Predictive value of hemoglobin, platelets, and D-dimer for the survival of patients with stage IA1 to IIA2 cervical cancer: a retrospective study

Bilan Li[1] (ORCID), **Yueyao Shou[2]** and **Haiyan Zhu[1,2]** (ORCID)

Abstract

Objective: Coagulation indexes may be useful survival biomarkers for cervical cancer. This study evaluated the ability of hemoglobin, red blood cells (RBCs), platelets, and D-dimer levels to predict post-hysterectomy survival outcomes in patients with stage IA1 to IIA2 cervical cancer.

Methods: In this retrospective study, coagulation-related indexes were compared between the anemia and non-anemia groups. Independent variables were analyzed by the Cox proportional hazards model. Survival was assessed by the Kaplan–Meier method with the log-rank test. Mortality predictions were evaluated by receiver operating characteristic curves.

Results: Among this study's 1088 enrolled patients, 152 had anemia. The 10-year overall survival and recurrence-free survival rates were 90.8% and 86.5%, respectively. Hemoglobin, RBC, and the rate of abnormal platelet counts were significantly lower in the anemia group. Abnormal preoperative D-dimer was an independent factor for recurrence-free survival. Receiver operating characteristic curves showed that D-dimer had area under the curve of 0.734 (cut-off value: 0.685, sensitivity: 85.7%, and specificity: 64.0%). Hemoglobin and platelets had areas under the curves of 0.487 and 0.462, respectively.

Conclusion: Preoperative D-dimer was the most effective prognostic predictor for patients with cervical cancer. The prognosis of patients with cervical cancer was poorer if their D-dimer levels were >0.685 mg/L.

[1]Department of Gynecology, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, Shanghai, China
[2]Department of Gynecology, the First Affiliated Hospital of Wenzhou Medical University, Wenzhou, China

Corresponding author:
Haiyan Zhu, Department of Gynecology, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, No. 2699 West Gaoke Road, Shanghai 201204, China.
Email: zhuhaiyandoc@sina.com

Introduction

Despite efficient screening and vaccination, cervical cancer remains the fourth most common cancer in women worldwide, affecting around 500,000 patients annually.[1] The incidence and mortality of invasive cervical cancer have decreased steadily, but it remains a leading cause of cancer-related deaths among women in underdeveloped countries.[1] Persistent human papillomavirus (HPV) infection is a major causative factor for cervical cancer.[2] Women with early-stage cervical cancer have between an 80% and 95% chance of being cured.[3]

Tumor-specific parameters are currently the most useful prognostic factors for cervical cancer, such as tumor size, lymph node status, depth of invasion, and histologic grade.[4,5] The stage of cervical cancer is determined according to the 2009 International Federation of Gynecology and Obstetrics (FIGO) classification.[6] For early-stage cervical cancer, treatment usually involves radical hysterectomy, and then chemotherapy and/or radiotherapy after pathology results are available. For locally-advanced cervical cancer, chemoradiotherapy is the standard treatment strategy because it improves local control and reduces distant metastasis. Patients with stage IB2, IIA1, or IIA2 disease can first receive adjuvant chemotherapy, then undergo hysterectomy.[7] However, cervical cancer staging can be inaccurate, especially for advanced disease.[8] Therefore, reliable and accessible prognostic biomarkers are needed to identify risk classifications and guide treatments. Currently, several serum markers such as hemoglobin, thrombocytosis, and D-dimer have shown the potential to predict progression in various cancers.[9]

To date, the effects of anemia in terms of hemoglobin and red blood cells (RBCs), and anticoagulation factors such as platelets and D-dimer levels on the prognosis of patients with cervical cancer remain unknown. Therefore, this study investigated the prognostic value of hemoglobin, RBCs, platelets, and D-dimer levels for patients with stage IA1 to IIA2 cervical cancer post-hysterectomy.

Patients and methods

Patients

This retrospective study was conducted between January 2008 and December 2018 at the First Affiliated Hospital of Wenzhou Medical University, China. All treatments followed the National Comprehensive Cancer Network guidelines. This study was approved by the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University (approval no.: Ks21280). Informed consent was waived due to the retrospective nature of the study. We have de-identified all patient details. The reporting of this retrospective study conforms to STROBE guidelines.[10]

The inclusion criteria were as follows: 1) pathologically identified stage IA1 to IIA2 cervical cancer according to the FIGO (2009) cervical cancer guidelines[6]; and 2) patients undergoing radical hysterectomy. The exclusion criteria were as follows: 1) other previous malignancies, blood system diseases including venous thromboembolism, thrombocytosis, and chronic

leukemia, inflammatory diseases including autoimmune disorders, or infections; 2) lack of preoperative hemoglobin data; and 3) inaccurate survival data.

Study design

All surgeries were performed with the goal of complete cytoreduction and no visible disease by gynecologic oncologists with >15 years of postgraduate experience. Depending on the stage, total hysterectomy or extensive hysterectomy were performed *via* the abdominal laparoscopic route with or without the following procedures double appendectomy, pelvic lymph node dissection, and abdominal aortic lymph node dissection.[6]

Patients were divided into anemia and non-anemia groups according to their preoperative hemoglobin levels. Anemia was defined as hemoglobin <11 g/dL according to the World Health Organization criteria.

Definitions and follow-up

Patient characteristics and clinical data were collected from the hospital's medical database, including age, body mass index (BMI), history of smoking and drinking, complications such as hypertension and diabetes, family genetic history, HPV infection, FIGO stage, pathological results, infiltration and metastasis, and surgery-related indexes such as operation time. Three important coagulation related indexes were collected and recorded before (within 1 week before) and after (3 days after) surgery: hemoglobin (<11 g/dL was the cut-off for anemia), D-dimer (≥0.5 mg/L was considered abnormal), and platelet count (≥320 × 10^9/L was considered abnormal).

Patients were followed up every 3 to 6 months in the first 2 years after surgery, every 6 months to 1 year between 3 and 5 years after surgery, and every year when they had reached 5 years after surgery. Gynecological examinations were performed during each follow-up visit, and ultrasound scans and imaging were performed regularly: computed tomography or magnetic resonance imaging were performed every 6 months for patients at stage II or above, and positron emission tomography-computed tomography was recommended. Routine blood markers, creatinine, urea nitrogen, and blood squamous cell carcinoma (SCC) antigen were examined at every follow-up; thrombin clotting time was examined every 6 to 12 months. The last follow-up was in December 2018.

Recurrence was defined as cancer returning after treatment. If there was a recurrence, recurrence-free survival (RFS) was recorded from the time of surgery to the time of recurrence. Overall survival (OS) was recorded from the time of surgery to the time of all-cause death.

Statistical analysis

SPSS 22.0 (IBM Corp., Armonk, NY, USA) was used for all statistical analyses. Measurement data with a normal distribution are presented as mean ± standard deviation, and those not following a normal distribution are presented as median (range). Count data are presented as number (%). Differences between groups regarding the measurement data were analyzed by the Student's t test of independent samples or the Mann–Whitney U test, as appropriate. The chi-square test or Fisher's exact probability method were used to compare count data between groups, as appropriate.

Cox proportional hazards regression analysis was used for multivariable analysis to estimate independent variables. Survival curves were calculated using the Kaplan–Meier method, and the log-rank test was used for subgroup analysis. Receiver operating characteristic (ROC) curves were used to evaluate the predictive value of variables, and an area under the curve (AUC) >0.7 was

regarded as a high predictive value. $P < 0.05$ was considered statistically significant.

Results

Baseline characteristics of the study population

Among the 1191 patients who were considered for inclusion in this study, 70 were excluded because of a history of other tumors, 31 were excluded due to a lack of preoperative hemoglobin data, and two were excluded due to incorrect survival data. In total, 1088 patients were included, and their baseline data are listed in Table 1. According to the cut-off of hemoglobin $<11\,g/dL$, 152 patients were assigned to the anemia group and 936 to the non-anemia group. Most baseline characteristics were similar between two groups, except age, which was 52 years (range: 33–71

Table 1. General information of the patients.

Clinical information	Total ($n = 1088$)	Anemia group ($n = 152$)	Non-anemia group ($n = 936$)	P value
Age (years), median (range)	57 (33–71)	52 (33–71)	57 (43–71)	**<0.001**
HPV positive infection, n (%)	636 (94.4)	71 (92.2)	565 (94.6)	0.426
Preoperative SCC-Ag (ng/mL), median (range)	1.4 (0.1–70)	2 (0–89.4)	1.4 (0–89.4)	**0.001**
Postoperative SCC-Ag (ng/mL), median (range)	0.8 (0.1–70)	0.8 (0.1–6.7)	0.8 (0.1–70)	0.555
FIGO stage, n (%)				0.166
IA	73 (6.8)	7 (4.6)	66 (7.1)	
IB	562 (52.1)	71 (47)	491 (53)	
IIA1	437 (40.5)	73 (48.3)	364 (39.3)	
IIA2	6 (0.6)	0 (0)	6 (0.6)	
Pathological type, n (%)				0.636
Squamous cell carcinoma	930 (88.1)	128 (89.5)	802 (87.8)	
Adenocarcinoma	95 (9)	10 (7)	85 (9.3)	
Adenosquamous cell carcinoma	31 (2.9)	5 (3.5)	26 (2.8)	
Degree of differentiation, n (%)				0.224
low differentiation	509 (54.7)	66 (48.9)	443 (55.7)	
moderate differentiation	362 (38.9)	57 (42.2)	305 (38.3)	
high differentiation	60 (6.4)	12 (8.9)	48 (6)	
Invasion depth, n (%)				**0.007**
superficial 1/3	352 (32.5)	37 (24.3)	315 (33.8)	
intermediate 1/3	230 (21.2)	27 (17.8)	203 (21.8)	
inner 1/3	501 (46.3)	88 (57.9)	413 (44.4)	
Positive parauterine infiltration, n (%)	30 (2.8)	5 (3.3)	25 (2.7)	0.595
Positive margin, n (%)	30 (2.8)	2 (1.3)	28 (3)	0.419
Positive tumor metastasis, n (%)	142 (13.1)	26 (17.1)	116 (12.4)	0.119
Lymph node metastasis, n (%)	184 (17)	33 (21.9)	151 (16.3)	0.090
Positive vascular or lymphatic infiltration, n (%)	227 (21.4)	37 (25.2)	190 (20.7)	0.233
Follow-up time (months), median (range)	48 (0–145)	56 (2–140)	48 (0–145)	0.220

HPV, human papillomavirus; SCC-Ag, squamous cell carcinoma antigen; FIGO, International Federation of Gynecology and Obstetrics.

years) in the anemia group and 57 years (range: 43–71 years) in the non-anemia group (P < 0.001), preoperative SCC antigen, which was 2 ng/mL (range: 0–89.4 ng/mL) in the anemia group and 1.4 ng/mL (range: 0.1–70 ng/mL) in the non-anemia group (P = 0.001), and invasion depth, which was deeper in a higher percentage of patients in the anemia group compared with in the non-anemia group (P = 0.007).

Comparison of coagulation indexes

Differences in coagulation indexes between the two groups are shown in Table 2. The levels of preoperative hemoglobin, postoperative hemoglobin, preoperative RBCs, postoperative RBCs, and abnormal platelet counts were significantly lower in the anemia group compared with in the non-anemia group (all P < 0.001). However, preoperative D-dimer was not significantly different between the two groups (P = 0.158).

Survival analysis

OS and RFS curves of the entire cohort are shown in Figure 1. The 5-year OS rate was 92.9%, the 10-year OS rate was 90.8%, the

5-year RFS rate was 89.0%, and the 10-year RFS rate was 86.5%.

Factors related to OS and RFS

Univariable and multivariable Cox regression analyses of factors that influenced OS and RFS are shown in Tables 3 and 4, respectively. Univariate analysis showed that age, SCC antigen, adenocarcinoma pathological type, lymph node metastasis, vascular or lymphatic infiltration, inner invasion depth, parametrial infiltration, and distant metastasis were factors significantly related to OS. However, multivariate analysis showed that preoperative anemia, abnormal platelet counts, and abnormal D-dimer levels were not independent factors for OS (P > 0.05). Univariate analysis showed that SCC antigen, preoperative D-dimer levels, FIGO stages IIA1 to IIA2, high degree of differentiation, lymph node metastasis, vascular or lymphatic infiltration, inner invasion depth, parametrial infiltration, distant metastasis, and a positive margin were factors significantly related to RFS. However, multivariate analysis showed that abnormal preoperative D-dimer levels (hazard ratio [HR]: 3.246,

Table 2. Differences in coagulation-related indicators between the two groups.

| Clinical information	Total (n = 1,088)	Anemia group (n = 152)	Non-anemia group (n = 936)	P value
Preoperative hemoglobin (g/dL), median (range)	12.9 (11.1–16.1)	10.1 (5.8–11.0)	12.8 (11.0–14.6)	<0.001
Postoperative hemoglobin (g/dL), median (range)	10.5 (6.4–99.6)	8.4 (5.0–12.3)	10.3 (78–12.5)	<0.001
Preoperative RBC count (1012/L), median (range)	4.28 (0.35–5.98)	3.74 (1.93–5.43)	4.25 (0.35–5.98)	<0.001
Postoperative RBC count (1012/L), median (range)	3.47 (0.27–5.24)	3.24 (1.94–4.8)	3.44 (0.27–5.24)	<0.001
Abnormal preoperative D dimer levels, n (%)	158 (49.8)	28 (59.6)	130 (48.1)	0.158
Abnormal preoperative platelet count, n (%)	154 (14.2)	48 (31.6)	106 (11.3)	<0.001

RBC, red blood cells.
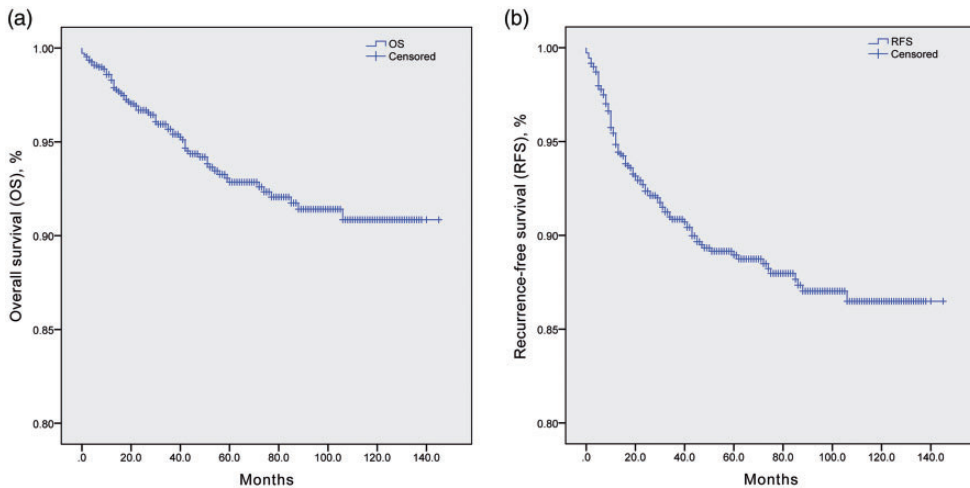
Figure 1. Kaplan–Meier curves for (a) overall survival (OS) and (b) recurrence-free survival (RFS) of all patients included in the analysis; the 5-year OS rate was 92.9%, the 10-year OS rate was 90.8%, the 5-year RFS rate was 89.0%, and the 10-year RFS rate was 86.5%.

95% confidence interval [C]: 1.189–8.864, P = 0.022), moderate differentiation (HR: 0.323, 95%CI: 0.109–0.959, P = 0.042), and vascular or lymphatic infiltration (HR: 3.16, 95%CI: 1.339–7.458, P = 0.009) were independently associated with RFS.

Subgroup survival analysis

Subgroup analysis was then performed to further investigate the influence of preoperative anemia, abnormal platelet counts, and abnormal D-dimer levels on survival (Figure 2). The RFS curve was significantly affected by preoperative abnormal D-dimer levels (P = 0.034). The 5-year RFS rate of patients with abnormal and normal D-dimer levels were 72.0% and 83.3%, respectively, and the 10-year RFS rate was the same as the 5-year RFS rate.

Further analysis of the predictive value of the three coagulation-related indexes for patient outcomes using follow-up data showed that D dimer levels had the highest AUC of 0.734 (cut-off value: 0.685, sensitivity: 85.7%, and specificity: 64.0%), indicating a high predictive value. In contrast,

hemoglobin and platelet had AUCs of 0.487 and 0.462, respectively, indicating low predictive value (Figure 3).

Discussion

The aim of this study was to investigate the prognostic value of hemoglobin, platelets, and D-dimer levels for patients with stage IA1 to IIA2 cervical cancer patients post-hysterectomy. Among the 1088 patients included in this study, 152 had anemia. The 10-year OS was 90.8% and the RFS was 86.5% for all included patients. Abnormal preoperative D-dimer levels were an independent factor for RFS. D-dimer levels had an AUC of 0.734 at a cut-off value of 0.685 mg/L with a sensitivity of 85.7% and a specificity of 64.0%, while hemoglobin and platelets had AUCs of 0.487 and 0.462, respectively. Therefore, preoperative D-dimer was the most effective prognostic. Patients with cervical cancer with D-dimer levels >0.685 mg/L had worse prognoses.

The survival of patients with stage IA1 to IIA2 cervical cancer in this study was

Table 3. Cox univariate and multivariate regression analyses of factors associated with OS.

	Univariable analysis			Multivariable analysis		
	HR	95% CI	P value	HR	95% CI	P value
Age	1.02	1.002–1.037	**0.027**	1.013	0.951,1.079	0.682
Preoperative SCC-Ag	1.038	1.024–1.052	**<0.001**	1.047	0.995,1.101	0.078
HPV positive infection	0.971	0.231–4.091	0.968	/	/	/
Preoperative anemia	1.372	0.732–2.571	0.323	/	/	/
Abnormal preoperative platelet count	1.042	0.496–2.187	0.914	/	/	/
Abnormal preoperative D dimer levels[a]	3.763	0.825–17.163	0.087	6.639	0.787,56.005	0.082
FIGO stage						
IA	Ref					
IB	1.831	0.435–7.719	0.41	/	/	/
IIA1	2.928	0.702–12.206	0.14	/	/	/
IIA2	6.52	0.591–71.935	0.126	/	/	/
Pathological type						
squamous cell carcinoma	Ref			Ref		
adenocarcinoma	2.293	1.122–4.686	**0.023**	1.39	0.142,13.588	0.777
adenosquamous cell carcinoma	1.327	0.322–5.465	0.695	0.923	0.09,9.472	0.946
Degree of differentiation						
low differentiation	Ref			Ref		
moderate differentiation	0.617	0.359–1.062	0.081	0.136	0.018,1.04	0.055
high differentiation	0.216	0.03–1.573	0.13	1.875	0.212,16.55	0.572
Lymph node metastasis	4.674	2.859–7.64	**<0.001**	0.309	0.038,2.535	0.274
Vascular or lymphatic infiltration	1.953	1.139–3.351	**0.008**	0.71	0.113,4.466	0.715
Invasion depth						
superficial 1/3	Ref			Ref		
intermediate 1/3	2.45	0.932–6.439	0.069	1.224	0.106,14.149	0.871
deep 1/3	5.091	2.301–11.265	**<0.001**	2.318	0.264,20.314	0.448
Parametrial infiltration[b]	6.04	2.876–12.682	**<0.001**	/	/	/
Distal metastasis	3.174	1.855–5.43	**<0.001**	8.475	0.951,75.5	0.055
Positive margin[b]	2.522	0.916–6.942	0.073	/	/	/

Indicators with P values <0.1 in the univariable analysis were included in the multivariable analysis.
[a]Only 250 patients had preoperative D-dimer data.
[b]There were few cases of parametrial infiltration (eight) and positive margins (eight) among the 250 patients with pre-operative D-dimer data who were included in the multivariable analysis. Due to the unbalanced composition ratio of the population, the results for these two parameters in multivariable analysis are not shown.
HR, hazard ratio; CI, confidence interval; OS, overall survival; HPV, human papillomavirus; SCC-Ag, squamous cell carcinoma antigen; FIGO, International Federation of Gynecology and Obstetrics.

good, with 92.9% and 90.8% OS at 5 and 10 years, respectively, and 89.0% and 86.5% RFS at 5 and 10 years, respectively. These data indicate better outcomes than the overall 5-year progression-free and disease-specific survival rates of 81.4% and 88.7%, respectively, observed in 100 patients with stage IA1 to IIA cervical cancer who underwent robot-assisted laparoscopy.[11] The OS for patients with cervical cancer up to stage II can be expected to be between 87% and 92%.[12] Therefore, the treatment for patients included in this study was effective for early-stage disease.

Decreased hemoglobin, increased platelets, and hypercoagulability are related to

Table 4. Cox regression analyses of factors associated with RFS.

	Univariable analysis			Multivariable analysis		
	HR	95% CI	P value	HR	95% CI	P value
Age	1.01	0.995–1.024	0.185	/	/	/
Preoperative SCC-Ag	1.03	1.018–1.043	**<0.001**	1.024	0.983–1.066	0.258
HPV positive infection	0.926	0.335–2.555	0.882	/	/	/
Preoperative anemia	1.043	0.613–1.773	0.877	/	/	/
Abnormal preoperative platelet count	1.004	0.573–1.761	0.989	/	/	/
Abnormal preoperative D-dimer levels[a]	2.451	1.042–5.768	**0.04**	3.246	1.189–8.864	**0.022**
FIGO stage[b]						
IA	Ref					
IB	3.378	0.821–13.902	0.092	/	/	/
IIA1	4.822	1.176–19.780	**0.029**	/	/	/
IIA2	14.013	1.973–99.513	**0.008**	/	/	/
Pathological type						
squamous cell carcinoma	Ref					
adenocarcinoma	1.604	0.875–2.939	0.126	/	/	/
adenosquamous cell carcinoma	1.805	0.732–4.451	0.2	/	/	/
Degree of differentiation						
low differentiation	Ref			Ref		
moderate differentiation	0.69	0.458–1.039	0.076	0.323	0.109–0.959	**0.042**
high differentiation	0.126	0.017–0.906	**0.04**	0.699	0.091–5.387	0.731
Lymph node metastasis	3.623	2.470–5.313	**<0.001**	0.716	0.25–2.046	0.533
Vascular or lymphatic infiltration	2.383	1.603–3.540	**0.019**	3.16	1.339–7.458	**0.009**
Invasion depth						
superficial 1/3	Ref			Ref		
middle 1/3	1.567	0.807–3.041	0.184	0.458	0.113–1.857	0.274
deep 1/3	3.122	1.865–5.226	**<0.001**	0.983	0.305–3.172	0.978
Parametrial infiltration	5.196	2.783–9.700	**<0.001**	0.969	0.111–8.489	0.978
Distal metastasis	2.871	1.885–4.373	**<0.001**	1.509	0.583–3.908	0.397
Positive margin	2.694	1.252–5.795	**0.011**	2.393	0.482–11.886	0.286

Indicators with P values <0.1 in the univariable analysis were included in the multivariable analysis.

[a]Only 250 patients had preoperative D-dimer data.

[b]Although variables with P value <0.1 in the univariable analysis were included in the multivariable analysis, an abnormal value was observed in the multivariable analysis (HR > 1000) due to the unbalanced composition ratio of the population (P > 0.05). Therefore, multivariable analysis results for this indicator are not shown.

HR, hazard ratio; CI, confidence interval; RFS, recurrence-free survival; HPV, human papillomavirus, SCC-Ag, squamous cell carcinoma antigen; FIGO, International Federation of Gynecology and Obstetrics.

tumor invasion and progression. In some cancers such as breast cancer and lung cancer, patients' hemoglobin levels are related to treatment outcomes and survival.[13,14] In cervical cancer, anemia is associated with poor local disease control and a decreased survival rate.[15,16] Improving hemoglobin levels in patients with cervical cancer may help achieve better outcomes.[17] Excessive platelet in the blood, known as thrombocytosis, was found to be an independent prognostic predictor in patients with cervical cancer.[18] Additionally, platelets play important roles in tumor growth, tumor cell extravasation, and metastasis.[19] D-dimer is the product of fibrin
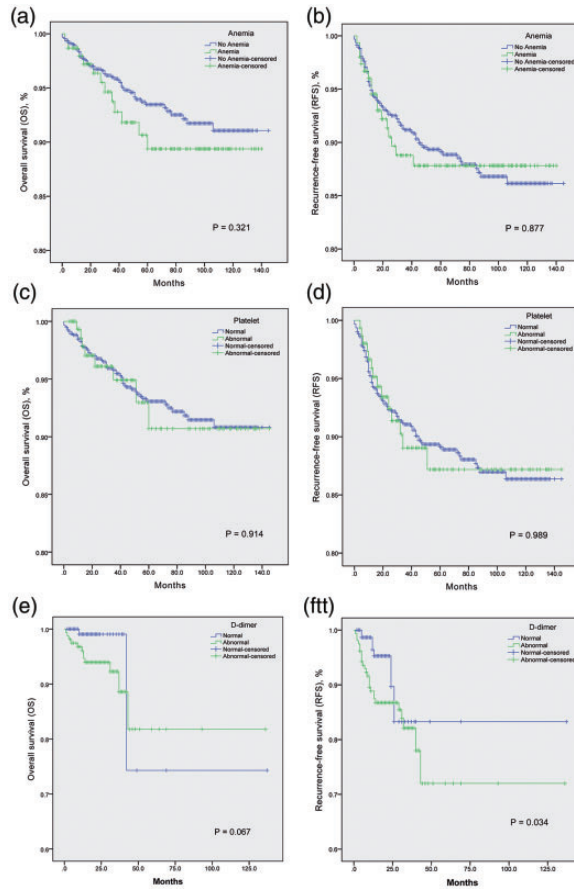
Figure 2. The influence of preoperative hemoglobin, platelet count, and D-dimer levels on overall survival (OS) and recurrence-free survival (RFS). Kaplan–Meier curves showing no significant effects (a) of preoperative anemia (hemoglobin) on OS, (b) of preoperative anemia (hemoglobin) on RFS, (c) of abnormal preoperative platelet count on OS, (d) of abnormal preoperative platelet count on RFS, and (e) of abnormal preoperative D-dimer levels on OS; however, (f) a significant effect of abnormal preoperative D-dimer levels on RFS was observed (P = 0.034).

degradation.[20] In gynecological cancers, both the coagulation and fibrinolysis systems are hyperactivated, leading to increased plasma D-dimer levels.[21] Elevated D-dimer levels are predictive of survival in different cancers including lung, pancreatic, colorectal, and breast cancer.[22–25] The relationship between high plasma D-dimer levels and poor prognosis has also been found in cervical cancer.[9] Therefore, this study investigated these factors for their ability to predict prognosis.

A recent study showed that pre-treatment and on-treatment anemia (hemoglobin $\leq 11.0\,\mathrm{g/dL}$) was a significant independent predictor of decreased progression-free survival (PFS) and OS, and that normalizing hemoglobin levels improved OS.[26] Additionally, that study also reported that thrombocytosis (platelets $>400 \times 10^9/\mathrm{L}$) was associated with reduced
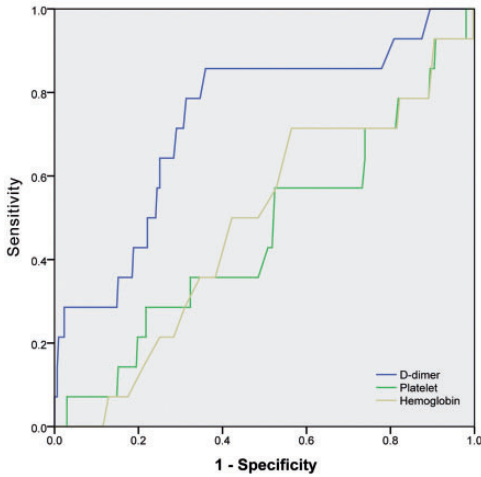
Figure 3. Receiver operating characteristic (ROC) curves showing the ability of the three coagulation-related indexes to predict death at the end of follow-up. The area under the curve (AUC) for D-dimer levels was the highest, with a value of 0.734 (cut-off value: 0.685, sensitivity: 85.7%, and specificity: 64.0%). The AUC value of preoperative hemoglobin was 0.487 (cut-off value: 12.650 g/dL, sensitivity 71.4%, and specificity 43.6%), and the AUC of preoperative platelets was 0.462 (cut-off value: 314.50, sensitivity: 28.6%, and specificity: 78.2%).

5-year progression-free survival and OS.[26] However, in this study we did not find that preoperative low hemoglobin levels or abnormal platelet counts were independently associated with OS or RFS. These data suggest that anemia is a poor biomarker of recurrence and that the relationship between anemia and cervical cancer prognosis is complex.[27] Notably, we found that D-dimer levels were a prognostic factor for cervical cancer, consistent with previous studies.[28,29] These results suggest that D-dimer levels may be the most reliable prognostic marker among the three indexes. However, further large scale studies are needed to support this conclusion.

As a single-center retrospective analysis, this study had some limitations. The sample size was relatively small, particularly regarding patients with anemia. Certain confounding variables could not be controlled, and some data were incomplete. For example, many patients were excluded from the analysis due to a lack of preoperative D-dimer data.

Conclusion

This study investigated the prognostic value of hemoglobin, platelets, and D-dimer levels in patients with stage IA1 to IIA cervical cancer following hysterectomy. The results suggested that patients with D-dimer levels >0.685 mg/L are likely to have poorer prognoses.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

ORCID iDs

Bilan Li https://orcid.org/0000-0002-7239-2109

Haiyan Zhu https://orcid.org/0000-0002-1030-4601

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