Determining the optimal follow-up protocol after primary surgery in patients with early-stage endometrial cancer

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Abstract

Objective: The aim of this study was to investigate the timing of recurrence in patients with early-stage endometrial cancer and to determine the optimal postoperative follow-up protocol for the detection of recurrence.

Material and Methods: Patients with stage 1 and 2, grade 1-3 endometrioid type endometrial cancer who underwent follow-up for at least two years were included. The diagnostic method for recurrence was analyzed for each patient. Analysis of risk factors for recurrence were done using SPSS. Sensitivity analyzes were performed comparing the diagnostic methods.

Results: A total of 303 patients were included and recurrence was diagnosed in 17 (5.61%). Cumulative risk of recurrence was 3.06% in the first 23 months, rising to 7.52% in the first 33 months. Sensitivity of physical examination (PE) was 50.00%, specificity 99.52%, positive predictive value 88.89%, negative predictive value 96.30% and accuracy rate 96.00% respectively. It was found that each step increase of grade increased recurrence odds by 2.549 times [95% confidence interval (CI): 1.078-6.027; p=0.033] while each step increase of stage increased recurrence odds by 2.943 times (95% CI: 1.270-6.820; p=0.012).

Conclusion: It is notable that recurrence rate increased after 25 months and the risk of recurrence increased as the tumor stage and grade worsened. Symptoms in patients with high-grade and deep myometrial invasion, especially after the first two years, should be considered risky and patients should be informed about seeking medical care when symptoms occur. PE and symptoms of patients are key factors in detecting reccurence while other diagnostic methods can be used according to clinical findings. [J Turk Ger Gynecol Assoc. 2025; 26(2): 82-9]

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Introduction

Endometrial cancer is the second most common gynecologic malignancy (1). Endometrial cancer develops in approximately 3% of females in the United States of America (USA) (2). In Türkiye, its incidence was found to be 9.3 in 2009. Since the cancer typically presents with abnormal uterine bleeding, 70% of patients are diagnosed at an early stage (3). Data from the SEER database shows the 5-year survival rate for patients with endometrial cancer to be approximately 95%, but with a significant decrease to 18.9% in cases of metastatic disease (2). Endometrial cancer staging is performed according to the FIGO system, which was revised in 2023 (4,5). The standard surgical treatment involves at least an extrafascial hysterectomy, bilateral salpingo-oophorectomy, peritoneal washing, exploration of the pelvis and abdomen, and biopsy of suspicious lesions. Omentectomy is recommended in high-risk patients. Prognostic factors include age, ethnicity, histological type, tumor grade, myometrial invasion, lymphovascular invasion, cervical involvement, lymph node metastasis, molecular factors (such as POLEmut and p53abn), and positive peritoneal cytology (6).

Most recurrences occur within the first three years, with the vaginal cuff, pelvis, abdomen, and lungs being the most common metastatic sites (7). Local and distant metastases are observed at similar rates. The survival rate in patients with recurrence ranges from 10% to 38% (8). The prior radiotherapy status of the patient is associated with the recurrence rate and survival after recurrence. It has been reported that survival is higher for recurrences that occurred in patients who did not have radiotherapy (6).

Follow-up is recommended in the guidelines at 3-6 month intervals for the first two years, 6-12 month intervals up to five years, and then annually (9,10). The detection of relapses after two years may be delayed by extended intervals. It is improbable that frequent follow-up of asymptomatic patients during the follow-up period will result in the detection of recurrence. There is an absence of evidence that a specific examination method can detect recurrence in asymptomatic patients. Moreover, intensive follow-up has been demonstrated to have no effect on OS, even in high-risk patients. The British Gynaecological Cancer Society advocates a dual approach, integrating symptom-based and patient-based follow-up methodologies (6,9,11,12). Seventy-five to eighty percent of recurrences are detected during physical examination (PE), and half of the patients are symptomatic.

Reducing follow-up intervals increases costs and complicates patient compliance, while longer intervals may lead to late diagnosis of recurrence. The goal of follow-up is to detect recurrences early and prolong survival. However, there is no proven optimal follow-up protocol. Seventy percent of patients with recurrence are symptomatic, and most recurrences are detected by PE. CA-125 levels, smear, and imaging methods used in follow-up have limited success in detecting recurrence. Therefore, a balanced and effective follow-up protocol is also essential.

The aim of this study was to analyze the recurrence patterns and follow-up methods in patients treated for early stage endometrial cancer in a single center, with the goal of developing a more effective follow-up protocol, including optimal follow-up intervals and diagnostic methods.

Material and Methods

The study included patients with stage 1 and 2, grade 1-3 endometrioid-type endometrial cancer who underwent primary surgical treatment at the Department of Obstetrics and Gynecology at a tertiary referral hospital, between February 2006 and July 2016, and were followed for at least two years. Patients with extrauterine disease confirmed by clinical, imaging, and/or pathological evaluation, those with non-endometrioid histology, and those who could not undergo primary surgery due to comorbidities or received fertility-sparing treatment were excluded. Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Ankara University Faculty of Medicine (approval number: 07-441-18, date: 16.04.2018). After diagnosis was confirmed by endometrial biopsy, patients underwent preoperative evaluation through clinical examination and at least transvaginal ultrasonography as an imaging method. Other imaging modalities including magnetic resonance imaging, positron emission tomography/computed tomography (PET/CT), or CT were also used in the preoperative period, but not routinely.

As data in the new staging system, such as molecular classification and lymphovascular space invasion (LVSI), were not available at the time of the study (2006-2016), the study methodology followed the 2009 staging system (13). Patients included in the study were staged according to the FIGO staging system, and those with stage 1A, 1B, and 2 were enrolled. Patients with pathology reports of endometrioid type, endometrioid type with squamous differentiation, and villoglandular endometrioid type endometrial cancer were included. Tumor histologic typing was performed according to the World Health Organization classification system. Grade 1 tumors were defined as having less than 5% non-squamous or non-morular components, whereas grade 3 tumors were defined as having more than 50% non-squamous or non-morular components. Higher grades were associated with increased nuclear atypia and architectural disorganization of cancer cells. Myometrial invasion was determined based on the distance from the endomyometrial junction to the

deepest point of tumor invasion. Myometrial invasion was considered present when the tumor invaded more than 50% of the myometrium. Tumor grade, presence of myometrial invasion, and lymphovascular invasion were documented by the histopathologist.

Patients were followed up every 3-4 months for the first two years, every 6 months for the next three years, and annually after five years. During follow-up visits, symptom inquiry, pelvic examination, and transvaginal ultrasonography were performed. In addition, vaginal cytology, CA-125 levels, posteroanterior chest X-ray, and other imaging methods were used. Imaging techniques such as CT and PET-CT were typically used when symptoms were present or when suspicious findings were detected during PE. Adjuvant treatments, including external radiotherapy, brachytherapy, and chemotherapy, were planned, based on risk factors, in collaboration with the radiation oncology and medical oncology departments.

Patient follow-up data were collected from medical records and the Case Tracking System of Ankara University Faculty of Medicine. Surgical reports, laboratory results, and imaging findings were reviewed to document follow-up assessments, including CA-125 levels, findings from chest X-ray, PET-CT, CT, and PE, and symptom status. Each recurrence was examined individually, and sensitivity and specificity analyses were performed based on the diagnostic methods used to detect recurrence. For patients with recurrence, sensitivity and specificity analyses were performed for combinations of all diagnostic methods used for the same patient. Disease-free intervals and the timing of recurrences were evaluated in light of the available data.

Statistical analysis

Data analysis was performed using SPSS for Windows, version 11.5 (IBM Inc., Armonk, NY, USA). Descriptive statistics are presented as mean ± standard deviation for normally distributed variables, median (minimum-maximum) for non-normally distributed variables, and number of cases and percentages for nominal variables. For comparisons between two groups, the t-test was used for mean values and the Mann-Whitney U test for median values. When the number of groups exceeded two, analysis of variance was used for comparing mean values, and the Kruskal-Wallis test for comparing median values. Nominal variables were analyzed using Pearson's chi-square test or Fisher's exact test. Correlations between continuous variables were evaluated using the Spearman correlation test for non-normally distributed variables and the Pearson correlation test for normally distributed variables.

Recurrence probabilities were calculated using the Kaplan-Meier method. Factors affecting recurrence time were analyzed with the Log-rank test. Multivariate analysis to identify independent factors influencing recurrence time was performed using Cox regression. A p-value <0.05 was considered statistically significant.

Results

A total of 303 patients with early-stage endometrial cancer were included in the study. Among them, 17 patients (5.6%) experienced recurrence. Table 1 shows the demographic, preoperative pathological and postoperative pathological findings of the groups with and without recurrence in patients with early stage endometrial cancer. The demographic, preoperative, and postoperative pathological findings were compared between the non-recurrence group (n=286) and the recurrence group (n=17). The mean age at diagnosis was 59.3±11.1 years in the non-recurrence group and 63.7±10.4 years in the recurrence group (p=0.114). Parity and preoperative CA-125 levels were also comparable between the two groups (p=0.908 and p=0.977, respectively). Menopausal status did not differ significantly between groups (p=0.242), with 88.2% of patients in the recurrence group being postmenopausal compared to 75.9% in the non-recurrence group. Pathological type compared between the recurrence and non-recurrence groups did not reach statistical significance (p=0.057). However, all patients in the recurrence group had endometrioid-type tumors. Grade distribution was significantly associated with recurrence (p=0.023), with higher recurrence rates observed in patients with grade 2 and grade 3 tumors (58.8% and 29.4%, respectively). The stage of the disease was significantly associated with recurrence (p=0.005). Most patients with recurrence were classified as stage 1B (70.6%), while only 17.6% were stage 1A. Myometrial invasion was significantly more common in the recurrence group (76.5% vs. 39.5%, p=0.003). In addition, LVSI was observed in 60.0% of patients in the recurrence group compared to 25.5% in the non-recurrence group (p=0.004).

Recurrence characteristics, diagnostic approaches and timing of recurrence in patients with early stage endometrial cancer are shown in Table 2. Among the 17 patients with recurrence, the most common location of recurrence was the vaginal cuff (41.1%), followed by the abdomen (35.2%). Bone and inguinal lymph nodes were each affected in 11.7% of cases. The primary diagnostic approach for detecting recurrence PE (47.0%), followed by computed tomography (35.2%). PET scan and pap smear less frequently identified recurrence, with detection rates of 5.8% and 11.7%, respectively. Regarding the timing of recurrence, 23.5% of recurrences occurred in the first year after surgery, while 11.7% were observed in the second and fourth years. The third year had the highest incidence, with 35.2% of recurrences. Late recurrences were detected in 17.6% of patients in the seventh year of follow-up.

Table 1. Comparison of demographic, preoperative pathological and postoperative pathological findings in early stage endometrial cancer patients with and without recurrence

	Non-recurrence group n=286	Recurrence group n=17	p value
Age in years, mean ± SD	59.3 ± 11.1	63.7 ± 10.4	0.114
Parity, n (%)	2.6 ± 2.1	2.6 ± 1.7	0.908
CA 125, IU/mL	20.7 ± 21.3	20.9 ± 16.5	0.977
Menopausal status, n (%)			0.242
Premenopause	69/286 (24.1)	2/17 (11.8)	
Postmenopause	217/286 (75.9)	15/17 (88.2)	
Postoperative pathological findings			
Pathological type, n (%)			0.057
Endometrioid	213/286 (74.5)	17/17 (100)	
Squamous Diffuse	61/286 (21.3)	0/17 (0)	
Villoglandular	12/286 (4.2)	0/17 (0)	
Postoperative pathological findings			
Grade, n (%)			0.023
Grade 1	111/286 (38.9)	2/17 (11.8)	
Grade 2	141/286 (49.5)	10/17 (58.8)	
Grade 3	33/286 (11.6)	5/17 (29.4)	
Stage, n (%)			0.005
Stage 1A	166 /286 (58.0)	3/17 (17.6)	
Stage 1B	106/286 (37.1)	12/17 (70.6)	
Stage 2	14/286 (4.9)	5/17 (29.4)	
Myometrial invasion, n (%)			0.003
No	173/286 (60.5)	4/17 (23.5)	
Yes	113/286 (39.5)	13/17 (76.5)	
LVSI, n (%)			0.004
No	190/286 (74.5)	6/17 (40.0)	
Yes	65 /286 (25.5)	9/17 (60.0)	
LVSI: Lymphovascular space invasion, SD: Standard Deviation			

In the evaluation of factors affecting recurrence, a backward stepwise logistic regression analysis was performed, and the most significant factors were included in the final model. These factors were tumor grade, stage, myometrial invasion, and LVSI. After the final step of the analysis, tumor grade and stage remained as independent predictors of recurrence. The analysis revealed that each increase in tumor grade was associated with a 2.549-fold high-risk of recurrence (95% confidence interval (CI): 1.078-6.027; p=0.033). Similarly, each increase in stage was associated with a 2.943-fold high-risk of recurrence (95% CI: 1.270-6.820; p=0.012) (Table 3).

The sensitivity and specificity of individual and combined diagnostic methods for detecting recurrence were evaluated (Table 4). Among isolated methods, PET had the highest sensitivity (91.67%), followed by CT with 88.89%. PE and CA-125 levels demonstrated relatively lower sensitivity at 50% and 41.67%, respectively, while PAP smear showed the lowest sensitivity (20%). Regarding specificity, PE and pap smear had the highest specificity at 99.52% and 99.37%, respectively, indicating a strong ability to rule out recurrence when the test result is negative. CA-125 levels and CT also showed high specificity at 94.01% and 94.00%. PET scan had a specificity of

Table 2. Recurrence characteristics, diagnostic approaches, and timing of recurrence in patients with early-stage endometrial cancer

Variables	Recurrence group n=17
Location of recurrence, n (%)	
Vaginal cuff	7/17 (41.1)
Abdomen	6/17 (35.2)
Bone	2/17 (11.7)
Inguinal LN	2/17 (11.7)
Diagnostic approach for recurrence, n (%)	
PE	8/17 (47.0)
CT	6/17 (35.2)
PET scan	1/17 (5.8)
Pap smear	2/17 (11.7)
The year the recurrence developed, n (%)	
1st year	4/17 (23.5)
2nd year	2/17 (11.7)
3rd year	6/17 (35.2)
4th year	2/17 (11.7)
7th year	3/17 (17.6)
LN: Lymph node, PE: Physical examination, CT: Computed tomography, PET: Positron emission tomography	

Table 3. Evaluation of factors affecting recurrence by multivariate logistic regression analysis

	aOR	95% CI	p value
Grade	2,549	1,078-6,027	0.033
Stage	2,943	1,270-6,820	0.012
The model was established by backward stepwise logistic regression. Tumour grade, stage, myometrial invasion, and lymphovascular space invasion were included in the model. Factors that remained statistically significant are shown in the table. CI: Confidence interval, aOR: Adjusted odds ratio			

87.50%. When diagnostic methods were combined, the highest accuracy (100%) was achieved using either the combination of PE, CT, and CA-125 or the combination of PE, PAP smear, CT, and CA-125, though the positive predictive value (PPV) was relatively lower in the latter combination (53.33%). The combination of PE and CT offered a balance of high sensitivity (93.33%) and specificity (91.49%), resulting in an accuracy of 91.94%.

The estimated mean time to recurrence was 115.1 months, with a standard error of 3.064. The 95% CI for the mean time to recurrence ranged from 108.10 to 122.22 months. The cumulative hazard rates for recurrence over time are illustrated in Figure 1. When evaluating the cumulative hazard rates for recurrence over time, the risk of recurrence was 0.45% at 5 months, 0.91% at 8 months, 1.86% at 10 months, 3.06% at 23 months, 3.70% at 25 months, 4.41% at 28 months, 5.91% at 30 months, 6.70% at 31 months, 7.52% at 33 months, 8.74% at 46 months, 10.06% at 48 months, 12.87% at 73 months, 15.78% at 76 months, and 18.68% at 77 months. These values represent cumulative risk percentages, meaning that by the end of the 77th month, the expected cumulative risk of recurrence for a patient is 18.68%.

Discussion

There is still no universal follow-up protocol after treatment for endometrial cancer. Follow-up frequency and the use of laboratory and radiological monitoring tests vary between countries. Although patients regularly attend follow-up due to fear of recurrence (14), it has been shown that close monitoring does not improve survival in endometrial cancer (9). While the aim of follow-up is to detect recurrences early and improve quality of life, it may have negative effects. Rustin et al. (15) demonstrated that early detection of recurrence in ovarian cancer did not improve survival, and patients' quality of life was adversely affected by earlier chemotherapy initiation. Moreover, many recurrences give symptoms between follow-up visits, but closely monitored patients tend to wait for their next scheduled visit rather than seek immediate evaluation (16). In the systematic review by Leitch et al. (11), the effectiveness of the patient-initiated follow-up model (PIFU) in low-risk endometrial cancer patients after surgery was investigated. The study reported that PFU provided significant positive effects on patient satisfaction, quality of life and psychological well-being when compared with traditional physician-centered follow-up methods. The study further stated that this model enhances patient autonomy, provides flexibility in accessing healthcare services, and reduces the utilization of costly resources. The findings suggest that a patient-oriented and cost-effective approach to follow-up for low-risk endometrial cancer patients is feasible and offers a valuable alternative to current clinical practices (11). Similarly, The British Gynaecological Cancer Society's publication offers a comprehensive overview of the viability and benefits of the PIFU model in the context of gynecological cancer patient follow-up. The PIFU model empowers patients to self-monitor their symptoms and access healthcare services as required, thereby minimizing routine check-ups and enhancing patient satisfaction. The study's findings offer significant insights that can inform the development of more personalized follow-up protocols and enhance the efficient use of resources in the field of gynecological oncology. In the cohort of endometrial cancer patients, it was suggested that patients in the low-risk

Table 4. Sensitivity and specificity analyses of examination, CT, CA 125, pap smear, PET tomography examinations individually and in combination for the detection of recurrence

	Sensitivity (%)	Specifity (%)	PPV (%)	NPV (%)	Accuracy (%)
Physical examination (PE)	50.00	99.52	88.89	96.30	96.00
Computed tomography (CT)	88.89	94.00	72.73	97.92	93.22
CA 125	41.67	94.01	33.33	95.73	90.50
PAP smear	20.00	99.37	66.67	95.15	94.64
Positron emission tomography (PET scan)	91.67	87.50	84.62	93.33	89.29
PE and CA 125	71.43	93.83	50.00	97.44	92.05
PE and pap smear	66.67	98.72	83.33	96.86	95.91
PE and CT	93.33	91.49	77.78	97.73	91.94
PE, pap smear, CA 125	75.00	91.47	52.17	96.72	89.66
PE, pap smear, CT	93.75	86.49	75.00	96.97	88.68
PE, CT, CA 125	100	92.45	77.78	100	94.03
PE, pap smear, CT, CA 125	100	68.89	53.33	100	77.05
PPV: Positive predictive value, NPV: Negative predictive value					

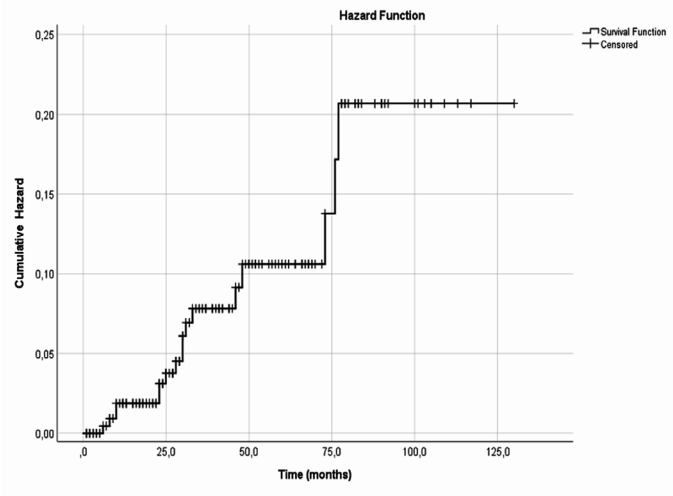

Figure 1. Cumulative assessment of risk ratios of developing recurrence against time

group may be suitable for PIFU shortly after completion of treatment (following a holistic needs assessment), while in the intermediate and high-risk groups, it is safe to switch patients to the PIFU model after the first two years of regular clinical follow-up (12). In another study, Zola et al. (9) compared the effects of intensive and minimalist follow-up regimens on overall survival (OS) after endometrial cancer treatment in the TOTEM trial (9). The study included 1,847 patients, of whom 60% were classified as low-risk. Following a mean follow-up period of 69 months, the 5-year OS rates were 90.6% and 91.9% in the intensive and minimalist groups, respectively, with no significant difference between the two groups. This finding supports the efficacy of minimalist follow-up regimens and suggests the feasibility of less intensive follow-up strategies in the management of endometrial cancer patients (9).

In the present study, which included 303 early-stage endometrial cancer patients, recurrence was detected in 17 patients (5.6%). A recent population-based cohort study in Denmark reported a 7% recurrence rate in stage I-II patients (17), while a 2006 database review, which included all stages, found a recurrence rate of approximately 13% (8).

Several risk factors are associated with a high-risk of recurrence in endometrial cancer. Grade 3 tumors are universally recognized as high-risk, and in our study, both univariate and multivariate analyses demonstrated a significant association with recurrence. Although deep myometrial invasion and LVSI are not universally defined as high-risk, many experts agree that these factors increase recurrence risk. In the present study, both LVSI and deep myometrial invasion were significantly more frequent in the recurrence group.

PE remains essential for detecting recurrences. In the present study, 47% of recurrences were initially suspected based on findings of PE. A review published in 2015 reported that PE had the highest rate of recurrence detection (18%), while vaginal cytology detected recurrence in 1% of cases. Furthermore, 56% of patients with recurrence were symptomatic in the follow-up of 254 patients with high-grade disease. Moreover, elevated levels of the cancer antigen tumor marker CA-125 were detected in 10% of patients (18). Vaginal cytology is widely used in post-treatment follow-up, although its effectiveness is debated. The use of vaginal cytology is no longer recommended for asymptomatic patients in National Comprehensive Cancer Network (NCCN) guidelines. Nevertheless, cytological analysis was historically employed as a means of detecting vaginal recurrences in numerous medical centers. In our protocol, annual vaginal cytology was performed, and two patients (11.1%) with recurrences were diagnosed by cytology. CA-125 measurement has become increasingly popular, although its effectiveness in endometrial cancer follow-up is limited. In our series, preoperative CA-125 levels were within the normal range in two patients with recurrence. Despite this, CA-125 was routinely measured at each visit, but no recurrence was detected based solely on isolated CA-125 elevation. In addition, CA-125 levels can be elevated in many benign conditions, reducing its PPV, which was approximately 33.3% in our series. The NCCN guideline recommends that in patients with initially detected elevated CA-125 levels, the marker should be measured again later (10).

CT is not routinely used in follow-up but was performed when patients were symptomatic or suspicious findings were detected during clinical evaluation. Among patients with recurrence, CT detected recurrence in six (35.2%). Five of these had distant metastases, while one had a local recurrence. A systematic review previously reported that only 5% to 21% of asymptomatic recurrences were detected via CT (8). However, in a study conducted by Jung-Yun Lee et al., it was found that 60% of asymptomatic recurrences were identified via CT scans; four (66.7%) of these patients had localized recurrences and underwent curative-intent surgery, and all of them survived (19). Advances in chemotherapy regimens and surgical techniques may contribute to improved survival outcomes in patients with asymptomatic recurrences detected by CT.

PET/CT is not recommended as a routine follow-up tool due to its high cost. In our center, PET/CT is used for systematic evaluation when suspicious distant or local lesions are detected. Since the installation of PET/CT at our hospital, 12 patients have undergone evaluation for suspected recurrence, with one vaginal cuff recurrence missed by PET/CT. It was found that PET/CT had a sensitivity 95.8% (92.2-98.1) and a specificity of 92.5% (89.3-94.9) for confirming recurrence (20).

Based on our findings, the highest recurrence risk in early-stage endometrioid adenocarcinoma occurs in the first

three years. The recurrence rate increased from 1.86% at 10 months to 3.06% at 25 months, reaching 10.06% at 48 months. Although the risk in the first year is low, follow-up frequency in the second to fourth years should be more intense. Detailed patient education about symptoms requiring immediate medical attention is crucial, especially if considering the PIFU model. PE remains an essential follow-up tool, with a sensitivity of 93.33% and specificity of 91.49% when combined with CT. Larger, randomized studies comparing follow-up intervals and diagnostic tools are still needed to establish an optimal protocol.

Study limitations

The main limitation of the study is that it was conducted using the old staging system. However, as the pathology reports of the patients in the study were recorded using the 2009 staging system, it would not have been appropriate to adjust for the new staging system due to the lack of data, such as molecular classification. Our study has other limitations, including its retrospective design, changes in treatment protocols over the years, and advances in imaging technology that complicate data interpretation. However, the number of patients in our study is comparable to other reports.

Conclusion

The optimal follow-up protocol for early-stage endometrial cancer remains uncertain. Our findings emphasize the importance of risk stratification and individualized follow-up strategies, particularly in the second to fourth years when the recurrence risk is highest. PE should remain a cornerstone of follow-up, supported by targeted imaging when clinically indicated. Future prospective studies with larger patient cohorts are necessary to establish evidence-based follow-up protocols that balance early detection, patient quality of life, and healthcare costs.

Ethic

Ethics Committee Approval: *Ethical approval for the study was obtained from the Clinical Research Ethics Committee of Ankara University Faculty of Medicine (approval number: 07-441-18, date: 16.04.2018).*

Informed Consent: *All patients were informed about colposcopy and follow-up procedures and informed consents were obtained.*

Footnotes

Author Contributions: *Concept: S.T., Design: D.A., Data Collection or Processing: A.G., Analysis or Interpretation: Ş.K.B., Literature Search: B.V., Writing: C.O.U.*

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References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021; 71: 209-49.
2. SEER [Internet]. [cited 2025 Mar 1]. Cancer of the Endometrium - Cancer Stat Facts. Available from: https://seer.cancer.gov/statfacts/html/corp.html
3. Pakish JB, Lu KH, Sun CC, Burzawa JK, Greisinger A, Smith FA, et al. Endometrial cancer associated symptoms: a case-control study. J Womens Health (Larchmt). 2016; 25: 1187-92.
4. Pecorelli S. Revised FIGO staging for carcinoma of the vulva, cervix, and endometrium. Int J Gynaecol Obstet. 2009; 105: 103-4.
5. Berek JS, Matias-Guiu X, Creutzberg C, Fotopoulou C, Gaffney D, Kehoe S, et al. FIGO staging of endometrial cancer: 2023. Int J Gynaecol Obstet. 2023; 162: 383-94.
6. Oaknin A, Bosse TJ, Creutzberg CL, Giornelli G, Harter P, Joly F, et al. Endometrial cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Ann Oncol. 2022; 33: 860-77.
7. Ben Arie A, Lavie O, Gdalevich M, Voldarsky M, Barak F, Schneider D, et al. Temporal pattern of recurrence of stage I endometrial cancer in relation to histological risk factors. Eur J Surg Oncol. 2012; 38: 166-9.
8. Fung-Kee-Fung M, Dodge J, Elit L, Lukka H, Chambers A, Oliver T, et al. Follow-up after primary therapy for endometrial cancer: A systematic review. Gynecol Oncol. 2006; 101: 520-9.
9. Zola P, Ciccone G, Piovano E, Fuso L, Di Cuonzo D, Castiglione A, et al. Effectiveness of intensive versus minimalist follow-up regimen on survival in patients with endometrial cancer (TOTEM study): a randomized, pragmatic, parallel group, multicenter trial. J Clin Oncol. 2022; 40: 3817-27.
10. Abu-Rustum N, Yashar C, Arend R, Barber E, Bradley K, Brooks R, et al. Uterine Neoplasms, Version 1.2023, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2023; 21: 181-209.
11. Leitch M, Arshad A, Cohen PA, Allanson ER. Patient-initiated follow-up in low-risk endometrial cancer after surgery: a systematic review. Int J Gynecol Cancer. 2025; 35: 100037.
12. Newton C, Nordin A, Rolland P, Ind T, Larsen-Disney P, Martin-Hirsch P, et al. British Gynaecological Cancer Society recommendations and guidance on patient-initiated follow-up (PIFU). Int J Gynecol Cancer. 2020; 30: 695-700.
13. FIGO Committee on Gynecologic Oncology. FIGO staging for carcinoma of the vulva, cervix, and corpus uteri. Int J Gynaecol Obstet. 2014; 125: 97-8.
14. Lewis RA, Neal RD, Williams NH, France B, Hendry M, Russell D, et al. Follow-up of cancer in primary care versus secondary care: systematic review. Br J Gen Pract. 2009; 59: 234-47.
15. Rustin GJ, van der Burg ME, Griffin CL, Guthrie D, Lamont A, Jayson GC, et al. Early versus delayed treatment of relapsed ovarian cancer (MRC OV05/EORTC 55955): a randomised trial. Lancet. 2010; 376: 1155-63.
16. Olaitan A, Murdoch J, Anderson R, James J, Graham J, Barley V. A critical evaluation of current protocols for the follow-up of women

treated for gynecological malignancies: a pilot study. Int J Gynecol Cancer. 2001; 11: 349-53.

17. Jeppesen MM, Mogensen O, Hansen DG, Iachina M, Korsholm M, Jensen PT. Detection of recurrence in early stage endometrial cancer - the role of symptoms and routine follow-up. Acta Oncol. 2017; 56: 262-9.
18. Hunn J, Tenney ME, Tergas AI, Bishop EA, Moore K, Watkin W, et al. Patterns and utility of routine surveillance in high grade endometrial cancer. Gynecol Oncol. 2015; 137: 485-9.
19. Lee JY, Kim JH, Seo JW, Kim HS, Kim JW, Park NH, et al. Detecting asymptomatic recurrence in early-stage endometrial cancer: the value of vaginal cytology, imaging studies, and CA-125. Int J Gynecol Cancer. 2016; 26: 1434-9.
20. Kadkhodayan S, Shahriari S, Treglia G, Yousefi Z, Sadeghi R. Accuracy of 18-F-FDG PET imaging in the follow up of endometrial cancer patients: systematic review and meta-analysis of the literature. Gynecol Oncol. 2013; 128: 397-404.