

## RESEARCH ARTICLE

# Comparison of Neutrophil/Lymphocyte and Platelet/Lymphocyte Ratios for Predicting Malignant Potential of Suspicious Ovarian Masses in Gynecology Practice

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### Abstract

**Purpose:** To compare the diagnostic accuracy of the neutrophil/lymphocyte ratio (NLR) with the platelet/lymphocyte ratio (PLR) in predicting malignancy of pelvic masses which are pre-operatively malignant suspicious. **Materials and Methods:** In this retrospective study we evaluated the clinical features of patients with ovarian masses which had pre-operatively been considered suspicious for malignancy. The patients whose intraoperative frozen sections were malign were classified as the study group, while those who had benign masses were the control group. Data recorded were age of the patient, diameter of the mass, pre-operative serum Ca 125 levels, platelet count, neutrophil/lymphocyte ratio and platelet/lymphocyte ratio. **Results:** There was statistically significantly difference between the groups in terms of age, diameter of the mass, serum Ca 125 levels, platelet number and platelet/lymphocyte ratio. Mean neutrophil/lymphocyte ratios showed no difference between the groups. ROC curve analysis showed that age, serum Ca 125 levels, platelet number and PLR were discriminative markers in predicting malignancy in adnexal masses. **Conclusions:** According to the current study, serum Ca 125 levels, pre-operative platelet number and PLR may be good prognostic factors, while NLR is an ineffective marker in predicting the malignant characteristics of a pelvic mass.

**Keywords:** Pelvic mass - frozen section - neutrophil/lymphocyte ratio - platelet/lymphocyte ratio

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### Introduction

Ovarian masses have a large spectrum from benign cysts to malign ovarian cancer (Prapaporn et al., 2008). The most critical step in the management of ovarian masses is deciding the malignant potential. The inadequate surgeries in local hospitals result in incomplete surgeries and result in poor prognosis of the patients (Ashrafangoeei and Rezaeezadeh., 2011). In the case of ovarian masses, preoperative workshop in order to guess the malignant potential of the mass includes; tumor markers, sonographic evaluation, computerized tomography and/or magnetic resonance imaging (Ashrafangoeei and Rezaeezadeh., 2011; Arab et al., 2012; Hafeez et al., 2013). Despite all of the preoperative evaluation in some ovarian masses clinicians should not decide the malignant potential. In such situation the most used technique is intraoperative frozen section (FS) analysis of tumor (Shih et al., 2011). FS is a procedure performed in a pathology laboratory in order to perform a rapid microscopic analysis and decide the malignant potential of a tissue (Gal and Cagle, 2005). In gynecology practice FS is used in detecting malignant potential of endometrial pathologies (Balik et al., 2013)

ovarian masses, cervical and vulvar malign neoplasm and detect lymph node metastases (Ganesan et al., 2012). Neutrophil/lymphocyte ratio (NLR) and platelet/lymphocyte ratio (PLR) are simple, easily calculated markers that may be used as predictive markers in cancer and premalignant pathologies (Halazun et al., 2009; Acmaz et al., 2014).

In current study, we aimed to evaluate diagnostic accuracy of NLR with platelet/lymphocyte ratio PLR in predicting malignancy of pelvic masses which are pre-operatively malignant suspicious.

### Materials and Methods

This is a retrospective designed study performed in the gynecology department of Zekai Tahir Burak Women's Health Education and Research Hospital, in Ankara, Turkey. This is a referral education and research hospital in the middle east region of Turkey. Most of the patients are free of charge and health services are supported by the government. The patients' data whom underwent surgery between November 2011 and April 2014 in gynecology clinic included to the study. The study was approved by the

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A total of 94 women were included to the study. 54 of them had malignant ovarian masses detected by FS and 40 had benign ovarian masses. The patients underwent preoperative workshop in order to guess the nature of the ovarian mass including; hemogram, ultrasonography and serum Ca 125 levels. All of the patients were also evaluated by FS intraoperatively. The FS was performed in the operating room by experienced pathologists. In case of benign ovarian masses only extirpation of the mass was performed. In malign cases, the cases underwent comprehensive surgical staging.

**Statistics**

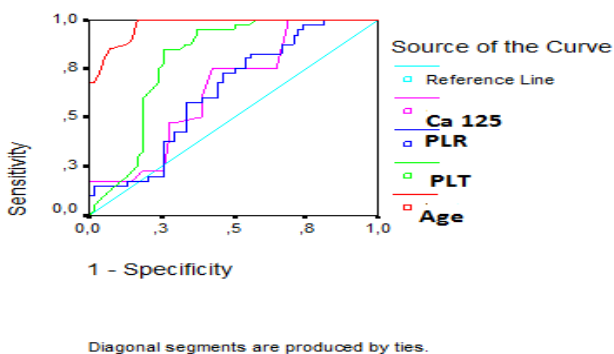
The Mean and standard deviation (SD) were calculated for continuous variables. Chi-square ( $\chi^2$ ) test and Student’s t test evaluated associations between the categorical and continuous variables. ROC curve analysis was performed to analyze the discriminative role of variables. Two-sided P values were considered statistically significant at  $p < 0.05$ . Statistical analyses were carried out by using the statistical packages for SPSS 12.0 for Windows (SPSS Inc., Chicago, IL, USA).

**Results**

A total of 94 women were included to the study. 54 of those cases had malignant ovarian masses (Group 1) and 40 had benign ovarian masses (Group 2). Table 1 depicted the demographic and clinical characteristics of

**Table 1. Demographic and Clinical Characteristics of the Cases**

	Patients with malignant ovarian masses (n=54)	Patients with benign ovarian masses (n=40)	P value
Age (years)	53.5±9.50	41.1±7.85	<0.001
Diameter of the mass (cm)	5.64±2.12	7.43±3.074	0.032
Ca 125	52.4±18.4	21.6±10.9	0.005
Platelet count	419537±121,318	294550±73,110	<0.001
PLR	206.2±132.6	137.6±75.0	0.004
NLR	3.06±2.09	2.51±1.76	0.184



**Figure 1. ROC Curve analysis Showing the Area Under Curve for the Discriminative Parameters**

**Table 2. ROC Curve Characteristics of the Discriminative Factors**

	AUC	SD	P	95%CI
Age	0.970	0.014	0.000	0.944-0.997
Platelet	0.795	0.048	0.000	0.702-0.889
PLR	0.636	0.057	0.025	0.524-0.747
Ca 125	0.647	0.057	0.015	0.537-0.758

the patients. The mean age of the patients in group 1 was 41.14±7.85 years old and 53.46±9.50 years old in group 2 ( $p < 0.001$ ). The mean diameter of the mass was 5.64±2.12 cm in group 1 and 7.43±3.074 cm in group 2 ( $p = 0.032$ ).

There was a statistically significant difference between the groups in terms of serum Ca 125 levels; in group 1 and in group 2, values were 21.6±10.88 and 52.4±18.44; respectively ( $p = 0.005$ ). The mean platelet count and PLR were statistically significantly higher in group 2 ( $p < 0.005$ ). The mean NLR was similar between the groups ( $p > 0.005$ ). ROC curve analysis demonstrated that age of the patients, platelet count, PLR and serum Ca 125 levels may be preoperative discriminative markers in assessing the malignant potential of an ovarian mass.

**Discussion**

In current study; we evaluated the demographic and clinical characteristics of patients with benign and malignant ovarian masses managed at our clinic. We found statistically significant differences between the groups in terms of age, diameter of the mass, Ca 125 levels, preoperative platelet count and PLR. There was no statistically significant difference between the groups in terms of mean NLR values. ROC curve analysis that we performed to evaluate the discriminative values of age, platelet count, PLR and Ca 125 levels showed that, all of these variables may be used as preoperative prediction of malignancy.

Ovarian tumors, in particular; malignant ovarian tumors have clinical values due to the aggressive malignant potential of their nature. It still remains as the leading cause of death for gynecologic malignancies (Covens et al., 2012). If these tumors caught in the early stage, they have survival rates over 90% (Myers et al., 2006). Therefore for clinicians it is very important to assess the malignant potential of an ovarian mass.

Risk of malignancy index (RMI) is a simple parameter in assessing the malignant potential of an ovarian mass including CA125 level, ultrasound findings and menopausal status. Jacob et al. (1990) found the specificity and sensitivity of RMI in detecting the malignant potential of an ovarian mass as 85.4% a 96.9%; respectively. We also evaluated the age of the patients, diameter of the mass and Ca 125 levels and found all of those variables as discriminative values in assessing the malignant potential of an ovarian mass.

Preoperative platelet count is a common used finding in many of the solid tumors. In gynecological oncology practice such as ovarian cancer, vulvar carcinoma, cervical cancer, and endometrial cancer preoperative thrombocytosis was also reported to be increased

(Hernandez et al., 2000; Tamussino et al., 2001). Kuyumcuoglu et al. (2001) also reported that increased platelet number was associated with poor prognosis in their study. We also found that platelet number was higher in our malignant group patients.

Both PLR and NLR were associated to be prognostic indicator for many types of cancer (Halazun et al., 2009; Yang et al., 2013). They are both easily to calculate and easily calculated markers. In current study we evaluated the PLR and NLR of the patients. We found PLR as discriminative marker in predicting the malignant potential of an ovarian mass however NLR was not found to be a useful marker. The limitation of our study is retrospective design and small patient number.

In conclusion, we think that in assessing the malignant potential of an ovarian mass, preoperative workshop should include Ca 125 levels, ultrasound examination, platelet count and PLR levels. By this way the management of a patient with ovarian mass should be performed accurately. Further studies including more participants are needed for absolute results.

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