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Outcome of Laparoscopic and Abdominal Hysterectomy for Management of Early-Stage Endometrial Carcinoma

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ABSTRACT

Background: Endometrial cancer (EC) is the commonest gynecologic malignancy in developed countries. Early-stage EC often has a favorable prognosis, with surgery being the primary treatment.

Aim: This study aimed to assess the outcomes of total laparoscopic hysterectomy (TLH) vs. total abdominal hysterectomy (TAH) in managing early-stage EC in a low resource country.

Patients and Methods: This randomized clinical trial included 83 females with FIGO stage I–II EC, allocated into two groups: 46 females underwent total abdominal hysterectomy ± lymphadenectomy (Group A) and 37 females had total laparoscopic hysterectomy ± lymphadenectomy (Group B).

Results: TLH was associated with significantly shorter hospital stays (median 5 days), shorter operative time (median 105 minutes), less blood loss (median 275ml), and fewer blood transfusions (3 cases only received one unit of packed RBCs). There were no reported cases of wound infection or seroma in the laparoscopic group. Bladder and ureteric injuries were reported in 5.4% and 2.7% respectively in the laparoscopic group. Post operative hemoglobin and hematocrit vales were statistically significant lower in the abdominal group than in the laparoscopic group (9.8±0.6, 11.2±1.0 & 39.4±2.4, 41.7±2.9 p value ≤0.001 & ≤0.001 respectively)**.** Notably, four deaths occurred in the abdominal group (8.7%). Pulmonary embolism, sepsis, intestinal obstruction and hepatic encephalopathy were the main causes of mortality in the abdominal group.

Conclusion: Laparoscopic hysterectomy offers superior perioperative outcomes and fewer complications compared to the abdominal approach, supporting its use as a safe and effective treatment for early-stage EC management.

Keywords: *Endometrial carcinoma, Laparoscopic hysterectomy, Abdominal hysterectomy, Minimally invasive surgery, Gynecologic oncology.*

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1. INTRODUCTION

EC is the commonest gynecologic cancer in the developed countries (1). Since the early 1990s, the age-standardized incidence rate has increased by about 40% and such an increase has been linked to lifestyle factors like obesity, diabetes, increasing age and tamoxifen administration for breast carcinoma treatment and other forms of HRT (2).

The majority of females who presented with early symptoms and early diagnosed will have subsequent good prognosis reaches 80% - 90% 5-year disease free interval (3).

TAH with removal of the adnexa with or without pelvic and para-aortic lymphadenectomy is the standard surgery for early-stage EC. The benefit of systematic pelvic lymphadenectomy is still controversial (4).

Several factors can affect choosing the hysterectomy route as shape and size of uterus, the surgical indication, presence or absence of pathology in the adnexa, extensive pelvic adhesions, surgical risks, length of hospital stay and recovery, hospital resources and surgeon experience. Each approach has its own advantages and drawbacks which should be discussed with the woman **(5)**.

Harry Reich performed the first LH January,1988 **(6)**. With the development of minimally-invasive surgery (MIS), many reports concluded the benefits of LH for early disease in many patients (**7)**.

Usually, the surgical management for gynecological cancer has been by laparotomy, meanwhile the TLH has become of choice for some malignancies, primarily the EC **(8)**

This study evaluated the outcomes of TLH and TAH for management of early-stage EC.

2. PATIENTS AND METHODS:

This study was an initial experience with low resource settings conducted on 83 patients admitted to Obstetrics and Gynecology department **(**Gynecologic Oncology Unit**)** at Mansoura University Hospitals over 28 months from September 2022 to January 2025.

Study design: Randomized allocated study, and treatment was the primary purpose.

Sample size:

Sample size underwent calculation based on mean length of hospital stay among females with TLH versus TAH for early EC retrieved from similar research **(9)**. The G power program (version 3.1.9.4) was used for sample size calculation based on effect size of 0.669 using 2-tailed test, α error =0.05 and power = 80.0%, the total sample size was 37 in each group.

Inclusion criteria: Women aged more than 40 years old undergoing TLH or TAH with or without lymphadenectomy for early-stage EC (stages I – II) with descent of no more than 1st degree of uterus. Staging was done according to the FIGO 2009 classification which comprises early stages (Stage I): tumor limited to the corpus uteri, (stage II) tumor invasion of cervical stroma but confined to uterus**.** MRI scan was done for complete staging and detection of the depth of myometrial invasion and CT scan was done for lymph node involvement and to rule out metastasis.

Exclusion criteria: Women with uterine size > 14 weeks, Patients with poorly controlled diabetes mellitus, uncontrolled hypertension, history of major cardiovascular or cerebrovascular accident and advanced liver diseases, Patients with cardio-pulmonary contraindications for laparoscopic surgery, Patients with clinically advanced stages of malignancy which are fixed to other organs and contraindication of laparoscopy and Patients with coexisting or previous cancers are likely to interfere with the treatment and outcomes for example: (concurrent ovarian cancer which may require more extensive staging or debulking surgery or Lymphoma treated with chemotherapy may have bone marrow suppression which increases the risk of perioperative complications).

Methods

All patients were done by the same operative team and were subjected to the following:

Randomization was performed utilizing a computer-generated random number table and sealed opaque envelopes. Patients were allocated to groups based on patient ID: odd numbers to Group A, even numbers to Group B. All women provided informed consent. **Group A (Abdominal group) – 46 patients:** Underwent TAH while **Group B (Laparoscopic group) – 37 patients:** Underwent TLH. Bilateral salpingo-oophorectomy was also performed in both groups.

Lymphadenectomy Indications: Performed in either group when: Tumor invaded ≥ 50% of the myometrium, grade 3 tumors or non-endometrioid histology (type II) including high-grade, serous, undifferentiated, or clear cell carcinoma and Stage II EC (cervical stromal invasion but confined to uterus).

Pre-operative Details:

History Taking: Included age, height, weight, menopausal status, parity, and medical/surgical history, **Physical Examination:** General: Included body mass index (BMI), Abdominal: Checked for scars, uterine size, and palpable masses and PV and Bimanual: Assessed uterine and adnexal status.

Preoperative Investigations: Transvaginal ultrasonography for uterine/adnexal assessment, endometrial biopsy (office, D&C, or hysteroscopic) for tumor histological type and grade and routine labs: CBC with differential, blood grouping, liver/kidney function tests, ECG.

Staging and Grading: Final stage and grade determined histologically post-surgery, FIGO 2009 used: Stage I: Tumor confined to uterus, Stage II: invasion of cervical stroma, Grade 1: Solid growth ≤5%, Grade 2: 6–50%, Grade 3: >50%.

Perioperative Preparation

Blood availability ensured pre-surgery, Prophylactic antibiotic: Ceftriaxone 1 g IV one hour before surgery; clindamycin

600 mg IV used for cephalosporin-allergic patients.

Surgical technique

All patients received standardized general anesthesia following a detailed pre-anesthetic check-up. In **Group A (Abdominal group)**, surgery was performed via a lower midline vertical incision, with thorough exploration of abdominal viscera followed by pelvic lymphadenectomy and total abdominal hysterectomy with bilateral salpingo-oophorectomy. Lymphadenectomy involved meticulous dissection of external iliac, obturator, hypogastric, and medial external iliac lymph nodes (**Figure 2**). Total hysterectomy was completed by securing ligaments, mobilizing the bladder, ligating uterine arteries, and excising the uterus and cervix from the vagina, followed by vaginal cuff closure. In **Group B (Laparoscopic group)**, patients were positioned in dorsal lithotomy with a Mangeshkar uterine manipulator in place. After achieving pneumoperitoneum and inserting three trocars, laparoscopic pelvic lymphadenectomy was performed through careful dissection of lymph node chains while preserving critical structures such as the genitofemoral and obturator nerves **(Figure 3**). Laparoscopic hysterectomy followed, involving sealing and division of the infundibulopelvic ligaments, bladder dissection, coagulation of uterine vessels and cardinal ligaments, and culdotomy around the manipulator's cup **(Figure 4).** The uterus and lymphatic tissue were removed vaginally. The vaginal cuff was closed either laparoscopically or vaginally, abdominal cavities were irrigated and inspected, hemostasis confirmed, and a drain was inserted through a port site before final closure of all trocar sites.

Study Outcomes:

The primary outcome was hospital stay duration (from day of surgery to discharge).

Secondary outcomes included operative time (from incision to final suture), blood loss (via suction and gravimetric methods), need for transfusion (>500 ml loss), postoperative Hb and deficit (measured at 24 hours), complication rates (intra/postoperative injuries, infections, thromboembolism, etc.), conversion to open surgery, recurrence, survival, and postoperative pain (VAS score during first 2 days).

Follow Up:

Patients were first reviewed on the 5th postoperative day for dressing removal and examination, including transvaginal ultrasound to exclude vaginal cuff hematoma. A second follow-up was conducted at 1 month to assess for vaginal cuff complications, determine the type of adjuvant therapy, and perform abdominal, bimanual pelvic, and transvaginal ultrasound examinations for detection of any vaginal masses.

Ethical considerations

The research was approved by IRB (the ethical committee of Mansoura University Hospital) with code: MD.22.07. 669.R1. Written consents were taken from all patients participating in this study.

Statistical analysis

Data was analysed by SPSS version 24. Normality was tested with the Kolmogorov-Smirnov test. Qualitative data were represented in numbers and percentages; associations were tested using Chi-square, Fisher's exact, or Monte Carlo tests. Quantitative data were represented in means ± SDs for normally distributed variables and medians (Min–Max) for non-normal data. Independent t-tests and Mann-Whitney tests were used to compare groups while within-group comparisons were performed using paired t-tests and Wilcoxon signed-rank tests. A p-value ≤ 0.05 was considered statistically significant.

3. RESULTS

We evaluated 90 cases to be eligible for our study. Seven cases were excluded as they were not met with our inclusion criteria. 83 patients were divided randomly into two groups. Group A included 46 cases underwent open surgical hysterectomy and pelvic lymphadenectomy with or without omentectomy and paraaortic lymphadenectomy. Group B included 37 cases of early stage EC and were managed laparoscopically **(Figure 1).**There were no significant differences in the base line and demographics of patients in the study groups. The mean patients' ages were (63.2±7.7, 60.6±7.3 yeas) respectively and only (6.5%, 13.5%) of them were presented in the premenopausal period. Obesity was diagnosed in (84.8%,89.2%) of patients in both od the study groups respectively**.** However, the median parity of our patients was 3 in both groups. **(Table 1)**

The mean uterine sizes were (10.6±0.9, 10.4±0.9 weeks) during bimanual examination respectively in both groups. Only 2 cases in the abdominal group and one case in the laparoscopic group were associated with mild degrees of pelvic organ prolapse. All patients in the laparoscopic group were diagnosed preoperatively in stage I of the disease and 6 patients in the abdominal group were diagnosed to have stage II of endometrial cancer. Well differentiated endometroid adenocarcinoma was diagnosed in (43.5%, 62.2%) of preoperative endometrial biopsies in abdominal and laparoscopic groups respectively. However, undifferentiated EC was diagnosed in one case of the abdominal group**. (Table 2)**

Total Pelvic lymphadenectomies were done in (82.6% vs. 70.3%, p > 0.05) of patients in abdominal and laparoscopic groups respectively. But, para-aortic lymphadenectomy was done for 12 cases in the abdominal group only. No statistically significant differences were found in the intra- operative complication rates. In laparoscopic group, 2 cases (5.4%) had bladder injury, one case (2.7%) had ureteric injury, two cases (5.4%) had nerve injury (right genitofemoral nerve. and right obturator nerve injures.), two cases (5.4%) had vascular injury (left internal iliac vein and left obturator artery injures), and no reported bowel injury **(Table 3).**

Two cases (5.4%) of laparoscopic group were converted to laparotomy due to severe adhesions and bladder injury. However, in the abdominal group one case (2.2%) had bladder injury, no reported ureteric injury or nerve injury, one case (2.2%) had vascular injury (left internal iliac vein), and one case (2.2%) had serosal small bowel injury. There was statically significant drop of post operative hemoglobin and hematocrit levels in the abdominal group **(Table 3).** Stage III EC was diagnosed in 5 postoperative specimens in the abdominal group and one specimen of the laparoscopic group. Post operative hemoglobin and hematocrit vales were significant lower in the abdominal group than the laparoscopic group (9.8±0.6, 11.2±1.0 & 39.4±2.4, 41.7±2.9 (p ≤0.001 & ≤0.001 respectively) **(Table 4).**

There was statistically significant shorter operative time in the laparoscopic group, than abdominal group (105, 160 minutes p ≤0.001). Also, intra-operative blood loss was significantly lower with TLH compared to TAH (275, 525 ml p value ≤0.001), only 3 cases in the laparoscopic group were in need for intraoperative transfusion of single unit of packed RBCS. The median length of hospitalization was statistically significant shorter with TLH compared to TAH (5, 7 days, p value < 0.05). **(Table 5)**

The median score for visual analogue scale for pain evaluation in the first 24 hours was statistically significant lower with TLH compared to TAH (6, 7 p value ≤0.001). Intraperitoneal drains were left for shorter duration in the laparoscopy group than abdominal group (3, 6 days p ≤0.001). There were no reported cases with signs of wound infection or seroma in the laparoscopic group, compared to 23.9% wound infection signs and 13% wound seromas in the abdominal group. Concurrent chemotherapy was recommended for (63%,48.6% of cases in abdominal and laparoscopic groups respectively. No mortalities occurred in the laparoscopic group. However, 4 cases died in the abdominal group because of pulmonary embolism, septicemia, hepatic encephalopathy and intestinal obstruction. **(Table 6)**

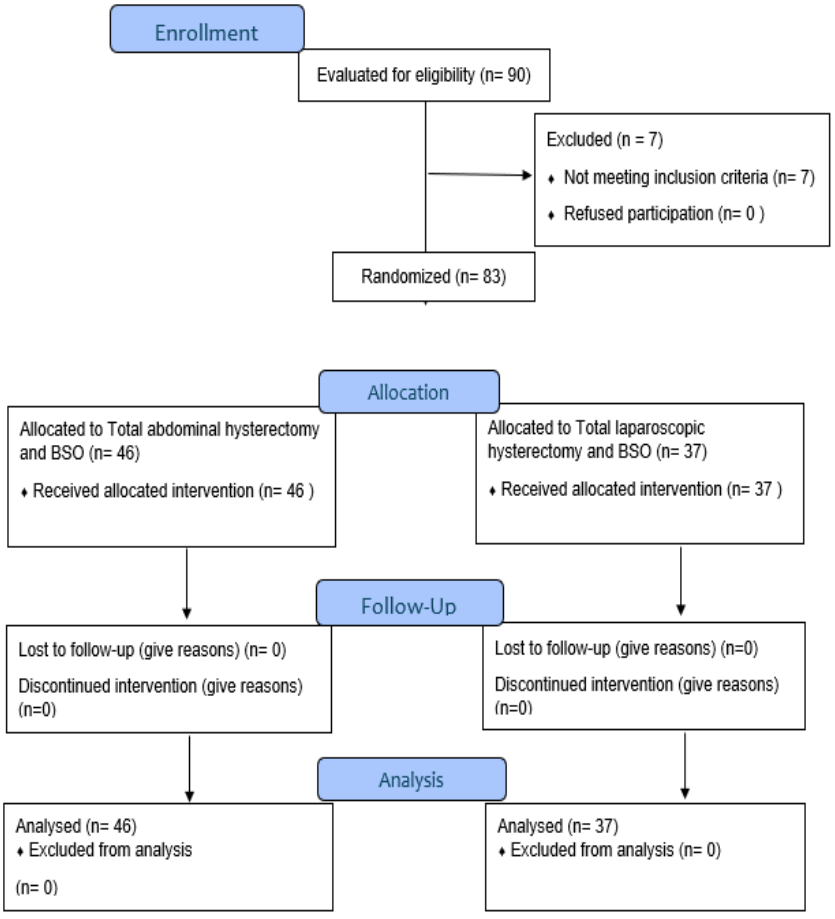

Figure (1): Consort flow chart showing study design

Table (1): Different base line demographic data and patients' characteristics

Patients' characteristics	**Abdominal group (n=46)**	**Laparoscopic group (n=37)**	**Test of significance**	**p value**
Age (Years) Mean ± SD	63.23±7.78	60.67±7.37	t=1.53	0.131
Menopausal status				
Postmenopausal	43 (93.5%)	32 (86.5%)	FET	0.457
Perimenopausal	3 (6.5%)	5 (13.5%)		
Parity Median (Min-Max)	3 (0-8)	3 (0-7)	Z=0.776	0.438
Previous Vaginal delivery	39 (84.8%)	31 (83.8%)	χ^2=0.015	0.901
Previous Cesarean delivery	12 (26.1%)	8 (21.6%)	χ^2=0.224	0.636
Body mass index (kg/m²) Mean ± SD **Obesity** (BMI ≥ 30 kg//m²)	33.95±3.36 39 (84.8%)	34.85±3.11 33 (89.2%)	t=1.261 χ^2=0.346	0.211 0.556

t: Independent t-test, FET: Fisher exact test, Z: Mann Whitney test, $\chi^{2:}$ Chi square test, *significant p≤0.05, SD: standard deviation

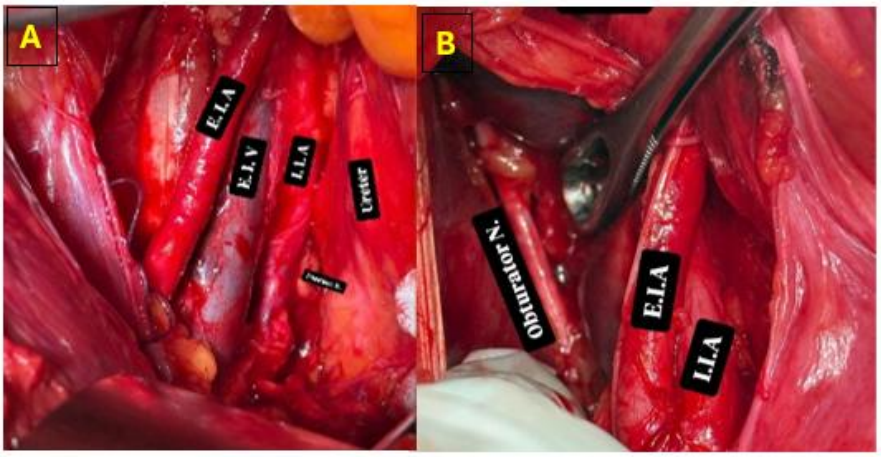

Figure (2): (A) Final view after TAH+BSO+PLND+PALND showing the external & internal iliac vessels, obturator nerve and the ureter

Table (2): Pre-operative clinical, radiological, histopathological and laboratory evaluation:

Variables	**Abdominal group (n=46)**	**Laparoscopic group (n=37)**	**p value /test of significance**
Local pelvic examination			
Uterine Size (week) Mean ± SD	10.69±0.96	10.48±0.98	0.334 / t=0.972
Uterine descent	2 (4.3%)	1 (2.7%)	1.00 / FET
Radiological pre-operative Stage			
1 A	23 (50.0%)	32 (86.5%)	
1 B	17 (37.0%)	5 (13.5%)	**0.001***
II	6 (13.0%)	0 (0%)	χ^2=13.19

Pre-op Histopathological type Endometroid adenocarcinoma Serous endometrial carcinoma Clear cell endometrial carcinoma Squamous endometrial cell carcinoma Mixed (Endometroid + Clear cell) type Carcinosarcoma Undifferentiated malignant tumor	 31 (67.4%) 6 (13.0%) 3 (6.5%) 1 (2.2%) 1 (2.2%) 3 (6.5%) 1 (2.2%)	 33 (89.2%) 1 (2.7%) 0 (0%) 1 (2.7%) 0 (0%) 2 (5.4%) 0 (0%)	0.205
Pre-operative histopathological grade GRADE I GRADE II GRADE III	20 (43.5%) 13 (28.3%) 13 (28.3%)	23 (62.2%) 8 (21.6%) 6 (16.2%)	0.219 $\chi 2=3.039$
Pre -operative Hb (g/dl) Mean ± SD	11.59±1.35	12.16±1.27	0.056 t=1.939
Pre -operative Hct Mean ± SD	42.73±2.59	43.00±3.41	0.694 t=0.395

t: Independent t-test, FET: Fisher exact test, χ^2: Chi square test, *significant p≤0.05, Hb: haemoglobin, Hct: hematocrit

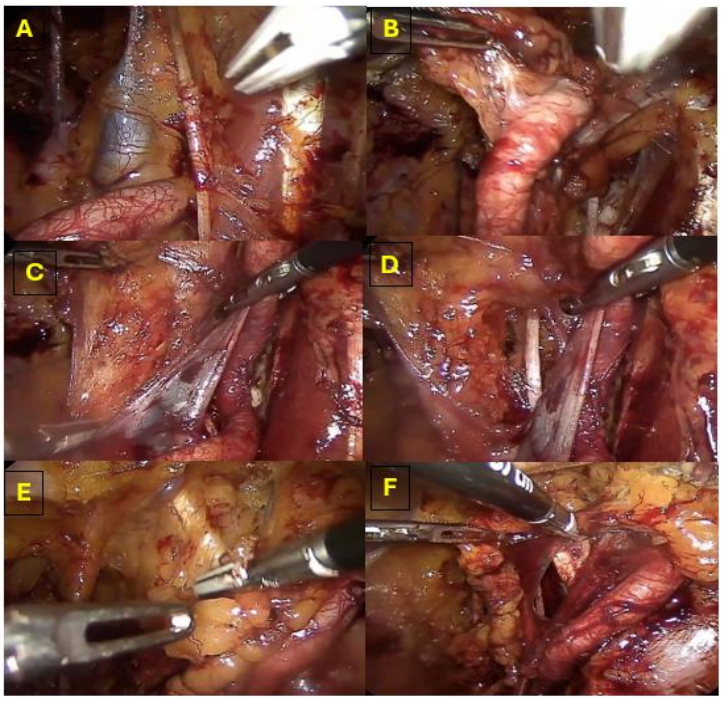

Figure (3): (A) Dissection was initiated laterally over the psoas muscle and proceeded medially (B&C) External iliac artery and vein lymph nodes dissection (D) Identification of obturator nerve (E&F) Dissection the nodes in the obturator fossa.

Table (3): Different Intra-operative interventions and surgical complications in both groups:

Variables	Abdominal group (n=46)	Laparoscopic group (n=37)	p value /test of significance
Surgical interventions			
Pelvic lymphadenectomy	38 (82.6%)	26 (70.3%)	0.184 /χ^2=1.76
Para-aortic lymphadenectomy	12 (26.1%)	0 (0%)	**0.001***/χ^2=11.28
Omentectomy	23 (50.0%)	3 (8.1%)	**≤0.001***/χ^2=16.73
Surgical complications			
Bladder injury	1 (2.2%)	2 (5.4%)	0.583
Ureteric injury	0 (0%)	1 (2.7%)	0.446
Nerve injury	0 (0%)	2 (5.4%)	0.196
Vascular injury	1 (2.2%)	2 (5.4%)	0.583
Bowel injury	1 (2.2%)	0 (0%)	1.00
Conversion to laparotomy	0 (0%)	2 (5.4%)	0.196
Hb drop before and after intervention %	15.3%	7.2%	≤0.001*
Hct drop before and after intervention %	7.8%	2.8%	≤0.001*

χ^2 : Chi square test, FET: Fisher exact test, *significant p≤0.05, Hb: hemoglobin, Hct: hematocrit

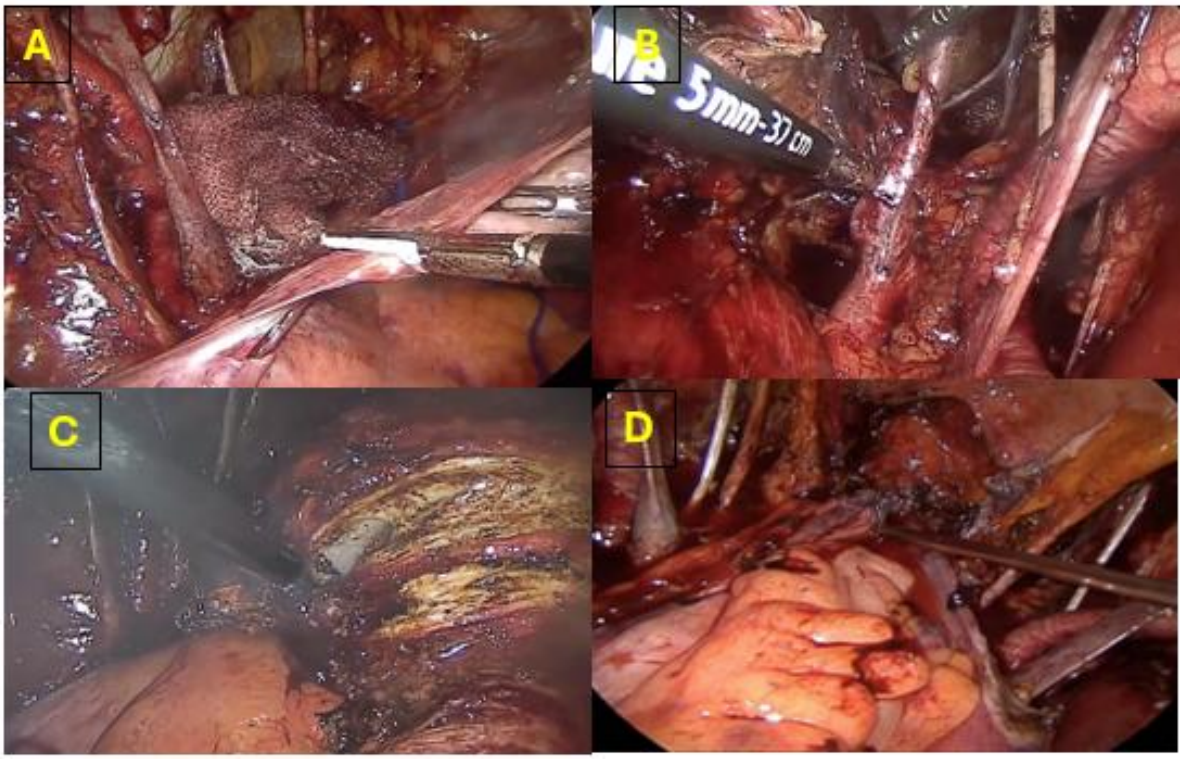

Figure (4): (A) Ligation and dissection of the IPL (B&C) Ligation and dissection of the uterine vessels (E) Anterior culdotomy and continues circumferentially (F) Final view after total laparoscopic hysterectomy and bilateral pelvic lymphadenectomy and omentectomy.

Table (4): Post-operative histopathological, laboratory evaluation in both groups:

Variables	Abdominal group (n=46)	Laparoscopic group (n=37)	p value /Test of significance
Post-operative Histopathological type Endometroid adenocarcinoma Serous endometrial carcinoma Uterine papillary serous carcinoma Clear cell endometrial carcinoma Carcinosarcoma Undifferentiated malignant tumor	35 (76.1%) 5 (10.9%) 2 (4.3%) 1 (2.2%) 2 (4.3%) 1 (2.2%)	35 (94.6%) 0 (0%) 0 (0%) 0 (0%) 2 (5.4%) 0 (0%)	0.09
Post-operative grade GRADE I GRADE II GRADE III	15 (32.6%) 19 (41.3%) 12 (26.1%)	21 (56.8%) 10 (27.0%) 6 (16.2%)	0.087 χ^2=4.875
Post-operative Stage 1 A 1 B II 3 C	26 (56.5%) 13 (28.3%) 2 (4.3%) 5 (10.9%)	28 (75.7%) 8 (21.6%) 0 (0%) 1 (2.7%)	0.159 MC
Post –operative Hb (g/dl) (24 hrs) Mean ± SD	9.82±0.68	11.29±1.05	**≤0.001*** t=7.667
Post – opoerative Hct (24 hrs) Mean ± SD	39.41±2.48	41.78±2.96	**≤0.001*** t=3.969

χ^2: Chi square test, MC: Monte Carlo, *significant p≤0.05, Hb: hemoglobin, Hct: hematocrit, , *significant p≤0.05

Table (5): Primary and secondary outcome measures for patients in both groups:

Variables	Abdominal group (n=46)	Laparoscopic group (n=37)	Test of significance	p value
Total Operative time (min) Median (Min-Max)	160 (90-240)	105 (70-165)	Z=6.00	**≤0.001***
Intraoperative blood loss (ml) Median (Min-Max)	525 (250-975)	275 (150-650)	Z=6.18	**≤0.001***
Blood transfusion (units) 0 1 2	18 (39.1%) 23 (50.0%) 5 (10.9%)	34 (91.9%) 3 (8.1%) 0 (0%)	χ^2=24.62	**≤0.001***
Hospital stays (days) Median (Min-Max)	7 (4-20)	5 (3-9)	Z=5.34	**≤0.001***

Z: Mann Whitney test, χ^2: Chi square test, *significant p≤0.05

Table (6): Follow up data in the first month after intervention in both groups:

Variables	Abdominal group (n=46)	Laparoscopic group (n=37)	p value
Post operatives follow up			
Pain score fist 24 hours Median (Min-Max)	7 (6-9)	6 (5-8)	**≤0.001***
Duration of IPD (days) Median (Min-Max)	6 (4-10)	3 (2-7)	**≤0.001***
Fever after first 24 hours	10 (21.7%)	3 (8.1%)	0.089
Lymphocele	3 (6.5%)	2 (5.4%)	1.00
Wound infection	11 (23.9%)	0 (0%)	**0.001***
Wound Seroma	6 (13%)	0 (0%)	**0.031***
Incisional hernia	3 (6.5%)	0 (0%)	0.250
Vaginal cuff hematoma	5 (10.9%)	1 (2.7%)	0.218
Vault masses	2 (4.3%)	1 (2.7%)	1.00
Adjuvant therapy (CCRT)			
Received	29 (63.0%)	18 (48.6%)	0.188
Not received	17 (37.0%)	19 (51.4%)	χ^2=1.73
Survival rate			
Survived	42 (91.3%)	37 (100.0%)	0.125
Died	4 (8.7%)	0 (0%)	FET
Cause of death			
Pulmonary embolism	1 (2.2%)	0 (0%)	1.00 MC
Burst abdomen + sepsis	1 (2.2%)	0 (0%)	
Liver decompensation + hepatic encephalopathy	1 (2.2%)	0 (0%)	
Intestinal obstruction + sepsis	1 (2.2%)	0 (0%)	

FET: Fisher exact test, Z: Mann Whitney test, χ^2 : Chi square test, MC: Monte carlo test, *significant p≤0.05, IPD: intraperitoneal drain, CCRT: concurrent chemoradiotherapy

4. DISCUSSION

EC is significantly rising in our locality and even it is presented in the premenopausal age group. MIS such as laparoscopic and robotic-assisted interventions have a very important role in improving the post-operative outcomes and quality of life of patients after surgery. This study compared the postoperative outcomes of laparoscopic and open surgical management of diagnosed early-stage EC in our locality. We found that there was a significantly shorter hospital stay in laparoscopic group than in abdominal group (5 (3-9) days vs 7 (4-20) days, respectively) (p value< 0.05). **Anwar and colleagues**, revealed that the average hospital stay (18.65 ± 7.4 versus 26.54 ± 6.2 days) was significantly (P-value > 0.05) less in laparoscopic group **(10)**. **Tawfik his colleagues**, revealed that the mean time of hospital stay in the TLH group was 26.7±5.667 hours and in the TAH group was 116.4± 17.31 hours (p<0.001) **(11)**. In the current study, obese post-menopausal patients were the most common risk factors in both groups. Post-menopausal bleeding was the main complaint of our patients, with (93.5%, 86.5%) of affected females in abdominal and laparoscopic groups respectively. The mean ages of our patients were 63.23±7.78 years in abdominal group and 60.67±7.37 years in the laparoscopic group. Also, patients with BMI more than 30 kg/m^2 were representing (89.2% in laparoscopic group and 84.8% in abdominal group). **Baum et al.** evaluated the outcome of laparoscopic and open surgical management of patients with EC in the same age group (63.75±12 years versus 64.93±13 years, respectively). There was no significant difference between groups regarding their physical constitution or ASA classification **(12)**. In this study, there was a statistically significant shorter total operative time, less intraoperative blood loss and less blood units transfused in laparoscopic group than abdominal group (p value < 0.05). In this study, a significant difference was observed in the total operative time being much shorter with TLH compared to TAH (105 (70-165) minutes versus 160 (90-240) minutes, respectively), basically the increase in the total operative time in the abdominal group was due to (50%) of the patients underwent omentectomy, (26.1%) of them underwent para-aortic lymphadenectomy and time consumed for midline wound closure which had made the operative

time prolonged much more. There are wide variations in the operative time between different studies. Our operative time data agree with khalifa, et al., in which the total operative time with TLH was significantly shorter compared to TAH (115.20 ± 22.38 min vs 122 ± 22.78 min, respectively **(13)**. In our study, the blood loss was significantly lower in the laparoscopic group compared to the abdominal group [275 (150-650) ml vs 525 (250-975) ml, respectively]. The recorded blood loss in our study was slightly higher than what was reported with **Tawfik et al. (11)**. In our study, no significant difference existed between both groups regarding incidence of intra- operative complications. For laparoscopic group, 2 cases had bladder injury, one had ureteric injury, two had nerve injury (rt genitofemoral n. and rt obturator n.) two had vascular injury (left internal iliac vein and left obturator artery) and none of the cases had bowel injury versus one case had bladder injury, none of the cases had ureteric injury or nerve injury, one had vascular injury (left internal iliac vein), and one had serosal small bowel injury among abdominal group (p value > 0.05). Also, 23.9% of patients in the abdominal group had wound infection versus none among laparoscopic group. Anwar and his colleagues demonstrated a higher complication rate with laparotomy group than with laparoscopy group **(10)**. In our study, there was no significant difference between both groups regarding post-operative complications like fever, lymphocele formation, vascular complications, incisional hernia, vaginal cuff haematoma, vaginal cuff infection, vaginal cuff dehiscence and recurrent vault masses ($p > 0.05$). A significant less post-operative pain, shorter time of drain usage, less wound infection and seroma formation were detected in laparoscopic group than abdominal group ($p < 0.05$). Walker and his colleagues displayed that laparoscopic surgery had fewer moderate to severe post-operative complication compared to laparotomy (14% versus 21%, respectively; $P < .0001$) **(14)**. **Liu et al. (15)** found similar complication rates in both groups comparing MIS and open surgery for hysterectomy. Furthermore, **Mourits et al. (16); Janda et al. (17)** did not report significant difference between laparoscopic surgery and laparotomy regarding post-operative adverse events. The rate of conversion from MIS to open surgery is widely variable (0 to 27%). In our study, there was a low rate of conversion of about 5.4%. The two cases who converted to open surgery were because of obesity, severe adhesions and bladder injury. In our study, there were no significant differences in overall survival and recurrent vault masses among the two groups and these findings agree with numerous studies regarding the safety of MIS in early-stage EC. The survival rate was marginally higher in the laparoscopic group, which reported 100% survival, whereas the abdominal group exhibited a mortality rate of 8.7%. Despite this discrepancy, the difference was insignificant ($p = 0.125$). Additionally, all reported deaths occurred exclusively in the abdominal group, resulting from diverse complications such as pulmonary embolism and sepsis-related causes. The absence of any mortality in the laparoscopic group, though not statistically significant, may have clinical implications. These findings reflect a growing body of evidence supporting the safety and effectiveness of laparoscopic surgery in managing early-stage EC. The observed zero mortality in the laparoscopic group aligns with previous studies that have highlighted the advantages of MIS, including reduced perioperative morbidity and faster recovery times. Although statistical significance was not achieved, the complete absence of mortality in the laparoscopic group is clinically meaningful and may reflect reduced surgical trauma and fewer postoperative complications.

5. CONCLUSION

In conclusion laparoscopic treatment of EC has several advantages when compared to open surgery, less post-operative pain, better surgical field visualization; shorter hospitalizations and less complications are the key advantages. The advantages of laparoscopic surgery have made it as a therapeutic option for EC, especially in low resources countries and morbidly obese patients.

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