SCIENTIFIC PAPER

Total Laparoscopic Hysterectomy for Uteri Over One Kilogram

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ABSTRACT

Introduction: Laparoscopic hysterectomy for large fibroid uteri is technically a difficult procedure. In this article, we report our experience with fibroid uteri >1 kg in weight.

Materials and Methods: An intent-to-treat study.

Results: From 2003 to 2009, 13 patients were successfully treated for large fibroid uteri with postoperative specimens weighing >1000 g. Four patients had total abdominal hysterectomy, one patient had laparoscopically assisted vaginal hysterectomy, and 8 patients had total laparoscopic hysterectomy. The last 6 cases were total laparoscopic hysterectomy cases.

Conclusion: With experience and specialized techniques, total laparoscopic hysterectomy can replace abdominal hysterectomy for large uteri.

Key Words: Large fibroid uterus, Total laparoscopic hysterectomy, Total abdominal hysterectomy, Laparoscopically assisted vaginal hysterectomy, Morcellation, Bowel bag.

INTRODUCTION

Fibroids (leiomyomata uteri) are a common gynecological pathology and the leading indication for hysterectomy in the United States. Between 25% to 50% of reproductive age women complain of fibroids, and additionally 80% of surgical specimens and autopsies show microscopic evidence of fibroids.[1] Uterine fibroids are more common in African-American women with a tendency towards earlier and more severe disease.[2–4] Age-standardized rates of ultrasound- or hysterectomy-confirmed diagnoses per 1000 woman-years are estimated at around 8.9 among white women and 30.6 among black women.[3] The prevalence of uterine fibroids is approximately 60% among African-American women by age 35 and increases to over 80% by age 50. Caucasian women have a prevalence of 40% by age 35, and the prevalence rises to 70% by age 50.[4] Uterine fibroid tumors consume a significant amount of healthcare resources in the United States. More than $2 billion are spent every year on hospitalization costs for uterine fibroids, mainly on inpatient care, particularly, hysterectomy.[5] Healthcare costs are more than $4600 per woman per year.[6] In addition, uterine fibroids are associated with high disability costs, due to the long recovery period after abdominal and vaginal hysterectomies. We think that the real cost in lost workdays, lost corporate productivity, cost of disability income to corporate sponsors, loss of personal disposable wealth, and the increase in patient suffering and physical pain is considerably higher.

Leiomyomas may grow to a large volume in neglected cases. In the literature, there are a few autopsy reports of huge leiomyomas weighing up to 23 kg that compressed the lungs, causing severe congestion.[7] Such cases may still happen but occur mostly in developing countries. They may rarely be encountered in developed countries, such as the case reported recently by Nappi et al[8] in Italy. He described a bilobated giant myoma of the uterus that weighed 27.7 kg. Such cases are, obviously, only treated with abdominal hysterectomy. Large uteri of much smaller size (5000 g) can cause serious complications including deep venous thrombosis (DVT) due to blood stasis in the pelvic venous plexus.[9]

In a previous article,[10] we described a 3043 g fibroid uterus removed by total laparoscopic hysterectomy with in situ morcellation. In the current article, we expand on

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that previous article and report our experience with fibroid uteri >1 kg in mass, including their routes of treatment, intraoperative difficulties, and postoperative complications.

MATERIALS AND METHODS

We retrospectively reviewed the charts of patients from our suburban gynecological practice, Heart of Georgia Women's Center, who were treated with hysterectomy and yielded uteri >1000 g in weight. These patients were part of a larger database of patients treated by a single operator–Dr. Heaton. After acquiring the necessary laparoscopic skills, he intended to do all hysterectomies via the total laparoscopic route, if feasible. For the database the following variables were collected: age, gravida/para status, body mass index (BMI), history of cesarean delivery, uterus size, type of surgery, specimen weight, blood transfusion, reason for readmission, if any, and other data points not relevant to this article. All patients had negative Pap smears and endometrial biopsies and were counseled on the risks and benefits of laparoscopic surgery before the operation was performed. In cases where suspicious fibroids could harbor a malignancy, patients were counseled about their increased risk of a hidden leiomyosarcoma, and the surgery was performed by the total abdominal route in some of these patients early in the study.

Dr. Heaton developed the bowel bag technique for pelvic mass isolation, which has been explained in detail elsewhere.[11] According to his method, after the hysterectomy is completed extrafascially, with the uterus intact, a bowel bag is inserted into the abdomen via the vagina, and the uterus is maneuvered into it. The mouth of the bag is then brought out through the vagina, and the uterus is morcellated vaginally with retractors placed inside the bag in the vagina in the same manner as they would be placed for a vaginal hysterectomy. This prevents intraabdominal contamination with a potentially malignant mass.

RESULTS

From 2003 to 2009, 13 patients were treated for large uteri with postoperative specimens weighing >1000 g. Of these, 4 patients were treated by total abdominal hysterectomy (TAH), 1 had laparoscopically assisted vaginal hysterectomy (LAVH), and 8 underwent total laparoscopic hysterectomy (TLH).

The patients' data are presented in **Table 1**. It is evident from this table that in the last years we were able to

Table 1.
Summary of the 13 Cases of Fibroid Uteri >1000 g

Year	Age	GP*	BMI*	H/O C-S*	Uterus Size (weeks)	Type of Surgery & Morcellator Diameter	Intraoperative Incidents	Operative Time (minutes)	Blood Loss (mL)	Resected Weight (grams)
2003	48	G2P2	46	2	18–20	TAH		80	100	1109
2003	51	G4P4	35	0	14	TAH		108	350	1007
2004	48	G3P3	53	1	12–14	LAVH 20 mm	Bladder Injury	296	1000	1064
2006	36	G3P2	52	0	16	TAH		120	600	1219
2006	47	G1P1	33	0	24	TLH 15 mm		357	800	3043
2007	40	G5P5	50	0	18–20	TLH 20 mm		182	350	1210
2007	38	G0P0	32	0	28–30	TAH		86	250	2669
2007	54	G3P3	35	0	16	TLH 20 mm		175	100	1446
2007	40	G2P1	23	0	18–20	TLH 20 mm		200	150	1105
2008	39	G2P2	31	0	16	TLH BB		190	150	1006
2009	36	G1P1	27	0	28	TLH BB		330	400	1859
2009	49	G1P1	26	0	14	TLH BB		185	50	1035
2009	41	G3P3	42	0	24	TLH 20 mm		140	125	1484

*GP=gravida para; BMI=body mass index; H/O C-S=history of Cesarean section; BB=Bowel Bag; TAH=total abdominal hysterectomy; LAVH=laparoscopic assisted vaginal hysterectomy; TLH=total laparoscopic hysterctomy.

gradually replace TAH with TLH for large uteri with no significant complications. The last 6 patients were total laparoscopic hysterectomy cases with no complications. Operative time and blood loss correlated with the mass of the resected uterus in TLH cases **(Figures 1 and 2)**.

The largest uterus was 24-week size, 3043 g, removed by total laparoscopic hysterectomy with in situ morcellation in 5 hours 57 minutes with a blood loss of 800 mL.[10] This was the only patient who required readmission 3 days after discharge. The patient came back with nausea, vomiting, and abdominal distension despite flatus and good bowel sounds. She was treated with antibiotics for pelvic cellulitis and was discharged home on the third day in good condition.

DISCUSSION

Hysterectomy has many positive attributes as a treatment for fibroids. Because the entire uterus is removed, the possibility of new fibroids growing back is eliminated. Menstrual bleeding is stopped permanently and recurrent menorrhagia cannot occur. The risks of cervical, uterine, endometrial, and if combined with bilateral salpingo-oophorectomy, ovarian cancer are eliminated. The likelihood of repeated gynecological surgery is greatly reduced. We have done numerous hysterectomies either for recurrent fibroids or pain, or both, resulting from severe adhesions caused by prior myomectomies and a smaller number for chronic pelvic pain and adhesions following uterine artery embolization procedures. We believe that laparoscopic hysterectomy is the preferred surgery for patients who do not desire further childbearing to obviate the need for repeat surgeries and because in most cases large uteri are secondary to multiple fibroids. Uterus-sparing treatment with laparoscopic myomectomy for these patients would be a more technically challenging operation without significant long-term benefits, except for the preservation of future childbearing function, which most of these patients do not desire to keep. In no way does laparoscopic myomectomy compare favorably with laparoscopic hysterectomy: bleeding can still be heavy, severe adhesions may ensue and cause infertility and pain, and new fibroids may grow that may be malignant.[12] It is doubtful that uterine artery embolization or any other in situ destructive procedures would survive a careful cost-benefit risk analysis compared with laparoscopic hysterectomy that causes much fewer adhesions,[13] ends the risk of recurrent fibroids, cervical cancer, endometrial cancer, sarcoma, and ovarian cancer, if concomitant bilateral salpingo-oophorectomy is performed.

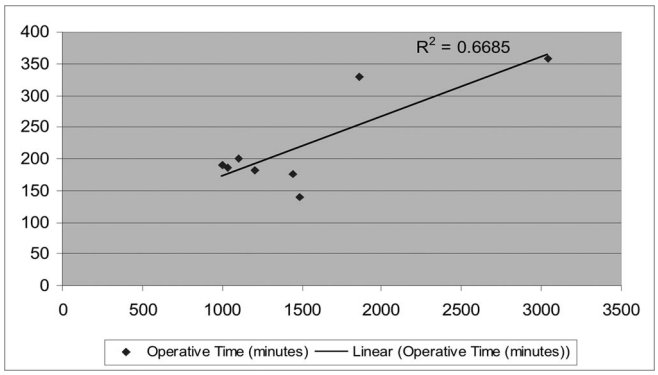

Figure 1. Operative time and resected mass correlation (TLH cases only).

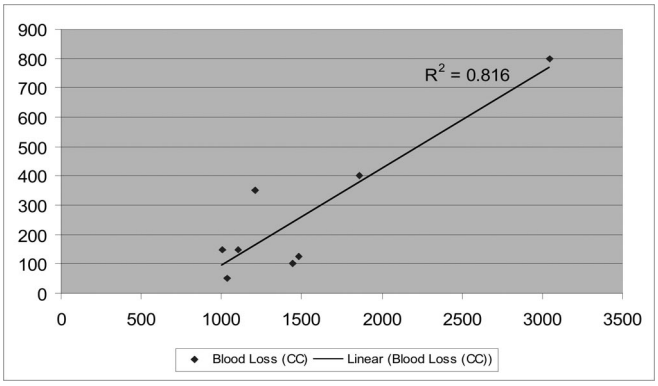

Figure 2. Estimated blood loss and resected mass correlation (TLH cases only).

Laparoscopic hysterectomy also has the advantage of less pain. In our opinion, the low level of discomfort from laparoscopic hysterectomy in the short term is comparable to that after embolization, but in the long term it is better. Most of these patients are able to go home within 24 hours of surgery, and if they have a sedentary job are able to return to work in one week. They have far less pain, shorter hospital stay, fewer wound complications (actually there are no significant wounds to become infected), fewer pulmonary complications, and faster recovery than in abdominal hysterectomy patients. In our patient cohort, 2 of the abdominal hysterectomies had wound problems, a 50% incidence. It is noteworthy that 10 patients were obese (BMI>30), and 2 were overweight (BMI>25), which is consistent with a previous study that reported an increased risk of wound healing complications in obese patients.[14]

In cases of large uteri, pretreatment with a gonadotropin-releasing hormone (GnRH) agonist may be necessary to induce uterine tissue shrinkage and decrease vascularity. Devascularization of the uterus at the start of hysterec-

tomy and obtaining a good *blanche* markedly reduces blood loss. The blood supply to the uterus should preferably be controlled before morcellation of an enlarged uterus. Sometimes, the injection of dilute vasopressin solution around the largest myoma before morcellation is begun may help control capillary bleeding, making it easier to identify larger vessels for coagulation with bipolar cautery and keeping the field dry to maintain good exposure. Occasionally, starting morcellation of a large myoma before its vasculature is totally controlled is the only way to gain enough exposure to complete the hysterectomy. Most intraoperative conversions to laparotomy occur because of intraoperative bleeding or concern about uncontrolled bleeding when the vascular pedicles cannot be controlled. Experienced laparoscopists usually have a low conversion rate from laparoscopy to laparotomy, around 2% to 4%.[15,16]

Most large fibroid uteri are actually not particularly difficult cases in experienced hands, just tedious with a lot of time spent with repetitive morcellation. It is important to use a 20-mm or 25-mm morcellator for large myomas, if available. From our experience, the ideal morcellator for very large uteri should have a wide cannula diameter with relatively high revolutions per minute (rpm) for smooth cutting and good lower-end torque to prevent bogging down and overheating when going through dense myoma tissue. It should have an ergonomic handle with an incorporated trigger bar that runs parallel to the handle to allow for easy activation over time without tiring the operator's hands (instead of the foot or thumb activation). It should also allow for full pull through of the tissue so that the morcellator does not need to be removed and reinserted during the morcellation process, and it should have a retractable V-shaped guide to keep the morcellator skimming over the uterus rather than penetrating it. The guide should insert with the cutting cannula and not be integral with the trocar, because the morcellator V-shaped tissue guides integral to the trocar are not particularly useful with in situ morcellation of very large uteri because the cannula requires insertion well beyond the limits of the trocar.

With large sized uteri, upper quadrant punctures are needed for visualization and proper traction angles with instruments. Exposure of the vascular pedicles can be greatly enhanced by using gravity as a retractor, leaning the patient to the right when working on the left infundibulopelvic ligament and uterine vessels and then to the left when working on the right side. There is no reason not to incorporate facilitating myomectomy when needed to allow better access to the vascular pedicles or to allow disimpaction of the impacted fibroid uterus from the pelvis so that the vascular pedicles can be reached.

Changing the camera angle by using lateral punctures and, if needed, using a 35° cystoscope as laparoscope can facilitate seeing around protruding fibroids so that important structures and vascular pedicles can be visualized and dealt with. We find the most challenging fibroid tumors to be those associated with severe adhesions or an obliterated cul-de-sac from endometriosis. Adhesions have to be lysed prior to beginning the hysterectomy to allow adequate exposure for safe surgery. In the case of a large fibroid uterus with an obliterated cul-de-sac, it may be useful to first do myomectomy on the largest central fibroid to allow better exposure and traction of the lateral and posterior uterine wall so that the ureter can be located at the pelvic brim. The ureter can then be followed to the cardinal web (the infundibulopelvic ligament is taken as soon as the ureter is separated from it if the ovary is to be taken), and the uterine vessel can usually be easily found at this level coming off the hypogastric artery (internal iliac artery) lateral to the ureter and clipped.[17] An alternative anterior approach has been described utilizing retrograde tracking of the umbilical ligament (RUL).[18,19] Once the vascular pedicles are controlled, careful uterine reduction will allow the remaining dissection of the posterior cul-de-sac.

CONCLUSION

Total laparoscopic hysterectomy can replace abdominal hysterectomy for large uteri if the surgeon has additional skills and uses specialized techniques beyond those necessary for the majority of total laparoscopic hysterectomies. It should be noted, however, that suspicious fibroids growing in menopausal women, growing on leuprolide or other GNRH agonists, rapidly growing over a short time frame in premenopausal women, exceeding 10 cm in diameter, or that appear visibly suspicious must be treated with prudence because of the rare possibility of a leiomyosarcoma.

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