The Utility of Hand-Assisted Laparoscopic Surgery (HALS) in Giant Pelvic Masses

Xuyin Zhang · Jingxin Ding · Keqin Hua

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Abstract The purpose of this study was to report the outcomes of a series of patients who underwent hand-assisted laparoscopy surgery for benign giant pelvic masses, including ovarian cysts and uterine myomas. We reviewed the records of all patients who underwent laparoscopic or hand-assisted laparoscopy surgery for a variety of benign gynecological conditions. Demographic, clinical, pathologic, and follow-up information was analyzed. Twelve patients have undergone hand-assisted laparoscopy for giant pelvic mass, including four hand-assisted laparoscopic myomectomy, four oophorocystectomy, and four salpingo-oophorectomy. The median age was 35.5 (19–55). The median BMI was 22.05 (19.8–26.7 kg/m²). The median diameter of adnexal mass was 21 (17–24 cm). The median diameter of uterine myoma was 18.5 (16–19 cm). The median length of hand-assisted (HA) incision was 5 cm (2–6 cm). The median operation time was 100 min (70 to 180 minutes), and median estimated blood loss was 60 mL (30 to 800 mL). The median length of stay was 3 days (3–5 days). There was no case of intraoperative and postoperative complications. Hand-assisted laparoscopic surgery is safe and feasible in the management of patients with benign giant pelvic masses. Additional studies are needed to further investigate potential advantages and outcomes of the technique.

Keywords Pelvic mass · Hand-assisted laparoscopy · Laparoscopy

Introduction

Gynecologists have acknowledged the benefits of laparoscopic surgery including shorter hospital stay, decreased postoperative pain, improved cosmesis, and faster return to normal activities, compared with open surgery. However, sometimes the disease of patients limited the application of laparoscopy, such as giant pelvic mass. And it has been widely accepted that the patients with giant pelvic masses should have a traditional open surgery.

Recently, hand-assisted laparoscopic surgery (HALS), a new technique, is a specific surgical technique in which the surgeon inserts a hand into the abdominal cavity during conventional laparoscopy and directly palpates the intraabdominal contents. It is emerging as a valuable method for evaluating gynecological pelvic masses [1–3].

By introducing a hand into the intraperitoneal cavity, the surgeon may be able to perform digital dissection while still benefiting from the superior visualization of the laparoscope. HALS allows the surgeon greater visualization, while the patient benefits from still having a minimally invasive procedure. The purpose of this study was to report the outcomes of a series of patients who underwent HALS for giant benign pelvic masses via hand-assisted laparoscopy and to describe the technique of hand-assisted laparoscopic myomectomy, oophorocystectomy, and salpingo-oophorectomy.

Methods

Patients Selection

This is a retrospective case series of 12 patients who underwent a hand-assisted laparoscopy (myomectomy, oophorocystectomy, or salpingo-oophorectomy) for giant pelvic mass from January 2013 to January 2014 in the Obstetrics

X. Zhang · J. Ding (✉) · K. Hua (✉)
Department of Obstetrics and Gynecology, Obstetrics and
Gynecology Hospital, Fudan University, 419 Fang xie Road,
Shanghai 200090, China
e-mail: dxdd@sina.com
e-mail: huakeqinjiaoshou@163.com

and Gynecology Hospital of Fudan University, Shanghai, People's Republic of China.

Patient selection for HALS was based upon clinical and biochemical evaluation, review of radiographic materials, and patient counseling. A patient with a giant and benign pelvic mass (diameter >15 cm, uterine myoma, ovarian cyst) detected by ultrasound and MRI was selected. Since dense adhesions prevented the surgeon from continuing the case laparoscopically, we chose the patients with good activity by gynecological examination and with no previous history of pelvic surgery. All HALS were operated by the same team.

Surgical Technique

After induction of general anesthesia, the patient is placed in a dorsal lithotomy position. A Foley catheter is inserted in the bladder. A 2- to 6-cm low midline transverse incision or vertical midline incision is made 2 cm above the pubis symphysis and carried down to the subcutaneous tissues. The fascia is opened by the use of monopolar electrosurgery. The muscles are split in the midline, and the peritoneum is entered bluntly.

A 10-mm laparoscopic transumbilical trocar was placed intraperitoneally utilizing a traditional laparoscopic technique with the help of the hand preventing the trocar cutting the mass. Five-millimeter lateral ports placed under direct visualization were made depending on the site of disease. A 14-mmHg pneumoperitoneum was performed, followed by introducing the optical system. Then, the surgeon had the ability to visualize and palpate all the pelvic mass.

Myomectomy

The authors prefer to use 6U of vasopressin in 20 mL of saline and inject into the corpus uteri. Under the total exploration by laparoscopy, we can master the incision of myoma. With the hand-assisted grasping the uterine, laparoscopic electric scalpel was performed to dissect the myoma (Fig. 1). The uterus was elevated out of the peritoneal cavity to close the myomectomy defects by suturing. The giant myoma was slivered and

Fig. 1 With the hand grasping the uterine, laparoscopic electric scalpel was used to dissect the myoma

taken out of the hand-assisted incision. If there are multiple myomata, the uterine can be elevated out of the peritoneal cavity to dissect the other myomas after removal of the giant one was accomplished.

Oophorocystectomy or Salpingo-oophorectomy

If the mass was cystic, the diameter of the hand-assisted incision was only 2–3 cm and hydatid fluid was aspirated by paracentetic needle (Fig. 2). After that, the wound of paracentesis was elevated out of the peritoneal cavity from the hand-assisted incision and sutured, followed by the total exploration of the pelvis by laparoscopy. The cyst would be dissected, and the ovary would be sutured by laparoscopy or out of the peritoneal cavity.

If the mass was solid, the diameter of the hand-assisted incision was 6 cm and the adnexectomy was laparoscopically accomplished by Ligasure with the hand grasping the mass. An endoscopic retriever or a plastic bag was inserted, and the mass was placed in and slivered it to be taken out of the hand-assisted incision.

Finally, it is critical to ensure proper coagulation to confirm hemostasis by laparoscopy. During all of the procedure above, we did not use the hand-port device. When the hand was not in the hand-assisted incision, we sutured the layers by 2-0 nylon suture simply to prevent CO₂ leaks with a 10-mm trocar in the incision (Fig. 3). After completing all of the procedures, all the incisions were closed with absorbable suture.

Fig. 2 Hydatid fluid was aspirated by paracentetic needle from the hand-assisted incision. The Alice forceps were used to clamp the paracentesis hole, preventing hydatid fluid to outflow

Fig. 3 With a 10-mm trocar in the incision, we sutured the layers by 2-0 nylon suture simply to prevent CO₂ leaks

Results

Twelve patients have undergone hand-assisted laparoscopy for giant pelvic mass from January 2013 to January 2014 at our institution. The primary indication for surgery in all patients was symptomatic pelvic mass larger than 15 cm in diameter. Procedures performed included four hand-assisted laparoscopic myomectomy, four oophorocystectomy, and four salpingo-oophorectomy.

The demographic and surgical data are presented in Table 1. The median age was 35.5 (19–55). The median BMI was 22.05 (19.8–26.7 kg/m²). The median diameter of adnexal mass was 21 (17–24 cm). The median diameter of uterine myoma was 18.5 (16–19 cm). The median length of hand-assisted (HA) incision was 5 cm (2–6 cm). The median operation time was 100 min (70 to 180 minutes), and median estimated blood loss was 60 mL (30 to 800 mL). The median

length of stay was 3 days (3–5 days). There was no case of intraoperative and postoperative complications (Table 1).

In case 4, the abdominal bulge of the patient was just like pregnancy at term (Fig. 4a, b). She had a fever over 39 °C for 3 days, and the antibiotics were ineffective. The operation was inevitable. During the process of HALS, a total of 10,000 ml hydatid fluid was taken suction from the two ovarian cysts (Fig. 4c). The two ovaries were attached to the omentum and could be detected clearly by laparoscopy after the suction of hydatid fluid (Fig. 4d). The hemostasis of all surgical sites was visualized and confirmed before closure with the assistance of the laparoscopy.

In case 12, blood loss of 800 mL occurred during dissection of the uterine myoma because of a large lower uterine segment and multiple myomas. The myomectomy was designed to perform after controlling uterine vascular supply by cerclaging the isthmus of uterine by tourniquets. However, we failed to accomplish it, and a large amount of bleeding was encountered.

Findings on follow-up examinations at 1 month of all the patients were unremarkable.

Discussion

Since the introduction of the first hand-assisted device in 1997, the hand-assisted technique has been successfully applied to a variety of surgical procedures, including colectomy [4], nephrectomy [5], liver resection [6], abdominal aortic aneurism repair [7], splenectomy [8], hysterectomy, and myomectomy [1, 2]. In this study, we have successfully used

Table 1 Clinical findings in the patients studied. Four myomectomy, Four oophorocystectomy, and four salpingo-oophorectomy

Case	Age	BMI	MD (cm)	B or U	C or S	Surgery	Length of HA incision (cm)	OR time (min)	EBL (ml)	Length of stay (d)	Pathology
1	23	20.2	21	U	C	RO	3 (VMI)	100	50	4	Ovarian serous cystadenoma
2	34	21.8	17	U	C	LO	3 (VMI)	90	40	3	Ovarian mucinous cystadenoma
3	36	23.3	18	/	/	M	6 (TI)	120	200	3	Uterine leiomyomata
4	19	21.7	20/22	B	C	LO/RO	4 (VMI)	120	100	5	Infective benign ovarian cyst
5	35	22.2	16	/	/	M	6 (TI)	130	250	3	Uterine leiomyomata
6	37	21.9	21	U	S	LSO	6 (VMI)	80	50	3	Ovarian theca cell tumor
7	35	20.3	17	U	S	RSO	5 (VMI)	70	30	3	Ovarian fibroma
8	42	24.8	19	/	/	M	6 (TI)	100	150	4	Uterine leiomyomata
9	48	26.7	24	U	C	RSO	5 (TI)	110	60	4	Ovarian follicular cyst
10	32	19.8	18	U	C	LO	2 (TI)	70	50	3	Parovarian cyst
11	55	25.3	23	U	C	LSO	3 (VMI)	100	60	3	Ovarian serous cystadenoma
12	40	23.1	19	/	/	M	6 (TI)	180	800	5	Uterine leiomyomata and degeneration with calcification

BMI body mass index, *MD* mass diameter, *OR* operation, *EBL* estimated blood loss, *B or N* adnexa mass was bilateral or unilateral, *C or S* mass was cyst or solid, *TI* transverse incision, *VMI* vertical midline incision, *HA* hand-assisted, *LSO* left salpingo-oophorectomy, *RSO* right salpingo-oophorectomy, *LO* left oophorocystectomy, *RO* right oophorocystectomy, *M* myomectomy

Fig. 4 **a, b** The abdominal bulge of the patient was just like pregnancy at term preoperatively and recovered from abnormality postoperatively. **c** A total of 10,000 ml hydatid fluid was taken suction from the two ovarian cysts. A bottle of 2000 ml×5. **d** The right ovarian cyst was attached to the omentum and could be visualized and managed under clearly by laparoscopy

HALS to manage patients with giant pelvic masses that otherwise could not be performed with traditional minimally invasive surgery.

Since we attempted to do the surgery for patients with benign pelvic mass, the significance of careful patient selection was emphasized. Detailed physical and imaging examination before HALS was very important and essential. MRI showed that all the lesions were benign and were confirmed uterine myoma and adnexal masses. In this series of patients, all the masses were benign. Of course, HALS was also used in malignant disease, and several reports showed HALS were applied in ovarian cancers [9, 10].

HALS combined the advantage of manual palpation of traditional open surgery and the adequate vision of laparoscopy. The intraabdominal hand use is preservation of tactile sensation, which is lost in pure laparoscopic techniques. Uterine myomas in our study may include a large and bulky myomatous uterus significantly obstructing the surgical field, and the operator could not decide the incision of myoma. However, with the assistant of the intraabdominal hand grasping uterine and palpating the large myoma, the incision of the uterus could be decided under laparoscopy. Similarly, the adhesions between mass and greater omentum or peritoneum could be dealt with. So, excellent visualization and magnification of the laparoscopy combined with the advantages of the intraabdominal hand allows for a complete and thorough assessment of the peritoneal cavity.

During the process of myomectomy, we palpated the uterus to identify all small myomas by elevating the uterine out of the

peritoneal cavity after the dissection of the giant myoma. At last, we closed the myomectomy defects by suturing out of the peritoneal cavity. We believed the method was better and faster than laparoscopic suturing techniques for closure of the myomectomy defects. Perhaps, the methods could reduce operative time and shorten the length of hospital stay accompanied by return to preop status earlier. However, how to reduce the blood loss of the myoma which was giant, multiple, and located in lower uterine segment even cervix or broad ligament was a problem to be solved [3].

Our technique does not impose an added cost burden on patients, is ergonomically balanced, and can be performed with minimal added inconvenience to surgeons.

Complete resection without mass rupture should be attempted with any suspicious pelvic mass. Additionally, adequate exposure and visualization should not be compromised by a minimally invasive approach. HALS overcomes many of the aforementioned limitations and concerns while retaining the advantages of traditional laparoscopy. In our study, we prevented the tumor rupture and spread by suturing the wound of paracentesis out of the peritoneal cavity and by using a large endoscopic retriever. Fortunately, the pelvic masses in our study were all benign.

The disadvantage of HALS is that it is a technically advanced procedure and may result in increased operative times during the initial training process [11]. Our study was limited in many ways due to its retrospective nature, small number of patients, and lack of randomization. In conclusion, this case series demonstrates the feasibility of a hand-assisted approach

in giant pelvic masses. Studies with bigger sample size are necessary and eagerly await to help determine the long-term risks and benefits as well as the most appropriate candidates and selection criteria.

Conflict of Interest The authors declare no conflict of interest.

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