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Original Research Article

Total laparo-endoscopic single site surgery hysterectomy for endometrial cancer: a single-centre retrospective review

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ABSTRACT

Background: LESS surgery is a novel technique for benign gynaecological conditions. It has advantages of shorter operative stay, less post-operative pain, better cosmesis, and improved patient satisfaction. However, similar data is limited in endometrial cancer. This study aims to analyse the peri- and post-operative outcomes of LESS surgery for endometrial cancer.
Methods: This was a retrospective, single-centre study. One gynae-oncologist trained in minimally invasive surgery performed 97 cases of LESS surgery for endometrial cancer at Singapore General Hospital, Singapore from January 2018 to December 2023.
Results: 97 patients were recruited for this study. At the time of pre-operative staging, 72 women were Stage IA, and 22 IIB. All underwent total hysterectomy bilateral salpingo-oophorectomy, with 90 and three patients undergoing pelvic and para-aortic lymphadenectomy respectively. A median of 18 pelvic lymph nodes (IQR 13-21) were retrieved. The median operative time and operative blood loss was 165 minutes (IQR 130-196.25) and 100mls (IQR 50-150) respectively. The median hospitalization stay was 2 days (range 1-7). Two women were readmitted for ileus (POD20) and post-op fever secondary to urinary tract infection (POD14), both of which were managed conservatively. The median duration of follow up was 24.5 months. There was 1 reported case of recurrence. There were three deaths in this study.
Conclusions: Women with early-stage endometrial cancer should be offered LESS surgery. It is a safe and effective surgical option for the management of endometrial carcinoma.

Keywords: Endometrial cancer, Endoscopic surgery, Gynecology, Gynecology-oncology, Laparoscopy

INTRODUCTION

Endometrial cancer (EC) is one of the common gynecological malignancies in the female reproductive system, and its incidence is increasing worldwide. In Singapore, EC is the 4th most common gynecological cancer, with an overall survival rate of 71.9%.[1] According to the National Comprehensive Cancer Network (NCCN), the surgical-pathological evaluation of EC includes assessing the involvement of the uterus, fallopian tubes, ovaries, vagina, parametrium, peritoneum, omentum, as well as peritoneal fluid and lymph nodes either with full lymph node dissection or sentinel lymph node biopsy.[2] Accurate staging of EC is important, as it has implications for the treatment modality and overall survival of the patient. Surgical staging can be performed via various modalities such as open or minimally invasive surgery (MIS).

Systematic reviews and meta-analyses have shown that MIS is increasingly recognized for its reduction in surgical morbidity without compromising oncological safety.[3-6] Its benefits include decreased trauma, intraoperative bleeding, and faster post-operative recovery. In 2009, the adoption of single-port laparoscopy (SPL) for gynecology oncology was described by the Cleveland Clinic Foundation.[7] Since then, there has been increased utilisation of single-port surgical devices in the management of gynecological diseases, even in advanced procedures such as para-aortic lymphadenectomies. Multiple studies have shown that SPL is a safe and feasible technique to introduce into gynaecologic oncology practice.[8-10] To date, there are no publications on SPL for EC in Singapore. The objectives of our study are to: 1) consolidate our institutions' experience with SPL, also known as laparo-endoscopic single site surgery (LESS); 2) compare our surgical and oncological outcomes with other institutions LESS experiences; and 3) assess the feasibility and safety of LESS for surgical staging of EC.

METHODS

This was a single-centre, retrospective analysis of data from a prospectively-maintained database of women with endometrial cancer in our institution. Women who were histologically diagnosed with early-stage endometrial cancer and who were planned for a LESS surgery at Singapore General Hospital (SGH) between the period of February 2018 to December 2023 were included in the study.

Ethical approval was obtained from the SGH internal review board (IRB). All women signed an informed, institution-specific, harmonised consent prior to the surgery, and were adequately counselled about the possibility of a mini-laparotomy for specimen retrieval, or conversion to open surgery (laparotomy) if deemed necessary. The same surgeon performed all LESS surgeries: a senior gynecological oncologist with extensive experience in laparoscopic surgery for gynecological malignant tumours, as well as expertise in single-site laparoscopic surgeries. Data was collected for patient demographics, pathological information, operative procedures, adjuvant treatment, and postoperative disease status.

Evaluation index

Patient demographic data collected included age, body mass index (BMI), co-existing medical conditions and previous surgical history notably previous laparotomies, abdominal or pelvic surgeries. Oncologic variables collected included the type of surgery, stage of malignancy, grade, histology, adjuvant treatment and date of most recent follow-up. Surgical data collected included total operative time (defined as time from skin incision to skin closure), estimated operative blood loss (EBL) defined at the end of surgery, intra-operative complications (classified by the Calvein-Dindo Scale of surgical complications), and conversion rates (from single-port laparoscopy to either multi-port laparoscopy or laparotomy). Post-operative complications were defined as any adverse event occurring within 30 days of the surgery, and was considered severe if it resulted in an unplanned admission, blood transfusion, or a secondary surgical procedure.

Surgical procedure

Pre-operatively, our patients were assessed systematically before treatment recommendations. Following a diagnosis of EC, all women underwent Magnetic resonance imaging (MRI) or a Computed tomography (CT) scan for pre-operative radiological staging. These women were reviewed at our multi-disciplinary team (MDT) meeting, comprising the gynecology oncology team, radiologists, trained nurse specialists and pathologists, for treatment recommendations. Women with multiple medical comorbidities received early referral to anaesthesiologists for pre-operative assessment and optimization.

Patients were scheduled for same day admission and received antibiotic prophylaxis of cefazolin and metronidazole pre-operatively. IV Clindamycin was given to patients with penicillin allergy. Following general anaesthesia, women were placed in lithotomy position, both legs were fitted with sequential compression devices for venous thrombosis prophylaxis, the vagina was cleansed with povidone iodine solution, and the bladder drained with Foley catheter insertion. A simple uterine manipulator (Advincula arch) with Koh-efficient cup was placed vaginally by an assistant to optimize the exposure of the surgical field.

The single-port surgical technique was previously described by Goh et al. for hysterectomies.[11] It begins with a 1.5-2cm infra-umbilical incision, followed by the insertion of a homemade single-port system comprising an Alexis® wound retractor (Applied Medical, CA, USA) and a 7½ surgical glove fixed to its outer ring. Two 5mm trocars and one 12mm trocar were inserted through small incisions made at the fingertip portions of the glove, and a rigid 30-degree, 5mm diameter, 45cm-long endoscope was used. Intraoperatively, cytological washings of the pelvic and peritoneal cavities were taken. Thereafter, a total hysterectomy and bilateral salpingo-oophrectomy (THBSO), with or without a pelvic lymph node dissection (PLND) and para-aortic lymph node dissection (PAND) was carried out. The specimens were delivered vaginally, followed by laparoscopic closure of the vaginal cuff with absorbable barbed sutures.

Post-operatively, women were transferred to either the general ward or the high-dependency unit depending on the need for additional monitoring. They resume oral fluids and diet as per ERAS (Early Recovery After Surgery) protocol. In-dwelling catheters were routinely removed, and ambulation encouraged, on post-operative day (POD) 1. Discharge was recommended upon

successful spontaneous urination and re-establishment of regular diet, with no symptoms or signs of infection.

Literature review

We also conducted a systematic review of the bibliography pertaining to LESS in endometrial cancers. We searched PubMed central and Cochrane databases using keywords 'endometrial cancer', 'endometrial malignancy', 'laparoendoscopic single site surgery', 'single port laparoscopic surgery' and 'single port'. We only included studies that were in English. Duplicate studies, or studies that did not specify the indicators that we were comparing, were excluded. To ensure relevance of studies, we only included papers between January 2001 to December 2023 that presented at least 50 patients in each cohort.

RESULTS

Patient demographics

The 97 women who were recruited had a median age of 61.0 (IQR 55-69) and median BMI of 23.6 (IQR 21.3-25.3). Twenty-two women were nulliparous and 75 parous. Eighty-four women had at least one significant comorbidity. Nine women had ischemic heart disease, two of whom required antiplatelet therapy. Four women were on anticoagulation, three of whom had atrial fibrillation and one had a mitral valve replacement. Eight (8.2%) women had previous abdominal surgeries, while 49 (50.5%) had previous pelvic surgeries. At the time of pre-operative staging, 72 (74.2%) women were stage 1A, and 22 (27%) 1B (Table 1).

Table 1: Patient demographics and pre-operative oncological data.

Variables		Pre-operative oncological data
Median age in years (range)		61.0 (29-90)
Median BMI in kg/m² (range)		23.6 (14.2-33.3)
Parity, N (%)	Nulliparous	22 (22.7)
	Multiparous	75 (77.3)
Comorbidities, N (%)	Total number of patients with comorbidities: 84 (86.6)	
	Chronic hypertension	47 (48.5)
	Hyperlipidaemia	36 (37.1)
	Diabetes mellitus	20 (20.6)
	Heart disease	9 (9.3)
	Chronic kidney disease	4 (4.1)
	Stage 5	3 (3.1)
	Stage 1	1 (1.0)
	Antiplatelet therapy	2 (2.1)
	Anticoagulation therapy	4 (4.1)
	Others: gastrointestinal, rheumatic, thyroid disease	40 (41.2)
Past surgical history, N (%)	Total number of patients with previous surgeries: 63 (65.0)	
	Pelvic surgeries: 49 (50.5)	
	1 caesarean section	7 (7.2)
	2 caesarean sections	11 (11.3)
	3 caesarean sections	1 (1.0)
	Myomectomy	2 (2.1)
	Ovarian cystectomy	8 (8.2)
	Abdominal surgeries: 8 (8.2)	
	Appendicectomy	2 (2.1)
	Bowel resection	1 (1.0)
	Renal transplant	2 (2.1)
	Triple aortic aneurysm surgery	1 (1.0)
	Surgeries in other areas (ENT, breast, etc)	32 (32.9)
ASA grade, N (%)	Grade 1	6 (6.2)
	Grade 2	73 (75.3)
	Grade 3	18 (18.5)
Pre-operative radiological stage - Internal Federation of Gynecology and Obstetrics (FIGO) N (%)	Stage IA	72 (74.2)
	Stage IB	22 (27)
	Stage II	1 (1.0)
	Stage III	1 (1.0)
	Stage IV	1 (1.0)

Continued.

Variables		Pre-operative oncological data
Pre-operative grade – FIGO N (%)	Grade 1	57 (58.8)
	Grade 2	34 (35.1)
	Grade 3	6 (6.2)

Operative analysis

The median operative time and median operative blood loss was 165 minutes (range 90-280) and 100mls (range 10-500) respectively. The average uterine size was 118g, and the median pelvic lymph node count was 17.6 (range 6-44). A total of 90 (92.8%) women underwent THBSO-PLND). Three (3.1%) women had THBSO-PLND with PAND as pre-operative imaging revealed enlarged para-aortic lymph nodes. The final histology for these women did not show any para-aortic lymph node metastasis. The remaining five women underwent THBSO only: one patient declined lymphadenectomy at the pre-operative counselling stage.

Two patients with a pre-operative radiological diagnosis of metastatic EC underwent palliative THBSO and the remaining two patients underwent THBSO only in view of extensive comorbidities (age of 90, history of renal transplant) with a radiological stage of IA, as per MDT recommendations.

Table 2: Operative details.

Median operative time in minutes		165 (IQR 130-196.25)
Median volume of blood loss in ml		100 (IQR 50-150)
Average uterine size in grams		117.4±71.9
Average tumor size in mm		28.8±17.1
Median number of lymph nodes dissected (range)		18 (IQR 13-21)
Procedure	THBSO only, (%)	5 (5.1)
	THBSO and PLND, (%)	89 (91.8)
	THBSO, PLND and PAND, (%)	3 (3.1)
Additional procedures	Conversion to laparotomy, (%)	0
	Conversion to multi-port laparoscopy, (%)	0
	Mini-laparotomy for specimen retrieval, (%)	0
	Adhesiolysis, (%)	30 (30.9)
	Omentectomy, (%)	16 (16.5)
	Repair of vaginal laceration, (%)	1 (1)
	Blood transfusion intra-operatively, (%)	3 (3.1)

None of the surgeries required a conversion to laparotomy, multi-port laparoscopy, or a mini-laparotomy for specimen retrieval. Thirty (30.9%) women required adhesiolysis. Port placement was successful in all cases, without incidental or inadvertent port removal. No fascial, vascular or visceral injuries, loss of pneumoperitoneum, or intraoperative port-site bleeding was noted. The findings are summarized in Table 2.

Post-operative analysis

Table 3 summarizes the post-operative outcomes for the study population. Eight women required high dependency unit (HDU) admissions in view of multiple medical comorbidities, and all were routinely stepped down to the general ward the next morning. None were admitted to the intensive care unit (ICU). The median inpatient stay lasted 2 days (range 1 to 7). One immunocompromised woman with renal transplant and multiple comorbidities was discharged on POD7 after completing one week of intravenous antibiotics. Two women were discharged on POD6 following one week of inpatient dialysis. One woman discharged on POD5 required inpatient hemodynamic monitoring while restarting anticoagulation for paroxysmal atrial fibrillation.

Table 3: Post-operative outcomes.

Median length of stay (days)		2 (range 1-7)
Post-operative monitoring, (%)	Intensive care unit	0 (0)
	High dependency unit	8 (8.2)
Post-operative ambulation, (%)	POD1	66 (68.0)
	POD2	15 (15.5)
	POD3	1 (1)
	POD6	1 (1)
Average haemoglobin levels in g/dL	Pre-operative	12.6
	Post-operative	11.1
Complications - Calvein Dindo Scale, (%)	Total number of complications: 12 (12.4)	
	Grade 1	7 (3.1)
	POD1 fever	6 (1)
	Ileus	1 (1)
	Grade 2	4 (4.1)
	Blood transfusions	3 (3.1)
	Urinary tract infection	1 (1)
	Grade 3	1 (1)
	Grade 4	0

Sixty-six (68.0%) women were ambulant on POD1. Post-operatively, six patients had fever on POD1, which they recovered from spontaneously. One woman experienced postoperative ileus. The average pre-operative Haemoglobin (Hb) level was comparable to post-operative Hb levels. Three women required blood transfusions post-operatively in view of their medical comorbidities. Only two women were readmitted for ileus (POD20) and post-op fever secondary to urinary tract infection (POD14), both of which were managed conservatively.

Oncological outcomes

Final histopathology confirmed 64 (69.1%) women had Stage IA, 20 (20.6%) had Stage IB, six (6.2%) women had Stage II and 7 (7.2%) had at least Stage III disease. Histology confirmed 34 (35.1%) were FIGO Grade 1, 46 (47.4%) were Grade 2, and 17 (17.5%) were Grade 3. Eighty-four (86.6%) women had a histology of endometroid adenocarcinoma.

Six women (6.2%) received chemotherapy only, whereas 10 (10.3%) received chemotherapy and radiotherapy. Ten (10.3%) and 29 (29.9%) women received pelvic radiotherapy and vault brachytherapy respectively. 42 women (43.3%) did not receive any adjuvant therapy. Patients were followed up for an average of 24.5 months (range 0.6-66.3). The findings are summarized in Table 4.

Table 4: Post-operative oncology outcome measures.

		N (%)
Final FIGO stage, (%)	Stage IA	64 (69.1)
	Stage IB	20 (20.6)
	Stage II	6 (6.2)
	Stage III and above	7 (7.2)
Final grade, N (%)	Grade 1	34 (35.1)
	Grade 2	46 (47.4)
	Grade 3	17 (17.5)
Final histology, N (%)	Endometroid adenocarcinoma	84 (86.6)
	Others	13 (13.4)
Postoperative adjuvant therapy, N (%)	Chemotherapy only	6 (6.2)
	Chemotherapy and radiotherapy	10 (10.3)
	Pelvic radiotherapy	10 (10.3)
	Vault brachytherapy	29 (29.9)
	No adjuvant therapy	42 (43.3)
Oncological follow-up	Median follow-up duration in months (range)	24.5 (0.6-66.3)
	Recurrence	1 (1.0)
	Deaths, (%)	3 (3.1)

There were three deaths in this study. Mdm S was a 74-year-old lady who was diagnosed concurrently with metasynchronous endometrial and lung cancer, and eventually died 1 month after undergoing a lobectomy procedure. Mdm C, aged 68 years old, had a pre-operative radiology stage 4B classification, with sites of disease at her uterus, peritoneum, and pelvic, axillary and inguinal lymph nodes. She underwent six cycles of chemotherapy with Paclitaxel and Carboplatin with partial response (resolution of tumour except in her uterus). Despite palliative THBSO for persistent per-vaginal bleeding, her cancer progressed 1 year later and she received terminal care at an inpatient hospice. Mdm K, aged 55 was initially staged with FIGO IB disease but declined adjuvant vault and pelvic radiotherapy and relapsed after a disease-free interval of 4 months with recurrence in her peritoneum, bone and vault. Her cancer was subsequently refractory to palliative chemotherapy, and she passed away secondary to metastatic endometrial cancer.

Literature review

After applying our exclusion criteria, 35 papers were read in full. We analysed a total of six papers and compared their findings with our results. The remaining 29 papers were not analysed as specific information relevant for comparison such as BMI, age, operative complications, and indications for surgery were not detailed in the paper. Our findings and comparisons are summarized in Table 5.

DISCUSSION

Our institution's experience has demonstrated that LESS for patients with endometrial cancer (EC) is safe and effective. To date, many authors have demonstrated the feasibility of LESS as a surgical approach in the management of endometrial carcinoma. It has proven effective in decreasing post-operative pain, providing better cosmesis and shortening hospitalisation stay, without compromising on post-operative complications nor the rates of recurrence and overall survival.[15-18] One key element in assessing LESS' effectiveness specific to EC is its feasibility regarding lymph node dissection. Park et. al found that there was no statistically significant difference in lymph nodes retrieved for LESS compared to conventional laparoscopic surgery. They also found no statistically significant difference for other outcome parameters such as operating time, EBL, and peri- and post-operative complications.[21]

As seen in Table 5, the median number of lymph nodes removed in our study is 18, which is comparable to other international studies of 14, 18, 27, 23 and 30. Intraoperatively, our median operating time and EBL are comparable with that of other institutions. Our institution had zero conversions to multi-port laparoscopy and generally fewer complications compared to other studies. Post-operatively, our median inpatient stay was two days and all women ambulated on POD1. Lastly, majority of women, at time of writing, were observed to have a good survival rate in terms of oncological outcomes.

Table 5: Comparisons with other international studies.

Papers	Our study	Chambers et al[12]	You et al[13]	Fagotti et al[14]	Barnes et al[9]	Fagotti et al[15]	Corrado et. al[16]
Country of study	Singapore	USA	China	Italy, USA	USA	Italy, USA	Italy
Total number of patients	97	284	78	75	110	100	50
Patient demographics							
Median age (years)	61.0 (29-90)	63.6	50.3 (mean)	58	63 (mean)	58	45
Median BMI (kg/m^2)	23.6 (14.2-33.3)	31.7	24.4 (mean)	27	34 (mean)	26	21.8
Comorbidities (%)							
Chronic hypertension	47 (48.5)	NR	13 (16.7)	NR	68 (62)	NR	NR
Diabetes	20 (20.6)	NR	6 (7.6)	NR	27 (25)	NR	NR
Previous pelvic surgery	57 (58.8)	NR	41 (52.6)	23 (30)	61 (55)	35 (35)	(29.7)
Surgery performed (%)							
THBSO	4 (4.1)	NR	3 (3.85)	44 (58.7)	NR	52 (52)	NR
THBSO-PLND	90 (92.8)	NR	47 (60.3)	31 (41.4)	NR	21 (21)	NR
THBSO-PL/PAND	3 (3.1)	NR	28 (35.9)	NR	NR	27 (27)	NR
Operative details							
Type of port	**Self-constructed Gloveport with Alexis retractor**	**Multi-access port (GelPOINT, GelPORT)**	**4 channel single-port device**	**Single multi-channel port (Triport, GelPORT)**	**Single-port device (Applied Medical ®)**	**Single multi-channel port (Triport, GelPORT)**	**3-channel Single-Incision laparoscopic Surgery (SILS) port**
Median operative duration	165 (90-280)	NR`	207.5 (180-251)	122 (45-220)	186 (mean)	129 (45-321)	100 (50-240)
Median EBL	100 (0-500)	NR	100 (50-100)	50 (10-500)	242 (mean)	70 (10-500)	90 (10-300)
Median no. of LNs removed	18 (6-44)	NR	23 (16-28)	17 (19-29)	30 (mean)	18 (1-33)	14 (5-20)
Conversion to lap	0	NR	4 (5.13%)	3 (4%)	7 (6.3%)	2 (2%)	0
Operative complications	2 (2.1%)	NR	3 (3.85%)	3 (4%)	4 (3.6%)	4 (4%)	0
Oncologic factors (%)							
Stage							
IA	64 (69.1)	218 (77)	63 (80.8)	67 (89.4)	58 (52.7)	88 (87.5)	35 (70)
IIB	20 (20.6)	25 (8.8)		5 (6.7)	20 (18.2)	6 (5.7%)	11 (22)
II	6 (6.2)	9 (3.2)	2 (2.56)	2 (2.6)	3 (3.7)	3 (3.4%)	3 (6)
≥III	7 (7.2)	31 (11.1)	13 (16.6)	1 (1.3)	25 (22.7)	3 (3.4%)	1 (2)
Histology (%)							
Endometroid	84 (86.6)	240 (84.5)	67 (85.9)	72 (96)	99 (90)	93 (93)	49 (98)
Others	13 (13.4)	44 (15.5)	11 (14.1)	3 (4)	11 (10)	7 (7)	1 (2)
Grade							
G1	34 (35.1)	154 (54.5)	65 (83.3)	65 (86.7)	69 (63)	83 (83)	18 (36)
G2	46 (47.4)	71 (25.1)	3 (3.85)		25 (23)		26 (52)
G3	17 (17.5)	58 (20.5)	10 (12.8)	10 (13.3)	5 (4)	17 (17)	6 (12)

Continued.

Papers	Our study	Chambers et al[12]	You et al[13]	Fagotti et al[14]	Barnes et al[9]	Fagotti et al[15]	Corrado et. al[16]
Post-operative outcomes							
Median length of stay (days)	2 (1-7)	NR	5 (mean)	1 (1-4)	1.3 (mean)	NR	3 (2-9)
Post-op complications within 1m	12 (12.4%)	NR	7 (8.97%)	3 (3.9%)	4 (3.6%)	NR	4 (8%)
Readmissions within 1m	0	NR	0	NR	12 (11%)	NR	0
Median follow up duration	24.5 (0.6-66.3)	31.1 (0.5-86.3)	41 (16-62)	NR	NR	NR	36 (16-62)
Deaths	3 (3.1%)	NR	1 (1.28%)	NR	NR	NR	1

Despite its evaluation in gynecological oncology for the past decade, LESS has yet to be routinely adopted by gynaecologic oncologists. One of the main barriers to its usage is the increased surgical challenge through a single incision. Compared to conventional laparoscopy, the optical surgical field is now limited to a single orifice, through which all operative instruments are mutually inserted. This creates a parallel angle of the camera and instruments, which in turn compromises the range of movement of the assistant and surgeon in creating an optimal view of the surgical field. Additionally, the single incision in LESS eliminates the presence of a surgical triangle, making it difficult to operate in an ergonomic fashion. 'Sword-fighting' then ensues, when difficulties are encountered internally in manipulating the camera and surgical instruments, and externally between the surgeons' hands within the compromised space.[19]

LESS is a single-fulcrum surgery where a cross-handing technique is occasionally employed.[20] This involves the external crossing of hands or internal crossing of instruments to increase the range of motion for surgery, which can lead to more complex surgical maneuvers and conceptualisation of the operation. Inevitably, surgeons need a certain amount of surgical experience and a cross-learning curve to become optimally competent. Barnes et. al report improvements in surgical time that could be observed after approximately 20 cases.[9] The use of articulating instruments, curved instruments, and flexible scopes of varying sizes and lengths could also help to alleviate the technical challenges faced by surgeons. However, the added costs of such equipment may preclude routine utilization.

We have gleaned some learning points from our study and its comparisons. First, patient selection is important in deciding the method of surgery. Our data shows that for a specific group of individuals, LESS is a safe and effective method with good outcomes. However, the same may not be true for patients with different characteristics, for instance with a higher BMI, multiple previous abdominal surgeries, or requiring extensive adhesiolysis (which may require additional instruments for traction). Second, the importance of surgical training for laparoscopic and LESS must be considered. Conrad et. al found that generally, six or more minimally invasive procedures per month would be appropriate for fellowship training, while Woelk et al found that surgical proficiency is obtained after approximately 91 procedures.[22,23] As MIS becomes more prevalent and advanced, efforts should be focused on training and equipping residents. Future studies should include a comparison of LESS stratified across different patient demographics, as well as comparisons of different MIS modalities. More prospective studies are also needed to recommend guidelines and goals for surgical training in these fields.

One important strength of this study is the standardized nature of the practice, as a single surgeon at a single institution performed the surgeries. Additionally, it is unique – our multi-port device is self-assembled via a glove-port, which shows no compromise in the quality of the surgery at no additional cost to the patient. Our patient demographics are more representative of populations in Asia and Southeast Asia, which shows BMI ranges comparable with You et al (23.6 and 24.4 respectively) as compared to ranges in the 30s.[13] To our knowledge, this is the only study in our area reporting specifically on oncologic outcomes in patients who have undergone LESS for EC. Some study limitations include the small number of cases, the retrospective nature of the study, and the susceptibility to biases inherent in this design. A median follow up duration of 24.5 months is inadequate to document the mortality and recurrence rates for long-term survival. Additionally, there is no comparison group to compare our outcomes against, although the authors hoped to mitigate this by comparing our data with other institutions.

CONCLUSION

In conclusion, our study reaffirms prior evidence that LESS is a feasible, safe and effective surgical option for the management of endometrial carcinoma.

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Ethical approval: The study was approved by the Institutional Ethics Committee (CIRB Ref No. 2021/2186)

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