Laparoscopic versus laparoscopically-assisted myomectomy: An institutional experience*

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ABSTRACT

Background: Uterine fibroids are the most common benign tumors in women. Management of symptomatic fibroids may ultimately require surgery and for those desirous of fertility, laparoscopically assisted myomectomy and the conventional laparoscopic procedure are conservative treatment options, with the former providing a less technically demanding approach.

Objectives: This study aims to evaluate the clinical outcomes for laparoscopically assisted myomectomy (LAM) versus laparoscopic myomectomy (LM) done at a tertiary hospital.

Methods: This is a retrospective chart review of 118 patients with symptomatic myomas who underwent LM (n=66) or LAM (n=52) at a tertiary hospital from January 2010 to December 2017.

Results: There were significantly more fibroids removed in the LAM group compared to the LM group, but with no significant difference in the average diameter of fibroid removed. Complex plastic reconstruction with more than 2 layers of repair was done more often in the LAM group ($p<0.001$). The mean operative time was longer and more blood loss was incurred in the LM group, but this was not statistically significant. Almost 14% of patients in the LM group had blood transfusion compared to 4.1% in the LAM group ($p=0.085$). The rate of perioperative complications was similar for both groups. The length of hospital stay was shorter in the LM group, but was not statistically significant. A trend towards higher odds of pregnancy was seen in the LAM group. Majority of patients were delivered via cesarean section with no incidence of uterine rupture. The recurrence of fibroids was seen more in the LAM group (17.9% versus 13.7% for LM), however this was not statistically significant.

Conclusions: The surgical, reproductive, and long-term clinical outcomes for both LAM and LM are similar, thus, LAM provides a non-inferior minimally invasive approach and a conservative option for patients desirous of future fertility.

Keywords: Laparoscopic myomectomy, Laparoscopically assisted myomectomy, Laparoscopic myomectomy

INTRODUCTION

Uterine leiomyomas (fibroids or myomas) are the most common benign uterine tumors. They are monoclonal tumors of smooth-muscle origin with large amounts of collagen, fibronectin, and proteoglycan-containing extracellular matrix. Prevalence has been reported to be as high as 77%. The 30 to 40% that are symptomatic are mostly in their 30s or 40s. Patients may present with abnormal uterine bleeding that may be heavy and lead to iron-deficiency anemia. Pelvic pressure, urinary symptoms, constipation, and sometimes pain, arise when uterine size has significantly increased. Risk of infertility is also increased with a distorted endometrial cavity and patients present with reproductive dysfunction-placental abruption, pain, preterm labor, and other obstetrical complications.[1,2] Diagnosis is mainly by pelvic examination. Sonography accurately determines uterine involvement of a pelvic mass. With equivocal results, magnetic resonance imaging can provide additional information, while sonohysterography, hysterosalpingography, or hysteroscopy help identify submucosal fibroids.[3]

Though most fibroids are clinically silent, they only require treatment when they cause significant morbidity. And the most important clinical determinant of treatment options is the desire for fertility and/or uterine preservation. This entails either observational, medical, radiological, or uterine-sparing surgery as opposed to hysterectomy, being the definitive treatment option.[4] Therapies for patients who present with

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heavy menses include the use of tranexamic acid and levonorgestrel-releasing intrauterine device. Combined oral contraceptives and to a lesser extent, nonsteroidal anti-inflammatory drugs, also reduces bleeding. For submucosal fibroids, FIGO types 0 and 1, hysteroscopic myomectomy is considered the best therapeutic approach. Menstrual bleeding is further reduced when this is done concomitantly with endometrial ablation, in cases of completed childbearing. The use of gonadotropin-releasing hormone agonists, aside from inducing amenorrhea, also results in significant reduction in uterine volume. Use of GnRH agonists, however, is limited to short-term use.[5] Recent evidence has shown that selective progesterone receptor modulators, particularly in the form of ulipristal acetate, has proven to be an effective medical treatment for fibroids either as a preoperative adjunct or as therapy to avoid surgery, by controlling bleeding and reducing uterine volume.[6] Minimally invasive interventional radiologic techniques include uterine-artery embolization targeting the uterus in its entirety. MRI-guided focused ultrasound, on the other hand, is fibroid-specific. Data are lacking when comparing with surgical alternatives.[5]

Surgical myomectomy is a treatment option for symptomatic intramural and subserosal fibroids in women who want to preserve their fertility. Abdominal myomectomy has been shown to confer a 3 to 4% risk of intraoperative conversion to hysterectomy and risk of postoperative adhesions.[5] Currently, there are a myriad of minimally invasive approaches to myomectomy. The standard laparoscopic myomectomy (LM), though popular, poses a concern for spontaneous uterine rupture and is technically challenging in terms of intracorporeal suturing and its requirement for more specialized instruments. Laparoscopically assisted myomectomy (LAM) provides an approach that addresses these concerns and retains the benefits of conventional laparoscopy, while decreasing recurrence rates and less postoperative pain.[7]

This study focuses specifically on laparoscopic and laparoscopically assisted myomectomy, as minimally invasive approaches and conservative options for patients with uterine fibroids. Locally, data is lacking with regards to the performance of these procedures, thus this paper aims to evaluate the surgical, reproductive, and long-term clinical outcomes for laparoscopically assisted myomectomy versus laparoscopic myomectomy at a tertiary hospital.

Background Information and Brief Literature Review

Laparoscopically assisted myomectomy

In 1994, Nezhat et al. first described the technique of laparoscopically assisted myomectomy with a report of 57 cases. The procedure entailed identifying the myomas by laparoscopy and bringing it to a minilaparotomy incision through which the myomas were removed and the uterine defect was repaired in layers. Laparoscopy was also used to treat additional pelvic pathologies. The procedure was completed laparoscopically with hemostasis and removal of blood clots and debris. The authors concluded that laparoscopically assisted myomectomy is a safe alternative to an open procedure and in comparison with laparoscopic myomectomy, is technically less challenging and provides better closure of the uterine defect in a shorter operative time.[8]

LAM versus abdominal myomectomy

LAM retains the benefits of laparoscopy and offers advantages over minilaparotomy and laparotomy. Myomectomy performed through an 8-12cm incision is considered laparotomic myomectomy versus a 5-7cm skin incision in minilaparotomy. Aside from cosmetic advantages, a prospective study of 75 premenopausal women managed by LAM or by laparotomy showed significantly less blood loss in the LAM group (246 +/- 161 vs. 351 +/- 219 ml, respectively, P = 0.03). Operative time and hospitalization was also found to be shorter in the LAM group. Bowel reactivity was faster after LAM. Perioperative complications between the two groups were not different.[9] Postoperative adhesions is minimized with laparoscopic pelvic irrigation which may not be removed completely with laparotomy. LAM allows treatment of other pelvic pathologies such as endometriosis which may be located in hard to reach areas and where visualization with laparotomy is usually inadequate.[10] The accurate visualization provided by LAM is also ideal in managing patients with infertility through chromopertubation and tubal surgery.

LAM versus conventional laparoscopy

In general, laparoscopy offers improved visualization, shorter recovery, less postoperative pain, and decreased postoperative adhesions. LAM, however, provides unique advantages over conventional laparoscopy. A multilayer uterine closure in cases of large or multiple myomas is made possible with LAM and it allows surgeons to reduce associated risks that results with inadequate laparoscopic suturing of the uterine defect, which is of utmost importance in patients desirous of future pregnancies. The procedure is simplified, thereby reducing operative time. LAM also enables palpation of small intramural myomas. With the use of cold knife, extensive use of thermal energy seen in laparoscopy is avoided.[10]

A prospective study of 116 patients who underwent either laparoscopic myomectomy or laparoscopically

assisted myomectomy were compared in terms of intraoperative and short-term outcomes. The mean diameter of the myomas were significantly larger in the LAM group. Operative time was shorter in the LAM group by a mean of 28 minutes. A significantly smaller uterine incision was found in the LAM group. Estimated blood loss, on the other hand, was significantly less in the laparoscopy group. Complications, recovery, and length of hospital stay was similar between the groups, thereby suggesting LAM as a valid alternative to laparoscopic myomectomy.[11] The only disadvantage with LAM is the need of an additional incision extending to 3-5cm, which may not be acceptable to some patients.

Surgical technique

Nezhat et al. described the technique of laparoscopically assisted myomectomy as follows. With laparoscopy, the most prominent myoma is injected with vasopressin at its base. A vertical incision over the uterine serosa is made and with visualization of the capsule, a corkscrew manipulator is inserted and used to elevate the uterus toward a midline suprapubic puncture. The incision is enlarged to a 4-cm transverse incision with the trocar and corkscrew manipulator still attached to the myoma. The peritoneum is entered and the myoma is brought through the incision using the corkscrew. The myoma is shelled and morcellated. The uterine defect is repaired in layers. The uterus is palpated for remaining myomas. The minilaparotomy incision is closed and the laparoscope is reinserted to observe and treat other pathologies. Hemostasis and removal of clots is done laparoscopically at the end of the procedure.[12] Laparoscopic myomectomy on the other hand entails performing the procedure entirely via video laparoscopy.

OBJECTIVES

General Objective:

To compare laparoscopic myomectomy and laparoscopically assisted myomectomy done in a tertiary hospital in terms of short-term and long-term clinical outcomes.

Specific Objectives:

a) To compare the patient profile of those who underwent laparoscopic myomectomy versus laparoscopically assisted myomectomy:
   - (i) Age
   - (ii) Parity
   - (iii) BMI
   - (iv) Chief complaint – pelvic mass, abnormal uterine bleeding, dysmenorrhea, dyspareunia, infertility

b) To compare the intraoperative findings in those patients who underwent laparoscopic myomectomy versus laparoscopically assisted myomectomy in terms of the following:
   - (i) Number of fibroids removed
   - (ii) Type of fibroids removed
   - (iii) Size of fibroids removed
   - (iv) Number of uterine incisions
   - (v) Level of uterine reconstruction

c) To compare the surgical outcomes for laparoscopy versus laparoscopically assisted myomectomy in terms of the following:
   - (i) Operative time
   - (ii) Blood Loss
   - (iii) Transfusion – no. of blood products transfused
   - (iv) Perioperative complications
   - (v) Length of hospital stay

d) To compare the reproductive outcomes for laparoscopy versus laparoscopically assisted myomectomy in terms of the following:
   - (i) Occurrence of pregnancy after the procedure
   - (ii) Time to pregnancy
   - (iii) Need for assisted reproductive technologies (ART)
   - (iv) Mode of delivery – vaginal delivery, cesarean section
   - (v) Incidence of uterine rupture

e) To compare other long-term clinical outcomes for laparoscopy versus laparoscopically assisted myomectomy in terms of the following:
   - (i) Recurrence of fibroids
   - (ii) Need for repeat myomectomy, hysterectomy

MATERIALS AND METHODS

Type of study & time period & target population

This is a retrospective cohort study of all patients who underwent laparoscopic myomectomy or laparoscopically-assisted myomectomy at a tertiary hospital. The study evaluated the surgical and reproductive outcomes of these patients based on chart review.

Inclusion criteria and Exclusion criteria for subject selection

This study included all patients who underwent laparoscopic myomectomy or laparoscopically-assisted myomectomy at a tertiary hospital from January 2010 to December 2017. Inclusion criteria – patients between the ages of 18 and 45 years with symptomatic myomas. Exclusion criteria – patients who underwent planned diagnostic laparoscopy then myomectomy via an open technique.

Operational definitions

Laparoscopic-assisted myomectomy was defined as myomectomy done using a combined approach of laparoscopy and minilaparotomy as described by Nezhat et al and Prapas et al. Laparoscopic myomectomy will refer to myomectomies done entirely via laparoscopy.

The patients' demographics was defined in terms of the following criteria – age (years), parity (nulliparous, multiparous), BMI (kg/m2), chief complaint – pelvic mass, abnormal uterine bleeding, dysmenorrhea, dyspareunia, infertility.

The following intraoperative parameters was assessed – number of fibroids removed, type of fibroids removed, size of fibroids removed (largest diameter, cm), number of uterine incisions (1-3, 4-6, or >6), and level of uterine reconstruction. The number of fibroids removed was the total number of well-circumscribed masses removed. The fibroids were classified according to their location – intramural, intramural/subserosal, subserosal, submucosal type. The level of uterine reconstruction was noted according to the classification by Juhasz-Boss et al – level 1: no reconstruction; level 2: simple reconstruction – single layer suture, adaption of wound margins, length of wound <2cm; level 3: plastic reconstruction – mobilization of myometrium, double-layer suture, length of wound >2cm; level 4: complex plastic reconstruction – myometrial flap, multilayer suture.[13]

The total operative time (minutes) and estimated blood loss (mL) was recorded based on the data on the operative record. Perioperative complications such as need for blood transfusion, development of postoperative ileus, fever defined as temperature > 38 degrees Celsius, and conversion to an open procedure was noted. Length of hospital stay (days) was computed from the time of admission to time of discharge.

The occurrence of pregnancy after the procedure was noted regardless of pregnancy outcome. The time to pregnancy was measured from the time of surgery up to the time of last menstrual period on which the age of gestation is based. The need for ovulation induction, intrauterine insemination, or in vitro fertilization was noted. The recurrence of fibroids was defined as the presence of leiomyomas >3cm in diameter noted on transvaginal ultrasound.

Description of Study Procedure

Method of subject selection

The list of patients included was obtained from the records of the department of obstetrics and gynecology (i.e. monthly census).

Data gathered from the subjects or medical records were the following:

Age
Parity
BMI
Chief complaint – pelvic mass, abnormal uterine bleeding, dysmenorrhea, dyspareunia, infertility
Number of fibroids removed
Type of fibroids removed
Largest diameter of fibroids removed
Number of uterine incisions
Level of uterine reconstruction
Operative time
Blood loss
Transfusion – no. of blood products transfused, type of blood products used
Perioperative complications
Length of hospital stay
Occurrence of pregnancy
Time to pregnancy
Need for ART
Mode of delivery – vaginal delivery, cesarean section
Incidence of uterine rupture
Recurrence of fibroids
Need for repeat myomectomy, hysterectomy

The above data was collected from the in-patient medical charts from the Medical Records Section and after having obtained consent from the attending consultants, out-patient charts from the clinics were reviewed.

Description of Outcome Measure

The following outcome measures was obtained per group (LAM vs laparoscopic myomectomy) - mean age, parity, BMI; the total number of patients presenting with pelvic mass, abnormal uterine bleeding, dysmenorrhea, dyspareunia, and infertility; mean number of fibroids removed; the most common fibroid removed (intramural, intramural/subserous, subserosal); the mean size of fibroids removed, number of uterine incisions; the level of uterine reconstruction most commonly done; mean operative time, mean blood loss, mean number of blood products transfused; number of perioperative complication; mean length of hospital stay, the number of pregnancies, mean time to pregnancy, number of patients that underwent ART. The percentage of vaginal delivery or cesarean section was based on the total number of deliveries. The incidence of uterine rupture was based on the total number of deliveries. The recurrence of fibroids and the number of patients that underwent repeat myomectomy or hysterectomy was based on the total number of patients per LAM or laparoscopic myomectomy.

Sample Size Estimation

Sample size was calculated based on the comparison of blood loss (it having yielded the largest sample size out

of the three outcomes) among patients who underwent laparoscopic myomectomy versus laparoscopically-assisted myomectomy. Assuming that mean blood loss for LAM is 303 ± 188 SD and for LM, 200 ± 107 SD, (Prapas, 2009), with an alpha error of 5%, power of 90%, and a one-tailed alternative hypothesis, sample size calculated is 38 per group or 76 for two groups. Controlling for 3 more variables in the analysis with an additional 20% for each control variable, final sample size required is 122. Only 118 patients were included in the study.

Data Analysis

Data was collected and recorded by the primary investigator. Data of all eligible subjects will be analyzed using Microsoft Excel and SPSS 16.0 for Windows. Comparison of clinical outcomes between LAM and LM was done using an independent T-test and Mann Whitney test for quantitative outcomes and Chi-square test and Fisher Exact test for categorical and qualitative outcomes. Multiple linear regression was then utilized for quantitative outcomes and multiple logistic regression for qualitative outcomes. Level of significance was set at alpha=0.05.

Ethical Considerations

There were no experimental interventions per the above protocol, hence, no informed consent was obtained. Charts were reviewed from the medical records section and respective clinics of the attending consultants after written permission was obtained. Personal identifiers were not included in the data collection. All documents were coded and did not contain any identifying information in order to ensure confidentiality. All data shall be recorded and investigators are responsible for data accuracy and completeness. Data will be kept for 3 years after study completion. The study was submitted to the Ethical Review Board and approval was obtained.

RESULTS

There were a total of 118 patients with symptomatic myomas between January 2010 to December 2017 who underwent either laparoscopic myomectomy or laparoscopically assisted myomectomy. There were 66 patients in the LM group and 52 patients in the LAM group.

The mean age (36.0 +/- 4.63 vs 36.4 +/- 4.86, p=0.606), BMI (24.9 +/- 4.30 vs 24.9 +/-4.07, p=0.999), and the various chief complaints of the patients – majority was abnormal uterine bleeding, followed by infertility, then pelvic mass and dysmenorrhea or hypogastric pain – (p=0.196), did not differ between the groups (Table 1).

There were significantly more nulliparous patients in the LAM group, 94.2%, versus 78.8% in the LM group (p=0.018) (Table 1). There were also more fibroids removed in the LAM group compared to the LM group (4.8 +/- 4.19 versus 2.3 +/- 1.58, p<0.001). Similarly, there were significantly more uterine incisions done in the LAM group (4.8 +/- 4.19 versus 2.3 +/- 1.58, p<0.001). There was no significant difference in terms of the average largest diameter of fibroid removed (7.0cm +/- 2.43 versus 7.0 +/- 2.57, LM versus LAM, respectively). Most of the fibroids removed were of the intramural and subserous types for both groups. However, complex plastic reconstruction with more than 2 layers of repair was seen more often in the LAM group (p<0.001) (Table 2).

The mean operative time was longer and more blood loss was incurred in the LM group, however, this was not statistically different from the LAM group (Table 2). Due to the variable length of procedures and blood loss incurred within the groups, there was heterogeneity in the standard deviations obtained, hence median values were computed and compared, with still no significant difference noted between the groups.

Almost 14% of patients in the LM groups had blood transfusion compared to 4.1% in the LAM group (p=0.085). There were more blood products transfused in the LM group (2.1 +/- 0.93) versus the LAM group (1.5 +/- 0.71), however, this was also not significant. Overall, if the location of the fibroid is intramural or submucous, the odds of blood transfusion in LM or LAM increases by more than 5 times compared to if the fibroid is intramural or subserous. And for every 1cm increase in the largest size of fibroid removed, the odds of blood transfusion increases by 35%. The two groups also did not differ in terms of occurrence of perioperative complications. The length of hospital stay was shorter in the LM group (3.0 days +/- 1.14 versus 3.2 days +/- 1.10, p=0.262), but was not statistically significant (Table 2).

There was no significant difference in terms of pregnancy rate between the two groups. However, the results showed a trend towards higher odds of pregnancy, an almost 2-fold increase, in patients who underwent LAM (OR=1.61; 95% CI: 0.50-5.27; p=0.37), compared with a lower chance of getting pregnant with LM (OR=0.62; 95% CI: 0.19-2.01; p=0.37). The need for intrauterine insemination or IVF was similar in both groups. The interval to pregnancy averaged 80.1 weeks in the LAM group versus 93.4 weeks in the LM group. Majority of patients were delivered via cesarean section with no incidence of uterine rupture (Table 3).

The recurrence of fibroids was seen more in the LAM group (17.9% versus 13.7% for LM), however this was not significant. The odds for recurrence were also comparable (OR=1.38; 95% CI: 0.38-4.94; p=0.58). As a result, the need for additional surgery and type of repeat procedure also did not differ (Table 3).

Table 1. Patient Demographics

Patient Demographics	LM	LAM	*p*-value
Age (years)	36.0 +/- SD 4.63	36.4 +/- SD 4.86	0.606
BMI	24.9 +/- SD 4.30	24.9 +/- SD 4.07	0.999
Parity (n)			0.018
Nulliparous	52 (78.8%)	49 (94.2%)	
Multiparous	14 (21.2%)	3 (5.8%)	
Chief complaint (n)			0.196
Pelvic Mass	13 (19.7%)	6 (11.5%)	
Abnormal Uterine Bleeding	25 (37.9%)	24 (46.2%)	
Pain	13 (19.7%)	5 (9.6%)	
Infertility	15 (22.7%)	17 (32.7%)	
LM laparoscopic myomectomy, LAM laparoscopically assisted myomectomy			

Table 2. Surgical Outcomes

Surgical Outcomes	LM	LAM	*p*-value
No. of fibroids removed (n)	2.3 +/- SD 1.58	4.8 +/- SD 4.19	<0.001
Largest diameter of fibroid removed (cm)	7.0 +/- SD 2.43	7.0 +/- SD 2.57	0.982
Location of fibroids removed (n)			0.201
Intramural	14 (21.2%)	6 (12.2%)	
Intramural/Subserous	33 (50.0%)	29 (59.2%)	
Subserous	19 (28.8%)	12 (24.5%)	
Submucous	0 (0%)	2 (4.1%)	
No. of uterine incisions (n)	2.3 +/- SD 1.58	4.8 +/- SD 4.19	<0.001
Level of uterine reconstruction (n)			<0.001
No reconstruction	6 (9.1%)	0 (0%)	
Simple reconstruction	7 (10.6%)	2 (4.1%)	
Plastic reconstruction	19 (28.8%)	3 (6.1%)	
Complex plastic reconstruction	34 (51.5%)	44 (89.8%)	
Operative time (mins)			
Mean ± SD	246.7 +/- SD 83.55	234.5 +/- SD 68.73	0.406
Median	240	238	0.280
Blood loss (mL)			
Mean ± SD	359.1 +/- SD 532.19	278.6 +/- SD 257.45	0.286
Median	150	200	0.830
Blood transfusion (n)	9 (13.6%)	2 (4.1%)	0.085
No. of blood products transfused	2.1 +/- SD 0.93	3.2 +/- SD 1.10	0.411
Perioperative complications (n)			0.440
Fever	15 (23.15%)	13 (26.5%)	
Ileus	0 (0%)	0 (0%)	
Conversion to laparotomy	2 (3.1%)	0 (0%)	
Length of hospital stay (days)	3.0 +/- SD 1.14	3.2 +/- SD 1.10	0.262
LM laparoscopic myomectomy, LAM laparoscopically assisted myomectomy			

DISCUSSION

Uterine leiomyomas are the most common benign gynecologic tumor. Majority of reproductive-aged women develop fibroids and when symptomatic, may present as excessive uterine bleeding, abdominopelvic pain and dysmenorrhea, pressure symptoms, subfertility, or pregnancy-related complications. Menstrual abnormalities were the primary complaint of most patients presenting for surgery in this study (37.9-46.2%), followed by infertility (22.7-32.7%). In order to address these problems, the surgical approaches employed for myomectomy include hysteroscopic, open myomectomy, robotic-assisted laparoscopy, laparoscopic or laparoscopic-assisted with mini-laparotomy, the latter two being the methods evaluated in this study.[14]

Comparing laparoscopic myomectomy with laparoscopically assisted myomectomy in a sample size population of 118 patients presenting with primarily symptomatic myomas, the study population was

Table 3. Reproductive and Long-term Clinical Outcomes

Reproductive Outcomes	LM	LAM	*p*-value
Pregnancy	8 (15.7%)	9 (23.1%)	0.375
Need for ART IUI IVF	1 (12.5%) 1 0	3 (60.0%) 1 2	0.071
Mode of delivery Vaginal Abdominal	 1 (20.0%) 4 (80.0%)	 0 (0%) 4 (100.0%)	0.343
Uterine rupture	0 (0%)	0 (0%)	-
Long-term Outcomes			
Recurrence of fibroids (n)	7 (13.7%)	7 (17.9%)	0.584
Need for additional surgery (n)	1 (14.3%)	2 (40.0%)	0.310
Type of repeat procedure (n) Myomectomy Hysterectomy	 0 1	 1 1	0.386
LM laparoscopic myomectomy, LAM laparoscopically assisted myomectomy			

homogenous in terms of patient demographics such as age, BMI, and chief complaint. However, it was noted that nulliparous patients were more commonly seen in the LAM group, consisting of 94.2% (p=0.018).

Analysis of the surgical outcomes has shown significant difference in the total number of fibroids removed with more myomas excised in the LAM group as was evident in previous studies. MacKoul et al reported that the ability to palpate the uterus during LAM enables detection of smaller and deeper myomas. As a result, more uterine incisions were made in the LAM group. The mini-laparotomy done in LAM allows for a wide range of sizes of myomas to be removed without the need for power morcellation, comparable to abdominal myomectomy. In this study, the largest size of fibroid excised in both LAM and LM groups were similar, probably owing to advanced endoscopy skills of surgeons in the LM groups enabling outcomes similar to that of LAM. The surgeon volume and case complexity, however, were also not controlled in this study.

LAM allows an easy multilayer repair of the myometrial defect with less electrocoagulation as opposed to the technically demanding laparoscopic myomectomy.[10] As such, this study has shown a greater complexity of repair more frequently done in the LAM group (p<0.001). In addition to easier myometrial suturing, Seidman et al has shown smaller uterine incisions were being done in LAM.[16]

Although not statistically significant, there was a trend towards shorter operation times despite more fibroids removed and adjunctive laparoscopic procedures in the LAM group. There was also a trend towards decreased estimated blood loss and lower transfusion rates in the LAM group. Prapas et al reported of faster uterine repair and shorter operation time, though greater blood loss in the LAM group. MacKoul et al employed the technique of using pericervical tourniquet or uterine artery ligation to control blood loss during LAM resulting in significantly lower rates of hemorrhage. In this study, the use of vasopressin, tranexamic acid, pericervical tourniquet, or uterine artery ligation was not reported and the use of these hemostatic techniques as a parameter could have been controlled to better reflect the impact on blood loss. Despite not controlling for this variable, it was shown that for minimally invasive approaches for myomectomy employed in the institution, the odds of blood transfusion increases by more than 5 times during excision of intramural or subserous fibroids with 35% increase in odds of transfusion for every 1 cm increase in size. This could prove valuable for preoperative planning and could contribute to judicious use of blood products and restriction of blood transfusion. This study has shown similar outcomes for both groups in terms of rates of other complications such as fever, ileus, and conversion to standard laparotomy. The length of hospital stay, though may be impacted by surgeon preference and discharge protocols, was similar for both groups.

This study further aimed at evaluating the reproductive and other long-term outcomes of LAM and LM. Potential long-term advantages of LAM over LM includes complete removal of myomas, hence lower recurrence, higher fertility rates, and better myometrial wall integrity as a result of meticulous repair that could lead to avoidance of obstetrical complications and hence, better outcomes.[16] This study has shown that though LAM and LM both have similar pregnancy rates, the odds of pregnancy are higher in patients who underwent LAM. Though the difference in the interval to pregnancy was not statistically significant, in patients more than 35 years of age wherein there is an exponential decline in

ovarian reserve, this becomes clinically relevant. Also, both groups are similar in terms of the need for ART, with no note of incidence of uterine rupture among those who became pregnant. Likewise, recurrence and reoperation rates for fibroids are not significantly different between the two groups.

CONCLUSION

This study provides local data from a single institution on the performance of laparoscopic and laparoscopically assisted myomectomy for the surgical management of symptomatic uterine leiomyomas in the reproductive age group. Established advantages of conventional laparoscopic myomectomy includes faster recovery rates, shorter hospital stay, patient convenience, and cosmetically acceptable surgical scars. Laparoscopic myomectomy is limited by the skills of the surgeon, since it remains to be a highly technically demanding procedure that may lead to longer operative time, prolonged anesthesia, and increased blood loss with concerns on postoperative adhesion formation. Also, the procedure may be limited by the size, type, and number of myomas with concerns regarding morcellation for specimen retrieval.[16] Myometrial defects may also be not as meticulously repaired as in abdominal myomectomy. Laparoscopically assisted myomectomy on the other hand, may provide an option that retains the advantages of laparoscopic myomectomy, but offers added advantage of microsurgery for concomitant gynecologic pathologies, particularly useful for patients with infertility. Other benefits as this study has shown, include a higher number of fibroids removed with higher complexity of uterine reconstruction, easier specimen retrieval, a trend towards a decrease in operating times, decreased need for blood transfusion, while maintaining similar rates for other complications as fever, ileus, and conversion to laparotomy. This study also demonstrated that with respect to reproductive outcomes – pregnancy rate, interval to pregnancy, need for ART, incidence of uterine rupture – both LAM and LM do not differ significantly, with a trend towards higher odds of pregnancy in the LAM group. Recurrence of fibroids and need for reoperation are also similar. Thus, compared to conventional laparoscopic myomectomy, LAM provides a non-inferior minimally invasive approach and a conservative option for patients desirous of future fertility.

LIMITATIONS OF THE STUDY

The study is limited by the total number of patients with failure to achieve the sample size for the LAM group. Surgeon volume, complexity of procedures, and the presence of other concomitant surgeries were not controlled for both groups and were not adjusted for statistical analysis. The reproductive and long-term outcomes are few and a larger sample size may have been needed to demonstrate statistical significance.

RECOMMENDATIONS

Additional parameters such as the presence or absence of previous surgeries, preoperative medical management, and use of hemostatic techniques and advanced bipolar instruments can be included in a prospective study. ■

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