Role of Hypercoagulable State for Predictive Ovarian Malignancy in Women with a Pelvic Mass

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Background: *Ovarian cancer (OC) is an important malignancy in women worldwide and is associated with hypercoagulable state and high risk of venous thromboembolism (VTE).*
Objective: *To assess the performance of preoperative blood coagulability in discriminating between OCs and benign gynecologic diseases in women presenting with a pelvic mass, and to study the incidence of postoperative thromboembolic events.*
Material and Method: *Preoperative coagulation tests (platelet count, prothrombin time, activated partial thromboplastin time, thrombin time, fibrinogen and D-dimer levels), and serum cancer antigen 125 (CA125) were investigated in women over 18 years old with clinically diagnosed pelvic or adnexal mass who underwent elective surgery at Rajavithi Hospital between January 2012 and December 2013. After a 9-week post-operation period, these patients were followed-up for VTE events.*
Results: *Of 196 women, 99 had OC and 97 had benign ovarian diseases. Platelet count, fibrinogen and D-dimer levels were significantly elevated in women with OC; however, only plasma fibrinogen level was a significant predictive factor for OC. Fibrinogen and CA125 displayed similar effectiveness (areas under receiver operating characteristic curve [ROC-AUCs], 76.0% vs. 77.7%) in OC prediction. A logistic model of combined fibrinogen and CA125 showed the best performance for OC prediction (ROC-AUC, 90.1%). Postoperatively, one deep vein thrombosis event in OC patients was found, while none appeared in patients with benign gynecologic diseases.*
Conclusion: *Women with OC are significantly more associated with hypercoagulable state than those with benign gynecologic diseases. Plasma fibrinogen level was the significant predictive factor for OC, and only 1 post-operative VTE event occurred.*

Keywords: *Hypercoagulable state, Platelet, Fibrinogen, D-dimer, Ovarian cancer*

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Ovarian cancer (OC) is the third most common gynecologic cancer and the second most prevalent cause of gynecologic cancer-related death[1]. In 2012, 238,700 new cases were diagnosed and 151,900 women died of the disease worldwide[1]. Cancer cells can release procoagulant factors that lead to fibrin formation and fibrinolytic factors that result in the formation of fibrin split products known as D-dimer fragments (DD). Interactions between tissue factor and factor VIIa complex and monocytes play a role in mediating OC invasion and metastasis[2].

When women present with a pelvic or adnexal mass, differential diagnosis of benign lesion or ovarian cancer is important. Women at high risk of OC will be referred to gynecologic oncologists for surgery. Serum cancer antigen 125 (CA125) is the most widely used biomarker in diagnosis of OC, but CA125 measurement has many limitations; furthermore, CA125 elevation has also been identified in several other conditions, both benign and malignant, such as endometriosis, first trimester of pregnancy, breast cancer and peritoneal inflammation[3]. Various biomarkers involving inflammation and coagulation have been investigated for their potential to replace or complement CA125 in predicting OC[4].

Cancer is an independent risk factor for the development of venous thromboembolism (VTE). Among all types of cancer, OC is the disease with the highest risk of VTE[5] followed by pancreatic, gastric, urological and brain cancer. Deep vein thrombosis (DVT) and pulmonary embolism (PE) after gynecologic surgery can result in significant morbidity and mortality. In a retrospective study of 253 women with OC who underwent surgery, the incidence of VTE was 16.6% (15% DVT and 1.6% PE)[6]. VTE often occurred after the patient was discharged from hospital and when

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prophylactic measures had been discontinued: 75% of all VTE events occurred more than a week postoperatively, and 36% after 4 weeks[7]. Gynecologic cancer patients who undergo a major operation are in a high risk group for VTE; therefore, prophylactic therapies including intermittent pneumatic compression device (IPC), unfractionated heparin (UFH) administration, and low molecular weight heparin (LMWH) injection are administered, and, as a consequence, the risk of VTE has been found to fall to 2 to 6%[8,9]. Thrombosis prophylaxis has not been routinely used for gynecologic cancer patients undergoing major cancer surgery in Thailand, and little information is available on the characteristics of VTE in Thai gynecologic cancer patients.

The primary purpose of the present study was to explore the performance of preoperative blood coagulation test in predicting OC in women presenting with a pelvic or adnexal mass, and to study the incidence of postoperative VTE events.

Material and Method

After obtaining approval from the Institutional Review Board of Rajavithi Hospital (No. 084/2011), this prospective cohort study was conducted of Thai women aged 18 years or older with clinically diagnosed pelvic or adnexal mass who were scheduled for elective gynecologic surgery in Rajavithi Hospital between January 2012 and December 2013. All participants were asked to give written informed consent before enrolment, and they were admitted for preoperative preparation at least 24 hours prior to their operation. Clinical data were collected and blood tests for platelet count, prothrombin time (PT), activated partial thromboplastin time (aPTT), thrombin time (TT), plasma fibrinogen and DD levels, and CA125 were obtained preoperatively. The exclusion criteria included women who: were pregnant; had previous history of OC or any known malignancies; had previous history of adnexal surgery, preoperative DVT or PE, DVT or PE, coagulopathy, chemotherapy or radiotherapy; had had an emergency operation; were using aspirin, anticoagulant or antiplatelet medication; had incomplete blood coagulation and/or serum CA125 results; or cancelled surgeries.

Postmenopausal women were defined as those older than 45 years of age with cessation of menstrual bleeding for more than one year, or those over 55 years of age. If menopausal status could not be identified from the clinical data, the FSH level was tested to assign the menopausal status at the cutoff value of 25 IU/L[10].

Blood samples (citrated plasma) were obtained by peripheral venous puncture and processed immediately or stored at -20°C until needed. Platelet count was measured by automated blood analyzer. PT, aPTT and TT were measured using Thromborel S, Dade Actin FS, and Dade Thrombin reagents respectively (Siemens Healthcare Diagnostics Products GmbH, Marburg, Germany). Plasma fibrinogen level was determined using Dade Thrombin reagent (Siemens Healthcare Diagnostics Products GmbH, Marburg, Germany). Plasma DD level was determined using NycoDard enzyme immunoassay kit (Axis-Shield PoC AS, Oslo, Norway). Because of the sensitivity of this assay, values below 0.1 μg/mL were set equal to 0.1 μg/mL. Serum CA125 level was measured using Elecsys CA125 II reagent kit (Roche Diagnostics, Basel, Germany). Normal test ranges were as follows: platelet count, 150-450 x 10^3/μL; PT, 10.5-13.5 sec; aPTT, 22-40 sec; TT, 15-20 sec; fibrinogen level, 180-400 mg/dL; D-dimer level, 0.1-0.3 μg/mL; and CA125, 35 U/mL.

After pathologic diagnosis, all patients were categorized into the OC or benign gynecologic disease groups. The OC group included tumor of borderline malignancy i.e. borderline ovarian tumor (BOT), granulosa cell tumor, Sertoli-Leydig tumor, steroid cell tumor and carcinoid tumor. After their operations, all patients underwent follow-up evaluation for VTE events on day 7, week 4, and week 9. VTE was defined as clinically suspected DVT or PE confirmed by imaging and requiring therapeutic anticoagulation or resulting in death. For the clinical signs of VTE, we carefully examined the patients for leg swelling, tenderness along the distribution of deep veins, acute cardiovascular dysfunction, dyspnea, chest pain and loss of consciousness. Patients who showed clinical signs of VTE were subjected to Duplex ultrasonography of leg vein and computed tomographic angiography scanning of the chest.

Sample size calculation was based on the formula for estimating proportion, using 2-tail alpha equal 0.05 and acceptable error (d) at 0.15. A sensitivity of 59.8% of serum fibrinogen in diagnosis of OC from the study of Hefler-Frischmuth et al[11] was used for calculation. The prevalence of OC in women presenting with pelvic or adnexal mass in Rajavithi Hospital was estimated at 40%; hence, at least 105 subjects were computed and 131 subjects were finally required to account for an expected 20% dropout.

Data analysis using STATA 14 (StataCorp, College Station, TX) was carried out. Continuous data

was assessed for normality using the Shapiro-Wilk test. Serum CA125 was initially log-transformed because of its highly positive skewed distribution. The characteristics of participants, blood coagulation tests and serum CA125 levels were summarized using mean and standard deviation (SD) for normally distributed continuous variables, median and range for non-normally distributed continuous variables, and percentage for categorical variables. Comparisons were made using Student's t- or Mann-Whitney U tests, as appropriate, for continuous variables, and χ^2 test for categorical variables. Binary logistic regression analysis using a backward elimination model-fitting strategy was generated to identify significant predictors of OC. These significant predictors formed a logistic equation. The predictive performance was then evaluated by calculating the area under receiver operating characteristic curve (ROC-AUC) and its 95% confidence interval (CI). Optimal cutoff values were identified using the Youden Index method[12]. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) with 95% CI were also calculated.

Results

During the study period, 210 women with clinically diagnosed ovarian tumor having a planned surgical intervention were prospectively enrolled. Two patients were pregnant, 5 had histories of previous adnexal surgery, 1 had a history of breast cancer, 2 had incomplete blood coagulation results, and 4 patients cancelled their surgeries; hence, 196 patients were categorized into the benign gynecologic disease group (97 cases) and the OC group (99 cases).

The clinical and pathologic characteristics of participants are summarized in Table 1 and 2 respectively. Both groups of participants were significantly different in age, menopausal status, parity, underlying diseases, and serum CA125 levels. Endometriotic cysts were the most common benign diseases and borderline mucinous tumors were the most frequently found OCs. Comparison of coagulation variables found that platelet count, plasma fibrinogen and DD levels in OC patients were significantly higher

Table 1. Patients' characteristics compared between ovarian cancers and benign gynecologic diseases

Variables	Benign (n = 97)	Cancer (n = 99)	*p*-value
Age (years)	42.2±14.9	52.8±13.0	<0.001*
Menopausal status			<0.001*
Premenopausal	68 (70.1)	32 (32.3)	
Postmenopausal	29 (29.9)	67 (67.7)	
BMI (kg/m^2)	23.6±4.7	24.0±4.5	0.610
Parity	0, 0-7	1, 0-10	0.014*
Underlying diseases$^+$	23 (23.7)	39 (39.4)	0.027*
Diabetic mellitus	8 (8.2)	10 (10.1)	0.653
Hypertension	11 (11.3)	31 (31.3)	0.001*
Thyroid diseases	5 (5.2)	1 (1.0)	0.193
Others	5 (5.2)	5 (5.1)	0.974
CA125 (U/mL)	43.3, 6.2 to 1,157.0	180.8, 8.2 to 25,000	<0.001*
Coagulation study			
Platelet count (x10^3/μL)	285.4±73.1	354.6±112.9	<0.001*
PT (sec)	12.2±1.2	12.5±2.1	0.257
aPTT (sec)	26.2±2.4	27.1±2.6	0.053
TT(sec)	8.5±0.5	8.6±0.6	0.242
Fibrinogen level (mg/dL)	328.4±75.8	429.2±113.1	<0.001*
D-dimer level (μg/mL)	0.1, 0.1 to 3.5	0.3, 0.1 to 8.6	<0.001*

Values are represented as n (%), mean ± SD, median, range; * Significant at $p<0.05$

$^+$ Six cases in benign gynecologic disease group and seven cases in cancer group had more than one underlying diseases.

aPTT = Activated partial thromboplastin time; BMI = Body mass index; CA125 = Cancer Antigen-125; IQR = interquartile range; RMI = Risk of malignancy index; PT = Prothrombin time; SD = Standard deviation; TT = Thrombin time; US = Ultrasound

than in those with benign gynecologic diseases. The aPTT in OC patients was more prolonged than in those with benign gynecologic diseases, but without statistical significance. There were also no statistically significant differences in PT and TT between both groups.

Table 2. Histopathologic diagnosis (n = 196)

Pathology	Number (%)
Benign diseases	97 (49.5)
Endometriosis	41 (20.9)
Mucinous cystadenoma	24 (12.3)
Mature cystic teatime	14 (7.2)
Serous cystadenoma	10 (5.1)
Fibrothecoma	3 (1.5)
Simple/paratubal/functional cyst	3 (1.5)
Tuboovarian abscess	2 (1.0)
Cancer	99 (50.5)
Borderline mucinous tumor	21 (10.7)
Clear cell carcinoma	18 (9.2)
Serous carcinoma	18 (9.2)
Mucinous carcinoma	7 (3.6)
Endometrioid carcinoma	10 (5.1)
Mixed epithelial carcinoma	4 (2.0)
Adenocarcinoma, NOS	4 (2.0)
Granulosa cell tumor	4 (2.0)
Borderline serous tumor	3 (1.5)
SCC arising in mature cystic teratoma	2 (1.0)
Mixed germ cell tumor	2 (1.0)
Metastatic gastrointestinal stromal sarcoma	2 (1.0)
Yolk sac tumor	1 (0.5)
Metastatic colorectal adenocarcinoma	1 (0.5)
Metastatic carcinoid tumor	1 (0.5)
Krukenberg tumor	1 (0.5)

NOS = Not otherwise specified; SCC = Squamous cell carcinoma

Binary logistic regression analysis was performed to find the predictive factors of OC. Significant variables including age, menopausal status, parity, underlying diseases, natural log of serum CA125, platelet count, plasma fibrinogen level, and DD level formed the initial multivariate logistic model. The final model was generated using a backward elimination model-fitting strategy and included menopausal status, natural logs of serum CA125 and fibrinogen levels (Table 3). A multimodality test of those combined parameters was developed from the logistic function presented as: Probability of OC (%) = 100/(1 + exp(-((-8.01) + (2.11 x menopausal status) + (0.86 x Ln(CA125)) + (0.009 x Fibrinogen))). This model fitted the data well (goodness-of-fit test, $p = 0.768$).

Evaluation of the performance of plasma fibrinogen level and the multimodality test compared with serum CA125 in discriminating OCs from benign gynecologic diseases is shown in Table 4 and Fig. 1. ROC-AUCs of CA125, fibrinogen, and multimodality test for predicting OC were 77.7%, 76.0%, and 88.2% respectively. Whereas CA125 and fibrinogen differed only slightly ($p = 0.683$), AUCs for both of them were significantly lower than for the multimodality test ($p<0.001$). At the optimal cutoff value of 375 mg/dL, plasma fibrinogen levels had sensitivity, specificity, PPV and NPV of 63.6%, 82.5%, 78.8% and 69.0% respectively. The multimodality test had the highest specificity (96.9%) at the optimal cutoff value of 77%.

The details of false positive and false negative cases for each test, categorized by their histopathology distribution, are summarized in Table 5. The multimodality test yielded the fewest false-

Table 3. Predictive factors of ovarian cancer from binary logistic regression

Variables	Total n (%)	Ovarian cancer			
		Coefficient	Crude OR (95% CI)	Adjusted OR (95% CI)	*p*-value
Menopausal status					
Premenopausal	100 (32.0)		1	1	
Postmenopausal	96 (69.8)	2.11	4.91 (2.68, 8.99)	8.24 (3.63, 18.72)	<0.001*
Ln(CA125), U/mL	196 (50.5)	0.86	2.43 (1.82, 3.26)	2.35 (1.66, 3.35)	<0.001*
Fibrinogen level, x10 mg/dL	196 (50.5)	0.09	1.11 (1.07, 1.15)	1.09 (1.05, 1.14)	<0.001*
Constant		-8.01			

CA125 = Cancer antigen 125; CI = confidence interval; OR = Odds ratio

Table 4. Performance of serum CA125, plasma fibrinogen and multimodality test for prediction of ovarian cancer

Tests	ROC		Cutoff value	Sn (%)	Sp (%)	PPV (%)	NPV (%)	*p*-value
	AUC	(95% CI)						
CA125 (U/mL)	77.7	(71.1, 84.2)	Ref.	35	80.8	41.2	58.4	67.8
Fibrinogen (mg/dL)	76.0	(69.3, 82.7)	0.683	375	63.6	82.5	78.8	69.0
Multimodality (%)	88.2	(83.5, 92.8)	<0.001*	77	64.6	96.9	95.5	72.8

CA125 = Cancer antigen 125; ROC = Receiver operating characteristic; AUC = Area under the curve; CI = Confident interval; Sn = Sensitivity; Sp = Specificity; PPV = Positive predictive value; NPV = Negative predictive value
* Significant at $p<0.05$

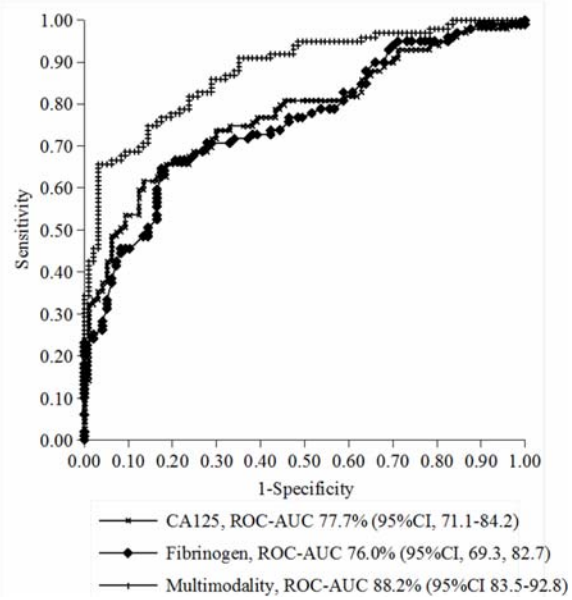

Fig. 1 Receiver operating characteristic curve of serum cancer antigen 125 (CA125), plasma fibrinogen and multimodality test for prediction of ovarian cancer.

positive cases in patients with benign gynecologic diseases (3.1%), whereas plasma fibrinogen levels and the multimodality test had the highest number of false-negative cases in patients with OC (36.4% and 35.4% respectively). In the OC group, patients with BOTs had the most false-negative cases in all tests.

After a 9-week period of post-operative surveillance, no VTE event appeared in patients with benign gynecologic disease, and only one DVT event occurred in patients with OC (1/99, 1.0%) at 4-week postoperation. A 56-year old patient with BMI 21.3 kg/m^2 was diagnosed with FIGO stage IIIC ovarian mucinous adenocarcinoma. She manifested with huge ovarian tumor, bilateral pleural effusion and ascites. Preoperative laboratory tests revealed D-dimer level, 2.2 µg/mL; fibrinogen level, 241 mg/dL; and platelet count, 390x10^3/µL. Plasma CA125 level was 754.2 U/mL. She underwent exploratory laparotomy with hysterectomy, bilateral salpingoophorectomy and omentectomy. Intraoperative findings revealed bilateral ovarian tumor extensively invading the uterus with pelvic and abdominal peritoneum. She was suboptimally debulked with evidence of approximately 5-cm size residual tumor along the abdominal peritoneum. The operative time was 210 minutes. To compensate for intraoperative blood loss of approximately 1,100 mL, two units of packed red cells were transfused. No intraoperative complication was noted. Adjuvant combination chemotherapy of carboplatin and paclitaxel was considered. Four weeks after her operation, she complained of painful left leg swelling. Diagnosis of DVT was confirmed by Duplex ultrasonography, and she was treated with warfarin. Two months after the operation, she died in her sleep without definite cause.

Discussion

Cancer is significantly associated with a hypercoagulable state. In the present study, platelet count, plasma fibrinogen and DD levels were significantly elevated in OC patients, supporting the view that hypercoagulability is associated with OC due to activation of both coagulation and fibrinolysis. Thrombocytosis, hyperfibrinogenemia and elevated plasma DD levels were reported to have significant associations with advanced disease and shorter survival in OC patients[13-16].

In agreement with a previously reported study[11], the author ascertained plasma fibrinogen levels as a significant diagnostic marker in women with pelvic or adnexal masses undergoing elective surgery. Overall performance of plasma fibrinogen levels in predicting OC did not differ from that of CA125, but

Table 5. Numbers of false positive and false negative cases of each parameter

Pathologic diagnosis	n	CA125 n (%)	Fibrinogen n (%)	Multimodality n (%)
False-positive in benign diseases				
Endometriotic cyst	41	31 (75.6)	8 (19.5)	1 (2.4)
Teratoma	14	4 (28.6)	2 (14.3)	0 (0.0)
Serous cystadenoma	10	6 (60.0)	0 (0.0)	0 (0.0)
Mucinous cystadenoma	24	12 (50.0)	5 (20.8)	0 (0.0)
Other benign diseases	8	4 (50.0)	2 (25.0)	2 (25.0)
Total	97	57 (58.7)	17 (17.5)	3 (3.1)
False-negative in ovarian cancer				
Borderline tumors	24	12 (50.0)	15 (62.5)	15 (62.5)
EOCs	61	7 (11.5)	14 (23.0)	14 (23.0)
Serous carcinoma	18	0 (0.0)	6 (32.3)	4 (22.2)
Mucinous carcinoma	7	2 (28.6)	3 (42.9)	5 (71.4)
Endometrioid carcinoma	10	1 (10.0)	3 (30.0)	2 (20.0)
Clear cell carcinoma	18	2 (11.1)	1 (5.6)	2 (11.1)
Mixed EOC	4	0 (0.0)	1 (25.0)	1 (25.0)
Adenocarcinoma, NOS	4	0 (0.0)	0 (0.0)	0 (0.0)
Non-EOCs	14	2 (14.3)	7 (50.0)	6 (42.9)
Total	99	21 (21.2)	36 (36.4)	35 (35.4)

CA125 = Cancer antigen 125; EOC = epithelial ovarian carcinoma; NOS = not otherwise specified

sensitivity and specificity had some degree of difference. Serum CA125 revealed high sensitivity and low specificity, while plasma fibrinogen showed the reverse.

Because no single marker is accurately predictive of a benign or malignant status of a pelvic mass, multimodality testing has been advocated in order to increase the test accuracy[17,18]. Using a multivariable logistic regression model, preoperative plasma fibrinogen levels predicted OC independently of preoperative CA125 levels and menopausal status. A logistic equation for calculating the probability of OC was developed as in the multimodality testing in the present study, and performed significantly better than plasma fibrinogen and serum CA125 levels. This model showed a high specificity of 96.9%, and may be used as a second-line diagnostic test following the first-line diagnostic test which has high sensitivity i.e. Risk of Ovarian Malignancy Algorithm (ROMA)[19], and may improve the accuracy of OC diagnosis.

Patients with cancer undergoing major operations have a high risk of developing VTE. According to the American College of Chest Physicians (ACCP) Guidelines, the incidence of DVT is 15-40% among patients undergoing major gynecologic surgery without preventive measures, which is the same as for general surgery, major urological operations and neurosurgery[20].

In contrast, VTE has been perceived for a long time to be less common in Asian populations. Sermsathanasawadi et al[21] reported the prevalence of perioperative DVT approximately at 7% in Thai gynecologic cancer patients (preoperative DVT 5%, and postoperative DVT 2.1%). In the present study, only one postoperative DVT event occurred in Thai ovarian cancer patients (1.0%) without prevention, while none appeared in those with benign ovarian disease. The DVT patient was in advanced stage OC with suboptimal debulking and showed high levels of plasma DD but normal platelet count and fibrinogen level. Routine use of thromboprophylaxis in Thai OC patients undergoing major operations must be considered carefully. Korean guidelines for the prevention of VTE recommend that active prophylaxis should be initiated at one level higher than the ACCP guidelines[22]; hence, the prevention of VTE in Asian countries must take into account several parameters i.e. the incidence and risk factors of postoperative VTE, the cost-effectiveness and adverse effects of prevention measures, and the mortality of PE.

The limitation of the present study is that it was a hospital-based prospective cohort from a referral hospital and may not be representative of the whole country. Patients did not undergo subclinical VTE

screening prior to surgery, so the author was not certain of the VTE process start time and what the true incidence of postoperative VTE was. Due to the very low incidence of postoperative VTE, multivariate analysis could not evaluate its risk factors. Further multicenter, prospective studies of postoperative VTE in Thai gynecologic cancer is recommended to establish the true incidence and definite risk factors. Risk score models using combined clinical factors and coagulation markers to identify patients at high risk to VTE may be appropriate and provide an optimal risk-benefit ratio.

Conclusion

In summary, OC patients are significantly associated with hypercoagulable stage more than those with benign gynecologic disease. Plasma fibrinogen levels were the significant predictive factor for OC. A multimodality test of combined preoperative plasma fibrinogen levels with serum CA125 and menopausal status could be useful in OC diagnosis. Postoperative VTE occurred in only 1.0% of OC patients.

What is already known on this topic?

Women with ovarian cancers are associated with hypercoagulable state and have an independent risk factor for the development of venous thromboembolism. Ovarian cancer patients undergoing major surgery are in a high-risk group for venous thromboembolism and thromboprophylaxis is recommended.

What this study adds?

Plasma fibrinogen levels are a significant predictive factor of ovarian cancer. Multimodality test of combined plasma fibrinogen level, serum CA125 and menopausal status performed well with high specificity. The prevalence of postoperative venous thromboembolism in ovarian cancer patients was 1.0%.

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Potential conflicts of interest

None.

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บทบาทของสถานะการแข็งตัวของเลือดสูงกว่าปกติสำหรับการทำนายมะเร็งรังไข่ในสตรีที่มีก้อนอุ้งเชิงกราน

มรุต ญาณารณพ

ภูมิหลัง: *มะเร็งรังไข่เป็นมะเร็งที่มีความสำคัญในสตรีทั่วโลก ซึ่งมีความสัมพันธ์กับสถานะการแข็งตัวของเลือดสูงกว่าปกติและมีความเสี่ยงสูงต่อการเกิดโรคลิ่มเลือดอุดตันในหลอดเลือดดำ*

วัตถุประสงค์: *เพื่อสำรวจสมรรถภาพของการแข็งตัวของเลือดก่อนการผ่าตัดในการวินิจฉัยแยกระหว่างมะเร็งรังไข่ และโรคทางนรีเวชอื่น ๆ ที่ไม่ใช่มะเร็งในสตรีที่มาด้วยก้อนอุ้งเชิงกราน และเพื่อศึกษาอุบัติการณ์ของเหตุการณ์ ลิ่มเลือดอุดตันหลังการผ่าตัด*

วัสดุและวิธีการ: *การทดสอบการแข็งตัวของเลือด (เกล็ดเลือด, prothrombin time, activated partial thromboplastin time, thrombin time, ระดับ fibrinogen และ D-dimer) และซีรัม cancer antigen 125 (CA125) ถูกตรวจสอบก่อนการผ่าตัดในสตรีอายุมากกว่า 18 ปี ที่ได้รับการวินิจฉัยทางคลินิกเป็นก้อนอุ้งเชิงกรานหรือปีกมดลูกที่เข้ารับการผ่าตัดแบบนัดที่ โรงพยาบาลราชวิถี ในช่วงเดือนมกราคม พ.ศ. 2555 ถึงเดือนธันวาคม พ.ศ. 2556 ผู้ป่วยเหล่านี้ได้รับการติดตามสำหรับโรคลิ่มเลือดอุดตันในหลอดเลือดดำหลังจาก 9 สัปดาห์หลังผ่าตัด*

ผลการศึกษา: *ในสตรี 196 ราย พบ 99 รายเป็นมะเร็งรังไข่ และ 97 รายเป็นโรคทางนรีเวช เกล็ดเลือด, ระดับ fibrinogen และ D-dimer มีระดับสูงอย่างมีนัยสำคัญในสตรีที่เป็นมะเร็งรังไข่ อย่างไรก็ตาม fibrinogen ใน plasma เป็นปัจจัยสำคัญที่ทำนายการเป็นมะเร็งรังไข่ fibrinogen และ CA125 มีความสามารถที่คล้ายกันในการทำนาย มะเร็งรังไข่ (ROC-AUCs, 76.0% เทียบกับ 77.7%) ตัวแบบโรจิสติของ fibrinogen และ CA125 รวมกันแสดงให้เห็น ความสามารถที่ดีที่สุดในการทำนายมะเร็งรังไข่ (ROC-AUC, 90.1%) ภายหลังผ่าตัดพบผู้ป่วยมะเร็งรังไข่เกิดหลอดเลือดดำอุดตันหนึ่งรายในขณะที่ไม่พบในผู้ป่วยโรคนรีเวช*

สรุป: *สตรีที่เป็นโรคมะเร็งรังไข่มีความสัมพันธ์กับภาวะการแข็งตัวของเลือดสูงกว่าปกติมากว่าสตรี โรคนรีเวชอย่างมีนัยสำคัญ ระดับพลาสมา Fibrinogen เป็นปัจจัยทำนายที่สำคัญสำหรับมะเร็งรังไข่ โรคลิ่มเลือดอุดตันในหลอดเลือดดำหลังการผ่าตัดเกิดเพียงร้อยละ 1*