

Laparoscopic assisted adenomyomectomy using double flap method

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Objective

The purpose of this study was to evaluate postoperative prognosis and progression in patients who received laparoscopic-assisted adenomyomectomy using the double flap method.

Methods

The pelvic cavity was explored by the conventional laparoscopic method, and drainage was achieved through a 5-mm trocar. After a small incision in the abdomen, the uterus was incised from the fundus to the upper cervical margin until exposing the endometrial cavity. Adenomyotic tissue was removed using a scalpel, scissors, or monopolar electrical bovie. The endometrial cavity was repaired with interrupted sutures using 2-0 vicryl. One side of the serosal flap was used to cover the endometrial side of the uterus. The second serosal flap covered the first flap after removal of the serosal surface of the first flap.

Results

From January 2008 to March 2012, there were 11 cases of laparoscopic-assisted adenomyomectomy at Chungnam National University Hospital. Nine cases were analyzed, excluding two cases with less than one year of follow-up. The average patient age was 37.0 years and average follow-up duration was 32.8 months. All patients showed improvement in dysmenorrhea ($P < 0.001$) and hypermenorrhea ($P = 0.001$) after surgery and were evaluated by visual analogue scale score. However, symptoms of adenomyosis were aggravated in three patients. Adenomyosis was progressed in the side opposite the site of operation. One patient required a total laparoscopic hysterectomy 27 months after surgery.

Conclusion

Laparoscopic-assisted adenomyomectomy using the double flap method is effective for uterine reduction and relief of dysmenorrhea and hypermenorrhea. Conservative management and careful follow-up are needed because adenomyosis can recur or progress in some patients.

Keywords: Adenomyomectomy; Double-flap; Laparoscopy

Introduction

Adenomyosis is a medical condition characterized by ectopic endometrial glandular tissues and interstitium in the myometrium [1]. The condition usually occurs when the uterus enlarges in a spherical form and infiltrating tissue spreads diffusely but can sometimes appear locally, which is called adenomyoma [2].

Although adenomyosis can appear in young women of childbearing age, it mainly appears among women in the later reproductive stage after the age of 40 years and manifests as

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symptoms such as menorrhagia and dysmenorrhea, irregular uterine bleeding, chronic pelvic pain, and dyspareunia. In severe cases, it threatens not only physical health, but also mental health and negatively affects quality of life. In addition, it sometimes leads to infertility [3,4] and can become a cause of pregnancy-related complications.

Treatment of adenomyosis is determined with consideration of the patient's age and disease severity. If symptoms are not severe, medical treatment with non-steroidal anti-inflammatory drugs or hormones is carried out to relieve discomfort. However, if symptoms are extremely severe and cannot be controlled with medication, hysterectomy may be considered. However, for women who want to conceive in the future or women who do not want a hysterectomy, conservative treatment should be performed. Adenomyomectomy is one of several conservative treatments available.

Adenomyomectomy was first introduced as a conservative surgery by Hyams [5] in 1952, and early surgical methods used wedge resection and suturing, resulting in frequent recurrence and occasional serious complications such as uterine rupture [6-8]. Since then, a variety of surgical methods have been introduced to reduce recurrence and complications [9-11]. However, the risks of recurrence of adenomyosis and uterine rupture during pregnancy remain, requiring a safer method for resecting adenomyotic tissues.

We performed adenomyomectomy using the double flap method, which includes double suturing the uterus using a serous-side flap after radically resecting adenomyotic tissues, and attempted to evaluate the effectiveness of this surgical method by observing postoperative progress and prognosis.

Materials and methods

This is a retrospective study of patients who underwent laparoscopic-assisted adenomyomectomy using a double flap method in the Obstetrics and Gynecology Department in Chungnam National University Hospital between January 2008 and March 2012. Surgery was performed to relieve hypermenorrhea and dysmenorrhea for patients who complained of severe symptoms despite medical treatment and for whom surgical treatment was inevitable. The selection of candidates for surgery was based on the following criteria: aged 45 years or younger, single, married but without children, desire to be pregnant in the future, or desire to avoid hysterectomy.

All of the patients were diagnosed with adenomyosis by preoperative interview and pelvic and ultrasound examinations. The diagnosis of adenomyosis was made when the uterus was larger than normal, felt hard and spherical on pelvic examination and showed the following observations on ultrasound: the fundus of the uterus was enlarged in a spherical form, heterogeneous echogenicity, a pattern of 1 to 7 mm small anechoic cysts scattered in the myometrium, unclear margins unlike uterine fibroids, and disproportionate anterior and posterior walls of the myometrium [12,13].

Those patients who received laparoscopic adenomyomectomy only or wedge resection without double flaps were excluded. All patients received histological confirmation after the operation.

The abdominal wall was incised in a mini-laparotomy on the lower abdomen after examining the pelvis with laparoscopy, and the uterus was reconstructed using the double flap method after adenomyomectomy. In order to determine dysmenorrhea symptoms after surgery, the visual analogue scale (VAS score) was used. Because most patients complained of extreme dysmenorrhea despite administration of painkillers, we measured the change from preoperative dysmenorrhea, which was scored as 10, to the level of postoperative dysmenorrhea. Hypermenorrhea was measured in the same way, by the change in the amount of menstrual bleeding between the preoperative level, which was scored as 10, and the postoperative level between 1 to 10 [11].

Statistical analysis was performed using SPSS ver. 18.0 (SPSS Inc., Chicago, IL, USA) and included the Wilcoxon signed-rank test as a nonparametric test using a significance level (*P*-value) less than 0.05.

1. Surgical procedure

1) Laparoscopic observation and insertion of peritoneal drainage tube

First, we installed the laparoscope in the conventional way and determined the location of the lesion and the size and shape of the uterus. At that time, we identified other accompanying pelvic diseases and performed laparoscopic treatment if necessary. In addition, if pelvic adhesions were observed, adhesiolysis was performed with laparoscopy.

Next, a 5-mm trocar was inserted in the left or right lower abdomen, a drain was inserted, and the trocar was removed. A mini-laparotomy incision in the lower abdomen was per-

formed with pneumoperitoneum conditions, making a 4 to 6 cm horizontal incision using the suprapubic Pfannenstiel method. At this time, the incision size was minimized by estimating the size of the uterus, which was examined in advance with laparoscopy.

2) Resection of adenomyotic tissue

The uterine wall in the area with the adenomyoma was incised vertically from the fundus to the upper margin of the cervix. At that time, the endometrial cavity was exposed so that the complete layers of the uterus could be removed (Fig. 1). Adenomyotic tissues on the uterine wall were incised on both sides and cut away using a scalpel, Metzenbaum, or monopolar incision. When the tissues were removed, a resection margin was created by gauging the thickness of the uterine wall by inserting a finger into the uterine cavity. When adenomyotic tissues were removed, special care was taken to avoid damage to the fallopian tubes. After resection was performed, the thickness of the remaining myometrial tissue on both the endometrial and serosal sides was approximately 0.5 to 1.0 cm (Fig. 2).

3) Reconstruction with double-flap

After suturing the exposed endometrial cavity using 2-0 vicryl (Fig. 3), we sutured by placing one side of the flap over

the endometrial side of the uterus. At this time, special care should be taken not to allow dead space or hematoma to occur (Fig. 4).

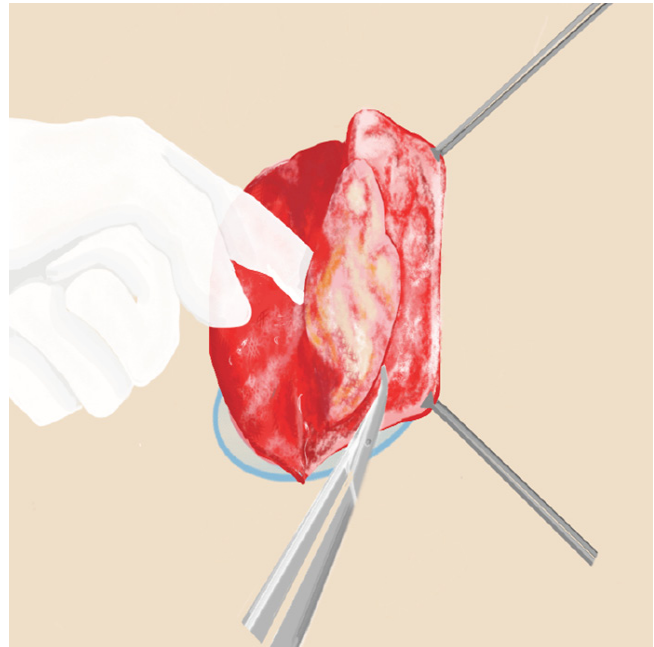


Fig. 2. Removal of adenomyotic tissue using scalpel, metzenbaum or monopolar cutting: myometrial tissue should be preserved 0.5 to 1.0 cm in thickness above the endometrial cavity and below the serosal layer.

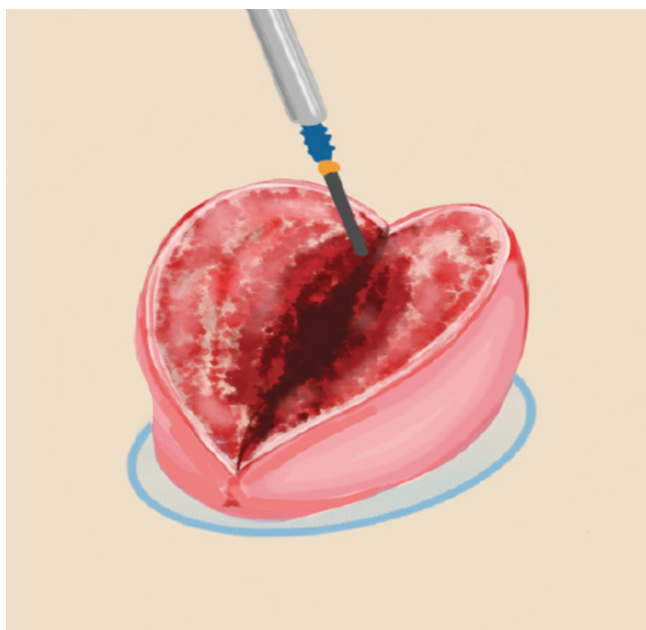


Fig. 1. Uterine wall incision from fundus to upper cervical margin: endometrial cavity should be exposed.

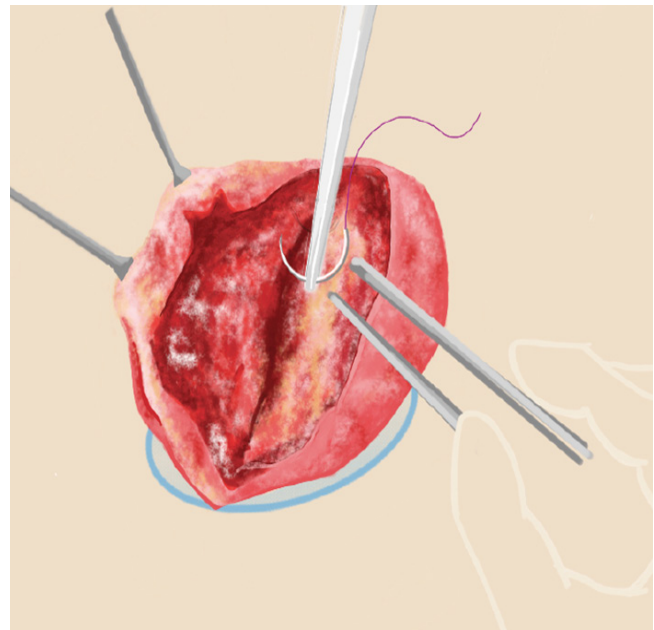


Fig. 3. Repair of endometrial cavity using 2-0 vicryl interrupted suture.

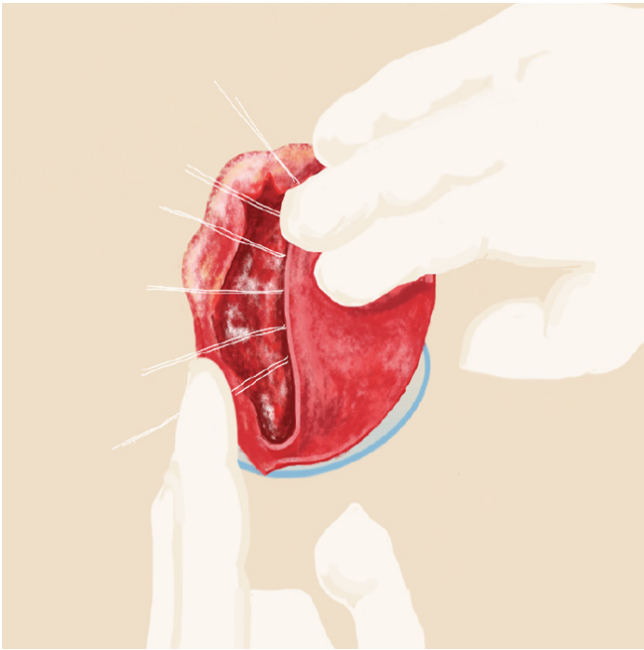


Fig. 4. Covering the first flap using one side serosal layer by 2-0 vicryl interrupted suture: careful suture is needed to prevent dead space or hematoma between the tissues.

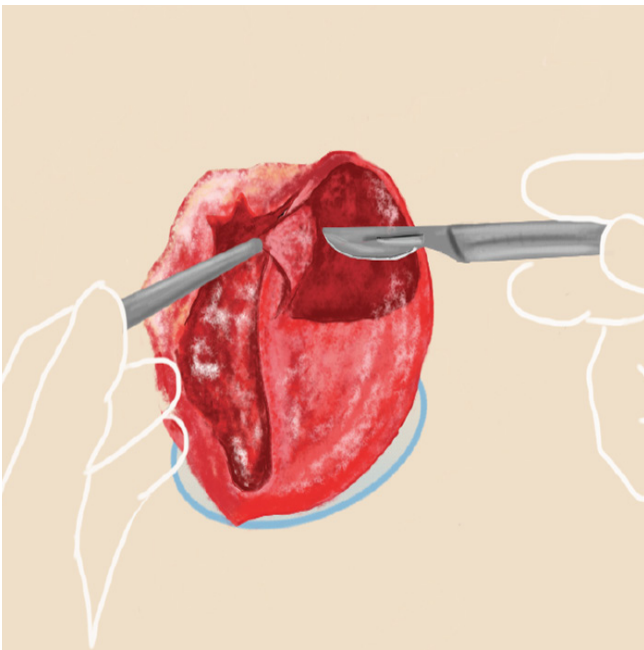


Fig. 5. Serosal layer of the first flap must be removed before covering the second flap.

Next, the serosal layer of the previously covered flap was peeled off in order to ensure that the tissues between the flaps are strongly attached (Fig. 5). When suturing is per-



Fig. 6. Covering the second flap using the other side serosal layer by 2-0 vicryl interrupted suture.

formed without peeling off the serosal surface, the tissues between the flaps do not completely attach, increasing the risk of uterine rupture during subsequent pregnancy. Finally, the other side of the flap was placed over the previously covered flap (Fig. 6). In order to minimize the risk of adhesion, an anti-adhesive agent was applied before the surgery was completed.

Results

A total of 11 patients underwent the surgery of interest between January 2008 and March 2012, and the analysis was performed on nine patients excluding two patients for whom less than one year had passed since the surgery. The patient ages ranged from 32 to 43 years, with an average age of 37.0 years. Four patients were single and five were married. Only one had experienced childbirth, and the number of miscarriages ranged from 0-2, with an average of 1.0 (Table 1).

Five patients showed posterior wall thickening, three showed anterior wall thickening, and one showed thickening of both walls. The thickness of the uterine wall on which disease was observed was measured with ultrasound, showing a uterine wall thickness ranging from 50 to 65 mm with an average of 58.3 mm. Similarly, measurements of the thicken-

Table 1. Characteristics of the patients

Case	Age (yr)	Delivery	Abortion	Marital status	Location	Medical treatment before surgery
1	34	0	2	Single	Ant	Oral contraceptive
2	38	0	1	Married	Post	NSAIDs
3	32	0	0	Single	Post	GnRHa
4	35	0	1	Married	Ant	GnRHa
5	37	0	0	Single	Ant	LNG-IUS, GnRHa
6	36	0	0	Single	Post	GnRHa
7	43	0	1	Married	Post	NSAIDs
8	37	1	2	Married	Both	LNG-IUS
9	41	0	2	Married	Post	NSAIDs
Mean ± SD	37.0 ± 2.4	0.1 ± 0.2	1.0 ± 0.7	–	–	–

NSAID, nonsteroidal anti-inflammatory drugs; GnRHa, gonadotropin releasing hormone agonists; LNG-IUS, levonorgestrel releasing intra-uterine system; SD, standard deviation.

Table 2. Preoperative and postoperative findings

Case	Preoperative uterine A-P diameter (mm)	Adenomyosis thickness(mm)		Operation time (min)	EBL (mL)	Drop of Hb (g/dL)	Days of admission
		Preoperative	Postoperative				
1	88	61	23	145	200	4.6	9
2	66	50	21	150	500	5.7	8
3	89	60	25	170	600	1.8	7
4	90	56	26	150	800	2.7	10
5	90	62	11	90	300	2.7	7
6	82	65	20	120	100	1.7	6
7	79	55	30	115	300	2.8	6
8	64	61	30	115	150	1.9	6
9	75	55	26	120	500	2.9	7
Mean ± SD	80.3 ± 10.2	58.3 ± 3.9	23.6 ± 5.9 ^{a)}	130.6 ± 20.6	383.3 ± 192.6	3.0 ± 1.0	7.3 ± 1.1

A-P, anterior-posterior; EBL, estimated blood loss; Hb, hemoglobin; SD, standard deviation.

^{a)} $P < 0.001$.

ing of the uterine wall in the area where lesions occurred were repeated at follow-up, and the thickness of the uterine wall one month after surgery ranged from 11 to 30 mm with an average of 23.6 mm. The length of the surgery was 90 to 170 minutes with an average of 130.6 minutes. The amount of blood loss was 100 to 500 mL with an average of 383.3 mL, the reduction in hemoglobin was 1.7 to 5.7 g/dL with an average 3.0 g/dL, and the hospital stay was 6 to 10 days with an average of 7.3 days (Table 2). No postoperative complications such as bleeding that required blood transfusion, infection, or voiding dysfunction occurred among the nine patients.

After surgery, patients were followed-up on an outpatient basis at one week, one month, six months, and 12 months

and were encouraged to undergo regular checkups every year after that. The length of follow-up was 15 to 50 months with an average of 32.8 months. At the outpatient follow-ups, changes in hypermenorrhea and dysmenorrhea were noted, a pelvic exam was conducted, and an ultrasound examination was performed when necessary. Patients who wished to become pregnant received education to attempt natural pregnancy six months after surgery, married patients who did not wish to become pregnant in the near future were recommended the levonorgestrel intrauterine system (Mirena, Bayer Schering Pharma Oy, Turku, Finland), and single patients were recommended oral contraceptives. Three patients used Mirena, one patient took an oral contraceptive, and one patient

Table 3. Change of postoperative visual analogue scale score of dysmenorrhea and hypermenorrhea

Case	Follow-up (mo)	LNG-IUS or COC	Dysmenorrhea		Hypermenorrhea		Recurrence
			3 mo	1 yr	3 mo	1 yr	
1	50	LNG-IUS after 2 yr	5	5	3	3	Recurred
2	49	None	2	5	7	7	No
3	41	COC after 4 mo	2	2	3	3	No
4	39	LNG-IUS after 2 yr	5	10	8	10	Recurred, hysterectomy
5	36	None	2	2	3	3	No
6	28	LNG-IUS immediately COC after 1 yr	1	1	1	1	No
7	22	None	7	10	8	10	Recurred
8	15	LNG-IUS after 2 mo	7	3	4	4	No
9	15	None	3	5	5	6	No
Mean ± SD	32.8 ± 11.4	–	3.6 ± 2.0	4.8 ± 2.5	4.9 ± 2.1	5.2 ± 2.7	–
P-value	–	–	<0.001	0.001	<0.001	0.002	–

LNG-IUS, levonorgestrel releasing intrauterine system; COC, combined oral contraceptives.

changed from using Mirena to an oral contraceptive after surgery.

As for dysmenorrhea, VAS scores improved significantly three months after surgery compared to before surgery ($P < 0.001$), but dysmenorrhea tended to increase one year after surgery, with a score of 4.8. Hypermenorrhea showed a reduction at three months with a score of 4.9 compared to before surgery ($P = 0.001$) but was increased at one year with a score of 5.2 (Table 3).

There was no recurrence among the three patients who underwent medical treatment within six months of surgery, but there was recurrence for three of six patients who did not receive medical treatment within six months. Those with recurrence showed thickening of the uterine wall on the opposite side from which surgery was performed. One of the three patients with recurrence experienced recurrence about two years after surgery and switched to using Mirena. However, hypermenorrhea and dysmenorrhea were not controlled, and a laparoscopic hysterectomy was performed 27 months after surgery.

Discussion

Adenomyosis often occurs in women of late childbearing age who have experienced childbirth, and patients frequently suffer from hypermenorrhea and dysmenorrhea. Drug treatment is often the first choice, but the effects of drug treatment are

usually temporary, and symptoms often recur when patients stop taking medication [14]. If medicinal management does not bring satisfactory outcomes, surgical methods, usually hysterectomy, are chosen [15]. However, women who wish to someday have children or women who do not want a hysterectomy may choose adenomyomectomy as a surgical method to conserve the uterus, and this procedure has been reported to improve symptoms in many studies [5,16].

However, because adenomyosis does not have a clear margin from normal tissues, unlike uterine fibroids, and often invades the entire uterine muscle layer, it is difficult to establish an accurate lesion resection line and remove all of the infiltrated tissues [9]. In addition, adenomyosis is an estrogen-dependent disease like endometriosis and uterine fibroids and often recurs in operated areas or spreads to other areas. Therefore, although tissues with adenomyosis should be radically surgically removed, proper removal of lesions and reconstruction of the uterus are necessary during surgery in order to prevent the serious complication of uterine rupture during subsequent pregnancy. In other words, the ultimate goals should be radical removal to prevent recurrence and proper removal and sturdy reconstruction for safe pregnancy after surgery.

Adenomyomectomy may have a psychological effect due to avoiding hysterectomy with a conservative surgical method, but preserving fertility is the most important advantage. Therefore, in order to preserve fertility after surgery, three principles should be followed [9]. First, the uterine cavity should be

reconstructed to maintain an intact shape and function. The uterine cavity should not be twisted or cramped to assure no interference with endometrial implantation of the fertilized egg. Second, the fallopian tubes should not be damaged by twisting or obstruction during reconstruction of the uterus after extensive radical resection. The fallopian tubes should be protected from blockage during the suturing process as this can cause loss of patency. Third, the uterine wall should be sturdily reconstructed so that it can support the fetus in the final stage of pregnancy. Suturing should be performed meticulously so that no dead space is created during the reconstruction process, and reconstruction should be performed in such a way that all sides of the uterus are evenly reconstructed with no thin or weak areas.

This study included only cases of adenomyomectomy with mini-laparotomy and uterine reconstruction with the double flap method, excluding laparoscopic adenomyomectomy. Laparoscopic surgery has the benefits of fewer complications, less postoperative pain, shorter length of surgery, and shorter hospital stay compared to open surgery and has recently been used in place of conventional gynecological surgery. However, it is difficult to radically resect adenomyotic tissues using only laparoscopy, and radical resection is very important for preventing recurrence. In addition, while uterine reconstruction should be performed accurately to prevent uterine rupture in future pregnancies, laparoscopic surgery requires highly skilled surgical techniques as well as many hours of surgery and may cause bleeding due to extensive and complicated suturing. Therefore, although laparoscopic surgery may be a choice when adenomyosis is small and localized, open surgery is desirable when adenomyosis is large and diffuse, spreading over a large area of the uterus.

Osada et al. [9] reconstructed the uterine wall using the triple-flap method after open adenomyomectomy for 104 patients, and the average length of operation and the amount of blood loss were 182 minutes and 372 mL, respectively. This was longer than the 130 minute length of operation in the present study and similar to the amount of blood loss. In addition, of the 26 patients who desired future pregnancy, 14 patients (53.8%) experienced full-term delivery, and no complications of uterine rupture were reported. Takeuchi et al. [10] conducted laparoscopic adenomyomectomy with transverse incision in the uterus and reconstructed the uterus with flap suturing. The length of operation and the amount of blood loss were 101 minutes and 225 mL, respectively, faster and

with less blood loss compared to the present study, and two of 14 patients reported pregnancy achievement.

In the present study, we examined the size of the lesion and the status of comorbid disease using laparoscopy prior to mini-laparotomy incision. The purpose of laparoscopy prior to surgery was to check for the presence of comorbid disease, determine treatment and the extent of incision, and to insert a drainage tube prior to surgery. Endometriosis or intra-abdominal adhesions may accompany adenomyosis, but they are extremely difficult to accurately diagnose prior to surgery. Diagnosis may be easier when endometriosis occurs in the ovaries and is confirmed by ultrasound, but diagnosis is difficult when endometriosis does not occur in the ovaries and only does make cul-de-sac of Douglas complete or partial obliteration. In addition, in cases of severe pelvic adhesion with a history of surgery or pelvic inflammatory disease, surgery can be more accurately performed with laparoscopic examination and pre-treatment before open surgery.

In the present study, the average hospital stay was 7.3 days, including admission and discharge days, which is longer than with general laparoscopy. The discharge criteria were the ability to have a normal diet and ambulate, absence of problems such as fever, and patients were usually discharged four days after surgery. However, some patients had severe pain and required longer hospital stays.

Adenomyosis commonly relapses and progresses, and in this study, three of nine patients showed progression that occurred on the side of the uterine wall opposite from the site of surgery. Those three patients did not receive treatment with the levonorgestrel intrauterine system (Mirena) or oral contraceptives (Yasmin or Yaz) for pregnancy prevention immediately following surgery, and two of the three patients showed an increase in dysmenorrhea and hypermenorrhea. One of the patients underwent laparoscopic hysterectomy due to severe pain and profuse menses. The three patients who used Mirena or oral contraceptives after surgery did not experience relapse, but three of the six patients who did not receive supplementary postoperative treatment experienced relapse. Considering that nearly half of the patients who did not receive postoperative medical treatments showed progression of the disease despite the positive results of improved symptoms and reduced uterus size after surgical treatment, the necessity of medical treatment after surgery should be thoroughly explained to patients. If patients refuse medical treatment or medical treatment is put on hold for pregnancy, ongoing out-

patient follow-up and testing should be performed, and the status of relapse should be consistently examined.

Adenomyomectomy using the double flap method has the advantage of fewer recurrences, but more importantly, it can decrease the risk of fatal complications of rupture in the final stage of pregnancy due to the sturdier reconstruction of the uterus. However, in the present study, no patient actively attempted natural pregnancy or made a proactive effort to become pregnant using assisted reproductive technology. Therefore, in the present study, although the robustness of the uterine reconstruction could not be verified, future follow-up observation is needed for postoperative pregnancy and childbirth.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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