularization and tissue necrosis.[8,14]

At second-look laparoscopy, we have observed indentations at the sites from which leiomyomas were removed that were directly proportioned to the size of the myomas removed and may therefore represent structural defects. Uteroperitoneal fistulas also have been noted after laparoscopic myomectomy.[23] Adhesion formation may be more numerous and dense around laparoscopically sutured uterine incisions.[24] This is a significant potential problem when the myomectomy is performed to enhance or preserve fertility. However, data are still limited concerning postsurgical adhesion formation and pregnancy outcome[6] although some preliminary data are encouraging.[7,9,15,25] Another concern recently raised is the possibility that, after incomplete resection of the uterine myomas, the recurrence of myomas may be higher with the laparoscopic approach.[26]

Nezhat et al[24] developed laparoscopic-assisted myomectomy (LAM) and reported on it in 1994. It has been advocated as a technique that may lessen these concerns regarding laparoscopic myomectomy while retaining the benefits of laparoscopic surgery, namely, short hospital stay, lower costs, and rapid recovery.[24] Herein, the LAM technique and possible associated advantages are described.

METHODS

Whether to proceed with LAM is usually decided in the operating room after first completing the diagnostic laparoscopy and treating any associated pathology. The criteria for LAM are myomas larger than 10 to 12 cm or numerous and deep myomas requiring extensive morcellation and necessitating uterine repair with sutures.

The leiomyoma, or in patients with multiple myomas, the most prominent one, is injected at its base with 3 to 7 mL of diluted vasopressin to minimize blood loss. An incision is made over the uterine serosa until the capsule of the leiomyoma is reached.[27] A corkscrew manipulator is inserted into the leiomyoma and used to elevate the uterus toward the midline suprapubic puncture. With the trocar and manipulator attached to the myoma, the midline 5-mm puncture is enlarged to a 4- to 5-cm transverse incision. After incision of the fascia transversely at 4 to 5 cm, the rectus muscles are separated at the midline.

We do not routinely use preoperative gonadotrophin-releasing hormone (GnRH) analogues. For anemic patients, preoperative treatment with GnRH analogues may enable restoration of a normal hematocrit, decrease the size of the myomas,[28] and reduce the need for transfusion.[29,30] However, the benefits of preoperative treatment with GnRH analogues for laparoscopic myomectomy have recently been challenged in a prospective randomized study.[11]

The peritoneum is entered transversely, and the leiomyoma is located and brought to the incision using the corkscrew manipulator; a uterine manipulator is used to raise the uterus. The corkscrew manipulator is replaced with 2 Lahey tenacula. The leiomyoma is shelled sequentially and morcellated, gradually exposing new areas. After complete removal of the leiomyoma, the uterine wall defect is seen through the incision. If uterine size allows, the uterus is brought to the skin through the minilaparotomy incision to complete the repair. When multiple leiomyomas are found, as many as possible are removed through a single uterine incision. When the leiomyomas are in distant locations and identification is impossible, the minilaparotomy incision is closed temporarily with 1 layer of running suture or several Allis clamps. The laparoscope is reintroduced, and the leiomyomas are identified and brought to the incision. If posterior leiomyomas are difficult to reach through a minilaparotomy incision, they are removed completely laparoscopically. The uterus is then exteriorized through the minilaparotomy incision.

The uterus is reconstructed in layers using 4-0 to 2-0 and 0-polydioxanone suture without suturing the serosa, and the uterus is palpated to ensure that no small intramural leiomyomas are present. The uterus is returned to the peritoneal cavity, and the fascia and skin are closed in layers. The fascia is closed with 1-0 polyglactin suture, and the skin is closed in a subcuticular manner. The laparoscope is used to evaluate the uterus and ensure final hemostasis. The pelvis is evaluated to detect and treat endometriosis

and adhesions that may have been obscured previously by myomas. Copious irrigation is performed, and blood clots are removed.

RESULTS

Laparoscopic-assisted myomectomy outcomes were compared with the results in patients who had either myomectomy by laparotomy or laparoscopic myomectomy.[24] The myoma weight was significantly greater in the LAM group than in the patients undergoing laparoscopic myomectomy. It was found that LAM could safely replace myomectomy by laparotomy, because patient selection criteria were comparable, and the myoma weights of these 2 groups were similar.

The mean estimated blood loss of the LAM and laparotomy groups was not different. In contrast, blood loss among the patients undergoing laparoscopic myomectomy was significantly lower and may be attributed to the smaller myomas removed.[24]

Previous studies have underscored the need to decrease the operating time of laparoscopic myomectomy.[10] Although subserosal myomas less than 5 cm can be managed easily laparoscopically, larger and intramural lesions require prolonged morcellation and laparoscopic suturing of the uterine defect. The largest reported myomas removed by laparoscopy have been 15 to 16 cm.[13,14] Some surgeons have suggested that the size of the myoma to be removed laparoscopically should be limited to 10 cm[31] or even 6 to 7 cm.[32,33] Both laparoscopic morcellation and myometrial suturing are difficult and time-consuming. Consequently, it has also been suggested that no more than 4 myomas, 3 cm or more in size, should be attempted to be removed laparoscopically.[31,32]

LAM, with conventional morcellation and suturing through the minilaparotomy incisions, allows fast removal of multiple and large myomas and reduces the duration of the operation and the need for extensive laparoscopic experience. Similar mean operating times for laparoscopic myomectomy and LAM techniques were observed despite larger myomas and their intramural positions, adjunctive laparoscopic procedures, and the smaller incisions in the LAM groups.[24]

Hospitalization was significantly longer for the patients who underwent myomectomy by laparotomy when compared with that for the groups having LAM or laparoscopic myomectomy.[24] Currently, the hospitalization time is

Table 1.
Potential advantages of
laparoscopic-assisted myomectomy (LAM).

Short-term benefits
- Technically easier to perform
- Thorough repair of the uterus
- Easier morcellation of myomas
- Fast removal of bulky tissue
- Reduced operation time
- Rapid recovery typical of laparoscopy

Long-term benefits
- More complete removal of myomas
- Higher fertility rates
- Lower recurrence of myomas
- Maintaining uterine wall integrity
- Better obstetrics outcome

similar for patients undergoing LAM and patients having laparoscopic myomectomy. For both procedures, day surgery is used, and the patient is usually discharged on the first postoperative day. The postoperative recovery time is comparable for patients undergoing LAM versus laparoscopic myomectomy, despite the differences in the size of the different incisions.

DISCUSSION

The use of LAM offers several obvious and potential long- and short-term benefits **(Table 1)**. The major advantages of LAM are ease of repair of the uterus and rapid morcellation of the fibroids. In addition, LAM allows more meticulous suturing of the uterus, thus maintaining better uterine wall integrity.

The most feared postoperative complication, uterine rupture during pregnancy, has been reported to date in 5 cases after laparoscopic myomectomy.[18-22] Because the number of procedures performed over the last few years remains unknown, it is difficult to determine whether these 5 cases represent an incidence higher or lower than expected after any myomectomy. Uterine rupture after myomectomy is rare, but has been reported to account for approximately 2% of all pregnancy-related uterine ruptures.[34] All large series reported to date did not confirm the hypothesis that laparoscopic myomectomy is associat-

ed with an increased risk for uterine dehiscence during pregnancy.[7-9,15] However, it must be remembered that inadequate approximation of the uterine wall and poor healing may predispose patients to uterine rupture.[18]

Second-look laparoscopies performed on postmyomectomy patients with pedunculated and superficial subserosal myomas show complete uterine healing. In contrast, intramural and deep subserosal myomas are associated with evidence of granulation tissue and indentation of the uterus proportional to the size of the leiomyoma removed, unless sutures are used to approximate the edges. The use of sutures is associated with a higher rate of adhesions.[24] In a recent study of second-look after laparoscopic myomectomy, 72 myomectomy sites were checked.[14] The overall rate of postoperative adhesion was 35.6% per patient. The rate of adhesions per myomectomy site was 16.7%. The factors that influenced the occurrence of an adhesion on the myomectomy site were posterior location of the myoma and the existence of sutures.[14] Meticulous suturing techniques facilitated by LAM may therefore reduce the rate of postoperative adhesions.[24]

In patients with intramural fibroids and significant uterine wall defects, an unacceptably high rate of endometrial-serosal fistula occurs. Currently, the meticulous suturing made possible during laparotomy is very challenging to perform at laparoscopy. LAM therefore may provide a safer approach allowing more complete multilayer correction of the postmyomectomy uterine defects.

A similar approach, combined laparoscopic and vaginal myomectomy, has also been suggested for treating extensive and deeply infiltrating fundal and posterior wall leiomyomata.[35] The posterior colpotomy permits delivery of the myomas and allows uterine reconstruction by conventional suturing performed transvaginally. This approach also permits layered traditional uterine reconstruction of deep myometrial defects.

A long-established dogma dictates that, if the endometrial cavity is entered or a submucous or large intrauterine myoma is removed during abdominal myomectomy, the patient should undergo cesarean delivery for subsequent pregnancies.[24] Similar guidelines should be followed for laparoscopic myomectomies and LAM. Currently, women with large intramural fibroids, who wish to have children, should be strongly cautioned regarding the relative paucity of data regarding the precise risk during pregnancy after laparoscopic myomectomy.

CONCLUSION

LAM, in carefully selected cases, is a safe and efficient alternative to both laparoscopic myomectomy and myomectomy by laparotomy. These cases include patients with numerous, large or deep intramural myomas. LAM allows easier repair of the uterus and rapid morcellation of the myomas. LAM may also be a more appropriate approach for women who desire a future pregnancy because uterine healing and adhesion formation remain a significant concern. In such women, LAM may offer better management, because it allows careful suturing of the uterine defect in layers and avoids excessive electrocoagulation. By decreasing the technical demands, and thereby the operative time, LAM may be more widely offered to patients. Thus, providing them with the well-recognized advantages of minimal access surgery, including a shorter hospital stay, and better patient convenience and recovery.

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