Postoperative CA-125 as a Prognostic Marker for Overall Survival in Ovarian Cancer

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ABSTRACT

Objective: To investigate the association between postoperative CA-125 levels and overall survival (OS) in patients with ovarian cancer, assessing its potential role as a prognostic biomarker.

Study Design: Observational study.

Place and Duration of the Study: Department of Medical Oncology, Faculty of Medicine, Celal Bayar University, Manisa, Turkiye, from February 2012 to November 2024.

Methodology: The medical records of 211 women diagnosed with ovarian cancer were retrospectively reviewed. Descriptive statistical analyses were conducted to investigate the relationship between CA-125 levels and OS. Patients were categorised into high and low perioperative CA-125 groups based on predefined cut-off values: 305 U/mL preoperatively and 30.4 U/mL postoperatively. The predictive performance of preoperative and postoperative CA-125 levels for ovarian cancer recurrence was assessed using receiver operating characteristic (ROC) analysis. The Kaplan-Meier survival curves were employed to estimate OS, and the Cox regression analysis was performed for univariate and multivariate assessments.

Results: Significant differences in OS were observed between the patients with low *versus* high postoperative CA-125 levels: 1-year OS (93.3% *vs*. 81.8%), 3-year OS (87.8% *vs*. 48.1%), 5-year OS (73.3% *vs*. 35.4%), and 10-year OS (52.0% *vs*. 19.7%) ($p < 0.001$). Furthermore, postoperative CA-125 levels were independent predictors of both OS (univariate: $p < 0.001$; multivariate: $p = 0.009$) and progression-free survival (PFS) (univariate: $p = 0.005$; multivariate: $p = 0.011$).

Conclusion: Perioperative CA-125 levels hold significant prognostic value in ovarian cancer management, offering a valuable biomarker for predicting survival outcomes and disease progression.

Key Words: *Postoperative CA-125, Tumour marker, Ovarian cancer, Overall survival, Prognostic marker.*

How to cite this article: Agaoglu AB, Ekinci F, Erdogan AP, Sahbazlar M, Turkmen E. Postoperative CA-125 as a Prognostic Marker for Overall Survival in Ovarian Cancer. *J Coll Physicians Surg Pak* 2025; **35(09)**:1128-1134.

INTRODUCTION

Ovarian cancer ranks as the third most prevalent malignancy among gynaecologic tumours and stands out as the deadliest gynaecological cancer globally among women. According to GLOBOCAN 2022, an estimated 324,398 women develop ovarian cancer, with 206,839 deaths annually. The global incidence of this cancer is 6.7 per 100,000 women, with a mortality rate of 4.0 per 100,000.[1] The asymptomatic nature of the disease and the absence of effective early screening often delay diagnosis until advanced stages, thereby increasing the risk of recurrence and contributing to persistently high mortality rates.

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Received: January 30, 2025; Revised: June 06, 2025; Accepted: August 16, 2025
DOI: https://doi.org/10.29271/jcpsp.2025.09.1128

Standard treatment options for ovarian cancer consist of primary debulking surgery with platinum-based chemotherapy and interval debulking surgery (IDS) with several rounds of chemotherapy in the neoadjuvant setting. Despite these therapeutic advances, the 5-year survival estimate in ovarian cancer remains at just 50.9%, primarily attributable to the advanced stage presentations and the absence of efficient early screening approaches.[2]

Serum CA-125 assays are pivotal in monitoring ovarian cancer, offering insights into the disease progression during and after chemotherapy, and recent studies further support its prognostic significance.[3,4] While numerous studies have explored the changes in CA-125 levels postoperatively, its predictive value immediately after primary cytoreductive surgery remains under investigation.

This study aimed to evaluate the prognostic significance of postoperative serum CA-125 levels, measured immediately after primary cytoreductive surgery and before adjuvant chemotherapy, in predicting overall survival (OS) and progression-free survival (PFS) in patients with ovarian carcinoma.

METHODOLOGY

The medical records of patients with ovarian cancer at the Department of Medical Oncology, Faculty of Medicine, Celal Bayar University, Manisa, Turkiye, between February 2012 and November 2024, were retrospectively reviewed. The collected data included age at diagnosis, smoking status, use of statins/metformin, eastern cooperative oncology group performance status (ECOG PS), metastasis sites, comorbidities, stage, histologic subtype, P53 status, surgery type, cytoreductive surgery status, BRCA mutation status, adjuvant chemotherapy, platinum response, number of chemotherapy cycles, perioperative CA-125 levels, and oestrogen and progesterone receptor status.

Out of 211 patients, only those with histologically confirmed ovarian cancer and adequate lab data were included in the study. Patients under 18 years or with multiple solid or haematologic malignancies were excluded. Serum CA-125 levels were measured using the ARCHITECT platform (Abbott Diagnostics). Preoperative CA-125 was defined as the level closest to surgery, while postoperative CA-125 was measured within one week before the first chemotherapy cycle. The normal CA-125 threshold was set at 35 U/mL.

Categorical variables were expressed as frequencies and percentages, and continuous variables as medians (min-max). The Chi-square test assessed categorical differences, while the Mann-Whitney U test was used for non-normally distributed variables. OS was defined as the time from diagnosis to death or last follow-up, and was estimated using the Kaplan-Meier method, with $p \leq 0.05$ considered statistically significant.

Receiver operating characteristic (ROC) curve analysis identified optimal CA-125 cut-off (≥305 U/mL preoperatively, ≥30.4 U/mL postoperatively. To determine hazard ratios (HRs) with their 95% confidence intervals (CIs) with greater precision and reliability, univariate Cox regression analyses were initially performed to evaluate the individual impact of each variable—including age at diagnosis, smoking status, use of statins or metformin, ECOG PS, metastasis sites, comorbidities, stage, histologic subtype, P53 status, surgery type, cytoreductive surgery status, BRCA mutation status, adjuvant chemotherapy, platinum response, number of chemotherapy cycles, perioperative CA-125 levels, and oestrogen and progesterone receptor status — on the survival rate. It was subsequently followed by the multivariate Cox regression analyses to account for potential confounding factors and to assess the combined effects of multiple variables on the survival outcomes. Results were presented as medians (IQR); statistical analyses were performed using SPSS (version 15.0, SPSS Inc., Chicago, IL).

RESULTS

The medical records of 211 patients with ovarian cancer were analysed. The median age of patients was 57 years (range: 20–86). Most were diagnosed at stage IV (n = 98; 46.9%), with serous histology predominant (n = 127; 64.8%). Adjuvant chemotherapy was administered to 96.4% of patients (n = 190), and optimal cytoreductive surgery was achieved in 53.3% (n = 104). During the follow-up, 60.9% of patients (n = 129) had died, while the remaining 39.1% were alive (n = 83).

Mortality was associated with factors such as age (≤45 *vs.* >45 years), smoking status (active, ex-smoker, non-smoker), ECOG PS (0–1 *vs.* ≥2), statin use, BRCA mutation (BRCA1/2 *vs.* none), platinum response (sensitive, resistant, or refractory), comorbid conditions (diabetes, chronic obstructive pulmonary disease (COPD), hypertension, and coronary artery disease), cancer stage (I–IV), histological type (high-grade serous *vs.* others), type of surgery (performed or not), achievement of optimal cytoreduction, presence of metastases (liver, lung, peritoneum, bone, or brain), and number of treatment lines (≤3 *vs.* >4). No significant associations were found for bone or brain metastases, metformin use, COPD, and diabetes (Table I). Elevated perioperative CA-125 levels were linked to a higher mortality rate, while lower oestrogen and progesterone receptor expression correlated with poorer outcomes. The median preoperative and postoperative CA-125 levels were 455.5 U/mL (IQR: 6.4–50,610.0) and 68.0 U/mL (IQR: 3.8–36; 38.0), respectively. The median follow-up was 50.7 months (IQR: 0–196).

Postoperative CA-125 levels were assessed as predictors of OS using ROC curve analysis. As shown in Figure 1, a statistically significant cut-off value for postoperative CA-125 was identified as 30.4 U/mL, with a sensitivity of 75.61%, specificity of 58.82%, and an AUC of 0.709 (95% CI: 0.629–0.780, $p < 0.0001$).

Patients with low postoperative CA-125 had significantly higher OS rates: 93.3% at 1 year, 87.8% at 3 years, 73.3% at 5 years, and 52.0% at 10 years. In contrast, high CA-125 levels were associated with lower survival rates: 81.8% at 1 year, 48.1% at 3 years, 35.4% at 5 years, and 19.7% at 10 years ($p < 0.001$, Figure 2).

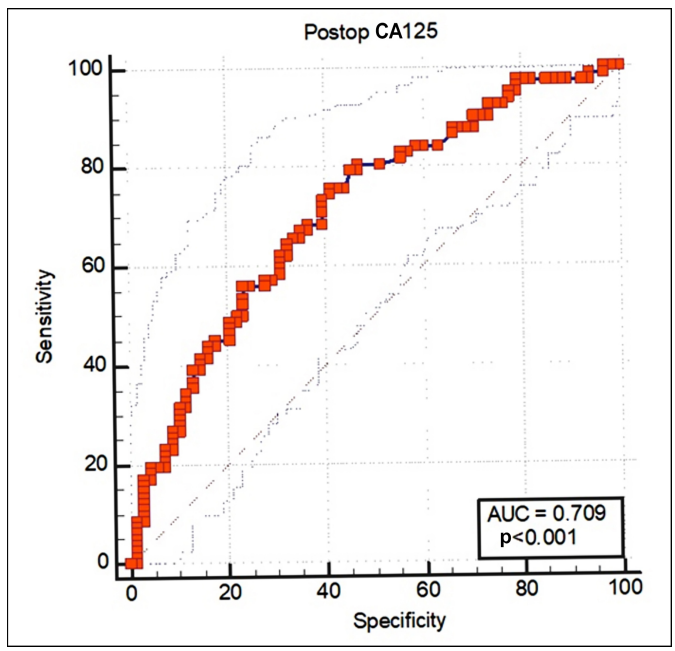


Figure 1: An ROC curve area of 0.709 (p<0.001) was observed.

Table I: Comparison of demographics and clinical characteristics of the survivors (n = 83) and the non-survivors (n = 128) diagnosed with ovarian cancer.

Characteristics		Total		Survivors		Non-survivors		p-values
		n	%	n	%	n	%	
Age (years)	≤45	37	17.5	26	31.3	11	8.6	<0.001
	>45	174	82.5	57	68.7	117	91.4	
Smoking	Active smoker	30	14.4	18	22.2	12	9.4	<0.001
	Ex-smoker	36	17.2	25	30.9	11	8.6	
	Non-smoker	143	68.4	38	46.9	105	82	
ECOG PS	0-1	170	80.6	78	94	92	71.9	<0.001
	≥2	41	19.4	5	6	36	28.1	
Comorbid disease	Diabetes	38	18.1	12	14.6	26	20.3	0.297
	Hypertension	83	39.5	19	23.2	64	50	<0.001
	CAD	28	13.3	5	6.1	23	18	0.014
	COPD	13	6.2	3	3.7	10	7.8	0.223
Statin use		19	9	3	3.7	16	12.5	0.029
Metformin use		39	18.6	12	14.6	27	21.1	0.24
Stage	1	39	18.7	34	42	5	3.9	<0.001
	2	3	1.4	2	2.5	1	0.8	
	3	69	33	31	38.3	38	29.7	
	4	98	46.9	14	17.3	84	65.6	
Histologic status	High-grade serous	127	64.8	43	55.1	84	71.2	0.021
	Others	69	35.2	35	44.9	34	28.8	
P53	No	41	31.5	16	28.1	25	34.2	0.452
	Yes	89	68.5	41	71.9	48	65.8	
Surgery	No	38	18	5	6	33	25.8	<0.001
	Yes	173	82	78	94	95	74.2	
Optimal cytoreductive surgery	No	91	46.7	8	9.8	83	73.5	<0.001
	Yes	104	53.3	74	90.2	30	26.5	
BRCA	No	19	9	19	22.9	0	0	0.002
	1	7	3.3	7	8.4	0	0	
	2	2	0.9	0	0	2	1.6	
	Unknown	183	86.7	57	68.7	126	98.4	
Metastasis status	No	62	29.8	55	68.8	7	5.5	<0.001
	Yes	146	70.2	25	31.3	121	94.5	
Metastasis localisations	Liver	44	21.2	4	4.9	40	31.5	<0.001
	Lung	65	31.3	0	0	65	51.2	<0.001
	Peritoneum	147	70.3	33	40.2	114	89.8	<0.001
	Bone	14	6.7	3	3.7	11	8.7	0.164
	Brain	1	0.5	0	0	1	0.8	1
	Lymph node	148	71.2	25	30.9	123	96.9	<0.001
Adjuvant or first-line	No	5	2.6	4	5.1	1	0.9	0.034
	Carboplatin-paclitaxel	183	93.8	70	88.6	113	97.4	
	Others	7	3.6	5	6.3	2	1.7	
Platinum response	Sensitive	104	55.6	62	86.1	42	36.5	<0.001
	Resistant	17	9.1	1	1.4	16	13.9	
	Refractory	66	35.3	9	12.5	57	49.6	
Treatment lines	≤3	144	73.8	70	88.6	74	63.8	<0.001
	>4	51	26.2	9	11.4	42	36.2	
Postoperative chemotherapy cycles	Median (IQR)	0-24 (6)		0-20 (6)		0-24 (6)		<0.001
OS (month)	Median (IQR)	0-196 (37)		2-196 (75)		0-138 (26)		<0.001
ER	Median (IQR)	0-100 (20)		0-100 (40)		0-100 (20)		0.036
PR	Median (IQR)	0-100 (0)		0-100 (1)		0-70 (0)		<0.001
Preoperative CA-125	Median (IQR)	6-50610 (455.5)		7.1-50610 (174)		6-18739 (662)		<0.001
Postoperative CA-125	Median (IQR)	3.8-3638 (68)		3.8-3638 (25)		4.8-2160 (106)		<0.001

Results are presented as median (IQR) or frequency (%), with p ≤0.05 considered significant. The Mann-Whitney U test was used for continuous variables, and the Chi-square test was applied for categorical variables. COPD: Chronic obstructive pulmonary disease, ER: Oestrogen, Min-Max = Minimum - maximum, PR: Progesterone, ECOG PS: Eastern Cooperative Oncology Group performance status, CAD: Coronary artery disease, IQR: Interquartile range.

Multivariate Cox regression identified independent predictors of PFS as preoperative (HR: 1.00; 95% CI: 1.00–1.00; p = 0.043), postoperative CA-125 levels (HR: 1.00; 95% CI: 1.00–1.00; p = 0.011), non-smoker or ex-smoker (HR: 0.046; 95% CI: 0.008–0.248; p <0.001), the presence of comorbidities (HR: 21.685; 95% CI: 3.003–156.57; p = 0.002), ECOG PS ≥2 (HR: 0.106; 95% CI: 0.015–0.722; p = 0.022), and liver metastases (HR: 7.158; 95% CI: 1.853–27.65; p = 0.004) in Table II.

For the OS, significant predictors included postoperative CA-125 levels (HR: 1.003; 95% CI: 1.001–1.005; p = 0.009), non-smoker or ex-smoker (HR: 0.010; 95% CI: 0.001–0.145; p = 0.001), ECOG PS ≥2 (HR: 0.112; 95% CI: 0.013–0.967; p = 0.047), metformin use (HR: 0.081; 95% CI: 0.010–0.663; p = 0.019), peritoneal metastases (HR: 12.236; 95% CI: 1.031–145.19; p = 0.047), and lymph node metastases (HR: 0.024; 95% CI: 0.001–0.810; p = 0.038). Preoperative CA-125 levels were not significant in the OS analysis (Table III).

DISCUSSION

CA-125 is a glycoprotein expressed in various adult tissues, including the ovaries, epithelium of the Fallopian tubes, endocervix and endometrium, and mesothelial cells of the pericardium, pleura, and peritoneum.

Table II: COX regression analysis results of the PFS.

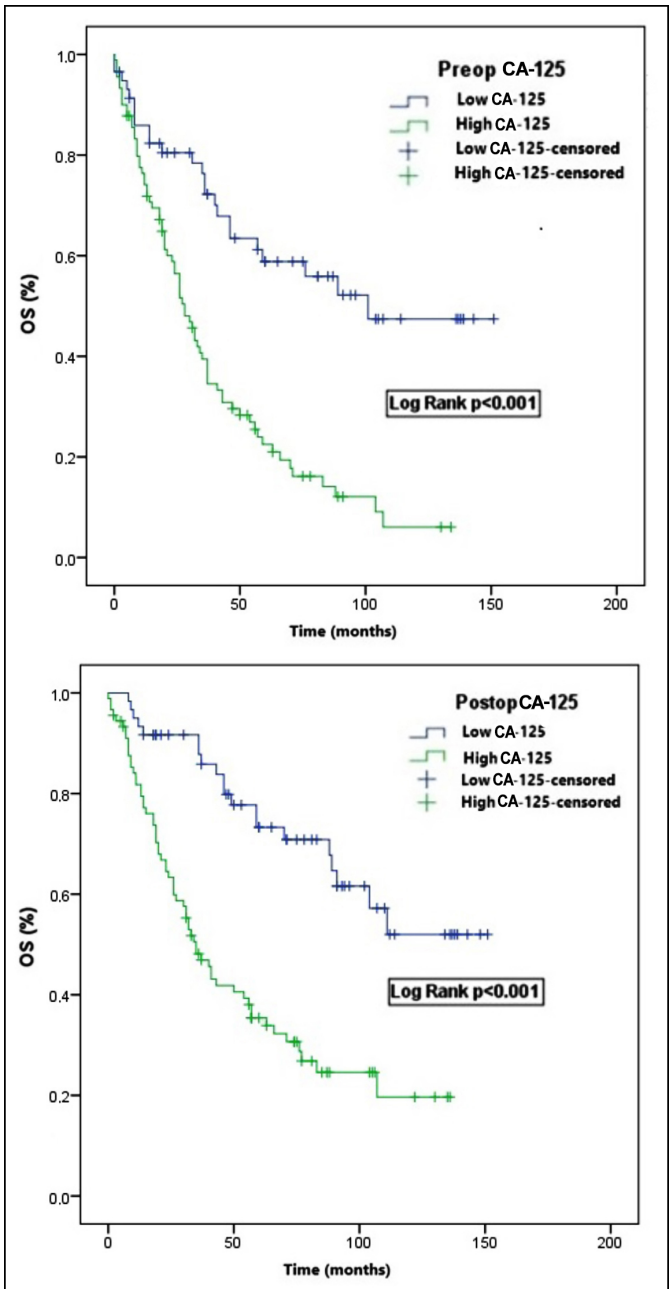
Variables	Univariate		Multivariate	
	HR (95% CI range)	p-values	HR (95% CI range)	p-values
Age ≤45 years				
Age >45 years	1.352 (0.857 – 2.133)	0.195	0.413 (0.056 – 3.068)	0.387
Non-smoker		<0.001		0.001
Active smoker	0.482 (0.284 – 0.817)	0.007	1.634 (0.366 – 7.297)	0.52
Ex-smoker	0.298 (0.17 – 0.523)	<0.001	0.046 (0.008 – 0.248)	<0.001
ECOG PS 0-1				
ECOG PS ≥2	1.708 (1.096 – 2.661)	0.018	0.106 (0.015 – 0.722)	0.022
Comorbid disease	0.811 (0.581 – 1.131)	0.216	21.685 (3.003 – 156.57)	0.002
Statin use	1.273 (0.73 – 2.218)	0.395	1.076 (0.168 – 6.894)	0.938
Metformin use	1.172 (0.773 – 1.776)	0.455	0.232 (0.042 – 1.286)	0.094
Stage I		<0.001		0.176
Stage II	8.795 (1.821 – 42.485)	0.007		
Stage III	7.184 (3.253 – 15.869)	<0.001	7.517	0.98
Stage IV	13.459 (6.147 – 29.469)	<0.001	1.881	0.994
Non-high-grade serous				
High-grade serous	1.304 (0.899 – 1.891)	0.161	0.191 (0.034 – 1.066)	0.059
P53	0.793 (0.5 – 1.258)	0.325	0.142 (0.033 – 0.613)	0.009
Surgery	0.436 (0.281 – 0.676)	<0.001		
Optimal cytoreductive surgery	0.318 (0.22 – 0.458)	<0.001	0.436 (0.082 – 2.324)	0.331
Non-BRCA		0.338		
BRCA1	0.914 (0.317 – 2.632)	0.867		
BRCA2	3.184 (0.702 – 14.443)	0.133		
Metastasis	11.071 (6.025 – 20.34)	<0.001		0.864
Liver	2.669 (1.833 – 3.885)	<0.001	7.158 (1.853 – 27.65)	0.004
Lung	3.523 (2.463 – 5.039)	<0.001	0.851 (0.143 – 5.055)	0.859
Peritoneum	4.327 (2.74 – 6.831)	<0.001	3.021 (0.402 – 22.73)	0.283
Bone	1.859 (1.069 – 3.235)	0.028	5.771 (0.542 – 61.42)	0.146
Brain	1.317 (0.184 – 9.441)	0.784		
Lymph node	12.203 (6.47 – 23.015)	<0.001	0.482 (0.027 – 8.556)	0.619
Preoperative CA-125	1.00 (1.00 – 1.00)	0.216	1.00 (1.00 – 1.00)	0.043
Postoperative CA-125	1.001 (1.00 – 1.001)	0.005	1.003 (1.001 – 1.005)	0.011
Number of the treatment lines ≤3				
Number of the treatment lines >4	1.869 (1.313 – 2.659)	0.001	2.191 (0.32 – 15.022)	0.425

The statistics were analysed using the Cox's regression test. HR: Hazard ratio; ECOG PS: Eastern Cooperative Oncology Group performance status.

Table III: COX regression analysis results of the OS.

Variables	Univariate		Multivariate	
	HR (95% CI range)	p-values	HR (95% CI range)	p-values
Age ≤ 45				
Age >45	2.972 (1.6 – 5.522)	0.001	1.34 (0.12 – 14.968)	0.812
Non-smoker		<0.001		0.002
Active smoker	0.394 (0.216 – 0.718)	0.002	1.9 (0.433 – 8.342)	0.395
Ex-smoker	0.251 (0.134 – 0.47)	<0.001	0.01 (0.001 – 0.145)	0.001
ECOG PS 0-1				
ECOG PS ≥2	4.172 (2.794 – 6.231)	<0.001	0.112 (0.013 – 0.967)	0.047
Comorbid disease	1.18 (0.83 – 1.678)	0.357	11.288 (1.787 – 71.28)	0.01
Statin use	2.235 (1.314 – 3.803)	0.003	0.934 (0.119 – 7.361)	0.948
Metformin use	1.461 (0.953 – 2.24)	0.082	0.081 (0.01 – 0.663)	0.019
Stage I		<0.001		0.448
Stage II	2.079 (0.242 – 17.843)	0.504		
Stage III	5.948 (2.339 – 15.127)	<0.001	3.338	0.988
Stage IV	18.602 (7.461 – 46.381)	<0.001	0.987	1.00
Non-high-grade serous				
High-grade serous	1.509 (1.012 – 2.25)	0.043	0.177 (0.029 – 1.086)	0.061
P53	0.86 (0.53 – 1.395)	0.54	0.234 (0.053 – 1.024)	0.054
Surgery	0.239 (0.158 – 0.361)	<0.001		
Optimal cytoreductive surgery	0.158 (0.102 – 0.245)	<0.001	0.215 (0.037 – 1.246)	0.086
Non-BRCA		1.00		
BRCA1	1.00 (0.044 – 22.887)	1.00		
BRCA2	1.00 (0.003 – 338.992)	1.00		
Metastasis	14.114 (6.509 – 30.605)	<0.001		0.838
Liver	2.729 (1.859 – 4.005)	<0.001	4.346 (0.992 – 19.044)	0.051
Lung	5.167 (3.558 – 7.503)	<0.001	2.364 (0.241 – 23.186)	0.46
Peritoneum	7.028 (3.938 – 12.543)	<0.001	12.236 (1.031 – 145.19)	0.047
Bone	1.388 (0.747 – 2.58)	0.3	2.098 (0.241 – 18.271)	0.502
Brain	2.045 (0.284 – 14.709)	0.477		
Lymph node	25.447 (9.29 – 69.705)	<0.001	0.024 (0.001 – 0.81)	0.038
Preoperative CA-125	1.00 (1.00 – 1.00)	0.036	1.00 (1.00 – 1.00)	0.122
Postoperative CA-125	1.001 (1.001 – 1.001)	<0.001	1.003 (1.001 – 1.005)	0.009
Number of the treatment lines ≤3				
Number of the treatment lines >4	1.205 (0.823 – 1.764)	0.337	0.301 (0.034 – 2.647)	0.279

The statistics were analysed using the Cox's regression test. HR: Hazard ratio; ECOG PS: Eastern Cooperative Oncology Group performance status.



	Survival time						
	Estimate Median (SE)	95% CI	1 year % (SE)	3 years % (SE)	5 years % (SE)	10 years % (SE)	Log Rank p
Preop CA125							
≤305	101	-	85,9 (4,6)	72,2 (6,2)	58,8 (7,0)	47,4 (8,3)	<0,001
>305	28 (3,3)	21,6-34,4	74,1(4,7)	39,5 (5,3)	22,5 (4,7)	6,1 (3,6)	
Postop CA125							
≤30,4	-	-	93,3 (3,2)	87,8 (4,4)	73,3 (6,2)	52,0 (8,9)	<0,001
>30,4	35(4,4)	26,3-43,7	81,8 (4,1)	48,1 (5,4)	35,4 (5,3)	19,7 (6,1)	

Figure 2: Kaplan-Meier curve of OS based on perioperative CA-125 cut-off values (≤305 U/mL *vs.* >305 U/mL and ≤30.4 U/mL *vs.* >30.4 U/mL), showing survival proportions at 1, 3, 5, and 10 years, along with median OS.

Due to its cost-effectiveness and simplicity, CA-125 is widely used, especially in low-income countries, for monitoring ovarian carcinoma. Its levels correlate with tumour burden and disease progression, offering diagnostic value for detecting recurrence and metastasis after surgery.[5-7]

Surgical cytoreduction as a therapeutic strategy in advanced ovarian cancer was first documented and characterised in the medical literature by Meigs in 1934.[8] Zhang *et al*. demonstrated that CA-125 functions as a standalone indicator of residual ovarian tumours or metastatic lesions following surgery.[9] Additionally, dynamic monitoring of CA-125 half-life has been shown to predict recurrence.[10] A meta-analysis indicated that for every 10% increase in the share of patients attaining optimal residual disease, the median survival time increased by 2.5 months.[11] Similarly, Winter *et al*. identified younger age, low residual disease volume, good performance status, and serous histology as major prognostic factors in ovarian cancer.[12] Consistently, the multivariate analysis identified age, residual tumour volume, ECOG PS, and postoperative CA-125 levels as standalone predictors of overall survival in this study.

Residual disease remains the strongest prognostic factor. Wang *et al.* reported that tumour burden after IDS and pre-IDS CA-125 levels predict the OS.[13] Furthermore, a retrospective analysis of 3,147 patients demonstrated that deep vein thrombosis was associated with elevated CA-125 levels and represented a notable contributory factor, being a major secondary cause of death, regardless of disease progression.[14]

Additionally, lymph node and peritoneal metastases significantly impacted OS in the present study, aligning with the findings of Bao *et al*.[15] Consistent with these results, recent evidence emphasises the clinical relevance of CA-125 serum levels as a reliable prognostic indicator, highlighting its value in optimising patient follow-up strategies and management.[16] In contrast, AlSomairi *et al*. reported that monitoring HE4 or CA-125 levels had limited prognostic value in individuals with ovarian malignancy undergoing neoadjuvant chemotherapy and subsequent surgical treatment.[17] However, preoperative detection of HE4 and CA-125 is the optimal marker combination for predicting surgical outcomes, as indicated by other studies.[18] Tumour debulking and ascites drainage generally cause a decline in CA-125 levels; on the contrary, peritoneal damage and surgical manipulation can result in short-term increases.[19] Therefore, measuring CA-125 prior to adjuvant chemotherapy is recommended. Moreover, a meta-analysis by the Gynaecologic Cancer Intergroup emphasised the CA-125 elimination rate constant (KELIM) as an independent survival indicator, supporting its value in predicting surgical outcomes. This underscores the significance of integrating biomarkers such as CA-125 into prognostic assessments to optimise therapeutic strategies and enhance patient outcomes.[20,21]

This study showed that postoperative CA-125 levels strongly influenced both PFS and OS, while preoperative CA-125 affected only PFS. In a meta-analysis involving 77 studies evaluating the diagnostic accuracy of CA-125 for preoperative

use, its sensitivity was low, and its overall specificity was limited.[22] This study has several limitations. First, its retrospective and single-centre design may introduce selection bias. Second, changes in staging techniques and assay variability over time could have affected the consistency of measurements. Additionally, the sample size may limit the generalisability of the findings, and potential confounding factors could not be fully controlled. Hence, a well-designed prospective, multicentre study with a larger cohort is needed to validate these results.

CONCLUSION

Postoperative CA-125 levels are strongly associated with prognosis in ovarian cancer. Higher levels correlate with worse overall survival, while lower levels serve as an important prognostic marker. Further studies are needed to validate the reference values for clinical use, enhancing prognostic accuracy and patient management.

ETHICAL APPROVAL:
Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine, Celal Bayar University, Izmir, Turkiye (Decision No: 20.478.478/2748; Dated: November 27, 2024). The research adhered to the Declaration of Helsinki and relevant ethical standards.

PATIENTS' CONSENT:
Written or verbal informed consent was obtained from all participants included in the study.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
ABA, APE, ET: Conception and design of the study.
FE, MS: Administrative support.
ABA, APE: Provision of the study materials or patients.
FE, MS, ET: Collection and assembly of data.
ABA, FE: Data analysis and interpretation.
All authors approved the final version of the manuscript to be published.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, *et al*. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2024; **74(3)**:229-63. doi: 10.3322/caac.21834.
2. National Cancer Institute. Cancer of the Ovary - Cancer Stat Facts. [cited 6 June 2025]. SEER. 2018. Available from: https://seer.cancer.gov/statfacts/html/ovary.html.
3. Doherty JA, Peres LC, Wang C, Way GP, Greene CS, Schildkraut JM. Challenges and opportunities in studying the epidemiology of ovarian cancer subtypes. *Curr Epidemiol Rep* 2017; **4(3)**:211-20. doi: 10.1007/s40471-017-0115-y.
4. Anwar S, Javed S, Nadeem M. Prognostic role of neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) in advanced stage ovarian cancer treated with interval debulking surgery. *J Coll Physicians Surg Pak* 2021; **31(6)**:701-6. doi: 10.29271/jcpsp.2021.06.701.
5. Colomban O, Tod M, Leary A, Ray-Coquard I, Lortholary A, Hardy-Bessard AC, *et al*. Early modeled longitudinal CA-125 kinetics and survival of ovarian cancer patients: A GINECO AGO MRC CTU study. *Clin Cancer Res* 2019; **25(17)**: 5342-50. doi: 10.1158/1078-0432.CCR-18-3335.
6. Gong Z, Han S, Zhang C, Zhao H, Xu J, Sun X. Value of serum miR-21, HE4 and CA125 in surveillance for postoperative recurrent or metastatic ovarian cancer. *Pak J Med Sci* 2022; **38(4 Pt-II)**:939-45. doi: 10.12669/pjms.38.4.5158.
7. Wang Q, Wu Y, Zhang H, Yang K, Tong Y, Chen L, *et al*. Clinical value of serum HE4, CA125, CA72-4, and ROMA index for diagnosis of ovarian cancer and prediction of postoperative recurrence. *Clin Lab* 2019; **65(4)**. doi: 10.7754/Clin.Lab.2018.181030.
8. Meigs JV. Tumors of the female pelvic organs. New York: MacMillan; 1934.
9. Zhang W, Li J, Chen Q, Jin H, Zhou L, Liu L. Prediction of postoperative residual primary ovarian neoplasm or metastatic lesion close to rectum of serous ovarian carcinoma based on clinical and MR T1-DEI features. *Acta Radiol* 2024; **65(9)**:1153-63. doi: 10.1177/02841851241262520.
10. Li Z, Yin H, Ren M, Shen Y. Prognostic significance of CA125 dynamic change for progression free survival in patients with epithelial ovarian carcinoma. *Med Sci Monit* 2020; **26**:e925051. doi: 10.12659/MSM.925051.
11. Chang SJ, Hodeib M, Chang J, Bristow RE. Survival impact of complete cytoreduction to no gross residual disease for advanced-stage ovarian cancer: A meta-analysis. *Gynecol Oncol* 2013; **130(3)**:493-8. doi: 10.1016/j.ygyno.2013.05.040.
12. Winter WE 3rd, Maxwell GL, Tian C, Carlson JW, Ozols RF, Rose PG, *et al*. Prognostic factors for stage III epithelial ovarian cancer: A gynecologic oncology group study. *J Clin Oncol* 2007; **25(24)**:3621-7. doi: 10.1200/JCO.2006.10.2517.
13. Wang D, Zhang G, Peng C, Shi Y, Shi X. Choosing the right timing for interval debulking surgery and perioperative chemotherapy may improve the prognosis of advanced epithelial ovarian cancer: A retrospective study. *J Ovarian Res* 2021; **14(1)**:49. doi: 10.1186/s13048-021-00801-4.
14. Shim H, Lee YJ, Kim JH, Lim MC, Lee DE, Park SY, *et al*. Preoperative laboratory parameters associated with deep vein thrombosis in patients with ovarian cancer: Retrospective analysis of 3,147 patients in a single institute. *J Gynecol Oncol* 2024; **35(4)**:e38. doi: 10.3802/jgo.2024.35.e38.
15. Bao R, Olivier M, Xiang J, Ye P, Yan X. The significance of lymph node dissection in patients with early epithelial ovarian cancer. *Ann Ital Chir* 2024; **95(4)**:628-35. doi: 10.62713/aic.3353.
16. Rafiq N, Ali N, Ashraf R, Naz S, Khan SA. Serum CA-125 levels in ovarian cancer patients in a tertiary care hospital of

Pakistan. *J Coll Physicians Surg Pak* 2023; **33(9)**:1052-5. doi: 10.29271/jcpsp.2023.09.1052.

17. AlSomairi A, Himayda S, Altelmesani A, Lee YJ, Lee JY. Prognostic value of HE4 in advanced-stage, high-grade serous ovarian cancer: Analysis of HE4 kinetics during NACT, predicting surgical outcome and recurrence in comparison to CA125. *Gynecol Oncol* 2024; **181**:155-61. doi: 10.1016/j.ygyno.2023.12.021.
18. Klotz DM, Link T, Wimberger P, Kuhlmann JD. A predictive and prognostic model for surgical outcome and prognosis in ovarian cancer computed by clinico-pathological and serological parameters (CA125, HE4, mesothelin). *Clin Chem Lab Med* 2023; **62(3)**:530-9. doi: 10.1515/cclm-2023-0314.
19. van der Zee AG, Duk JM, Aalders JG, Boontje AH, ten Hoor KA, de Bruijn HW. The effect of abdominal surgery on the serum concentration of the tumour-associated antigen CA 125. *Br J Obstet Gynaecol* 1990; **97(10)**:934-8. doi: 10.1111/j.1471-0528.1990.tb02450.x.
20. Corbaux P, You B, Glasspool RM, Yanaihara N, Tinker AV, Lindemann K, *et al*. Survival and modelled cancer antigen-125 ELIMination rate constant K score in ovarian cancer patients in first-line before poly (ADP-ribose) polymerase inhibitor era: A gynaecologic cancer intergroup meta-analysis. *Eur J Cancer* 2023; **191**:112966. doi: 10.1016/j.ejca.2023.112966.
21. Kus F, Guven DC, Yildirim HC, Chalabiyev E, Akyildiz A, Tatar OD, *et al*. KELIM score predicts outcome in patients with platinum-resistant/refractory recurrent ovarian cancer. *Biomark Med* 2023; **17(7)**:379-89. doi: 10.2217/bmm-2022-0923.
22. Dodge JE, Covens AL, Lacchetti C, Elit LM, Le T, Devries-Aboud M, *et al*. Preoperative identification of a suspicious adnexal mass: A systematic review and meta-analysis. *Gynecol Oncol* 2012; **126(1)**:157-66. doi: 10.1016/j.ygyno.2012.03.048.