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# Laparoscopic Surgery in Endometrial Cancer, Recommended Approach: A Review

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**ABSTRACT**

**Introduction** Endometrial cancer is one of the most common malignancies in women globally. The laparoscopic approach from endometrial cancer is suggested in the medical literature. The aim of the present review is to clarify clinical points of laparoscopic operation in endometrial cancer. A search using keywords included endometrial carcinoma, and treatment and laparoscopy were conducted on PubMed, Up-To-Date, Ovid and Clinical Key databases up to 2016.

**Conclusion** This present review research showed over 1600 full-text manuscripts, of which, 18 were relevant to this article. The laparoscopic approach to endometrial cancer is categorized as follows: 1) Comparison of complications and advantages of laparoscopy and laparotomy in endometrial cancer; 2) Hospitalization days; 3) Blood transfusion and blood loss; 4) Comparison of the operation time of laparoscopy versus laparotomy; 5) Conversion of laparoscopy to laparotomy; 6) Comparison of endometrial cancer lymphadenectomy in laparoscopy with laparotomy; 7) Laparoscopy of endometrial cancer in old age; 8) Surgical experience and learning curve; 9) Technical points in laparoscopic endometrial cancer surgery; 10) Comparison of endometrial cancer survival in laparoscopy and laparotomy methods; 11) Cost issues.

**Keywords** Endometrial Neoplasms; Treatment; Laparoscopy; Iran; Laparotomy; Malignancy

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[1] Endometrial cancer in elderly women: Which disease, which surgical management? A systematic review ... [2] Treatment of early stage endometrial cancer by transumbilical laparoendoscopic single-site surgery versus traditional ... [3] Laparoscopic treatment of endometrial cancer: Feasibility ... [4] Laparoscopy-assisted vaginal versus abdominal hysterectomy in endometrial ... [5] Total laparoscopic treatment of endometrial cancer-pilot study with a new model of uterine manipulator: Operating data and five years follow-up in a reference ... [6] Laparoscopic treatment of endometrial cancer ... [7] Laparoscopic-assisted vaginal hysterectomy versus abdominal hysterectomy in ... [8] Laparoscopic-assisted vaginal hysterectomy versus abdominal hysterectomy in patients with ... [9] Complications of laparoscopic radial hysterectomy and lymphadenectomy for invasive cervical cancer ... [10] A comparison of perioperative morbidity, perioperative mortality, and disease-specific survival in elderly women (>or=70 years) versus younger women (<70 years) with endometrioid ... [11] Robotic surgical management of endometrial cancer in octogenarians and nonagenarians: Analysis of perioperative ... [12] Laparoscopic hysterectomy is preferred over laparotomy in early endometrial cancer patients ... [13] Comparison of robotic surgery with laparoscopy and laparotomy for ... [14] Laparoscopically assisted radical vaginal vs ... [15] Laparoscopically assisted vaginal hysterectomy ... [16] Surgical management of early-stage endometrial ... [17] Laparoscopic staging in women older than 75 years with earlystage endometrial ... [18] Use of laparoscopy in older women ... [19] Cost analysis of laparoscopy versus laparotomy ... [20] Laparoscopic-assisted vaginal hysterectomy for ... [21] A prospective randomized comparison between laparoscopic and laparotomic ... [22] Analysis of survival after laparoscopy in women with endometrial ... [23] Laparoscopic hysterectomy in the treatment of endometrial cancer ... [24] The role of laparoscopy in staging of different ... [25] Laparoscopic pelvic and para-aortic lymph node ... [26] Laparoscopic versus abdominal approach to endometrial cancer ... [27] Robot-assisted staging using three robotic arms for endometrial cancer ... [28] Total laparoscopic hysterectomy versus total abdominal hysterectomy for ... [29] Introduction of transperitoneal lymphadenectomy ... [30] Laparoscopic staging of endometrial cancer: The learning ... [31] Effect of surgeon's experience on the surgical outcome of ... [32] Total laparoscopic hysterectomy for endometrial cancer ... [33] Laparoscopic-assisted vaginal versus abdominal ...

## Introduction

Endometrial cancer is the most common gynecologic malignancy in the western world with an incidence of 25/100,000 new cases every year. For the diagnosis, it is more frequent in older women with an average of 68 years. With growing rate of the old population, the rate of endometrial carcinoma is likely to rise in this population [1]. With a survival rate of 75%, endometrial cancer is usually diagnosed at an early stage which is curable by surgery [2].

The conventional staging technique for endometrial cancer has been via laparotomy. Studies have found that laparoscopy is superior to laparotomy in terms of hospital stay, need for transfusion and postoperative complications. According to the new studies, use of the laparoscopic approach has shown to be feasible in treatment, staging, and lymphadenectomy of endometrial carcinoma [3].

In the present research, a complete review of the literature regarding laparoscopy in endometrial cancer was done. For this purpose a search was conducted in PubMed, Up-To-Date, Ovid and Clinical Key databases for English publications using the keywords including endometrial carcinoma, treatment, and laparoscopy, for available full text manuscripts until 2016.

## Data synthesis

In the primary evaluation, 843 papers were found in the PubMed database and 169 of them were review articles, from which, 8 papers were selected.

From 800 papers found in Ovid database, 6 were chosen.

From 3 papers found on Clinical Key, none was selected and from numerous and mostly irrelevant papers found on Up-To-Date, only one was chosen. Other papers that were relevant and selected but were not in the above databases were put in the mixed category.

Finally, 18 full-text papers were reviewed as well as for reference list to identify other potentially relevant papers, in a total count of.

## Comparison of complications and advantages of laparoscopy and laparotomy in endometrial cancer

In a study of 465 patients undergoing laparoscopy and laparotomy, no significant difference was observed between the two methods in terms of intra-operative or postoperative complications [4]. In another study, however, laparoscopy reported being associated with fewer perioperative complications to that of open surgery [5]. Another study states intraoperative complications from laparoscopy to be higher than laparotomy but a lower rate of postoperative complications via laparoscopy [6].

Laparoscopy has been reported to have benefits from laparotomy that includes a lower rate of hemorrhages, fewer days of hospitalization and fewer complications during the procedure that is why even the elderly presented with endometrial cancer can benefit from this method [1]. Possible postoperative complications in people receiving laparoscopy include infections in the chest and around surgical wounds, thrombosis, fever, hemorrhage, lymphocele and urinary tract injuries [7]. It seems laparotomy is associated with a greater risk of infection because of a more exposed surgical site and an increased risk of thrombosis and embolism because of a longer postoperative bed rest of laparoscopy [8]. Xu *et al*. managed to reduce the risk of urological injury during laparoscopic surgery by filling the bladder with saline to improve visualization of the bladder and by careful observation of ureter course reduce the risk of accidental harm to these structures [9].

## Hospitalization days

Studies on laparoscopic and laparotomic approaches show a significant difference in post operational hospital stay, that is, the hospital stay in the laparoscopic method is much lower than the laparotomic one. The rate of patients needed more than 2 days of hospitalization in a study was lower in laparoscopic surgery compared to laparotomy (%52 versus %94). Some studies carried out Studies on hospital stay discrepancies between laparoscopic and robotic approaching in older patients and other different age groups did not find a meaningful difference. It appears that robotic and laparoscopic surgery is more efficient methods in many aspects such as days of hospitalization, blood loss and need for blood transfusion when compared to laparotomy and less blood loss and conversion to laparotomy compared to laparoscopy [10-12], but as today, laparotomy has shown to have a shorter surgery time than robotic laparoscopic surgery [13]. Malur *et al*. studied 37 endometrial cancer patients that underwent laparoscopy and compared them to 33 patients that had laparotomy and found patients in the first group to have shorter days of hospitalization, blood loss and blood transfusion rate [14, 15].

Another study in comparison of laparoscopy with laparotomy in patients with endometrial cancer confirmed less blood loss (145ml versus 501ml) and hospital stay (2.3 days versus 5.5 days) in laparoscopy group with no difference in the number of lymph nodes removed (21.3 versus 21.9).

## Blood transfusion and blood loss

In a study by Volpi *et al*. on 77 patients with stage I-III endometrial cancer, the patients underwent laparoscopic surgery didn't need transfusions [3], and in a study by Scribner *et al*. patients in the laparoscopy group received more blood transfusions than in the laparotomy group but Bogani *et al*. studied differences between laparoscopy and laparotomy in women over 75 years, they found no great difference in blood transfusion rate of the two groups. Ghezzi *et al*. in their study on the same subject found a higher blood transfusion rate for patients undergoing laparotomy. It is of importance that studies on different age groups undergoing laparoscopy do not show a notable difference in transfusion rates [16-18]. According to the result of a study, 10.7% of patients undergoing laparoscopic surgery needed blood transfusion whereas the rate was 14.5% in patients undergoing laparotomy [4].

## Comparison of the operation time of laparoscopy versus laparotomy

According to various studies, laparoscopic surgery in endometrial cancer tends to take longer than laparotomy [19, 20]. Scribner *et al*. reported a longer surgery time for laparoscopic surgery compared to laparotomy in older than 65 years old patients with endometrial cancer [1]. Frigerio *et al*. reported an average surgery time of 220min (range of 80-375) for laparoscopy and 175min (range of 70-360) for laparotomy, whereas Zullo found an average of 196.7min for laparoscopy and 135.3min for laparotomy.

The part of learning curve and experience is very important to the achievement of a shorter operative time [7, 21]. In a study of the laparoscopic approach from endometrial cancer compared with historical controls of open surgery, the operative time was longer with a mean of 190min, blood loss was less (278.3ml), hospital stay was shorter, pain medication was less, mean pelvic lymph nodes removed were more (10.8 versus 4.9).

## Conversion of laparoscopy to laparotomy

Main reasons resulting in conversion to laparotomy in the case of starting surgery by laparoscopy is as followed: Gastrointestinal tract trauma, high stage endometrial cancer (extrauterine extension of tumor), large uterus, extensive adhesion preventive for completion of the operation by laparoscopy and excessive bleeding [22, 23]. Gynecologic Oncology Group (GOG) ĹAP2 trial also showed metastases, haemorrhage and limited visual field contribute to conversion to laparotomy [24]; however, the main reason for laparotomy conversion to women with endometrial cancer is excessive weight [25]. In a study by Palomba *et al*., it was declared that the probability of conversion to laparotomy in patients with endometrial cancer is associated with the stage of endometrial carcinoma, that is, the more progressed the carcinoma is, the higher the risk of conversion to laparotomy will be and the overall conversion rate of laparoscopy in their study was 13.2% [26]. Conversion to laparotomy in a laparoscopic surgery increases the risk of complications that according to Jung *et al*. be related to the incision of laparotomy [27]. The two factors contributing significantly to a lower rate of conversion to laparotomy in a laparoscopic surgery for endometrial cancer include younger age and lower BMI that explains zero cases of conversions to Lee *et al*. study. Other effective parameters contributing to fewer conversions to laparotomy are an expert surgeon and incorporation of ĹeeeHuang point [12, 28].

## Comparison of endometrial cancer lymphadenectomy in laparoscopy with laparotomy

Lymphadenectomy accounts for an important part of surgery in endometrial cancer both in laparoscopy and laparotomy. Studies show different results comparing the two methods. Some studies report no difference in the number of obtained lymph nodes between laparoscopy and laparotomy and some studies show more number of nodes in laparotomy which might be due to more para-aortic nodes in laparotomy group [3]. Kohler *et al*. investigated the feasibility of laparoscopic lymphadenectomy in 650 patients with gynecologic cancers. Of 66 patients who had lymphadenectomy procedure, an average 26.7 lymph nodes (15.4 pelvic and 9.6 para-aortic) were obtained from with the time of 56 and 63minutes for pelvic and para-aortic lymph nodes, respectively [29]. In a more detailed investigation, the number of pelvic lymph nodes obtained from the women underwent laparoscopy tends to be higher than the ones performing the laparotomy (11.0-5.1 versus 7.0-4.6; P<0.001), whereas number of para-aortic lymph nodes removed did not differ much in the two surgical approaches (2.5-1.9 versus 3.5-2.6; P<0.148) [22]. In other studies, however, the number of yielded lymph nodes was higher in laparoscopy compared to laparotomy and that may be due to pneumoperitoneum resulting in a positive pressure making pelvic lymphadenectomy easier [22].

In another study of 295 patients with endometrial cancer stages I or II, laparoscopy appeared to be a better procedure in harvesting lymph nodes rather than laparotomy that is 27.4 in laparoscopy versus 23.9 in laparotomy [8].

## Laparoscopy of endometrial cancer in old age

According to the WHO and the Insee-National Institute of Statistics and Economic Studies (INSEE), people over 65 years of age are considered old and InCA (Institut National du Cancer) considers that threshold to be 75 years old. The incidence rate of endometrial cancer is the 4th among women that was surfaced in 7200 new women in 2012 in France alone. Susini *et al*. reported no significant differences in perioperative and postoperative complications from vaginal route surgery and laparotomy in people aged over 70 years [1]. Vankin *et al*. in their studies found the number of lymph nodes obtained by laparoscopy and robotic surgery to be significantly higher in people younger than 70 years old. Some other studies comparing lymph nodes dissected by laparoscopy and laparotomy from people over and below 65 or 70 years old did not find significant differences in that matter. It seems that mini-invasive surgical methods are proper for obtaining lymph nodes in staging of endometrial cancer in older age cases [1].

## Surgical experience and learning curve

Experience plays a crucial rule for laparoscopic endometrial cancer surgery. This means even experienced surgeons are to perform a few laparoscopic lymphadenectomy operations in order to be able to perform independently and more experience contributes to a shorter operative time [4]. After about 30 cases, perioperative complications tend to decrease. In regards to lymphadenectomy, an increase in a surgeon's experience is followed by a rise in number of dissected lymph nodes, decline to surgery time, hospitalization and conversion of laparoscopy to laparotomy [30, 31].

## Technical points in laparoscopic endometrial cancer surgery

Laparoscopic-Assisted Vaginal Hysterectomy (LAVH) approach consists of an abdominal phase and a vaginal phase. The Patient is positioned in lithotomy in a formal situation for laparoscopy; also 4 trocars are usually used.

Steps of abdominal phase are as follows:

1- Coagulation of salpinges before insertion of the cervical or uterine manipulator. This is for the avoidance of any spillage of tumoral cells. There is no evidence to confirm the efficiency of this action.

2- Some authors suggest avoiding of the uterine manipulator in order to prevent peritoneal spillage by tumoral cells. There is no confirmed evidence for this effect.

3- Peritoneum lateral to an infundibulopelvic ligament is incised and ureter course is exposed and followed towards uterine artery. Pararectal space is opened and the hypogastric artery is identified in order to coagulation of the uterine artery in the origin. Coagulation of uterine artery and exposure of pararectal space in the first step make the procedure easier.

4- In order to avoid ureteral injury, the course of the ureter is identified and exposed towards uterine artery.

5- In order to avoid bladder injury, filling the bladder could clarify safe dissection plan.

6- In starting lymphadenectomy, paravesical space is opened deeply for better control of bleeding.

7- Obturator fossa and lumbosacral fossa are opened by the separation of great vessels from the pelvic sidewall.

8- Obturator nerve in the obturator fossa and superior vesical artery is exposed.

9- Lymph nodes of the bifurcation of iliac to external iliac and obturator fossa over the obturator nerve are removed. Bipolar coagulation is used to control bleeders and open lymphatic vessels.

10- After lymphadenectomy, lymph nodes are removed by endobag or simply from a 10mm trocar.

Steps of vaginal approach are as follows:

1- Dissection of uterovesical fold abdominal and incision by monopolar followed by vaginal completion

2- Uterosacral and cardinal ligaments might be cut vaginally by laparoscopic control.

3- Uterus is removed transvaginally and in the case of a very large uterus a small pfannenstiel incision may help to bring the uterus out.

4- Vaginal vault is closed by vicryl continuously. In some studies, duration of the operation was 123 and 136minutes. Previous reports were 236minutes. Use of manipulator fastens the operation. The procedure could be totally done by laparoscopy and the vaginal route is just used for removal of the uterus. Para-aortic lymphadenectomy is more difficult and more complications are reported. Many authors omit this step which argument in favor or against might be considered.

## Comparison of endometrial cancer survival in laparoscopy and laparotomy methods

Gemignani *et al*. studied survival rates of 69 patients that had done the laparoscopy and compared it to 251 patients underwent open surgery and they found no significant difference between them. Obermair *et al*. and Malur *et al*. also concluded the same results from different patients receiving the two surgical methods [20, 32, 33]. In the trial of LAP2, longer operation time besides less complications and hospital stay were confirmed.

Survival and recurrence were equal in laparoscopic approach and laparotomy [3]. In a more detailed study, in the laparoscopic group with an average follow-up of 30.5 months, there was 1 case of recurrence out of 74 patients, and in the laparotomy group with an average follow-up of 36.5 months; there were two cases of recurrence out of 168 patients [8]. In another study carried out on differences in recurrence rates of the disease, 1.4% of patients in the laparoscopy group and 5.8% in the laparotomy group were reported and this difference might be due to a higher surgical stage of the cancer [4]. However in a study comparing survival rates of patients with endometrial cancer underwent laparoscopy and laparotomy, no significant differences were found. However, there was a difference in local recurrence rates between the two methods in stage 2-3 of endometrial cancer and the rates were higher in patients received laparoscopy [26].

## Cost issues

A laparoscopic operation might be associated with a higher cost compared to that of laparotomy in early endometrial or cervical cancer, but shorter days of hospitalization, faster going back to work, less need to pain relief and fewer complications could balance with its costs. It is of importance to mention that these findings do not go with obese women or with ovarian cancer.

## Limitation

Para-aortic lymphadenectomy that is useful in managing endometrial cancer patients postoperatively (including determination of the need for extensive field radiotherapy) is a difficult procedure during laparoscopy and sometimes excluded. More research ought to be done on the subject to define whether it is beneficial to the patient to delete or limit para-aortic lymphadenectomy or on the contrary, approve laparoscopy only if para-aortic lymphadenectomy is possible.

## Conclusion

This present review research showed over 1600 full-text manuscripts, of which, 18 were relevant to this article. The laparoscopic approach to endometrial cancer is categorized as follows: 1) Comparison of complications and advantages of laparoscopy and laparotomy in endometrial cancer; 2) Hospitalization days; 3) Blood transfusion and blood loss; 4) Comparison of the operation time of laparoscopy versus laparotomy; 5) Conversion of laparoscopy to laparotomy; 6) Comparison of endometrial cancer lymphadenectomy in laparoscopy with laparotomy; 7) Laparoscopy of endometrial cancer in old age; 8) Surgical experience and learning curve; 9) Technical points in laparoscopic endometrial cancer surgery; 10) Comparison of endometrial cancer survival in laparoscopy and laparotomy methods; 11) Cost issues.

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