Original Article

Comparative Study of Laparoscopic versus Conventional Open Surgical Staging Procedure for Endometrial Cancer: Our Institutional Experience

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Abstract

Objective: The aim of this study was to compare laparoscopic surgical staging of endometrial cancer with conventional open methods.
Materials and Methods: The retrospective data were collected from 90 endometrial cancer patients who were operated between 2013 and 2018 in our government institution. The safety and morbidity of the two groups were compared based on mean operative time, blood loss, intraoperative complications, postoperative complication, etc., and the results were analyzed. Statistical analysis was performed using IBM SPSS statistics version 20. Clinical and pathologic factors were compared between two groups with Fisher's exact test and Student's t-test for data analysis. The survival data were analyzed using Kaplan–Meier survival curves. $P < 0.05$ was considered statistically significant.
Results: Thirty-two patients underwent laparoscopic staging, 45 underwent laparotomy, and 13 cases lap converted to open surgery. The mean operative time for the laparoscopic procedure was lower than the open procedure ($P = 0.001$). The mean hospital stay of patients who underwent laparoscopic staging was around 7.1 days significantly less compared to the laparotomy group. Intraoperative blood loss of patients undergoing laparoscopic surgery was significantly less than that of the laparotomy group ($P = 0.015$). There was no statistically significant difference in nodal retrieval between laparotomy and laparoscopy group ($P = 0.172$). The mean duration of hospitalization was statistically significantly greater in the laparotomy group than the laparoscopic group (13 and 7 days, $P < 0.001$). Based on the Kaplan–Meier survival curve, there was no difference in survival rates between the groups. Median follow-up duration was 32 months.
Conclusion: Laparoscopic surgical staging is oncologically safe for the management of endometrial cancer with acceptable morbidity compared to the open approach with far less blood loss and shorter postoperative stay.

Keywords: Endometrial cancer, laparoscopy, surgical staging, survival rates

Introduction

Endometrial cancer is the most common gynecologic malignancy and the fourth most frequently diagnosed cancer in women worldwide. It occurs mainly in the postmenopausal period, and in 75% of cases, the diagnosis is made at an early stage, i.e., when the malignancy is confined to the uterus.[1] The median age of the diagnosis for endometrial cancer is 61 years.[2] In India, the median age of the diagnosis is 50 years.[3] Total hysterectomy with surgical staging through open laparotomy is the gold standard treatment for early-stage endometrial cancer, and recently, total laparoscopic hysterectomy and pelvic lymphadenectomy have been proven safe and feasible.[4] The aim of this study was

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to compare the outcomes of laparoscopic surgical staging of endometrial cancer versus conventional open methods and to analyze its oncological safety in our institution.

Materials and Methods

The retrospective data were collected from a total of 90 endometrial cancer patients who were operated between 2013 and 2018 in Government Royapettah Hospital, Kilpauk Medical College, Chennai, India. This study was approved by the institutional ethics committee, protocol ID. NO.02/2019 obtained on Aug. 9th, 2019. All operable cases underwent comprehensive surgical staging procedures, including total hysterectomy, bilateral salpingo-oophorectomy, and pelvic lymphadenectomy. In relation to paraaortic nodal management, if positive nodes were found preoperatively by imaging or by intraoperative palpation (in laparotomy group and lap converted to open group), paraaortic nodal sampling was done. The safety and morbidity of the two groups were compared based on mean operative time, blood loss, intraoperative complications, postoperative complication, etc., and the results were retrospectively analyzed. Postoperative surgical complications were graded based on Clavien–Dindo classification. Histopathology reports of both groups were compared in relation to nodal retrieval and margin status. All patients underwent preoperative magnetic resonance imaging (MRI) abdomen and pelvis imaging for the evaluation of the extent of disease. A preoperative biopsy was obtained by fractional curettage or Pipelles biopsy. Type 2 radical hysterectomy was done for patient with Stage 2 disease determined preoperatively by MRI. Pelvic lymphadenectomy consisted of removing lymphatic tissue proximal bifurcation common iliac artery, distal-deep circumflex iliac vein, lateral-genitofemoral nerve, medial-internal iliac (hypogastric) artery and ureter, and posterior-obturator nerve. Operating times were recorded from the first skin incision to the closure of skin incision. Blood loss was estimated from that collected in the suction device and if any blood transfusion done intraoperatively and postoperatively was recorded. We recorded the parameters, including patient age, parity, mean operation time, estimated blood loss, intraoperative and postoperative blood transfusions, intraoperative and postoperative complications, postoperative hospitalization, International Federation of Gynecology and Obstetrics surgical stage, histopathological type, tumor grade, and a number of lymph nodes yielded. Statistical analysis was performed using IBM SPSS statistics version 20 (IBM corp, Armonk, New york). Clinical and pathological factors were compared between two groups with Fisher's exact test and Student's *t*-test for data analysis. $P < 0.05$ was considered statistically significant. The survival data were analyzed by Kaplan–Meier method. Differences between survival curves were analyzed using the log-rank test. $P < 0.05$ was considered statistically significant.

Results

Among the laparoscopy group, the mean age in years was 53.5 years and the laparotomy group was 54.6 years [Table 1]. Mean parity was 2.5 and 3.0 in laparoscopy and laparotomy group, respectively. Thirty-two patients underwent laparoscopic surgery, forty-seven underwent laparotomy, and thirteen cases lap converted to open surgery. Causes for lap converted to open laparotomy was adhesion to the bladder and rectum (because of associated endometriosis), iliac vein bleeding, ureteric injury, etc., probably due to learning curve. One case had multiple peritoneal metastasis with liver metastasis, so diagnostic laparoscopy was done and biopsy alone was taken. The mean operative time for the laparoscopic procedure was lower than the open procedure ($P = 0.001$). Mean operative time in laparoscopy is 127 min (including cases converted to open) and that of laparotomy group was 151 min. However, in lap converted to open group, the meantime of surgery was 152 min almost equal to open surgery. However, overall laparoscopic surgery takes less time compared to open surgery. The average time in the laparoscopy group was around 140 min in the initial 2 years due to the learning curve which as reduced to over 95 min in the last 3 years. Blood loss in laparoscopy group is around 160 ml which significantly less than that of laparotomy group. The mean hospital stay was around 7.1 days significantly less compared to laparotomy group. Intraoperative complications were more common in laparoscopy group ureteral injury ($n = 1$), bladder injury ($n = 2$), great vessel injury (n-1), parametrial bleeding (n-1), compared to one bladder injury in laparotomy group. Intraoperative blood loss of patients undergoing laparoscopic surgery was significantly less than that of the laparotomy group ($P = 0.015$). The laparoscopic group had a median of eight pelvic nodes (range 5–12) retrieved as compared to nine pelvic nodes (range 5–14) retrieved in the laparotomy group but was not statistically significant ($P = 0.172$). As paraaortic nodal dissection is not mandatory for early endometrial carcinoma, sampling of nodes was done if nodes were enlarged on imaging or by intraoperative palpation (in laparotomy group and lap converted to open group). For 15 cases (13 in laparotomy group and 2 in lap converted to open group), paraaortic nodal sampling was done. In two cases, nodes were positive for malignancy both in laparotomy group. Adverse prognostic factors in endometrial cancer include depth of myometrial invasion, cervical stromal involvement, adnexal involvement, pelvic/para-aortic node involvement, extension into bladder or rectum, and distant spread [Table 2]. The mean hospitalization duration was significantly greater in the laparotomy group than the laparoscopic group (13 and 7 days, $P < 0.001$). In lap converted to open cases, the value was higher, but the mean hospitalization duration in laparoscopy group was 7 days. The incidence of postoperative complications was 22% and 11%

Table 1: Clinical characteristics (*n*=45)

	Laparoscopy, *n* (%)	Laparotomy, *n* (%)	*P*
Menopausal status			
Premenopausal	16 (35)	14 (31)	Not significant
Postmenopausal	29 (65)	31 (69)	Not significant
Comorbidities			
Type 2 diabetes	5	9	
Systemic hypertension	3	6	
Hypothyroidism	0	2	
Cardiac disease		1	
Chronic liver disease	1		
K/c/o carcinoma breast	3	3	
K/c/o carcinoma cervix	1	1	
HBsAg positive	1	2	
HCV positive	1		
Median age (years)	52	56	Not significant
Mean parity	2.5	3.0	Not significant
Mean operation time (min)	127.3	151	0.0001
Estimated blood loss (mL)	160	300	0.015
Number of cases in which intraoperative transfusion done	3	6	

HCV: Hepatitis C virus, HBsAg: Hepatitis B virus surface antigen

Table 2: Histopathological characteristics (*n*=45)

	Laparoscopy, *n* (%)	Laparotomy, *n* (%)	*P*
FIGO stage			
Stage 1A	23 (51)	29 (65)	Not significant
Stage 1B	7 (15)	5 (12)	
Stage 2	8 (17)	6 (13)	
Stage 3A	2 (4)	2 (4)	
Stage 3B	-	-	
Stage 3C1	3 (6)	1 (2)	
Stage 3C2		2 (4)	
Stage 4 A	1 (2)		
Stage 4B	1 (2)		
Postoperative histopathology			
Endometrioid	43 (95)	41 (91)	Not significant
Nonendometrioid			
Serous	1 (3)	1 (2)	
Carcinosarcoma		3 (7)	
Endometroid carcinoma grade in postoperative histopathology			
Grade 1	35 (82)	40 (97)	Not significant
Grade 2	5 (12)	1 (3)	
Grade 3	3 (6)		
Associated carcinoma ovary		1	

FIGO: Federation of Gynecology and Obstetrics

in the laparotomy and laparoscopic groups, respectively, and graded according to the Clavien–Dindo Classification [Table 3]. Based on Kaplan–Meier survival curve, there was no difference in overall survival rates between the groups [Figure 1]. One death in the postoperative period due to myocardial infarction in postoperative day 4 in laparotomy group. Based on Kaplan–Meier survival curve, there is no difference in survival rates between the groups (P = 0.669). The median survival is 23 months for laparoscopy (7–60 months) and 36 months for laparotomy group (6–62 months). Median follow-up duration was 32 months (range from 6 to 68 months).

Discussion

Conventionally, surgical treatment for carcinoma of the endometrium has been performed by laparotomy approach with total abdominal hysterectomy and pelvic lymphadenectomy.[5] Childers and Surwit were the first to report the use of laparoscopically assisted vaginal

Table 3: Intraoperative and postoperative complications (*n*=45)

Intraoperative complication	Laparoscopy		Laparotomy	
Ureteral injury	1			
Bladder injury	2		1	
Great vessel injury	1			
Parametrial bleeding	1			
Postoperative complication	**Laproscopy**	**Grade***	**Laparotomy**	**Grade***
Wound infection			7	I
Burst abdomen			1	IIIB
Bladder morbidity	2	I	2	I
Intestinal obstruction	1	IIIB		
Small bowel prolapse	1	IIIA		
Myocardial infarction	1	V		
Percentage	11		22	

*Clavien Dindo grade

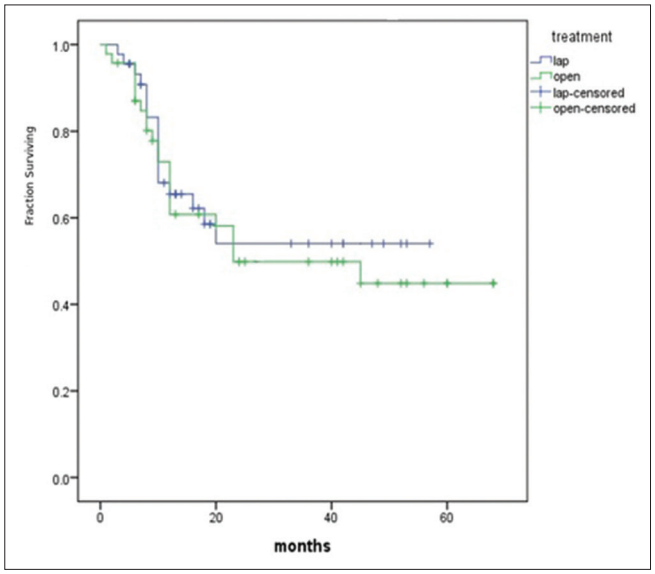

Figure 1: Kaplan–Meier analysis for overall estimated survival

hysterectomy with laparoscopic staging of pelvic and paraaortic lymph nodes in 1992 for the treatment of early-stage carcinoma endometrium.[6] In our study, all operable cases underwent a total hysterectomy, bilateral salpingo-oophorectomy, and pelvic lymphadenectomy.

The median age of the diagnosis for carcinoma endometrium is 61 years, with 20% of patients diagnosed before menopause. In our study population, the median age in laparoscopy group was 52 years and laparotomy group was 56 years. Sixty-five percent in laparoscopy group and 70% in laparotomy group of the study population were in the postmenopausal age group.

The guidelines from the society of radiologists in ultrasound have defined an endometrial thickness of ≥5 mm as being abnormal. MRI is very useful in detecting myometrial invasion, with an accuracy of 85%–93%.[7] In our study, MRI had an accuracy of 75% in determining myometrial invasion (more than 50%). In patients with suspected cervical involvement, preoperative MRI is useful to determine whether the uterine tumor involves the lower uterine segment or truly extends into the cervix. In our study, MRI had an accuracy of 90% in detecting cervical stromal involvement. If cervical stromal involvement is present, a radical hysterectomy is to be done as opposed to simple hysterectomy.

Our study indicates that laparoscopic surgical staging for carcinoma endometrium decreases operative time and postoperative stay in hospital. In Malzoni *et al*.'s study, the mean operative time was 136 min ± 31 (95% confidence interval [CI] 118–181) in the laparoscopic group and 123 min ± 29 (95% CI 111–198) in the laparotomy group ($P < 0.01$).[8] In contrast, in our study, the mean operative time for the laparoscopic procedure was lower than the open procedure ($P = 0.001$). Mean operative time in laparoscopy is 127 min (including cases converted to open) and that of laparotomy group was 151 min. However, in lap converted to open group, the meantime of surgery was 152 min almost equal to open surgery. However, overall laparoscopic surgery take less time compared to open surgery. The average time in laparoscopy group was around 140 min in the initial 2 years due to the learning curve which as reduced to over 95 min in the last 3 years.

In Palomba *et al*.'s study, lower intraoperative blood loss (odds ratio [OR] = −266.86, 95% CI − 454.82–−78.90, $P = 0.005$) and postoperative complications (OR = 0.40, 95% CI 0.23–0.70, $P = 0.007$) were associated to laparoscopy group comparable with our study [Table 1].[9] A higher number of complications were found in initial 3 years and of late complication rate is comparable to laparotomy group. The incidence of postoperative complications was 22% and 11% in the laparotomy and laparoscopic groups, respectively. In laparotomy group, wound infection ($n = 7$) was the main complication.

In Zorlu *et al*.'s study, the mean number of harvested lymph nodes was 18.2 in the laparoscopic group and 21.1 in the laparotomy group ($P > 0.05$), which is not statistically significant.[10] In our study, the laparoscopic group had an average of nine pelvic nodes (range 5–12, median = 8) retrieved as compared to 11 pelvic nodes (range 5–14, median = 9) retrieved in the laparotomy group but was not statistically significant ($P = 0.172$).

Table 4: Site of recurrence

Site of recurrence	Laparoscopy (*n*=4)	Laparotomy (*n*=3)
Pelvic nodal recurrence with supraclavicular node	1	
Supraclavicular node	2	1
Spinal metastasis	1	
Ascites with liver metastasis		2

In 2009, the GOG reported the results of the LAP2 study, and the largest randomized trial ever performed in endometrial cancer suggested that patients treated by laparoscopy had a superior quality of life through the first 6 postoperative weeks when compared with those treated by laparotomy, with fewer complications, less pain, faster recovery, and significantly reduced length of hospital stay without compromising overall survival.[11] Laparoscopic surgical staging is characterized by fewer postoperative moderate or severe complication. It seems that the only drawback of laparoscopic staging for endometrial cancer is the longer operation time, but in our study population, laparoscopic surgery had shorter operative time. Laparoscopic surgical staging is safe, feasible, results in fewer complications, has a shorter hospital stay, and should be considered a standard of care for uterine cancer. However, several recent studies showed that there is a tendency for shorter laparoscopic operation time and increased use of the laparoscopic approach for endometrial cancer as surgical skills are progressing. Even in our study, all major complications occurred initial 2 years suggesting a learning curve in laparoscopy, and the mean operative time in the laparoscopy group is significantly less compared to open procedure. There is no standard protocol followed for adjuvant treatment of carcinoma endometrium in our institute. All treatments are based on the decision of tumor board policies. All decision in tumor board are mostly based on the latest NCCN guidelines and individualized to each patient.

Stage of disease correlates with the risk of recurrence. In our study, seven cases had recurrence, of which five cases had Stage 2 disease and two cases with Stage 1b disease. All the seven cases completed adjuvant treatment [Table 4]. The most common recurrence was in supraclavicular node ($n = 3$), pelvic nodal recurrence with supraclavicular node ($n = 1$), spinal metastasis ($n = 1$), ascites, and liver metastasis ($n = 2$).

Malur *et al*. and Seracchioli *et al*. found that the survival rate was similar between both laparotomy and laparoscopy group. Even in our study, no significant differences in disease recurrence rates ($P = 0.711$) and overall estimated survival ($P = 0.669$) were found between the laparoscopy and laparotomy group [Figure 1].[12,13] The estimated mean survival in laparoscopy group was 35.5 months (95% CI 28.09–43.46) and laparotomy group was 38.8 months (95% CI 29.04–47.11).

Conclusion

Laparoscopic surgical staging is the oncologically safe and effective therapeutic procedure for the management of endometrial cancer with acceptable morbidity compared to the open approach and is characterized by far less blood loss, shorter postoperative stay, and probably less operating time at trained hands.

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Conflicts of interest

There are no conflicts of interest.

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