

Laparoendoscopic single-site surgery (LESS) for large benign adnexal tumors: one surgeon's experience over one-year period

N.J. Oh¹, W.Y. Kim²

¹Department of Obstetrics and Gynecology, Myongji Hospital, Kwandong University College of Medicine, Seoul

²Department of Obstetrics and Gynecology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Seoul (Korea)

Summary

Objective: To present the authors' experience with laparoendoscopic single-site surgery (LESS) surgery for large benign adnexal tumors and to compare the removal time of resected specimen with that of conventional laparoscopy. **Study Design:** Ten consecutive patients underwent LESS for huge adnexal tumors at Myongji Hospital, Korea between March 2011 and July 2012. A modified open Hasson technique was used to gain access to the abdominal cavity. The single-port device was inserted trans-umbilically into the wound opening. After suction of large amount of fluid content, LESS salpingo-oophorectomy was performed. The resected adnexal specimen was placed into a LapBag for removal out of the abdominal cavity. The authors compared the removal time of resected specimen between LESS and previously performed conventional laparoscopy for large benign adnexal tumors. **Results:** The adnexal tumors in this study were all very large cystic tumors reaching near or over the umbilicus. It took less than ten minutes for the removal of the resected adnexal tumors in all LESS cases (three to ten minutes), much less time than that of the conventional laparoscopy (usually ten to 17 minutes). **Conclusion:** LESS for large benign adnexal tumors is feasible and removal of resected adnexal tumor is easier than conventional laparoscopic surgery.

Key words: LESS; Large benign adnexal tumor; Removal time.

Introduction

Benign ovarian cysts are now managed laparoscopically rather than by laparotomy. The advantages of laparoscopy over laparotomy are less post-operative pain, short hospital stay, earlier recovery, and improved quality of life in the post-operative period and cosmetic effect. However, the size of the ovarian cyst has been the major limitation of laparoscopic management due to the possibility of malignancy and inadvertent cyst rupture during surgery [1, 2].

Recently, there have been some reports on the feasibility of the laparoscopic removal of large benign ovary cyst [3, 4]. Wong *et al.* also described the technique for successful conventional laparoscopic removal of large ovarian cysts [5].

Since 2008, single-port laparoscopic surgery for benign gynecologic disease has become increasingly common [6]. In many reports, there was no difference in the median operation time between (laparoendoscopic single-site surgery) LESS and conventional laparoscopy [7-9]. However, it would take a long time to extract a large ovarian cyst through a conventional port due to small port size. On the contrary, removal of resected ovarian cyst through a larger umbilical incision would be easier and more rapid because of larger diameter of single umbilical incision. However, there has been no prior report on the comparison of speci-

men removal time between single port and conventional laparoscopy.

In this study, the authors attempted to show the feasibility of LESS for large adnexal tumors and easiness of removal of resected tumors compared with that of conventional laparoscopy.

Materials and Methods

Patients

The authors retrospectively reviewed the medical records of the ten consecutive patients who underwent LESS for large benign adnexal tumors at Myongji Hospital (Kyunggi-do, Korea) between March 2011 and July 2012.

Inclusion criteria for this study were sonographic and magnetic resonance imaging (MRI) features of the ovarian cysts consistent with benign disease, and the maximum diameter of the ovarian cyst > 15 cm on MRI imaging. Clinicopathologic data including age, body mass index, (BMI), surgical time, surgical results, and pathologic results were reviewed. This study was approved by the Institutional Review Board. The authors also reviewed the medical records of the eight patients who had conventional laparoscopic surgery for huge adnexal tumors by other surgeons before March 2011.

Surgical technique

The patient was placed in the dorsal lithotomy position. Regarding the LESS approach, a 2.5 to 3.0 cm vertical incision was made within the umbilicus using a modified open Hasson technique at the beginning of the surgery to gain access to the abdominal cavity. The single-port device was inserted trans-umbilically into the wound opening and suction irrigator

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was inserted into the cyst to drain the cyst. If the abdominal cavity was blocked by a large cyst wall, the authors placed a purse string suture in the cyst wall using 3-0 suture on a GI needle and penetrated the cyst using a suction irrigator and tied a single throw in the purse string to tighten the cyst wall around the suction irrigator and to prevent spillage. After the cyst fluid content was evacuated as completely as possible, the suction irrigator was removed and the purse string suture was tied up to minimize spillage. Then the single-port device was inserted trans-umbilically into the wound opening and the entire ovary cyst could be visualized.

The authors used a rigid 30-degree, five-mm laparoscope and conventional laparoscopic instruments for all LESS procedures. The infundibulopelvic vessels were sealed and ligated, and salpingo-oophorectomy was performed. The resected adnexal specimen was placed in a LapBag for removal from the abdominal cavity and to minimize intra-peritoneal leakage of the contents. They checked the time from the completion of resection of adnexal specimen to complete removal through the port site.

The peritoneum and fascia were approximated and closed layer by layer with 2-0 Vicryl suture. Skin adhesive material was applied for good cosmetic outcome and it was also convenient for the patient. All LESS procedures were performed by a single surgeon.

Statistical analysis was performed using SPSS version 10.0. Comparisons between groups were performed with Student t test and chi square test, including Fischer's exact test. A p value < 0.05 was considered statistically significant.

Results

The adnexal tumors in this study were all very large cystic tumors ranging from 17 cm to 26 cm in the largest diameter. The pathologic diagnoses were confirmed as mucinous cystadenoma mixed with benign cystic teratoma ($n = 2$), endometriosis ($n = 2$), mucinous cystadenoma ($n = 4$), and serous cystadenoma ($n = 2$) (Table 1).

The median age of the patients was 56 years (range 31-70), and the median body mass index was 23.6 (range 19.5-27.1). The median surgical time was 52.5 min (range 45-70), and the median estimated blood loss during surgery was 50 ml (range 30-100). No patients received transfusions due to surgical blood loss. The median length of post-operative hospital stay was two days (range one to three days, Table 2).

Removal of the resected adnexal tumor through the large diameter (about 2.5 cm) umbilical single incision was much easier than through the small port diameter (about one cm) of conventional laparoscopy. It took less than ten minutes for the removal of the adnexal tumors in all LESS cases (three to ten minutes), much less time than that of the conventional laparoscopy (from ten to 17 minutes for huge adnexal cysts, Table 2).

All procedures were performed without complications. There were no perioperative port-related or surgical problems in all ten cases. One case needed one additional suprapubic port due to severe left pelvic wall adhesion arisen from the previous surgery. The other nine procedures were successfully performed without the use of additional ports.

Table 1. — LESS patients' characteristics.

Characteristics	LESS (n = 10)	Conventional (n = 8)	p value
Age (years, median)	56 (25-70)	50.5 (34-70)	0.78
Parity	2 (0-4)	2 (0-3)	0.85
BMI (kg/m ²)	23.6 (19.5-27.1)	22.8 (20.6-27.6)	0.91
Previous surgery history (n)	4	3	0.91
Mucinous cystadenoma	4	3	
Mucinous cystadenoma mixed with teratoma	2	0	
Serous cystadenoma	2	2	
Endometrioma	2	2	

Table 2. — Surgical and pathological results.

Results	LESS (n = 10)	Conventional (n = 8)	p value
Maximal cyst diameter (cm)	20.5 (17-26)	20 (18-24)	0.11
Surgical time (min)	52.5 (45-70)	60 (50-70)	0.17
Tumor extraction time (min)	6 (3-10)	13 (10-17)	< 0.01
Estimated blood loss (ml)	50 (30-100)	55 (30-80)	0.79
Post-op hospital stay (day)	2 (1-3)	2 (1-3)	0.94

The patients were followed-up at one and four weeks and at three months after discharge, and none showed early or late postoperative complications.

Discussion

Recently, LESS became more widespread than before owing to the improvement of flexible laparoscopic instruments and advances in technology. Several reports addressed the feasibility and safety of LESS for benign adnexal disease [10-12]. More recently, several case reports about LESS for large adnexal cysts also mentioned the feasibility, cosmetic aspect, and easiness of removal of large ovarian cyst [13-15].

In the current study, LESS surgery using the single-port device had a success rate of 90% with no conversion to laparotomy. The one failure case in which the authors used additional suprapubic port was due to severe pelvic wall adhesions originating from previous surgery.

Although the surgery period and operators were not the same between LESS and conventional laparoscopic adnexal surgery, this study shows that LESS for large benign adnexal cyst is feasible. There were no differences in patient's age, BMI, post-operative hospital stay, total surgical time, and estimated blood loss between LESS and conventional laparoscopic groups. However the present results showed that the removal of resected adnexal mass out of abdomen in LESS was much easier and more rapid than that of conventional laparoscopy (six min vs 13 min, p -value < 0.01).

There are many reports comparing LESS adnexal surgery with conventional laparoscopic adnexal surgery [7, 9, 11]. These studies demonstrated that the surgical outcomes of LESS for adnexal lesions, such as total surgical time, blood

Fig. 1

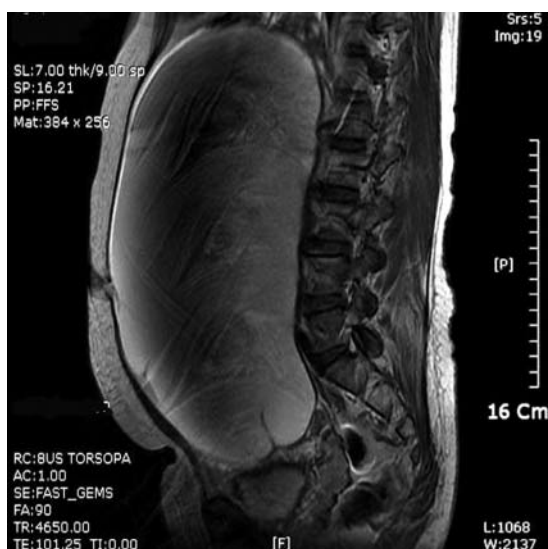


Figure 1. — Magnetic resonance imaging of large ovary cyst measuring 26 cm (T2-sagittal).

Figure 2. — Pictures illustrating LESS. A) Purse-string suture to the cyst wall; B) Evacuation of the cyst content; C) Placing of resected specimen into the Lapbag; D) Morcellation of the specimen.

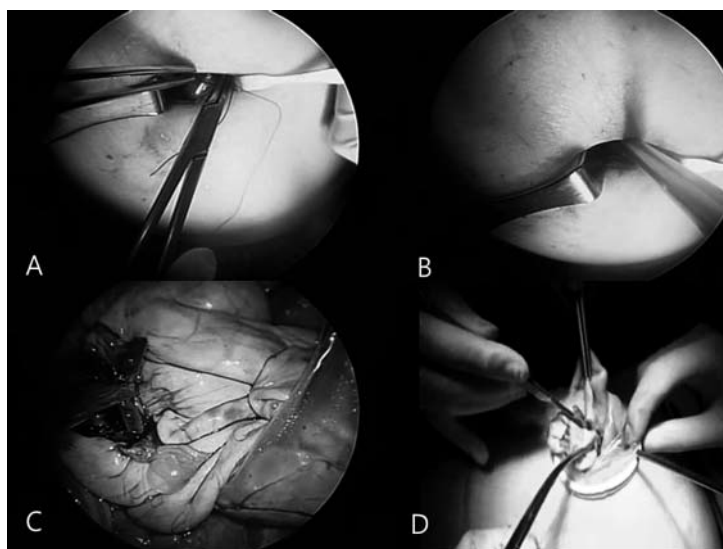


Fig. 2

loss, and operative complications did not differ from those of conventional laparoscopic surgery. However, no study compared the specimen removal time between the two types of surgery. They all compared total surgical time and speculated that specimen removal could be easier through a larger umbilical port. Accordingly, the authors analyzed the recorded film of previous conventional laparoscopy and indirectly compared the specimen removal time with that of LESS and discovered that removal of specimen was more rapid in LESS.

The removal of resected specimen consists of two parts: the first part consists of insertion of specimen into the laparoscopic pouch and the second part consists of morcellation of the adnexal specimen through port site. The first part usually takes only small portion of specimen removal time. The longest removal time in these LESS was ten minutes due to the longest first part time (4.5 minutes) and the longest second part time (5.5 minutes) owing to heavy cyst wall from the largest diameter (26 cm) with combined dermoid cyst content. (Figures 1, 2) In the remaining nine LESS cases, the first part did not take no more than two minutes and the second part no more than five minutes. From this experience, the authors can speculate that the second part of specimen removal comprises most of the specimen removal time in large adnexal cyst. Therefore removal through a larger umbilical incision site would be much easier and take less time than through a conventional smaller port site.

The authors generally used a rigid 30-degree, five-mm laparoscope with long shaft. Using this laparoscope, they could minimize the collision between the endoscope and surgical instruments and also minimize the in-line view of

the endoscope and the surgical instruments compared with using 0-degree laparoscope. The relatively short surgical time in this study compared to others' (ten minutes less time on average) is assumed to be that the authors performed salpingo-oophorectomy in all ten cases instead of time-consuming cystectomy. In addition, they were already on the learning curve when they performed this surgery.

Laparoscopic drainage of large ovarian cysts followed by salpingo-oophorectomy may be considered to be a controversial approach to managing large ovarian cysts because of the possibility of occult malignancy. The risk of spillage during laparoscopic excision of large cyst still exists even after laparoscopic drainage of the ovarian cyst. Some authors concluded from their studies that there was no difference in the five-year survival rate between the patients who had intact removal of the cyst compared with those with intraoperative cyst rupture in Stage I epithelial ovarian cancer patients [16, 17]. However, the recent reports advocate the impact of perioperative capsule rupture on survival. Improvement was observed in the five-year disease-free survival for Stage I epithelial ovarian cancer patients without intraoperative tumor rupture compared with those with tumor rupture [18]. Although the significance of this spillage in cases of malignant cysts is controversial, the importance of patient selection and capability of the surgeon to managing this situation should be stressed before applying the current result. Based on the previous reports and on the present study, however, the authors believe many patients with large benign adnexal tumors could share the benefits of minimally invasive surgery with surgeons' careful surgical evaluation and careful patient's selection on the basis of no evidence of gynecologic malignancy on imag-

ing studies such as computed tomography (CT), magnetic resonance imaging (MRI), and/or positron emission tomography CT (PET-CT).

There are many limitations in this study due to the small number of patients enrolled, its retrospectiveness, and different surgeons and varying surgery periods between LESS and conventional laparoscopy. Although the surgical skill is different between surgeons, the authors do not believe that simple removal of specimen through port site would employ experienced skills.

Despite shortness of retrospectiveness and indirect comparison of this study, this study adds to accumulating evidence supporting the feasibility and safety of LESS for large benign ovarian cysts and shows the removal of resected specimen is easier than the conventional laparoscopy. Considering the above, the authors believe LESS may be the first choice when it comes to large benign cystic adnexal tumors.

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Address reprint requests to:

W.Y. KIM, M.D.

Department of Obstetrics and Gynecology

Kangbuk Samsung Hospital

Sungkyunkwan University School of Medicine

108-1, Pyeong-dong, Jongro-gu

110-746 Seoul (Korea)

e-mail: obgykim@gmail.com