

Comparison of Laparoscopic Approach and Laparotomy in Patients with Endometrioid Adenocarcinoma

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Abstract

Objective: This study aimed to compare the laparoscopic approach with laparotomy for patients with endometrioid adenocarcinoma. **Methods:** Data from 206 patients who underwent laparoscopic and laparotomy approaches for endometrial adenocarcinoma between March 2016 and November 2019 were reviewed retrospectively from hospital records. The following were evaluated and compared: demographics, comorbidities, pre- and postoperative CA-125 levels, disease stage, tumor diameter, histological grade, depth of myometrial invasion, number of lymph nodes retrieved, postoperative hospital stay, and postoperative treatments (chemotherapy, radiotherapy, and brachytherapy). **Results:** Among stage IA patients, 41.07% underwent total abdominal hysterectomy (TAH) and 58.93% underwent total laparoscopic hysterectomy (TLH). Among stage 1B patients, 58.82% underwent TAH and 41.18% underwent TLH. Among stage II patients, 76.47% underwent TAH and 23.53% underwent TLH. Among stage III patients, 85.29% underwent TAH and 14.71% underwent TLH. All stage IV patients underwent TAH. No statistically significant differences were observed between the two groups for staging and grading, as well as age, gravidity, parity, tumor grade, tumor diameter, number of paraaortic lymph nodes, pre- and postoperative CA-125 levels and cancer recurrence rates. On the other hand, mean number of pelvic lymph nodes retrieved was 23.67 in the laparotomy group and 27.72 in the

laparoscopic group ($p = 0.02$), and the length of hospital stay was 2 - 9 (mean 3.65) days for TAH patients and 1 - 7 (mean 1.98) days for TLH patients ($p = 0.05$). **Conclusion:** Laparoscopic surgery for endometrial cancer is associated with lower morbidity than laparotomy and characterized by a shorter postoperative hospital stay and reduced analgesic requirements.

Keywords

Endometrial Cancer, Endometrioid Adenocarcinoma, Hysterectomy, Total Laparoscopic Hysterectomy, Total Abdominal Hysterectomy

1. Introduction

Endometrial cancer is the most common gynecological malignancy in high-income countries and the second most common after cervical cancer in low- and middle-income countries. In 2022, approximately 420,000 women worldwide were diagnosed with endometrial cancer, and nearly 98,000 of them died [1]. The lifetime risk of developing endometrial cancer is about 2.6%. Approximately 70% - 80% of patients are diagnosed at stage I, with a five-year survival rate of about 96%. Over 90% of uterine cancers are epithelial in origin, classified as endometrial carcinomas; the remaining cases arise from mesenchymal tissues such as myometrial muscle or endometrial stroma [2]. Incidence peaks between the ages of 60 and 70, though 2% - 5% of cases occur before age 40. Women under 50 who develop endometrial cancer are often at increased risk due to chronic anovulation, diabetes, and obesity [3].

The standard approach to managing endometrial cancer includes a histopathological diagnosis through endometrial tissue sampling. This is followed by a clinical evaluation based on the tumor's histological type and grade, as well as the presence of metastasis. Surgical treatment usually involves total hysterectomy and bilateral salpingo-oophorectomy (BSO). This procedure is often combined with lymph node dissection (LND) for patients at high risk for metastasis [4].

Based on histopathological features, epidemiology, and clinical behavior, endometrial cancers are broadly classified into two major types. Type 1 tumors are usually low-grade endometrioid carcinomas and account for approximately 80% of all cases. These tumors are estrogen-dependent, frequently associated with atypical endometrial hyperplasia, and generally have a favorable prognosis. In contrast, type 2 tumors include high-grade (FIGO grade 3) endometrioid carcinomas and non-endometrioid histologies such as serous carcinoma, clear cell carcinoma, mixed adenocarcinoma, mucinous adenocarcinoma, squamous cell carcinoma, transitional cell carcinoma, small cell carcinoma, and undifferentiated carcinoma. These tumors are not estrogen-dependent, are usually unrelated to obesity, often arise in atrophic endometrium, and are associated with a poorer prognosis. Carcinosarcomas are also included in this category. Even in patients without myometrial invasion, approximately one-third may have extrauterine disease when

comprehensive surgical staging is performed [5].

Laparotomy is still a common surgical approach for treating endometrial cancer. However, minimally invasive techniques, such as laparoscopy, have been increasingly adopted, particularly for early-stage disease. Compared with laparotomy, laparoscopic surgery is associated with reduced blood loss during surgery, fewer complications after surgery, and a shorter hospital stay. Long-term oncological outcomes appear to be similar [6]-[8]. Nevertheless, evidence regarding the effectiveness of laparoscopic surgery in high-risk patients is limited.

The aim of this study was to compare laparoscopic surgery and laparotomy in patients with endometrioid endometrial cancer who underwent surgical staging at the Gynecologic Oncology Unit of İstanbul Medeniyet University Göztepe Training and Research Hospital. The study evaluated the advantages and disadvantages of these surgical approaches and the differences in postoperative hospital stays and intraoperative blood loss among patients who underwent hysterectomy, bilateral oophorectomy, and pelvic and/or paraaortic LND between 2016 and 2019.

2. Methods

2.1. Study Population

This retrospective study included 206 patients diagnosed with endometrial adenocarcinoma and treated with either a laparoscopic or laparotomy approach at the Department of Obstetrics and Gynecology at İstanbul Medeniyet University Göztepe Training and Research Hospital between March 2016 and November 2019. Patient data were obtained through a retrospective review of hospital records.

Demographic characteristics, comorbidities, preoperative and postoperative CA-125 levels, disease stage, tumor diameter, histological grade, depth of myometrial invasion, number of lymph nodes retrieved, length of postoperative hospital stay, and postoperative adjuvant treatments, including chemotherapy, radiotherapy, and brachytherapy, were recorded. These parameters were evaluated to compare the outcomes of laparoscopic and laparotomic surgical approaches.

The study protocol was approved by the Non-Interventional Clinical Research Ethics Committee of İstanbul Medeniyet University Göztepe Training and Research Hospital.

2.2. Inclusion Criteria

Patients were included if they had

- Histologically confirmed endometrioid adenocarcinoma
- No history of preoperative chemotherapy, radiotherapy, or brachytherapy

2.3. Exclusion Criteria

Patients were excluded if they had

- Non-endometrioid endometrial carcinoma

- Another malignancy outside the endometrium
- Received chemotherapy, radiotherapy, or brachytherapy before surgery

2.4. Statistical Analysis

Statistical analyses were performed using SPSS version 15.0. Continuous variables that followed a normal distribution were presented as the mean $\pm$ standard deviation, while non-normally distributed variables were expressed as median (min-max). Categorical variables were presented as number and percentage (n%).

The chi-square test was used to evaluate associations between categorical variables. The Mann-Whitney U-test and the Wilcoxon signed-rank test were used for group comparisons when appropriate. Logistic regression analysis was performed to determine the strength and direction of the associations identified by the chi-square test. Univariate logistic regression analysis was used to evaluate possible risk factors affecting retroperitoneal and paraaortic lymph node metastasis, and multivariate logistic regression analysis was used to identify independent predictors.

A *p*-value of ≤ 0.05 was considered statistically significant, and all estimates were calculated with a 95% confidence interval.

3. Results

The study population consisted of 206 patients diagnosed with endometrioid endometrial adenocarcinoma who underwent surgery via laparoscopic or laparotomy approach. The patients' ages ranged from 28 to 82 years (mean 61.26 ± 10.41 years).

The analysis included 206 patients. Among them, gravidity ranged from 0 to 13 (mean 4.05 ± 2.57). Parity ranged from 0 to 10 (mean 2.98 ± 1.93).

The tumor diameter was recorded for 206 patients and ranged from 0 to 18 cm (mean 3.96 ± 2.82 cm). LND was performed on 135 patients, with a range of retrieved lymph nodes from 1 to 60 (mean 24.96 ± 12.41). Paraaortic LND was performed on 95 patients. The number of nodes retrieved ranged from 0 to 74 (mean 11.99 ± 11.40).

Preoperative CA-125 levels were measured in 192 patients and ranged from 2 to 9688 (mean 154.32 ± 997.71). Postoperative CA-125 levels were measured in 173 patients and ranged from 1 to 2988 (mean 51.33 ± 255.88).

The length of hospital stay was recorded for 206 patients and ranged from 1 to 28 days (mean 2.92 days) (**Table 1**).

Of the 206 patients included in the study, 116 underwent laparotomy surgery and 90 underwent laparoscopic surgery.

Of the surgical procedures performed, 8.21% of patients underwent total abdominal hysterectomy (TAH) with BSO (TAH + BSO), and 2.42% underwent TAH + BSO with bilateral pelvic LND (BPLND). TAH + BSO with BPLND and omentectomy was performed in 28.50% of patients. Additional surgical procedures, such as appendectomy, peritoneal sampling, tumor implant excision, and

low anterior resection, were performed in a small proportion of patients when clinically indicated. Laparoscopic procedures included total laparoscopic hysterectomy (TLH) with BSO (TLH + BSO) in 21.26% of patients, TLH + BSO with BPLND in 15.94%, and TLH + BSO with paraaortic LND and omental sampling in a few cases.

A histopathological evaluation revealed the following: 40.19% ($n = 83$) of patients had grade 1 tumors, 36.4% ($n = 75$) had grade 2 tumors, 24.52% had grade 3 tumors, and 0.48% had grade 4 tumors. Myometrial invasion was greater than half of the myometrial thickness in 34.15% of patients, limited to less than half of the myometrium in 62.44%, confined to the endometrium in 1.95%, and present in the full thickness of the myometrium in 1.46%.

Among patients with stage IA disease, 41.07% underwent TAH and 58.93% underwent TLH. Among stage IB patients, 58.82% underwent TAH and 41.18% underwent TLH. Among stage II patients, 76.47% underwent TAH and 23.53% underwent TLH. Among stage III patients, 85.29% underwent TAH and 14.71% underwent TLH. All stage IV patients underwent TAH. There was no statistically significant difference between the two groups in terms of disease stage or tumor grade ($p = 0.066$ and $p = 0.999$, respectively).

Logistic regression analysis was performed to investigate the relationship between the surgical procedure and the evaluated variables. The statistical results are presented in **Table 2**.

The analysis results showed that there was no statistically significant association between the type of surgical procedure and age, gravidity, parity, tumor grade, tumor diameter, number of paraaortic lymph nodes retrieved, preoperative CA-125 levels, or postoperative CA-125 levels (**Table 3**). The p -values were as follows: age ($p = 0.496$), gravidity ($p = 0.431$), parity ($p = 0.561$), grade ($p = 0.946$), tumor diameter ($p = 0.304$), paraaortic lymph node count ($p = 0.443$), preoperative CA-125 ($p = 0.922$), and postoperative CA-125 ($p = 0.486$).

Table 1. Baseline demographic and clinical characteristics of patients.

Variable	N	Mean $\pm$ SD	Range
Age (years)		61.26 $\pm$ 10.41	28 - 82
Gravidity		4.05 $\pm$ 2.57	0 - 13
Parity		2.98 $\pm$ 1.93	0 - 10
Tumor diameter (cm)		3.96 $\pm$ 2.82	0 - 18
Pelvic lymph node count	135	24.96 $\pm$ 12.41	1 - 60
Paraaortic lymph node count	95	11.99 $\pm$ 11.40	0 - 74
Preoperative CA-125	192	154.32 $\pm$ 997.71	2 - 9688
Postoperative CA-125	173	51.33 $\pm$ 255.88	1 - 2988
Length of hospital stay (days)		3.41 $\pm$ 2.85	1 - 28

Table 2. Distribution of tumor stage and grade according to surgical approach.

Variable	Laparotomy (n = 116)	Laparoscopy (n = 90)	<i>p</i> value
Stage			0.066
IA	41.07%	58.93%	
IB	58.82%	41.18%	
II	76.47%	23.53%	
III	85.29%	14.71%	
IV	100.00%	0.00%	
Grade			0.999
Grade 1	39.02%	60.98%	
Grade 2	54.93%	45.07%	
Grade 3	86.00%	14.00%	

Table 3. Comparison of perioperative and pathological outcomes between laparotomy and laparoscopy groups.

Variable	N	Laparotomy (n = 116) Median (range)	Laparoscopy (n = 90) Median (range)	<i>p</i> value
Age (years)		62.71 (28 - 82)	59.37 (37 - 80)	0.496
Gravidity		3.94 (0 - 13)	4.20 (0 - 12)	0.431
Parity		2.82 (0 - 10)	3.18 (0 - 10)	0.561
Tumor grade		2.10 (1 - 3)	1.52 (1 - 3)	0.946
Tumor diameter (cm)		4.31 (0.5 - 16)	2.91 (0.5 - 5.5)	0.304
Pelvic lymph node count	135	23.67 (3 - 60)	27.72 (1 - 59)	0.020
Para-aortic lymph node count	95	12.92 (0 - 74)	8.00 (0 - 27)	0.443
Preoperative CA-125	192	321.35 (4.7 - 9688)	19.13 (3.5 - 88.1)	0.922
Postoperative CA-125	173	94.63 (1 - 2988)	11.76 (4.1 - 36)	0.486
Length of hospital stay (days)		3.65 (2 - 9)	1.98 (1 - 7)	0.050

However, significant differences were observed in some surgical outcomes. In the laparotomic surgery group, the number of pelvic lymph nodes retrieved ranged from 3 to 60 (mean 23.67), and in the laparoscopy group, it ranged from 1 to 59 (mean 27.72). There was a statistically significant difference between the groups ($p = 0.02$).

Patients who underwent TAH had a mean hospital stay of 3.65 days, ranging from 2 to 9 days. Patients who underwent TLH had a mean hospital stay of 1.98 days, ranging from 1 to 7 days. The difference between the two groups was statistically significant ($p = 0.05$).

4. Discussion

Endometrial cancer is one of the most common gynecological malignancies and is associated with a high mortality rate. In Türkiye, it is the third most common

cancer in women, with a 1.2% mortality rate [9].

Surgical staging is the most important step in managing endometrial cancer. Approximately 20% of patients with clinically confined endometrial adenocarcinoma are found to have extrauterine disease. Therefore, in 1988, the International Federation of Gynecology and Obstetrics (FIGO) recommended surgical staging instead of clinical staging. The standard surgical approach includes peritoneal cytology, TAH, BSO, and retroperitoneal lymphadenectomy. However, FIGO updated the staging system in 2023 to include various histological types, tumor patterns, and molecular classifications. This update better reflects the improved understanding of the complex nature of several types of endometrial carcinoma and their underlying biological behavior [10].

Since the first report describing laparoscopic surgical staging for early-stage endometrial cancer, minimally invasive surgery has replaced laparotomy at many centers. Although laparoscopy has disadvantages, such as a two-dimensional view, dependence on the skills of the assistant, a limited range of motion, and ergonomic limitations for the surgeon, these limitations can be overcome with appropriate training and surgical experience.

In 2009, the Gynecologic Oncology Group reported the results of the LAP2 study, which remains the largest randomized trial comparing laparoscopy and laparotomy in endometrial cancer. The study demonstrated that, although operative times were longer, laparoscopic surgery was associated with fewer postoperative complications, a shorter hospital stay, and a faster recovery compared with laparotomy. Quality of life analyses showed no significant differences between the two groups [11] [12].

When we evaluated the safety and other operative features of surgical techniques, such as operative time, blood loss, perioperative complications, conversion to laparotomy during laparoscopy, relaparotomy, and morbidity and/or mortality, the data from previous studies highlighted the superiority of the laparoscopic approach over open surgery for treating endometrioid endometrial cancer in terms of these features [6] [13] [14]. However, several contraindications for laparoscopy must be considered, including peritoneal invasion, cardiorespiratory failure, a history of previous surgery, and a large uterine size. Qualification for a given procedure requires a detailed evaluation. In our laparoscopic cases, there were no perioperative complications, which we attribute to our experienced surgical team and the advanced postoperative care at our training and education hospital. However, we were unable to analyze the operative time and blood loss due to missing data in the retrospective records.

In staging endometrial cancer, sufficient LND remains important. Therefore, the status of the lymph nodes is critical when comparing laparotomy and laparoscopy. In our study, the number of lymph nodes retrieved during laparoscopic surgery was slightly lower than that obtained with laparotomy. The mean number of pelvic lymph nodes retrieved was 27.72 in the laparoscopic group and 23.67 in the laparotomy group; this difference was statistically significant. However, no differ-

ence was observed between the two groups regarding cancer recurrence. Consistent with previous studies, we found a significantly greater number of harvested lymph nodes with the laparotomy approach; however, this did not influence overall survival [13]-[15]. The learning curve for laparoscopic lymphadenectomy was also analyzed, and the number of lymph nodes removed during a single TLH procedure increased over time, from five in 2002 to 15 - 20 in 2007 [15].

Despite the common use of the laparoscopic approach in treating early-stage endometrial cancer, there is an increasing amount of data supporting its effectiveness in treating high-risk disease (grade 3 endometrioid carcinoma, uterine papillary serous carcinoma, clear cell carcinoma, carcinosarcoma, dedifferentiated carcinoma, and undifferentiated carcinoma of the endometrium) and stage I-II disease [16]. In our study, we included patients with stage III and IV endometrial cancer. Additional surgical procedures, such as appendectomy, peritoneal sampling, tumor implant excision, and low anterior resection, were performed in a small proportion of patients when clinically indicated. Only 14.71% of stage III patients underwent laparoscopy, while laparotomy was performed for all stage IV patients. Although we could not compare oncologic outcomes between advanced-stage cases, patients who underwent laparoscopy had a shorter hospital stay.

In terms of postoperative recovery, including hospitalization time, pain control, and other features of patient comfort, laparoscopic surgery for endometrial cancer seemed to have better outcomes and a shorter hospital stay [12]-[14]. In our study, the mean postoperative hospital stay ranged from 1 to 7 days (mean 1.98 days) for the laparoscopic group and from 2 to 9 days (mean 3.65 days) for the laparotomy group. The shorter hospital stay observed in the laparoscopic group was statistically significant.

Studies found no statistically significant difference in long-term oncologic outcomes, including disease-free and overall survival rates, in both low-risk and high-risk patients [7] [8] [12]. However, we could not conduct long-term follow-up due to missing records and patient contact information.

The strengths of this study include the number of endometrioid adenocarcinoma cases with different stages and the well-trained and experienced surgical team. However, there are some limitations. First, missing records prevented us from comparing some perioperative features, such as operation time, blood loss, and postoperative pain scale. Second, we could not report long-term disease-free and overall survival rates of 5 years or more due to a lack of contact information and missing patient data.

5. Conclusion

Laparoscopic surgery for staging and treating endometrial cancer appears to be a safe and effective approach. Compared with laparotomy, laparoscopic surgery is associated with lower morbidity and a shorter postoperative hospital stay. Patients who undergo laparoscopic surgery experience faster recovery times, reduced analgesic requirements, and an earlier return to normal activities, which may lead to

an improved quality of life. As minimally invasive techniques continue to evolve, including robotic surgery and vaginal natural orifice transluminal endoscopic surgery, we believe that future research will likely focus on comparing these approaches to optimize safety and surgical outcomes.

Statement

The authors did not receive support from any organization for the submitted work.

Author Contributions

Conceptualization: Eralp Ceviker, Gamze Yetim Erdem; **Methodology:** Gamze Yetim Erdem; **Formal analysis and investigation:** Eralp Ceviker, Mesut Polat, Mehmet Kucukbas, Mehmet Baki Senturk; **Writing - original draft preparation:** Eralp Ceviker, Oguz Devrim Yardimci; **Writing - review and editing:** Eralp Ceviker, Emel Kurtoglu Ozdes; **Supervision:** Ates Karateke.

Conflicts of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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