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ORIGINAL ARTICLE

A new risk malignancy index to predict ovarian cancer: a bicentric preliminary study

Georgios M. Iatrakis[1,2], Stefanos Zervoudis[1,2], Panagiotis Tsikouras[3], Dimitrios G. Iatrakis[4], Anastasia Bothou[1,3], Themistoklis Chardavelas[2], Panagiotis Apostolakopoulos[2], Iouliana Ceausu[5], George Galazios[3]

[1]University of West Attica, Athens, Greece; [2]REA Hospital, Athens, Greece; [3]University Hospital of Alexandroupolis, Alexandroupolis, Greece; [4]Medal in Balkan Olympiad in Informatics, Second High School of Gerakas, Greece; [5]Department of Obstetrics and Gynecology, 'Carol Davila' University of Medicine and Pharmacy, and Department of Obstetrics and Gynecology, 'Dr. I. Cantacuzino' Hospital, Bucharest, Romania

Summary

Purpose: *Ovarian cancer is the most common cause of gynecologic cancer death. Considering that diagnosis of ovarian cancer is done in advanced stage in most cases, the purpose of this study was to construct a "new risk malignancy index" (NRMI) to assess the risk of ovarian cancer in women with a pelvic mass.*

Methods: *The index includes the classical vaginal ultrasound and CA125 tumor marker along with risk and protective factors for ovarian malignancy.*

Results: *Compared to the original Risk Malignancy Index (RMI), NRMI found retrospectively a greater number of patients with ovarian cancer.*

Conclusions: *NRMI seems to be a promising tool for the early and reliable detection of cases with ovarian malignancy in an effort to maximize surgical benefits.*

Key words: *ovarian cancer, risk malignancy index*

Introduction

Ovarian cancer, including fallopian tube cancer and peritoneal cancer, collectively called "epithelial ovarian carcinoma", is the most common cause of gynecologic cancer death in Europe [1]. Risk malignancy index is a simple and useful calculator in the primary evaluation of patients with pelvic masses and it is a good option in daily clinical practice in non-specialized gynecologic departments and also in developing countries where access to a gynecologic oncologist is limited [2]. Considering that ovarian cancer is related to certain risk and protective factors [3], the inclusion of such factors in a similar index could possibly increase the diagnostic capability for this disease. Furthermore, although some progress has been made in the areas of screening and early detection, these advances have not yet translated into clinical benefits for patients with ovarian cancer [4]. Considering that early diagnosis of ovarian cancer is very difficult in most cases and it is done in advanced stage, we propose to use a "new risk malignancy index" (NRMI) to assess the risk of ovarian cancer in women with a pelvic mass. The calculator could be useful to reduce the time from possible malignancy to the final diagnosis.

Correspondence to: Stefanos Zervoudis, MD, PhD. Breast Unit, Rea Hospital, 17564, Palaiao Faliro, Athens Greece.
Tel: +30 6944308777, E-mail: szervoud@otenet.gr
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Table 1. Characteristics of the patients included in the study

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
PREGNANCY	0.6	1	0.6	0.6	0.6	0.6		0.6					0.6	0.6	0.6		0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6	0.6
INFERTILITY		2.67	1				2.67			2.67		2.67				2.67											
ENDOMETRIOSIS		1.24	1	1.24		1.24	1.24		1.24		1.24	1.24		1.24	1.24	1.24		1.24									
PCO		1	2.52	2.52	2.52	2.52	2.52	2.52		2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52			2.52	2.52	2.52				
SMOKING	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
IUD		1	1			1.76																					
COC		1	1																								
BREASTF		0.72	1																							0.72	0.72
TUBAL LIGAT		1	1																								
GENETIC		1	1																								
US	1	1	3	3	3	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PREMENOPAU		1	1	1				1											1				1				
POSTMENOPAU	3	3	3		3	3	3		3	3	3	3	3	3	3	3	3	3		3	3	3		3	3	3	3
CA-125	47.8	59.5	127.8	278.9	890.7	60.8	82.4	1250.8	37.8	49.7	50.8	53.9	56.7	42.8	54.8	63.7	73.8	59.9	66.7	62.8	57.8	49.6	54.1	60.3	75.2	67.2	48.8
RMI	143	178.5	1150	837	8016	182	247	3752	113	149	152	162	170	128	164	191	221	180	67	188	173	149	54	181	226	202	146
MODIFIED	89	438	1791	1616	12484	620	2124	5844	145	1033	491	1390	265	248	317	1642	345	280	51	116	450	232	84	112	139	90	65
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	5	16	17	18	19	20	21	22	23	24	25	26	27

PCO: Polycystic Ovarian Syndrome, IUD: Intrauterine Contraceptive Device, COC: Combined Oral Contracep-tion, BREASTF: Breastfeeding, TUBAL LIGAT: Tubal Ligation, GENETIC: Genetic Predis-position (BRCA mu-tation), US: Ultrasound, PREMENOPAU: Premenopausal, POSTMENOPAU: Postmenopausal, RMI: Risk Ma-lignancy Index, Modified: NRMI (see text)

Methods

The original risk malignancy index: (RMI) = U (ultrasound score) × M (menopause status) × CA125 level is successfully applied to distinguish benign from malignant cases [2].

Twenty seven patients from two gynecological clinics (Alexandroupolis University Hospital and Rea Hospital in Athens, Greece), diagnosed with ovarian cancer were included in this retrospective study [5]. In these patients, we studied a new modified index (NRMI) with more parameters (compared to the original index) for the prediction of malignancy. Risk factors (for instance infertility and endometriosis [6]) and protective factors (for instance a history of pregnancy and breastfeeding) for prediction of ovarian malignancy were included in the NRMI (i.e. the original result was multiplied by the product of the relative risks corresponding to the presence or absence of each factor). Actually, inclusion of more risk or protective factors was not intended to construct a new (combined) risk index but a spectrum of values. Our intention was to estimate if this spectrum could be successfully applied retrospectively in patients already diagnosed with ovarian cancer. Considering that these factors were unknown for each patient when the NRMI was initially constructed, the addition of new factors could have improved or weakened the original prediction. Both indexes (RMI and NRMI) were used in all patients. Factors with uncertain effect were not included in the NRMI. For example, some studies have reported an increased risk of ovarian cancer with the use of fertility drugs while others reported no increased risk [7]. Thus, a history of usage of fertility drugs was not recorded.

The personal medical history of the gynecological parameters (Table 1) was recorded in all patients. Furthermore, transvaginal ultrasound and CA 125 levels were assessed (Table 1) to predict the risk of ovarian malignancy with both indexes (RMI and NRMI).

Results

The RMI could correctly predict malignancy in 29.6% of the cases (8 of 27), whereas the NRMI in 66.7% of the cases (18 of 27) (p=0.003). Actually, in 12 cases the RMI values were <200 and the corresponding values of NRMI were >200. In 2 cases, the RMI correctly predicted malignancy which was missed by the NRMI. However, history of endometriosis and polycystic ovarian syndrome increased the score using the NRMI. In 6 cases, both the RMI and NRMI values were <200 (false negative).

Discussion

Despite efforts to devise an effective approach for the early detection of ovarian cancer, to date no screening test has been proven to reduce mortality for this cancer which is typically in advanced stage at detection [8]. Other attempts included the human epididymis protein 4 (HE4), in the Risk of Ovarian Malignancy Algorithm (ROMA), and progesterone in another algorithm with the same purpose [9]. Recently, the Copenhagen Index (CPH-I) was proposed as a simple alternative to ROMA in settings of basic medical care and independently of menopausal status [10].

The ability to predict the risk of ovarian cancer after a pelvic mass detection could be improved by this new index, named NRMI. The index includes risk factors, protective factors, the classical vaginal ultrasound and the CA125 tumor marker. However, because the "accuracy" of the indices is less than 70%, clinical judgment is mandatory in combination with the indices. Furthermore, a problem with such models is that they are prone to produce good results on the populations on which they were "developed" (applied in our case). Therefore, a vital step before incorporating these models into clinical practice is to ascertain whether they work in different patient populations (unrelated to those in which the tests were initially applied) and/or different clinical settings [11]. Finally, considering the small number of patients included in this study, our better results may be due to chance or the "solid background" of the original index.

Conflict of interests

The authors declare no conflict of interests.

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