Yonsei Medical Journal
Vol. 40, No. 6, pp. 583−588, 1999

Endoscopic Management of Uterine Myoma

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Abstract

This study was undertaken to evaluate the various gynecologic endoscopic surgical techniques including resectoscopic myomectomy, laparoscopic myomectomy, and laparoscopy assisted vaginal hysterectomy (LAVH) used in the treatment of uterine myomas. The medical records of 136 cases of uterine myomas treated using one or more of the gynecologic endoscopic surgical techniques in the Department of Obstetrics and Gynecology at Yonsei University were retrospectively reviewed from March 1997 to September 1998. Of the 136 cases reviewed, there were 40 submucosal myomas and 96 intramural and subserosal myomas. For statistical analysis, Student's t-test was used. Submucosal myomectomy using the resectosope was performed in 35 cases (mean age: 39±1.5 years), laparoscopic myomecotmy in 35 cases (mean age: 36±1.9 years), and LAVH in 66 cases (mean age: 42±1.1 years). In cases of huge myomas, the GnRH agonist was used prior to surgery, and in cases of heavy uterine bleeding, angioblock of the uterine artery was undertaken before the endoscopic procedures. The mean operating time was significantly shorter in resectoscopic myomectomy (41±12 min), followed by laparoscopic myomectomy (85.0±10.3 min) and LAVH (123±5.3 min). The mean hospital stay for resectoscopic myomectomy, laparoscopic myomectomy, and LAVH was 1.9±0.5, 2.5±0.5, and 3.4±0.8 days ($p<0.001$), respectively. There were 3 cases of complications including pulmonary edema and uterine perforation in the resectoscopic myomectomy group, and 4 cases of complications including bladder, ureter, and epigastric vessel injury in the LAVH group. In conclusion, the therapeutic effect of various gynecologic endoscopic surgical techniques can be maximized in terms of shorter operation time, shorter hospital stay, faster recovery, and less blood loss by the appropriate management of uterine myoma in well-chosen patients.

Key Words: Uterine myoma, resectoscopic myomectomy, laparoscopic myomectomy, laparoscopy assisted vaginal hysterectomy

INTRODUCTION

Uterine myomas, also known as uterine leiomyomas or fibroids, are by far the most common benign uterine tumors.[1] They may be subserosal, intramural, or submucosal in location within the uterus. Estimates of prevalence range from 25−50% of adult females in most reports.[2,3]

The cell of origin is presumed to be smooth muscle cells of the uterus, although other fibromuscular tissues have reportedly developed changes which are called myomatous.[1] Women with myomas may experience symptoms such as abnormal bleeding, pelvic pain, low abdominal fullness, urinary frequency, dysmenorrhea, infertility, spontaneous abortion, and preterm labor.[1,2,4] The management of uterine myomas includes conservative, nonsurgical, and surgical methods. Some examples of nonsurgical methods encompass medications such as progestational therapy, oral contraceptives, Danocrine, Gonadotropin-releasing hormone agonist (GnRHa), anti-progesterone agents (RU486) and anti-prostaglandins.[5-9] Total abdominal hysterectomy (TAH), myomectomy by laparotomy, total vaginal hysterectomy (TVH), resectoscopic myomectomy, laparoscopic myomectomy, laparoscopy assisted vaginal hysterectomy (LAVH), and total laparoscopic hysterectomy (TLH) are some examples of surgical methods in the treatment of uterine myomas.[10-22] Since the introduction of LAVH by Reich in 1989, endoscopes are currently used to perform a variety of gynecologic surgeries.[23] Endoscopic surgery offers the benefits of less operative complications, shorter hospital stay, and faster recovery than conventionally performed laparotomy, therefore a more widespread use of it can be anticipated in the future. In this respect, this study was conducted to compare various gynecologic endoscopic

Received October 28, 1999
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surgical techniques in the treatment of uterine myomas.

MATERIALS AND METHODS

From March 1997 to September 1998, 136 women underwent gynecologic endoscopic surgery with the indication of uterine myomas in the Department of Obstetrics and Gynecology, Yonsei University College of Medicine. Factors considered before choosig the surgical modality included: the patient's age, patient's will to reserve fertility, size, location, and number of uterine myomas, preference of the patient and surgeon, and indication of the surgery. In selecting the specific surgical method for the purpose of research, informed consent was obtained from the patient. Before surgery, all patients took pelvic examination and ultrasonographic or magnetic resonance imaging (MRI) for the purpose of obtaining the size and location of uterine myomas and other accompanying pelvic masses. In cases of submucosal myoma, diagnostic hysteroscopy, biopsy, and hysterosalpingography prior to the resectoscopic procedures were undertaken. The total number of cases reviewed was 136 cases, of which 40 were submucosal, and 96 were intramural and subserosal myomas. Thirty-five cases of submucosal myomectomy were performed using a resectosope (mean age: 39 ± 1.5 years), and in 5 of those cases endometrial ablation was concomitantly performed. Thirty-five cases of laparoscopic myomectomy were performed (mean age: 36 ± 1.9 years) and 66 cases of LAVH were performed (mean age: 42 ± 1.1 years). Gonadotropin-releasing hormone analogue (GnRHa, Decapeptyl, Ferring Co.GMBH, Kiel, Germany) was given in case of submucosal myomas with a diameter greater than 5 cm and an intramural portion of more than 50%. When performing laparoscopic myomectomy, GnRHa was given in uterine myomas with a diameter greater than 8 cm, and when performing LAVH it was given when the uterus size was larger than 13 gestational weeks. Three unmarried women under the diagnosis of heavy uterine bleeding initially undertook uterine artery angioblock, and after 3 months consequent endoscopic surgery was performed. Resectoscopic myomectomy was performed in cases of uterine myoma being less than 5.0 cm and more than 50% of the mass being submucosal type. LAVH was performed in cases of uterine myoma being less than 13 gestational weeks or less than 10 cm, as well as other pelvic masses being present. Laparoscopic myomectomy was withheld when there was more than 3 uterine myomas present or when they were greater than 8.0 cm. Laparoscopic surgical technique mimics the open technique. For laparoscopic myomectomy a diluted solution of pitressin (20 u/500 ccD5W) was injected over the uterine incision site (25 cc of this diluted solution). A serosal incision was made over the myoma and the avascular space was identified. Sharp and blunt dissection was made at this location, controlling the bleeding with bipolar cautery or the LCS (laparoscopic shears-ULTRACISION, Ethicon, Cincinnati, Ohio, USA). The defect was repaired with layers of 2-0 and 3-0 vicryl using a curved-needle suturing technique and extracorporal knotting. Dissected myomas were extracted using a Steiner Morcellator (Karl-Storz Portex Medicon, Tuttlingen, Germany). For the resection of submucosal myoma, a 9 mm rigid resectoscope (Richard Wolf, Bonn, Germany) was used. The loop of the resectoscope was activated by a foot pedal and the electric current was provided by an electric surgical unit. Resection was always performed from fundus to cervical os using pure cutting at 70 to 100 W. The uterine cavity was distended with 20% H/D by gravity and pressure cuff. The mean fluid absorption was estimated below 500 ml. Endometrial ablation was taken with a loop and roller ball in five patients, who underwent submucosal myomectomy and endometrial ablation simultaneously. All of the patients involved in this study were followed up in the out-patient-department for 24 weeks after their operations. Blood profiles and the patients' symptoms were recorded on each visit to the hospital. Student's t-test was used for the statistical analysis. P value $<$ 0.05 was considered to be statistically significant.

RESULTS

The patient's age, parturition history, blood profile, size and number of uterine myomas, operation time, blood loss during operation, days of hospital stay, and complications accompanying the surgery were compared in the groups that undertook resectoscopic myomectomy, laparoscopic myomectomy, and LAVH. The mean age of the group taking resectoscopic

myomectomy was 39±1.5 years, but it was relatively older in the group taking LAVH, being 42±1.1 (p=0.09). The mean number of parturition history was 2.1±0.5 in the group taking resectoscopic myomectomy, 2.0±0.2 in the group taking LAVH, and 1.0±0.3 in the group taking laparoscopic myomectomy, which was significantly lower than the other two groups (p=0.02). The preoperative hemoglobin level was 11.0±0.4 g/dl in the group taking laparoscopic myomectomy, but it was 9.6±0.5 g/dl in the group taking LAVH, which was comparatively lower (p=0.06). The size of the uterus measured by ultrasonographic examination before surgery was smallest in the group taking resectoscopic myomectomy, being 4.5±0.5 gestational weeks; 5.9±0.4 gestational weeks in the group taking laparoscopic myomectomy; 8.2±0.5 gestational weeks in the group taking LAVH, which was the largest (p=0.006). The mean number of uterine myomas were 1.8±0.2 in the group taking laparoscopic myomectomy and 2.0±0.2 in the group taking LAVH (p=0.06). The mean size(longest diameter) of the uterine myoma was 3.8±0.5 cm in the group taking laparoscopic myomectomy, while it was 4.2±0.4 cm in the group taking LAVH (Table 1).

The mean operation time was 41±12 minutes in the group taking resectoscopic myomectomy, 85.0±10.3 minutes in the group taking laparoscopic myo-

Table 1. A Comparison of Resectoscopic Myomectomy, Laparoscopic Myomectomy, and Laparoscopy-Assisted Vaginal Hystrectomy (LAVH)

	RM	LM	LAVH	
No. of patients	35	35	66	
Age (years)	39±1.5	36±1.9	42±1.1	NS
Parity	2.1±0.5 (a)	1.0±0.3 (b)	2.0±0.2 (c)	b<a, c*
Preop Hb (g/dl)	−	11.0±0.4	9.6±0.5	NS
Uterine size (gestational weeks)	4.5±0.5 (a)	5.9±0.4 (b)	8.2±0.5 (c)	a<b<c*
No. of myomas	−	1.8±0.2	2.0±0.2	NS
Size of myoma (cm)	−	3.8±0.5	4.2±0.4	NS

Values are mean±standard deviation.
RM, resectoscopic myomectomy; LM, laparoscopic myomectomy; LAVH, laparoscopy-assisted vaginal hysterectomy; NS, not significant.
* p<0.05.

Table 2. A Comparison of Resectoscopic Myomectomy, Laparoscopic Myomectomy, and Laparoscopy-Assisted Vaginal Hysterectomy

	RM	LM	LAVH	
Operation time (min)	41±12 (a)	85.0±10.3 (b)	123±5.3 (c)	a<b<c*
Blood loss (ml)	98±25 (a)	166±28 (b)	343±37 (c)	a<b<c*
Hospital stay (days)	1.9±0.5 (a)	2.5±0.5 (b)	3.4±0.8 (c)	a, b<c*
Switch rate (%)	3 (8.5%)	2 (5.7%)	2 (3.0%)	NS
Complications	Pulmonary Edema (2) Perforation (1) of uterus	Recurrence of myoma (4)	Bladder (1) Ureter (1) Epigastric vessel (1) injury	

Values are mean±standard deviation.
RM, resectoscopic myomectomy; LM, laparoscopic myomectomy; LAVH, laparoscopy-assisted vaginal hysterectomy; NS, not significant.
* p<0.05.

mectomy, and 123±5.3 minutes in the group taking LAVH, which was the longest (p=0.001). The mean blood loss during the operation was 98±25 ml in the group taking resectoscopic myomectomy, 166±28 ml in the group taking laparoscopic myomectomy, and 343±37 ml in the group taking LAVH, which was the largest (p=0.001). While performing the procedure, 3 cases (8.5%) of resectoscopic myomectomy, 2 cases (5.7%) of laparoscopic myomectomy, and 2 cases (3.0%) of LAVH were switched to laparotomy (Table 2).

The mean hospital stay was 1.9±0.5 days in the group taking resectoscopic myomectomy, 2.5±0.5 days in the group taking laparoscopic myomectomy, and 3.4±0.8 days in the group taking LAVH. Several postoperative complications were noted: 2 cases of pulmonary edema and 1 case of uterine perforation in the resectoscopic myomectomy group; 4 cases (11.4%) of uterine myoma recurrence in the group taking laparoscopic myomectomy; while 1 case of bladder injury, 1 case of ureter injury, and 1 case of epigastric vessel injury were noted in the LAVH group. Complications involving the bowel or wound infections were not noted.

DISCUSSION

The management of uterine myomas includes conservative, nonsurgical, and surgical methods. Myomectomy and hysterectomy are the two main methods used in surgery. These days, surgeries using endoscopes instead of laparotomy are being performed and their advantages are being reported.

Until recently, laparotomy was the main approach in patients with large or symptomatic myomas who wished to retain the uterus, regardless of the fertility status. And the only indication of myomectomy was the improvement of reproductive function. However, advances in endoscopic surgery have proven the feasibility of laparoscopic myomectomy, despite its technical difficulties. Many reports have suggested that laparoscopic myomectomy offers the benefits of a reduced postoperative complication rate, less adhesion formation, improved cosmesis, and faster recovery.[11,15,16,24-26] In addition to the benefits of endoscopic procedures in general, gynecologic endoscopic surgery may have the advantage of an increased fertilization rate.[15] Stephen et al. have performed laparoscopic myomectomy in patients with infertility, the size of the uterus being greater than 12 gestational weeks, the biggest myoma being 7.0 cm or greater, and fast growing myomas.[27] Usually there are no definite indications for performing myomectomy, but in the case of a patient eager to preserve the uterus, menorrhagia resulting in anemia, severe pelvic pain, rapid growth of the myoma, and history of habitual abortion can be considered as indications of myomectomy.[15,24] Several difficulties in performing laparoscopic myomectomy are well known: the operation field is relatively narrow, effective closing of the defect and control of capillary oozing after myomectomy is required, and extraction of the specimen through the small opening of the abdomen should be accessible.[16,22] The operation is more easily performed with smaller uterine myomas, and for this reason GnRHa is given. After GnRHa treatment, the uterine myoma of 12 gestational weeks decreased to about 40−50% of its initial size, blood supply was significantly decreased for the sake of the decreased bleeding, and anemia could be corrected during the GnRHa treatment.[28] The extraction of the specimen outside the pelvic cavity can now be easily done with electromechanical morcellation, which solved one of the greatest difficulties in endoscopic surgery.[29] Also, to lessen the bleeding during the operation, diluted pitressin injection as well as using the bipolar system and Ultracision (LCS) for cutting, coagulation, and dissection enabled bloodless surgery in the field of endoscopic surgery.[30,31] But since exposure of the operative field can be reduced, manipulation of the pelvic viscera is limited. And because the caliber of the suture required may be larger than otherwise desired, myomas greater then 8−10 cm size and more than 3−4 can be considered as the relative contraindication of laparoscopic myomectomy.[32] These relative contraindications in performing laparoscopic myomectomy were also applied in this study. There was no difficulty in suturing the defect made after removing the intramural myoma, although it was deeply impacted in the myometrium. In this study, 35 cases of laparoscopic myomectomy were performed, and the indications were infertility, single women, and abnormal uterine bleeding in those for whom preservation of the uterus was necessary. The operation time was 85 minutes, which was comparatively shorter than 123 minutes for LAVH, and this was shorter than previous reports.[15,25]

Since the first performance of hysteroscopic resection by Neuwirth and Amin in 1976, it was DeCherny and Polan who first successfully removed uterine myomas using unmodified urologic resectoscopy in 1983.[10,33] The submucosal type is the most common cause of menorrhagia, menometrorrhagia, postmenopausal bleeding, and habitual abortion. It cannot be diagnosed by diagnostic curettage or endometrial biopsy, but hysterosalpingography and transvaginal ultrasonography or MRI can be helpful.[34] Especially hysteroscopy can be used in confirming the size, location, and mapping of the myoma, and concomitant treatment is possible. In a case of the submucosal myoma protruding through the uterine cavity more than 50%, or if its size is smaller than 5 cm, successful treatment by resectoscopic myomectomy can be anticipated, and this criteria was used in this study.[35] GnRHa was given to patients with uterine myomas larger than 4 cm, but its effect was not that good. For the 3 severly bleeding cases who were transferred to the emergency department, uterine artery angioblcock was performed, and the assessment results after 3 months showed significantly decreased size of the uterine myoma. Resectoscopic myomectomy was performed afterwards. It has been suggested that GnRH agonist has little effect in reducing the size of intracavitary tumor and its use tends to create a fibrous transformation that makes resection more hazardous.[36] In well-chosen patients, resectoscopic myomectomy can be considered a safe and economically superior procedure which has a short operation time. These properties enable it to replace abdominal hysterectomy.[37,38]

In the LAVH procedure, the upper part of the uterus is manipulated using the endoscope and finally the whole uterus is removed through the vagina. Recently, the indication and safety of this procedure has been defined and progressively it is tending to replace the abdominal hysterectomy as an alternative therapeutic modality.[12,13,17-21,27]

The mean age of patients taking laparoscopic myomectomy was being 36−42 years, which was relatively younger than the LAVH group. This may be due to the preference of young women to preserve fertility. Patients with abnormal vaginal bleeding wanted to remove their uterus, and this might be the reason for the lower hemoglobin level in the group taking LAVH. The surgical modality was chosen according to the number and size of uterine myomas, because as the size of the uterine myoma enlarges and the number increases, more limitations accompany the laparoscopic procedures.

The mean operation time of LAVH in this study was 123 ± 5.3 minutes, and the mean hospital stay was 3.4 ± 0.8 days, which seemed comparable to the results of other reports.[17-21]

Perioperative and postoperative complications do exist despite many advantages of laparoscopic myomectomy, but their incidence is known to be less than that of laparotomy or vaginally-approached procedures. Those complications include bladder, ureter, and bowel injury, hemorrhage, high fever, intestinal obstruction, fistulas, hernias, pelvic abscess, abdominal wall emphysema, uterine perforation, abdominal wall hematoma, pelvic hematoma, and CO2 embolism. As in other surgeries, with an adequate combination of ability, training, and experience, complication rates in endoscopic surgery can be lowered substantially.[39] Complications in resectoscopic myomectomy include fluid overload, electrolyte imbalance, injuries to adjacent organs, hemorrhage, air embolism, and hematometra. In this study, complications in LAVH included 1 case of bladder injury, 1 case of ureter injury, and 1 case of epigastric vessel injury. In cases of resectoscopic myomectomy, 1 case of pulmonary edema and 1 case of uterine perforation were noted.

In conclusion, the therapeutic effect of various gynecologic endoscopic surgical techniques can be maximized by properly applying each technique according to the patient's indication of surgery.

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