

## Original Article

# Perioperative and long-term outcomes of laparoscopy and laparotomy for endometrial carcinoma

Xianghua Yin, Min Shi, Jianbo Xu, Qin hao Guo, Huan Wu

Department of Obstetrics and Gynecology, Clinical Medical College of Yangzhou University, 98 W Nantong Rd, Yangzhou 225001, Jiangsu, China

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**Abstract:** Objective: To compare the efficacy and the clinical value of laparoscopic surgery and traditional abdominal surgery for the treatment of endometrial carcinoma. Meanwhile, assessing the value of preoperative MRI in the depth of myometrial invasion of endometrial carcinoma. Methods: we retrospectively analyzed 32 patients with endometrial carcinoma who underwent laparoscopic surgery in Department of Obstetrics and Gynecology in the Subei People's Hospital from September 2008 to March 2015, comparing data using the same surgeons' traditional laparotomy cases during the same period. Data collected includes patient demography, intraoperative and postoperative clinical parameters and follow-up data. Result: All laparoscopic and laparotomy surgery were successful. laparoscopic surgery was better than traditional surgery with less blood loss, more early postoperative anal exhaust time, less postoperative hospital stay, and no seriously complications, there were significant differences (all  $P < 0.05$ ). The average operative time, in the laparoscopy group, was a little longer than the laparotomy group with no statistical significance ( $P > 0.05$ ). There were no differences in the two groups in terms of the number of excised lymph nodes and the recurrence and mortality rate ( $P > 0.05$ ). The sensitivity and specificity of the MRI imaging in assessment of deep myometrial invasion of endometrial carcinoma were 89.3% and 96.2%, respectively. Conclusion: Compared to conventional approaches, laparoscopic surgery showed favorable short-term outcomes with comparable survival. People with endometrial cancer can, therefore, be as safely managed using laparoscopy as laparotomy. MRI is of high value in assessing deep myometrial invasion in patients with endometrial carcinoma.

**Keywords:** Laparoscopic surgery, endometrial carcinoma, clinical efficacy, MRI

## Introduction

Endometrial carcinoma (EC) is one of the most common gynecologic malignancies and the incidence rate of EC is increasing surprisingly worldwide [1]. Traditional abdominal surgery was regarded as a standard processing method for endometrial carcinoma for a long time [2]. Recently, surgical devices and techniques improve so much, laparoscopic surgery has widely used in the diagnosis and treatment of various gynecological benign diseases, but the clinical efficacy in the application of malignant tumors was still in exploration. There is a lot of research about the security and feasibility of laparoscopic surgery curing endometrial carcinoma abroad [3-5], which have shown that the survival rate after laparoscopic surgery was similar to traditional laparotomy surgery. This article aim to evaluate whether laparoscopic

minimally invasive surgery, compared with laparotomy, provides benefits in endometrial carcinoma.

## Material and methods

### Patients

We retrospectively searched for the records of all patients with endometrial carcinoma who were primary treated and followed up at Subei people's Hospital between September 2008 and March 2015. The inclusion criteria were endometrial cancer with disease staging between FIGO (International Federation of Gynecology and Obstetrics, 2009) stage IA to IIIC, without preoperative brachytherapy or chemotherapy. A total of 67 patients were enrolled and all had received surgery as primary treatment, 35 underwent abdominal surgery and 32

**Table 1.** Pathologic characteristics

	Laparoscopy (n1=32)	Laparotomy (n2=35)
Mean age, years (range)	52.4	51.6
Weight (kg)	55.4	54.9
Procedure		
I	6	7
II	18	20
III	8	8
Stage		
I	25	27
II	2	2
III	5	6
Histology		
Endometrioid	28	30
Adenosquamous	2	2
Serous	1	1
Mucinous	1	1
Clear cell	0	1

Procedure I: Hysterectomy or Hysterectomy + bilateral salpingoophorectomy; II: I + pelvic lymphadenectomy; III: II + para-aortic lymphadenectomy.

underwent laparoscopic surgery in a similar clinical setting with the same surgical team.

The two groups in age at diagnosis, weight, histopathologic subtype and stage of disease had no significant difference. All cases involved in the study were pathologically confirmed by pre-operative endometrial pathological examination at our institution. Patient characteristics are presented in **Table 1**.

Of all the patients, 54 patients underwent pre-operative magnetic resonance imaging inspection (MRI). MRI findings were divided into four categories: (1) Tumors confined to the endometrium layer; (2) Superficial myometrial invasion ( $\leq 1/2$ ); (3) Deep myometrial invasion ( $>1/2$ ); (4) The cervical invasion. Sensitivity is the ability to correctly diagnosis myometrial invasion and lymphatic metastasis, namely the proportion of MRI preoperative diagnosis in all myometrial invasion and lymphatic metastasis patients. Specificity is the ability to correctly diagnosis patients without myometrial invasion and lymphatic metastasis.

#### Operation

Laparotomy surgery was performed as routine. Firstly, peritoneal washing, then total hysterectomy,

bilateral salpingoophorectomy, and bilateral pelvic lymphadenectomy for most. Choosing para-aortic lymphadenectomy or omentectomy according to intraoperative findings and characteristics of patient and cancer.

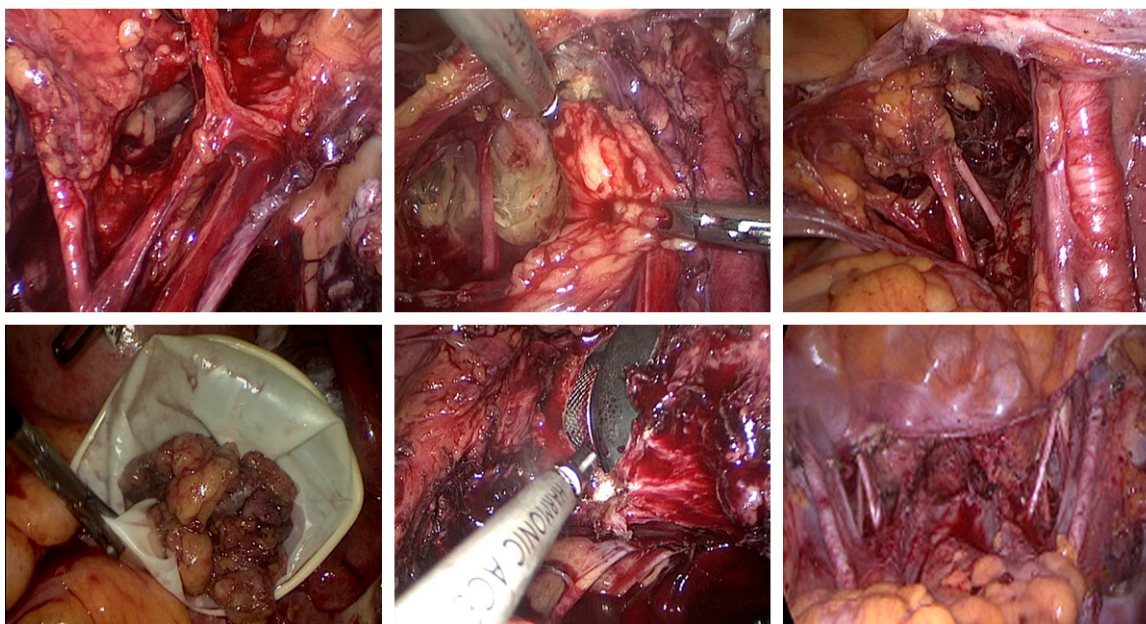
Laparoscopy total hysterectomy or hysterectomy plus bilateral salpingoophorectomy was performed as previously described [6]. For the patients with G2 or above IA, and unfavorable histological types (such as type II endometrial cancer, regardless of the stage and grade), we performed pelvic lymphadenectomy above all, opened the parietal peritoneum, identified the iliac vessels and ureters as the pelvic spaces were developed. Removed external iliac, internal iliac, and obturator lymph nodes of all patients. Then, performed hysterectomy or hysterectomy plus bilateral salpingoophorectomy, all specimens were removed in an endoscopic bag through vagina, finally, sutured the vaginal stump using 1/0 Vicryl threads. At the end of lymphadenectomy, reintroduced laparoscopy to reconfirm that the external iliac vessel, the internal iliac vessel, the iliac bifurcation, and the obturator nerve fully exposed and ensured hemostasis. Para-aortic lymphadenectomy was performed in patients with serous, adenosquamous, clear cell or G3 tumors and in tumors with deep myometrial invasion ( $>1/2$ ) [7] (**Figure 1**).

#### Record

Intraoperative and postoperative parameters including operative time, estimated blood loss, anal exhaust time, hospital stay, number of removed lymph nodes and complications such as blood vessel rupture, bladder or ureteral injury, postoperative fever of unknown reason, fat liquefaction, infection of incision and lymphatic cyst. Follow-up data include postoperative adjuvant therapy, recurrence and mortality rate. Blood loss was estimated as the total volume of suctioned fluids. The operative time was measured from the time of skin incision to the last suture. Hospital stay was counted from the first postoperative day.

#### Statistics analysis

Statistical analysis was performed with statistical software SPSS 19.0 and Excel 2007. The differences between proportions were analyzed using the Chi-square test. Fisher's exact



**Figure 1.** The methods of laparoscopic radical hysterectomy and lymph node dissection.

**Table 2.** Comparison of the operative time, blood loss, postoperative anal exhaust time, postoperative hospital stay, lymph node count for two groups of patients

	Laparoscopy (n1=32)	Laparotomy (n2=35)
Operative time, min	218.4±92.6	203.5±86.2
Blood loss, ml	258.5±42.7	304.7±35.1
Anal exhaust time, h	42.1±10.5	60.0±12.3
Hospital stay, day	4.8±2.4	7.7±1.5
Lymph nodes count	18.6±3.2	18.3±2.4

test was for categorical variables and T test for continuous parametric and nonparametric variables. Statistical significance was defined as  $P < 0.05$ .

## Results

In our study, 26 patients underwent laparoscopic lymphadenectomy and 28 patients underwent open lymphadenectomy of women who required lymphadenectomy, there was no significant differences between the two groups ( $P > 0.05$ ). In general, the mean operative time was 218.4 minutes for the laparoscopic group, 203.5 minutes for open group with no significant difference ( $P > 0.05$ ). The average intraoperative blood loss was 258.5 mL for laparoscopic versus 304.7 mL for laparotomy

( $P < 0.05$ ). The mean postoperative anal exhaust time was 42.1 hours for laparoscopic cases and 60.0 hours for laparotomy ( $P < 0.05$ ). The average length of postoperative hospital stay was 4.8 days versus 7.7 days ( $P < 0.05$ ). The average number of removed lymph nodes that were confirmed by postoperative pathological examination was 18.6 in laparoscopic group and 18.3 in laparotomy group ( $P > 0.05$ ). Shown in **Table 2**.

Considering surgical complications, no intraoperative blood vessel rupture was found in the laparoscopic, but one in laparotomy group ( $P < 0.05$ ). The bladder or ureteral injury was not found in both laparoscopic and the open group. There was one patient in the laparoscopic had postoperative fever of unknown reason, as well as one in the open group ( $P > 0.05$ ). No patient in the laparoscopic group and one in the open group had a fat liquefaction ( $P < 0.05$ ). There was no noted postoperative wound infection in either group. One in the laparoscopic happened Lymphatic Cyst, the same in the open group. Considering all perioperative complications, the overall complications rate was 6.3% in laparoscopy, compared to higher 11.4% in laparotomy. Shown in **Table 3**.

Radiotherapy was given to women with tumor invading deep myometrium or pathological diagnosis of lymph node metastases. Chemotherapy

**Table 3.** Intra-operative and post-operative complications

	Laparoscopy (n1=32)	Laparotomy (n2=35)
Blood vessel rupture	0	1
Bladder or ureteral injury	0	0
Postoperative fever	1	1
Fat liquefaction	0	1
Infection of incision	0	0
Lymphatic Cyst	1	1
Rate of complications	6.3%	11.4%

**Table 4.** Comparison of recurrence and mortality rate

	Laparoscopy (n1=32)	Laparotomy (n2=35)
Adjuvant treatment	16	18
Recurrence, n (%)	3 (9.4%)	4 (11.4%)
Death, n (%)	1 (3.1%)	1 (2.9%)

was indicated in cases of systemic spread or serous carcinomas or clear cell carcinomas. A combined chemoradiotherapy was administered according to criteria previously mentioned [8]. There was no significant differences regarding adjuvant treatment between two groups ( $P>0.5$ ). We followed up all patients with pelvic inspection and vaginal B ultrasound examination according to European Society for Medical Oncology recommendations [9]. Date of recurrence and death were recorded. In the end, there were 3 patients recurred and 1 patients died in laparoscopic group, correspondingly, 4 and 1 in laparotomy group up to now, with no significantly differences ( $P>0.5$ ). Shown in **Table 4**.

In addition, we analyzed preoperative MRI diagnosis and postoperative pathological results of 54 patients which showed in **Table 5**. Regarding depth of infiltration, agreement of tumors confined to the endometrium and superficial myometrial between MRI and pathology was found in 20/26 patients (76.9%) and postoperative pathological diagnosis of deep myometrial in 28 cases with preoperative MRI diagnostic conformed to 26 examples, specificity of diagnosis was 92.9% (26/28). For the detection of deep myometrial invasion, preoperative MRI examination obtained sensitivity 89.3% (25/28), specificity 96.2% (25/26).

## Discussion

Laparoscopic surgery, as an important component of minimally invasive surgery, shows a good prospect of application in the clinical practice for the treatment of endometrial carcinoma. There is a large number of studies on the clinical efficacy of laparoscopic surgery performed in uterine malignancies compared with laparotomy surgery, which indicates that there was no statistically significant difference between laparoscopic surgery and open in effect and security [10, 11]. In our research, the whole surgery is successful, no vital organ injury. By comparing the two groups, the average amount of intraoperative blood loss, the average length of anal exhaust time and hospital stay, in laparoscopic surgery group, are better than the laparotomy group. And we found that the difference between the two groups in average operating time was not statistically significant. Duration of laparoscopic surgery was a little longer than the laparotomy group, some scholars believed that it is related to the surgical skill [12] and the selection and proficiency use of surgical instruments [13].

For surgical treatment of endometrial carcinoma, Pelvic and/or para-aortic lymph node dissection should be considered for patients with high-risk factors [14], the surgical resection scope and the pelvic lymph node count are the key to assess whether laparoscopic pelvic lymphadenectomy is effective and adequate [15]. In our study, pathological examination showed that the number of excised lymph nodes in laparoscopic group is similar to laparotomy group. There is one case of postoperative lymphatic cyst in laparoscopic group (formation of postoperative lymphocele can be explained as a consequence of lymphadenectomy in combination with radical surgery on the parametria [16]), similarly one in laparotomy group. The overall postoperative complication rate of laparoscopic surgery was 6.3%, significantly lower than the open group (11.4%), and there was no intraoperative blood vessel rupture, formation of postoperative fat liquefaction or infection of incision, which indicated that with the use of minimally invasive surgical devices and as our surgical experience and surgical skills evolved, it can improve the quality of surgery and facilitate the recovery [17].



**Table 5.** Comparison of MRI finding and pathological diagnosis in 54 patients

MRI finding (invasion)	Pathological diagnosis			Total
	Non-myometrial	Superficial myometria	Deep myometrial	
Non-myometrial	3	3	0	6
Superficial myometria	2	17	3	22
Deep myometrial	0	1	25	26
Total	5	21	28	54

Several studies have investigated the follow-up parameters in women who underwent surgical operation for endometrial carcinoma. They are concordant in suggesting that laparoscopy minimally invasive surgery ensures short to medium-term postoperative quality of life due to shorter hospitalization and faster return to normal activities, without neglecting survival [18, 19]. Our study also shows that there was no significant difference in recurrence and mortality rate between laparoscopic and traditional abdominal groups.

Vaginal B ultrasound, CT and MRI are often used in preoperative diagnosis of endometrial carcinoma. Vaginal B ultrasound, due to its easy operation and cheap, has been widely used at present, but its accuracy in the depth of myometrial invasion has limitation, inferior to MRI. MRI, compared with CT, because of its great soft tissue resolution and better in displaying tumor multiply, scope and depth of infiltration, is superior to CT diagnosis. Our study shows that MRI can get high specificity in deep myometrial invasion for endometrial carcinoma patients, while the sensitivity is relatively low, were 96.2% and 89.3%, which is similar to the study of Teng F [20]. We didn't evaluate the value of MRI in cervical involvement and lymph node metastasis for endometrial carcinoma because of sample capacity restriction. In a word, we preliminarily consider that MRI is of high value in assessing the depth of myometrial invasion in patients with endometrial carcinoma.

All in all, laparoscopy has the function of amplifying operation vision, making pelvic cavity tissue and structure more clearly, laparoscopic instruments can expose the hidden areas in laparotomy without dead angle, removal of paravaginal tissues and deep obturator lymph nodes are more accurate and complete, and

the thoroughly degree of cleaning lymph node in laparoscopic surgery is equivalent to that of open operation [21]. Compared with open surgery, laparoscopic surgery has small incision and less trauma, laparoscopic lymphadenectomy avoid exposing too much tissue and many other procession, reducing the incidence of abdominal and pelvic

adhesions. Postoperative pain is lighter and prognosis is better. Minimally invasive surgery will not affect the appearance, the patient is willing to accept. The author argued that it is crucial to master laparoscopic surgical indication strictly preoperative, operate carefully intraoperative, constantly improve the performer's skills, and accumulate operation experience, in order to reduce or avoid the surgical complications as far as possible [22].

In recent years, with the mature of the theory, the development of implements and the increase of the training, it has made great progress in the feasibility and the tumor's radical aspects of this technology in the operation. With the constant perfection of laparoscopic techniques, the accumulation of clinical experience and continuous improvement of laparoscopic instruments, indications of laparoscopic radical surgery in uterine malignant tumors will continue to expand, complication rates will continue to reduce, the efficacy of laparoscopic treatment for uterine malignant tumours may be superior to that of the traditional laparotomy. This operation method will be accepted by more and more physicians and patients and become the standard procedure for the treatment of endometrial carcinoma.

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Department of Obstetrics and Gynecology of Subei People's Hospital.

#### Disclosure of conflict of interest

None.

**Address correspondence to:** Dr. Xianghua Yin, Department of Obstetrics and Gynecology, Clinical Medical College of Yangzhou University, Subei People's Hospital, 98 W Nantong Rd, Yangzhou

225001, Jiangsu, China. E-mail: yinxh1965@126.com

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