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ORIGINAL ARTICLE

A Prospective Analysis of Laparoscopic Management of Endometrial Cancer in a Tertiary Care Centre

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Abstract

Background Laparoscopic management of endometrial cancer is beneficial in view of decreased operative morbidity and post-operative recovery. In the case of early gynaecological malignancies, it is a safe and feasible mode of surgery.

Methods A prospective study was conducted in our tertiary centre in the period January 2017–December 2019. The study included 51 patients diagnosed with endometrial carcinoma. Demographic details and operative findings have been recorded.

Results The mean age was 55.47 years; 64.7% were post-menopausal. 86.2% had stage IA disease. All patients underwent laparoscopic staging. The mean operative time was 115 min, estimated blood loss was 82.5 ml, pelvic nodal yield was 13.53, and para-aortic nodes were 20.78. There were no conversions to laparotomy or any intra-operative complications, and none of the patients had recurrence. During post-operative follow-up, 2 patients had lymphocyst, 1 had chylous ascites and 1 had port site hernia. Average hospital stay was 3 days.

Conclusion In our study, we found that laparoscopic management of endometrial cancer is less morbid and has better post-operative recovery.

Keywords Laparoscopy · Endometrial cancer · Morbidity · Post-operative recovery

Introduction

Endometrial cancer is the most common gynaecological malignancy in developed countries. In developing countries, cervical cancer remains the most common gynaecological cancer, but in recent times there has been a sharp rise in the incidence of endometrial cancer [1]. In India, the number of new cases in 2018 was 13,328 with 5010 recorded deaths [2]. The mean age at the time of diagnosis is 63 years [3]. Most commonly, around 70% of the patients are diagnosed at an early stage and usually have good prognosis [4]. The treatment for endometrial cancer is surgical staging with or without adjuvant therapy based on the post-operative histopathological staging. Complete nodal dissection as a part of surgical staging still remains debatable. Recently, laparoscopic management for endometrial cancer has been the preferred mode. In terms of post-operative complications and recovery, various studies have shown that laparoscopic approach produces favourable results for women in comparison with conventional laparotomy [5].

Materials and Methods

We have conducted this prospective study in our tertiary-level laparoscopic centre for a period of 2 years (January 2017–February 2019) after obtaining informed written consent from all the patients and receiving approval from our ethical committee. Patients who had confirmed pre-operative diagnosis of endometrial cancer irrespective of their age were included in this study.

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The primary objective of the study was to assess the safety, efficacy and outcome of laparoscopic management of endometrial cancer. The secondary objectives of the study were to assess mean operative time, intra-operative and post-operative complications, number of nodes retrieved, estimated blood loss, duration of hospital stay and need for post-operative adjuvant therapy.

There were 51 patients with endometrial cancer. All parameters such as demographic details like age, body mass index, menopausal status, systemic illness, previous history of pelvic surgery, risk factors, USG findings such as endometrial thickness and size of the uterus, CA 125, tumour size, histology, grade, pre-operative and post-operative staging were recorded, analysed and formulated. Patients diagnosed with endometrial cancer and undergoing surgery as their primary treatment were included in this study. Most of the subjects were diagnosed at an early stage—stage I–II, although a small percentage of patients were diagnosed at an advanced stage—stage IIB and III. Patients who were diagnosed to have endometrial hyperplasia and underwent laparoscopic hysterectomy for benign disease and later were diagnosed to have endometrial cancer during post-operative histopathological examination were excluded in the study. All patients had transvaginal ultrasound, MRI and endometrial biopsy as a part of pre-operative work-up. All patients underwent laparoscopy. To reduce the subjective operator bias, surgeries were performed by three laparoscopic gynaecologists. Following the surgery, the outcomes studied were mean operative time, need for blood transfusion, intra-operative and post-operative complications, duration of hospital stay, number of lymph nodes obtained and lymph node positivity. Need for adjuvant therapy was decided based on the post-operative histopathology. Statistical analysis was performed by SPSS version 15, and the required variables were expressed in mean, range and standard deviation.

Surgical Technique

Under general anaesthesia, the patient was placed in a modified lithotomy position and bladder was catheterized using a Foley catheter. Pneumoperitoneum was achieved through a Veress needle. Then, four to five ports were inserted (Fig. 1a, b). After observation of the liver surface, pelvic organs and abdominal wall for spread of the tumour and the presence of adhesions, peritoneal fluid for cytology was taken. We routinely cauterize the cornual end of the fallopian tubes before proceeding with the hysterectomy to prevent the tumour dissemination [6].

The peritoneal incision was made over the triangle of doom in between the infundibulopelvic ligament and round ligament. This incision was extended lateral towards iliac vessels beyond the pelvic brim level with the traction over the cornual pedicle using the rubber band method in order to show the portion for lymphadenectomy. Rubber bands were used instead of uterine manipulator or a myoma screw in order to prevent dissemination of the tumour. The pelvic node was dissected. Lymphadenectomy was performed with the help of both sharp and blunt dissection. The lymphadenectomy constraints were as follows: Caudally involving the obturator group of pelvic nodes, and cephalad margin was the bifurcation of common iliac artery, posteriorly to internal iliac vessels, and laterally towards the circumflex iliac vein (Fig. 2). The specimens of lymphadenectomy were removed in the endo-bag. Later, bisection of infundibulopelvic ligament was done; adequate care was given to protect ureter. Further, the process continued with extrafascial hysterectomy along with bilateral salpingo-oophorectomy

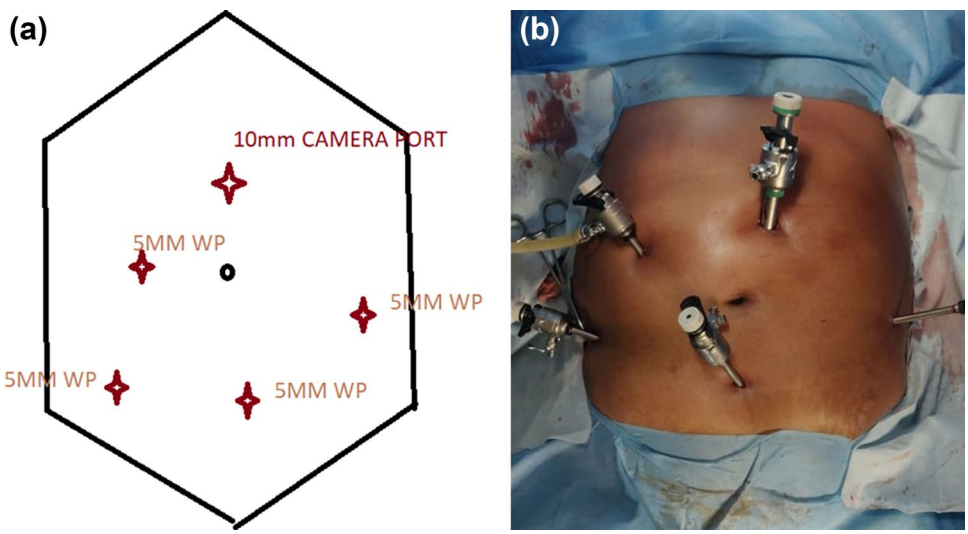

Fig. 1 **a** Port placement—diagrammatic representation. **b** Port placement for complete staging laparoscopy with pelvic lymphadenectomy

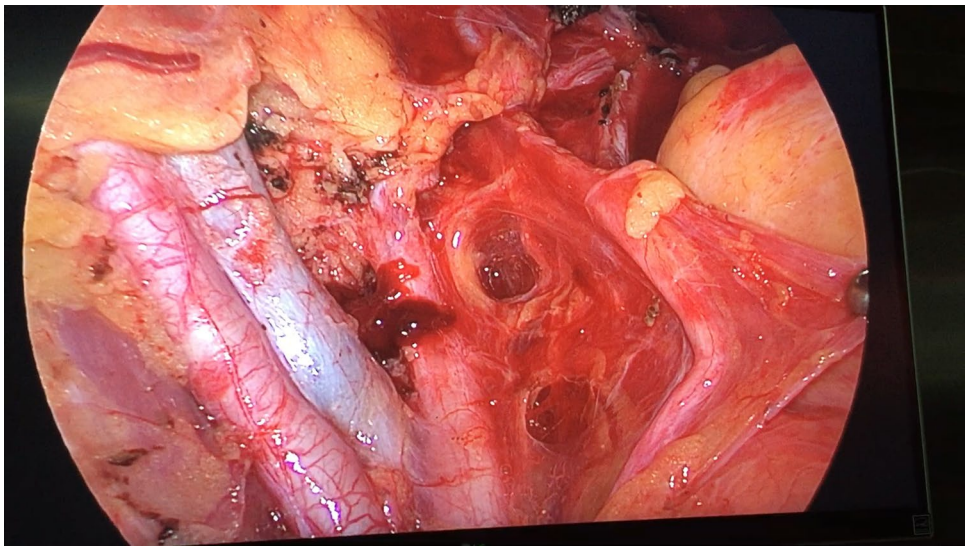

Fig. 2 Boundaries of pelvic lymphadenectomy

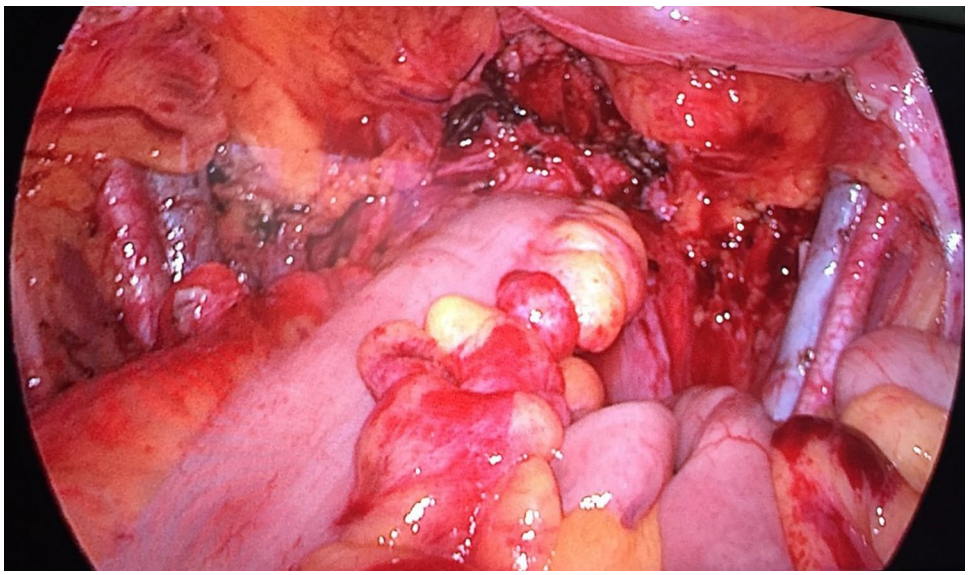

Fig. 3 Post-total laparoscopic hysterectomy and pelvic lymphadenectomy

(Fig. 3). The para-aortic lymphadenectomy was performed depending upon the diseases' pre-operative staging. Port placement for laparoscopic para-aortic lymphadenectomy is shown in Fig. 4a, and the boundaries of para-aortic nodal dissection are shown in Fig. 4b. The whole specimen was taken out through vagina in different endo-bags.

Results

The study group included 51 patients with endometrial cancer who underwent laparoscopic surgery as primary treatment modality. The age of the patients ranged from 36 to 70 years (mean age—55.47 years). Majority of the patients, 33 out of 51 (64.7%) subjects, were post-menopausal. From a total of 51 patients, 44 were multiparous and 7 were nulliparous. Average BMI was 31.39. Sixteen subjects presented with abnormal uterine bleeding, 29 (56.8%) patients had post-menopausal bleeding, and the remaining 6 (11.7%) patients were diagnosed incidentally during screening for thickened endometrium in transvaginal ultrasound (Table 1).

Sixteen cohorts had hypertension, 6 patients had diabetes, 3 patients had dyslipidemia, and 13 (25.4%) patients had all the three medical illness presenting as high risk for corpus cancer syndrome. Two patients gave history of carcinoma transverse colon, and another patient had ascending colon malignancy for which surgery was done earlier. These 3 patients were counselled and lynch screening was done; one had positive MSH gene mutation. One patient had cancer breast and gave history of Tamoxifen intake for past 15 years. Nine of the 51 cohorts had family history of cancer, among which 2 had breast cancer, 3 had stomach

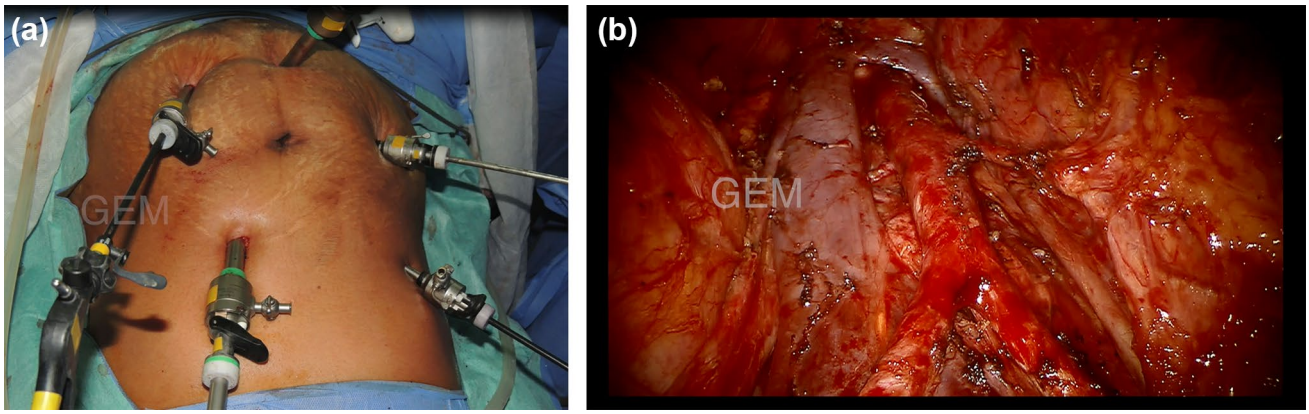

Fig. 4 **a** Port placement for para-aortic lymphadenectomy. **b** Boundaries of para-aortic lymphadenectomy

cancer, 2 had colon cancer, 1 had thyroid cancer and 1 had oral cavity malignancy. These comprise 17.6% of the study population. Twenty-seven patients had history of previous pelvic surgeries such as caesarean, sterilization and cystectomy; 3 underwent laparotomy for hemicolectomy, and 2 patients gave history of open mesh repair for hernia. Six patients gave history of PCOS and chronic anovulation. Six patients had history of intake in the past.

On evaluation, among the 33 post-menopausal women, 32 (96.9%) had thickened ET (> 4 mm); and 13/18 (72.2%) pre-menopausal women had thickened ET. CA 125 was > 35 in 8 patients. Pre-operative staging of disease was assessed following endometrial biopsy and MRI.

All patients were classified based on FIGO staging 2019 [7]. Forty-four out of 51 (86.2%) presented as Stage IA disease, 6 patients as Stage IB disease and 1 patient was diagnosed to have Stage IIIA disease. One patient in IB group had cervical involvement in MRI. Endometrial biopsy suggested endometrioid adenocarcinoma grade 1 disease in 31 patients (60.78%), grade 2 in 18 patients (35.2%) and grade 3 in 2 patients (3%). One patient had villoglandular type with grade 1 disease. All patients underwent laparoscopic extrafascial hysterectomy with bilateral salpingo-oophorectomy and pelvic lymphadenectomy with fluid for cytology as a part of complete staging. Combined para-aortic lymphadenectomy was done based on pre-operative staging. Two patients underwent laparoscopic Wertheim's hysterectomy (Table 2).

Mean operative time was 115 min (70–175 min), estimated blood loss was 82.5 ml, nodal yield in pelvic lymphadenectomy was 13.53, and para-aortic nodes were 20.78. Considering the intra-operative complications, none had conversion to laparotomy, blood transfusion or bowel, bladder and ureteric injury. In post-operative period, 2 patients had lymphocyst, 1 had chylous ascites and 1 patient had port site hernia during 1-year follow-up. There were no cases with post-operative pulmonary embolism, sepsis or mortality. Average duration of hospital stay was 3 days.

Post-operative staging was upgraded in 11 patients (21.5%), and nodal positivity was 3%. Post-operative adjuvant therapy was advised to 17 patients, and 34 patients (66.6%) were spared from unnecessary adjuvant therapy following complete staging laparotomy.

Our follow-up period ranged from 1 to 20 months. No patients had recurrence in our study during the post-operative follow-up. One patient had elevated CA 125 during one-year follow-up, CECT had suggested peritoneal deposits, and biopsy IHC showed high-grade serous cancer; hence, it was managed as if it were a new onset primary peritoneal cancer.

Discussion

Our study was conducted to assess the safety and efficacy of laparoscopic management for endometrial cancer. Efficacy was assessed by the number of lymph nodes obtained, the mean operative time, the length of hospital stay, the need for conversion to laparotomy, the safety measures included, the mean blood loss and the post-operative complications.

Surgery is the major step in the endometrial cancer management which involves peritoneal washing, total hysterectomy bilateral salpingo-oophorectomy with or without para-aortic and pelvic lymphadenectomy [8, 9]. Even now, the extent and indication of lymph node dissection in the endometrial cancer management is debatable [10]. A study that has been published in recent times showed that the laparoscopic surgery appears to be highly effective than laparotomy in women having endometrial cancer [11].

Traditionally, endometrial cancer was treated by abdominal hysterectomy. Over the past decade, laparoscopic surgeries have been performed. Several studies have proved that laparoscopy is feasible in endometrial cancer and has

Table 1 Patient characteristics

Demographic data	
Mean age (in years)	55.47 (range 36–70)
Mean parity	2 (range 0–4)
Mean BMI	31.39 (range 16.8–55)
Nulligravida	7
Multipara	44
Pre-menopausal	18
Post-menopausal	33
Risk factors	
Family history of CA	9
Comorbidities	
Hypertensive	16
Diabetic	6
Dyslipidemia	3
HT/DM/dyslipidemia	7
HT/DM/dyslipidemia/CAD	6
Obese	27
Previous history of malignancy	4
Presenting complaints	
PMB	29
AUB	16
Incidental diagnosis	6
Previous surgeries	27
LSCS	7
Sterilisation	14
Laparotomy	5
Laparoscopy	1
No previous surgery	24
Diagnosis	
CA 125 (> 35)	8
Pre-op staging	
Stage I A	44
Stage IB	6
Stage III A	1
Grade 1	31
Grade 2	18
Grade 3	2
Histology	
Endometrioid adenocarcinoma	50
Villoglandular	1

less post-operative complications and shorter hospital stay when compared to laparotomy [5]. Our study shows that the mean age of the participants diagnosed with endometrial cancer was 55.47 years with majority of women in multiparous group. According to Terao [12], the average age for endometrial cancer is 56 years. Mean BMI was 31.39 (range—16.8–55) in our study, which is evaluated as a risk factor, to assess the difficulty and outcome of laparoscopy surgery. According to a meta-analysis in 2015, relative risk of endometrial cancer in obese women was 2.54 [13]. Additionally, there are a few parameters to recommend that for every 5 kg/m2 increment in BMI, there is a critical increment in danger of developing endometrial cancer [14]. Renehan [15] stated that endometrioid type of endometrial cancer is predominantly related to obesity. Bouwman [16] stated that surgical complications were high in morbidly obese patients who underwent laparotomy.

Menopause and risk of endometrial cancer are controversial, and in our study majority of the patients presented at 41–50 years which is around the time of menopause. A meta-analysis showed that age at menopause had impact on risk of endometrial cancer; they indicated that the risk increased with menopausal age [17]. Endometrial cancers can present as a part of hereditary cancer syndrome. Hence, screening is important in case of high-risk patients [18]. In our evaluation, 17.6% of our study population had family history of malignancy. Three patients had previous history of colon malignancy, and among them 1 had positive lynch screening.

Pre-operative staging of disease was assessed following endometrial biopsy and MRI. 74.51% presented as Stage IA disease.

All 51 patients underwent laparoscopic hysterectomy, and bilateral salpingo-oophorectomy with pelvic lymphadenectomy irrespective of the pre-operative staging of the disease and para-aortic lymphadenectomy was done in 8 of our patients with high-risk tumours such as invasive lesions and high-grade histology following the NCCN guidelines for management of endometrial cancer [19].

In our study, the mean operative time was 115 min (range 70–175) and mean blood loss was 82.5 ml with no patients requiring blood transfusion. This is comparable with the literature; however, we could obtain a reduction in operative time and blood loss in this short period. Mariana et al. [20] reviewed 138 patients with endometrial cancer, out of which 41 underwent laparoscopy, and mean operative time was 175 min greater than laparotomy group (130 min) comprising 97 patients. Bennich et al. [21] reported that 227 women with early endometrial cancer underwent laparoscopic staging with mean operative time of 120 min and mean blood loss of 100 ml. This is a variable issue because it is much related to the experience of the surgeon and the learning curve.

In a recent study, authors have stated that there were no significant differences in the number of lymph nodes obtained in laparoscopic or open approach for gynaecological malignancies [22]. In this study, the mean number of lymph nodes obtained was 20.78 nodes in para-aortic lymphadenectomy and 13.53 in pelvic lymphadenectomy. This is in comparison with Bennich et al. [21], who obtained an average of 18 pelvic lymph nodes among 227 surgeries and Jung et al. [23] who obtained 12 para-aortic lymph nodes among 157 surgeries.

Table 2 Operative and post-operative data

Surgery type		
Laparoscopic extrafascial hysterectomy	49	
Laparoscopic Wertheim hysterectomy	2	
Pelvic + para-aortic	8	
Pelvic	43	
	Mean	Range
Nodal yield	Para-aortic: 20.78	16–49
	Pelvic: 13.53	2–23
Operative time	115 min	70–175 min
Blood loss	82.5 ml	
Post-op staging		
1A-G1	28	
G2	6	
G3	1	
1B-G2	13	
1B-G3	1	
3C2-G2	2	
Pre-op staging	Unaltered	Staging upgraded
Stage IA ($n=44$)	35	9
Stage IB ($n=6$)	5	1
Stage IIIA ($n=1$)	–	1
Adjuvant therapy		
RT	15	
Chemo/RT	2	

Urologic structures are at risk of injury at the time of the laparoscopic hysterectomy and pelvic lymphadenectomy procedure. In addition, good knowledge of anatomy and meticulous surgical technique decreases the risk of its injury [24]. No patients in our study had ureteric or bladder injury during surgery. In the study done by Bennich et al, 0.4% patients had ureteric injury, whereas in the study done by Jung et al. 1 injury was noted among 157 surgeries [21, 23].

Post-operative complications like chest infection, wound infection, pulmonary embolism and fever in the post-operative period were not seen in our study. Blood transfusion was not needed in any of our patients. There was no conversion to laparotomy. Mariana et al. stated that there were no significant differences in intra-operative complications between laparoscopy and laparotomy groups (12.2% vs 4.1%) and post-operative complications were significantly higher in laparotomy group than in laparoscopy (23.7% vs 7.2%, $p=0.005$) and the conversion rate was 4.9% [20].

In our study, the mean hospital stay was 3 days which was comparable to Mariana et al.'s study, in which median hospital stay in laparotomy group was 7 days and laparoscopy group was 3 days ($p<0.001$) [17].

These results showed reduced hospital stay in the laparoscopic group as compared to the open approach; this decreased the cost of hospitalisation and was an indicator of rapid recovery.

Post-operative staging was unaltered in 40 patients and upgraded in 11 of our subject. 17 patients required post-operative adjuvant therapy, that is 66.67% of the patients were spared from unnecessary chemo/radiation. 96.08% of the patient had no complaints on follow-up.

Since our study was conducted in a tertiary-level laparoscopic centre, every patient included in this study underwent laparoscopic management. This study was conducted with the objective to show that in the long term laparoscopic management could become pivotal in the treatment of endometrial cancer. However, it has to be stated with abundant caution that this treatment's progress depends on the learning curve of the surgeon, expertise of operator and team members, facilities available, well-trained anaesthetist team and proper selection of patient. This study was conducted on patients predominantly diagnosed at an early stage; however, surgeons may encounter patients with advanced malignancy which will require expert surgical help.

Limitation of our study was that we did an observational study with only patients who underwent laparoscopic surgery and there was no comparison between laparotomy group. This study is esoteric to our tertiary care centre which included only 51 patients. Similar studies from multiple centres and long-term follow-up are required to state that laparoscopic approach would be the preferred method in managing endometrial cancer.

Conclusion

Considering the advent of minimally invasive surgery for management of endometrial cancer, laparoscopic approach is a safe and feasible mode with proper selection of patient and good operative technique. There is minimal blood loss, shorter hospital stays and good nodal yield with rapid post-operative recovery. There is also a decrease in perioperative morbidity and improvement in surgical variables with the use of minimally invasive approach. It accurately identifies the patient who requires adjuvant therapy in the form of chemo or radiation by its precise staging in hands of an experienced laparoscopic surgeon.

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Compliance with Ethical Standards

Conflict of interest Dr. Kavitha Yogini Duraisamy, Dr. Malathi Ezhilmani, Dr. Devi Balasubramaniam and Dr. Kodeeswari Periyasamy declare that they have no conflict of interest, and there is no violation of human rights.

Ethical Statement All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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