Original Article

Laparoscopic Pelvic Surgery for Endometrial Cancer

Eng-Hseon Tay,[1] *FRCOG (UK), MMed (O & G), DGO (RANZCOG)*

Abstract

 Introduction: The traditional approach for the treatment of endometrial cancer by laparotomy is increasingly being replaced by laparoscopic surgery. The advantages of laparoscopy have been well-documented. Laparoscopy avoids the morbidity of a laparotomy, overcomes the limitations of vaginal hysterectomy, provides adequate pathological information for an accurate surgical staging and expedites the postoperative recovery of patients. This paper reports the outcome of a series of 50 consecutive cases of laparoscopic hysterectomy and pelvic lymphadenectomy for endometrial cancers that were performed by the author. The objective is to review the perioperative, postoperative experience and survival outcomes of patients with endometrial cancer managed by laparoscopic surgery performed by a single surgeon. Materials and Methods: The records of 50 consecutive patients with endometrial cancers from October 1995 to October 2007 treated by laparoscopic pelvic lymphadenectomy and laparoscopic hysterectomy (total and assisted) were retrospectively reviewed. Data on patients' attributes, endometrial cancers, surgical procedures, surgical complications and morbidity, perioperative experience, length of hospital stays and clinical outcome were analysed. Results: Laparoscopic surgery was successful in all 50 patients and is clearly an option for the treatment of early endometrial cancer. Conclusion: Careful patient selection and surgical competency are instrumental in ensuring successful treatment.

              Ann Acad Med Singapore 2009;38:130-5

Key words: Endometrial cancer, Hysterectomy, Lymphadenectomy, Laparoscopic surgery, Uterine cancer

Introduction

 The traditional approach for the treatment of endometrial cancer by laparotomy is increasingly being replaced by laparoscopic surgery.[1] Like laparotomy, operative laparoscopy can accomplish the full surgical procedures, which include doing a complete intraperitoneal survey, obtaining peritoneal washings, removing of the adnexae and performing pelvic and para-aortic lymphadenectomy and total hysterectomy.[2-4]

 The advantages of laparoscopy have been well-documented. Laparoscopy avoids the morbidity of a laparotomy, overcomes the limitations of vaginal hysterectomy, provides adequate pathological information for an accurate surgical staging and expedites the postoperative recovery of patients.[2,3]

 Laparoscopic hysterectomy and pelvic lymphadenectomy for endometrial cancers were first performed at KK Women's & Children's Hospital in the late 1990s. The results of the first 16 cases in the learning curve were reviewed[5] and the positive outcome led to more frequent use of such surgery. With increasing experience, surgical confidence and acceptability by patients, the numbers of these surgeries increased to 64 cases, of which 50 cases (78%) were performed by the author.

 However, as for all surgery, selection of appropriate patients with endometrial cancers for such surgery and surgical competency are key factors for positive outcomes both in terms of surgical success and cancer cure rate. Inadequate surgery could result in the patient developing recurrent or metastatic cancer, which is fatal. As such, surgeons venturing into laparoscopic approach must first be very competent in open surgery and need to audit the surgical and survival outcomes of all of his/her laparoscopic cases.

 This paper reports the outcome of a series of 50 consecutive cases of laparoscopic hysterectomy and pelvic lympha-

[1] Thomson Women Cancer Centre, Singapore
Address for Correspondence: A/Prof Tay Eng-Hseon, Thomson Women Cancer Centre, 10, Sinaran Drive, Square 2, Novena Medical Centre, #09-15/16, Singapore 307506.
Email: ehtay@tmc-sin.com.sg

denectomy for endometrial cancers that were performed by the author.

Materials and Methods

From October 1995 to October 2007, 50 consecutive cases of patients with endometrial cancers who were treated by laparoscopic pelvic lymphadenectomy and hysterectomy (total and assisted) by the same surgeon were studied.

Only patients who fulfilled the selection criteria were treated by laparoscopic surgery. These include patients with: endometrioid endometrial carcinomas, cytological grade of not more than 2 out of 3, clinically early stage disease, a mobile uterus on pelvic examination no larger then 12-weeks gravid uterus, no contraindications to laparoscopic surgery and patients who gave their consent.

All patients were informed and counselled on the options of laparoscopy and laparotomy before they gave informed consent for laparoscopy. All patients who underwent the surgery had preliminary histological diagnosis obtained through uterine dilatation and curettage. This series excluded patients treated solely by laparoscopic hysterectomy, without pelvic lymphadenectomy.

The key clinical parameters recorded include: patients' age, parity, body mass index (BMI); FIGO surgical stage, histo-pathology; cytological grade and the number of lymph nodes yielded. The operative outcomes were perioperative complications, surgical duration, need for perioperative blood transfusions and conversion to laparotomy. The postoperative recovery measures included the use of analgesics, speed of oral intake and ambulation, postoperative hospital stay and postoperative change of haemoglobin levels. The postoperative morbidities studied were: fever (defined as temperature 38^0C or higher on 2 occasions over 48 hours), urinary tract infection, respiratory tract infection, wound infection, pelvic lymphocyst with or without abscess, deep venous thrombosis and pulmonary venous embolism, intestinal or ureteric fistula and return to operating theatre within 14 days following the primary surgery. The type of postoperative adjuvant therapy, overall survival period, disease-free survival period, disease recurrence, port-site disease and any long-term complications were analysed.

Operative Technique

The typical operative management of a patient is described as follows. Routine preoperative investigations are performed for all patients. Pelvic ultrasound and pelvi-abdominal computed tomography (CT) scan are optional studies. The routine bowel preparation consists of 2 doses of 45 mL of Oral Fleet on the eve of surgery. Thrombo-prophylaxis is given in the form of thrombo-embolism deterrent stockings (TEDS) worn preoperatively,

perioperative intermittent pneumatic calf compressors and postoperative subcutaneous Fraxiparine. Prophylactic antibiotics, using cefazolin and metronidazole, are started at the commencement of surgery and continued postoperatively for at least 24 hours for all patients.

After the patient is put under general anaesthesia, he is placed in a modified lithotomy position using Allen's stirrups. Routinely, an indwelling urinary catheter is inserted into the patient and a laparoscopic spoon or a colpotomiser is placed within the uterus for manipulation.

Abdominal entry is established via an umbilical 10-mm port for the laparoscope, two 5-mm ports on either side of the abdominal wall and one more 5-mm port suprapubically (Fig. 1).

All the surgeries are carried out in the same manner as that performed by laparotomy. It begins with an inspection of the entire abdominal-pelvic cavity. A sample of peritoneal fluid is obtained for cytology. The round ligaments are grasped before being transected and the peri-vesical and obturator spaces are first fully opened. Next, the proximal pelvic ureters are identified and their courses are traced ventrally. The internal iliac arteries are then identified to facilitate the opening of para-rectal spaces. The surgical limits of the pelvic lypmhadenectomy are thus delineated. The area of pelvic lymphadenectomy is outlined by the common iliac artery cephaladly, the psoas muscle laterally, the circumflex iliac vein and pubic bone caudally, the umbilical ligament medially, and the obturator nerve in its fossa inferiorly (Appendix 1).

Laparoscopic Lymphadenectomy

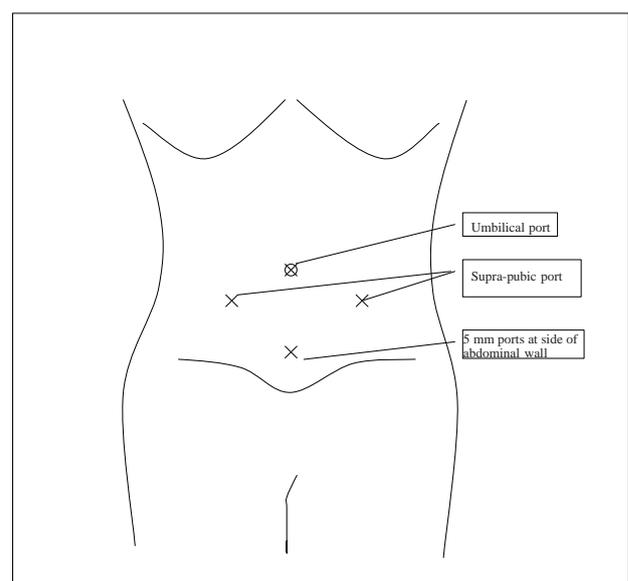A typical laparoscopic pelvic lymphadenectomy starts with the detachment of the external iliac chain of nodes
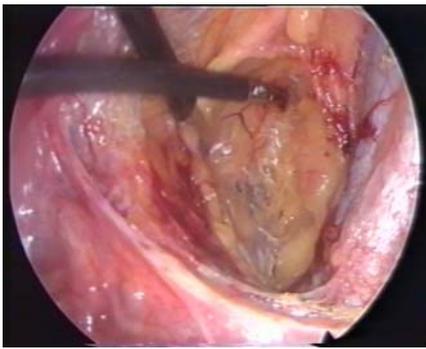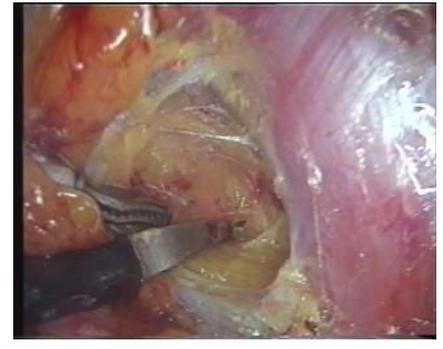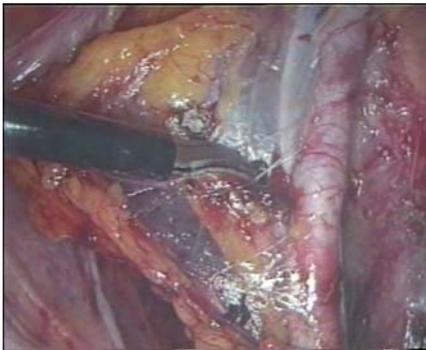

Fig. 1. Placement of port sites.
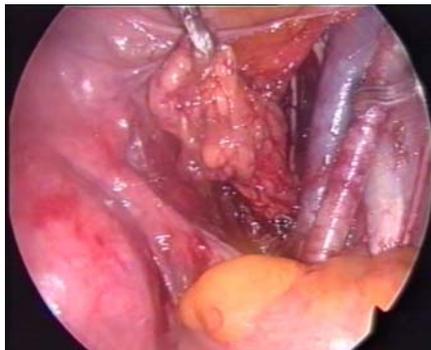
Para-vesical Space

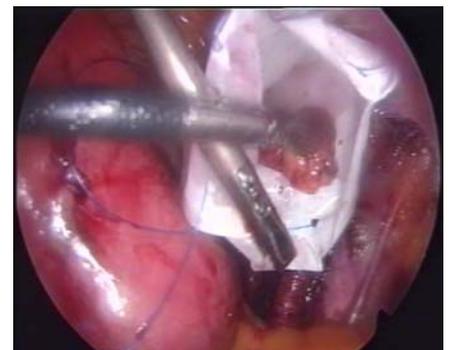Uterine artery & Superior vesical artery

Pelvic Sidewall – Obturator Space

External Iliac Lymph Nodes Space

Obturator Lymph Nodes Space

Collection of lymph nodes into endo-bag.

Appendix 1. Surgery photographs.

from the psoas muscles. Traction is applied on the external iliac vessels medially and the obturator nodes are separated from the lateral pelvic sidewalls, down to the level below the obturator nerve, which will ease the dissection of the obturator nodes. The external iliac nodes are first removed en-bloc, beginning with freeing the nodes from the psoas muscles and distal inguinal attachments and then detached from the external iliac artery cephalad-ward to the level of the common iliac artery. Medially, the nodes are freed from the iliac vein. The external iliac group of lymph nodes is first removed, intact, and placed in the pouch of Douglas (POD).

The dissection of the obturator group of lymph nodes begins with retracting the external iliac vessels laterally exposing the pelvic sidewall and frees the nodes inferiorly from the obturator nerve. The nodes are fist detached from their anterior attachment and then progressively freed proximally along the obturator nerve until the entire group of nodes is mobilised. Detachment at its proximal carries the risk of injuring the obturator nerve and internal iliac vein and hence demands special precautions.

Finally, the group of common iliac nodes is removed, dissecting them free from their attachment to the common iliac vessels and on the right side, from the distal end of the inferior vena cava.

Laparoscopic Hysterectomy

By this stage of surgery, the ureters, iliac vessels and all the pelvic spaces are clearly displayed. Laparoscopic hysterectomy and bilateral salpingo-oophorectomy can now be performed with ease, starting with isolating and desiccating the infundibulopelvic ligaments bipolar electro diathermy before being transected. The utero-vesical space is then opened and the bladder is freed from the uterus and upper anterior vagina.

Both the uterine arteries are well-visualised following pelvic lymphadenectomy and they can be desiccated and transected with ease. The upper cardinal ligaments are diathermised before detachment. At this point, the presenting ring of the uterine colpotomiser becomes prominent appreciable visual and by tactile probing.

The hysterectomy is completed by transecting the vagina circumferentially, using a mono-polar point-diathermy. The specimen is delivered vaginally intact. Copious amount of sterile water is flushed through the pelvis and drained out vaginally to clean out the pelvic cavity. One pelvic "Redivac" drain is inserted before closure of surgery.

Postoperative Management

Patients were discharged when the skin incisions were healing well, surgical drains were removed and when they

were fully ambulant, afebrile, retaining diet and postoperative pain was manageable.

Results

Patients' Profile

The ages of the patients treated laparoscopically ranged from 22 to 76 years, with a median age of 51 years. In this series, older patients were included with 10 patients (20%) being above the age of 60 (Table 1). The median BMI (weight/height²) was 25 (range, 18 to 43). Twenty per cent of the patients had a BMI of 30 kg/m² or more and 3 patients had a BMI of more than 35 kg/m².

Histology

FIGO Staging was used and the surgical-pathological stages cross-tabulated against the final histo-pathological cell type and cytological grades are presented in Table 2.

Based on the hysterectomy specimens, 49 cases (98%) were confirmed to be endometrioid adenocarcinoma and the majority of them are in FIGO Stage IA (60%). One case that initially had a curettage diagnosis of moderately differentiated adenocarcinoma was later found to be serous carcinoma-FIGO Stage IIIA.

Operative Outcome

A total of 50 patients had both laparoscopic lymphadenectomy and hysterectomy. There were 2 patients who had hysterectomy performed earlier and were consequently subjected to laparoscopic staging and pelvic lymphadenectomy. The surgical times for these 2 patients, being shorter, were excluded from analysis.

Duration of surgery ranged from 2 to 7 hours with a median of 3 hours; 80% of the total cohort had their surgeries completed in less than 4 hours (hysterectomy and lymphadenectomy). There were 4 cases that took about 6 hours or more with the longest case taking 7 hours because of difficult venous access at the commencement of surgery, technical difficulties due to extensive abdominal adhesions of the omentum and the uterus to previous midline scar for caesarean section. In addition, intraoperatively the patient was found to have sleep apnoea (OSA) that was not previously diagnosed. The other 3 cases that took 6 hours each were due to seroso-muscular injury to the large intestine, a mini-laparotomy needed to deliver a larger-than-expected uterus that could not be removed vaginally intact and a case which needed more time to secure a haemostasis of the bladder base.

Intraoperative difficulties were encountered in another 4 cases where surgery was completed smoothly within 4 hours. The difficulties encountered were a case of difficult intubation, 2 cases of extensive omental adhesions from previous laparotomy and a case of perineal tear.

Table 1. Age Distribution of Patients

Age (y)	2003 study		Current study	
	Frequency	%	Frequency	%
40 or younger	3	18.7	10	20
41-50	5	31.2	12	24
51-60	6	37.5	18	36
61-70	2	12.5	5	10
71-80	-	-	5	10
Total	16		50	

Table 2. FIGO Staging and Cytological Grade

FIGO Stages	Grade 1 (%)	Grade 2 (%)	Grade 3 (%)	Total (%)
Endometrioid adenocarcinoma				
I A	28	2	–	30 (60)
I B	11	–	1	12 (24)
I C	2	1	1	4 (8)
III A	–	–	1	1 (2)
III C	1	1	–	2 (4)
	42 (84)	4 (8)	3 (6)	
Serous carcinoma				
III A	–	–	1	1 (2)

Intraoperative blood losses were not significant in the majority of the patients (80%). A 2nd postoperative day haemoglobin level was routinely measured for all patients and the changes compared with the preoperative level were calculated. The average postoperative difference was lower by only 1.2g/%. Four patients had a blood-loss recorded as between 100 to 300 mL and 5 patients with blood-loss recorded as between 300 to 600 mL. One patient had a blood-loss of 800 mL. This patient needed surgical haemostasis for the base of the bladder, but no blood transfusion was needed. The patient's preoperative haemoglobin level was 12.7g/% and 10.1g/% on postoperative day 2. Only 1 patient needed intraoperative blood transfusion, whose preoperative haemoglobin level was 8.9g/%, and it improved to 9.9g/% on postoperative day 1. No significant blood loss was recorded for this patient.

Laparoscopic pelvic lymphadenectomies were carried out in all 50 patients. The lymph nodes were harvested en-bloc, without "cherry-plucking", in 3 major groups on each side of the pelvis, namely, external iliac nodes, obturator nodes and the common iliac nodes. The pelvic nodes were contained in bags before removal through the 10-mm port-site without "contaminating" the abdominal wall. The average lymph nodes harvested were 22, with a median of 20.

Postoperative Recovery and Morbidity

A great majority of the patients (70%) stayed in the

hospital for 5 days or less after the surgery, with a median of 4 days. Two patients stayed for only 2 days while 15 patients stayed longer than 5 days. The longest postoperative stay was 17 days because the patient suffered from postoperative depression and was kept under observation with psychological treatment. Five patients stayed in hospital for longer than 7 days (7 to 14 days): 1 was due to postoperative ileus and the patient underwent port-site hernia repair on postoperative day 7. The patient also had urinary tract infection that was resolved with antibiotics treatment. The remaining 4 had unusually high pelvic lymphatic fluid drainage.

There were 2 cases of intestinal (small intestines) herniation through the port-site within 14 postoperative days. Both patients needed surgical reduction and hernia repair, and their recoveries thereafter were uneventful.

Forty-four per cent of the patients were fully ambulating by the first postoperative day and 92% of them could do so by the early part of the second day. The majority of the patients (70%) tolerated oral intake well on the first POD and only 2 patients could not do so by the second POD.

As a routine, the urinary catheter is taken off on the second postoperative day (82%) and only 18% had the catheter kept beyond the routine period of 2 days. Most patients (76%) had only 1 pelvic drain and 68% of them had their pelvic drains removed by the 4th postoperative day.

Use of Analgesics

The majority of the patients needed only oral analgesics (82%). The most frequently used analgesics are mefanamic acid (70%), followed by paracetamol (46%) and diclofenac sodium (26%). Most were discontinued by the 3rd postoperative day. A total of 6% of the patients used patient-controlled analgesia and 12% of the patients used on-demand intramuscular pethidine. All parenteral analgesia was discontinued by the 2nd postoperative day.

Adjuvant Treatment

Twelve patients (24%) required adjuvant treatment, of which 9 had vault radiotherapy, 2 had extended-field radiotherapy and 1 patient had both chemotherapy and radiotherapy. The last patient mentioned had serous carcinoma of the uterus, tolerated chemotherapy poorly and the treatment was abandoned after 2 cycles of paclitaxel and carboplatin.

Recurrence and Survival

The follow-up period was defined as the time period between the date of surgery and the last overall follow-up. The median follow-up period was 29 months (mean, 36; range, 1 to 143). Four patients defaulted follow-up visits.

The median disease-free survival, calculated from the date of surgery to the date of the last disease-free follow-up was 29 months (mean, 35; range, 1 to 143) with 11 patients (22%) who have survived more than 5 years. There was no case of port-site disease.

Two patients developed further diseases following their primary treatment. One patient who had FIGO stage IIIC endometrial cancer and treated with radiotherapy postoperatively, developed distant lymph node metastases 21 months after her primary surgery. She was treated with chemotherapy. She survived another 7 months, making her total survival period of 29 months before dying of the disease. Another patient with FIGO stage IA endometrioid endometrial carcinoma was disease-free for 35 months postoperatively when a routine follow-up discovered she had intraperitoneal disease. At laparotomy, a new peritoneal cancer was diagnosed and the histology of the second cancer was serous carcinoma. A review of the histological specimen of her endometrial cancer was done and no serous carcinoma was detected.

Discussion

It is important to bear in mind that laparoscopic surgery is a treatment modality, and not a treatment by itself.[6] Therefore, the preference to use laparoscopic surgery can be evaluated in terms of (a) its effectiveness, (b) patient recovery and (c) ease of surgical performance. [7-11]

Treatment options for endometrial cancer differ according to the disease status and vary from a primary surgical treatment to a combination of surgery and adjuvant radiotherapy or chemotherapy.[5] Surgical management includes total hysterectomy, bilateral salphingo-oopherectomy, peritoneal cytology and pelvic lympha-denectomy. Laparoscopic surgery is feasible and can be performed safely in trained hands.[3,5,12]

This report, together with an earlier study by the same institution, confirms the feasibility of laparoscopic management for endometrial cancer. There is no obvious difference in patient characteristics such as age and the body-mass indices of the selected patients, reflecting the consistency in clinical management of patients over the years. In all 50 cases, laparoscopic surgery was performed successfully with only 2 cases of intraoperative surgical complications. One was a case of injury to the large intestine, another a perineal tear. This report also confirmed that the surgical approach for pelvic lymphadenectomy used in laparotomy could be consistently adopted at laparoscopy.

Cho et al,[9] Kalogiannidis et al[10] and O'Hanlan et al[11] reported on the comparisons of surgical parameters between laparoscopic surgery with laparotomy. All agreed that the laparoscopic procedure is a valid alternative to laparotomy and does not affect the prognosis of patients with early

endometrial cancer.

The feasibility of the procedure has been proven.[2,3,12,13] Reports on surgical procedure related parameters have shown insignificant difference between laparotomy and laparoscopic surgeries.[9-11] Intraoperative and postoperative surgical complications have been studied. As a procedure, laparoscopic surgery is as "functional"[7,8] as laparotomy and has the advantage of being a better surgical treatment experience for the patient.

There is no doubt that laparoscopic surgery expedites the immediate postoperative recovery of patients in terms of reduced pain, quicker ambulation and return to normal daily activities. For this study, the postoperative stay averaged at 5 days. Very few patients needed parenteral analgesics. Most patients needed only oral analgesics on the 1st and 2nd postoperative days. Most patients could ambulate and eat by the 2nd postoperative day. There were very few cases of postoperative morbidities. However, 2 patients had a second surgery for hernia repair. From the perspective of a patient's experience, laparoscopic surgery is definitely preferred over open abdominal surgery.

Magrina[14] compared findings of various studies on outcomes of laparoscopic vis-à-vis laparotomy treatment of endometrial cancer. The results showed consistency of findings on the benefits of laparoscopy. The operating time for laparoscopy was on average about 45 minutes longer, but the average number of hospital days is shortened by 3 days. In this report, the author did not make a comparative study with laparotomy cases.

As for long-term recovery, there appears to be no difference on long-term survival and recurrence of patients treated with laparoscopy or laparotomy. Magrina's[14] comparative report also showed that survival and recurrence rates by both surgical methods are comparable.

A comparison of operating time, lymph node harvested, intraoperative blood transfusion between the initial study and the current study were made. There has been a reduction of operating time and increase in lymph node harvested, which reflects improved performance with increased experience. There was 1 case of blood transfusion in each study, and for the case in the current study, blood transfusion was done as a precautionary measure due to the patient's low preoperative haemoglobin level.

Given that laparoscopic surgery does not affect the prognosis of patients with early endometrial cancer when performed properly,[9-11] it has better/comparable surgical outcomes and added benefits of better patient experience compared to laparotomy (except for operating time).[14] Therefore, laparoscopy should be the choice procedure in the treatment of early endometrial cancer in the absence of contra-indications.

However, laparoscopic pelvic lymphadenectomy is a complex procedure that demands good surgical competency.[13,15] What is more important in treating cancer patients is that long-term survival must not be compromised in exchange for improvements of short-term morbidity. The margin of error for inadequate surgery is extremely narrow and the price to pay is the patient developing recurrent or metastatic cancer that is usually fatal. As such all surgeons offering this surgical approach must first be competent in the open-approach and need to audit the surgical adequacy, cancer recurrence rate and survival outcomes of all his/her cases.

Conclusion

Laparoscopic surgery for endometrial cancer is clearly an option for the treatment of early endometrial cancer, and has the benefits of quick recovery with reduced postoperative pain for patients. However, each patient is unique in habitus and disease status,[16] therefore careful patient selection and surgical competency are instrumental in ensuring successful treatment.

REFERENCES

1. Rouzier R, Pomel C. Update on the role of laparoscopy in the treatment of gynaecological malignancy. Curr Opin Obste Gynecol 2005;17:77-82.
2. Nour MW, Childers JM. Endometrial carcinoma. In: Laparoscopic Surgery in Gynaecological Oncology. Chap 18. Blackwell Science Ltd, 1999:148-53.
3. Childers JM. Operative laparoscopy in gynaecological oncology. Baillieres Clin Obstet Gynaecol 1994;8:831-49.
4. Amant F, Moerman P, Neven P, Timmerman D, Limbergen EV, Vergote I. Treatment modalities in endometrial cancer. Curr Opin Oncol 2007;19:479-85.
5. Siow A, Beh ST, Tay EH. Initial experience of laparoscopic management of apparent early endometrial cancer. Singapore Med J 2003;44:288-92.
6. Kadar N. Present and future role of laparoscopic surgery in gynaecological oncology. In: Laparoscopic Surgery in Gynaecological Oncology. Chap 23. Blackwell Science Ltd, 1999:183-91.
7. Schlaerth AC, Abu-Rustum NR. Role of minimally invasive surgery in gynecologic cancers. Oncologist 2006;11:895-901.
8. Holub Z. The role of laparoscopy in the surgical treatment of endometrial cancer. Clin Exp Obstet Gynecol 2003;30:7-12.
9. Cho YK, Kim DY, Kim JH, Kim YM, Kim YT, Nam JH. Laparoscopic management of early uterine cancer: 10-Year experience in Asan Medical Centre. Gynecol Oncol 2007;106:585-90.
10. Kalogiannidis I, Lambrechts S, Amant F, Neven P, Gorp TV, Vergote I. Laparoscopy-assisted vaginal hysterectomy compared with abdominal hysterectomy in clinical stage I endometrial cancer: safety, recurrence, and long-term outcome. Am J Obstet Gynecol 2007;196:248.e1-8.
11. O'Hanlan KA, Huang GS, Garnier AC, Dibble SL, Reuland ML, Lopez L, et al. Total laparoscopic hysterectomy versus total abdominal hysterectomy: cohort review of patients with uterine neoplasia. JSLS 2005;9:277-86.
12. Childers JM, Nasseri A. Minimal access surgery in gynecologic cancer: we can, but should we? Curr Opin Obstet Gynecol 1995;7:57-62.
13. Eltabbakh GH. Effect of surgeon's experience on the surgical outcome of laparoscopic surgery for women with endometrial cancer. Gynecol Oncol 2000;78:58-61.
14. Magrina JF. Outcomes of laparoscopic treatment for endometrial cancer. Curr Opin Obstet Gynecol 2005;17:343-6.
15. Holub Z, Jabor A, Bartos P, Hendl J, Urbanek S. Laparoscopic surgery in women with endometrial cancer: the learning curve. Eur J Obstet Gynecol 2007;107:195-200.
16. Childers JM. The virtues and pitfalls of minimally invasive surgery for gynecological malignancies: an update. Curr Opin Obstet Gynecol 1999;11:51-9.