

Evaluation of preoperative diagnosis with results of histopathological examinations of ovarian tumors in women of reproductive age

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Summary

Ovarian tumors are the most frequent lesions encountered by gynecologists. Ovarian carcinoma most often develops asymptotically and until now no sufficient screening diagnostic methods have been developed, which is why various diagnostic methods are being tried concurrently to increase diagnostic sensitivity. The aim of this paper was to evaluate the compliance of the preoperative diagnoses with the results of histopathological examinations of ovarian tumors and to determine the usefulness of simultaneous application of gynecological, ultrasonographic, and Doppler examinations together with determination of CA-125 antigen in the diagnostic process of ovarian tumors. The study comprised a group of 250 women in reproductive age who were operated on for tumors of the ovary. Results of histopathological examinations were compared with the preoperative diagnosis based on the above-mentioned examinations and prognostic indicators: sensitivity, specificity, negative and positive prediction value as well as accuracy were determined. The results showed that combining the four diagnostic methods is a useful research panel in the preoperative diagnostic process of ovarian tumors and makes selecting the appropriate procedure and surgical treatment viable.

Key words: Ovarian carcinoma; Morphological index; Doppler examination; CA-125 antigen.

Introduction

Ovarian tumors are the most frequent lesions encountered by a gynecologists in daily medical practice. Differentiation between benign ovarian tumors and ovarian carcinoma, especially in early stage, before the operation is difficult because ovarian carcinoma most often develops asymptotically and until now no sufficient diagnostic screening methods have been developed. Today joining various diagnostic methods in order to increase diagnostic sensitivity is being attempted [1].

Gynecological examination together with a precise interview is the basis of the diagnostic process for ovarian carcinoma patients. Also ultrasonographic examination, by means of transvaginal probe (TVS) is a diagnostic standard in cases of suspicion of tumor changes within the ovary [2]. Great precision in assessment of the size and location of the tumor in the pelvis minor, the velocity, simplicity and low price make ultrasonography (US) a very useful screening examination, especially when it is extended with the Doppler examination. Another standard used in the diagnostic process of ovarian carcinoma since the beginning of the 1980s is determination of CA-125 antigen.

None of the above-mentioned methods has 100% sensitivity or specificity and the final diagnosis is possible only after obtaining the results of the histopathological examination.

The aim of the paper was to evaluate the compliance of the preoperative diagnosis with results of the histopathological examination of ovarian tumors in women in reproductive age and to determine the usefulness of simultaneous application of the above-mentioned examinations in the diagnostic process of the tumor.

Material and Methods

The study covered a group of 250 women aged from 18 to 48 years (mean 36 years) who were diagnosed and operated on in the Clinic of Gynecological Surgery at the Karol Marcinkowski University of Medical Sciences in Poznan in the years 2006-2008. Prior to surgery, after a detailed interview, each patient underwent a gynecological examination, US examination by means of Aloka apparatus (model 5500 with a TVS probe at a frequency of 5.0-6.5 MHz), Doppler examination of the detected ovarian tumor and blood analysis to determine the concentration of CA-125 antigen. During the gynecological examination the following features were examined: the shape of the tumor, its consistency, mobility, location (one- or two-sided) as well as the occurrence of ascites – the presence of which means greater progression of carcinoma, at least Stage Ic in FIGO (the International Federation of Gynecology and Obstetrics) classification. During US the morphological index was determined according to Szpurek *et al.* [3] - (the capacity of the tumor – calculated on the basis of the ellipse formula: length x width x height x 0.523, the structure of the inner wall, its thickness, the structure of the septum, echogenicity and the presence of ascites), assuming a cut-off point of 7 points out of 17 possible. By means of the color Doppler technique the wave shape of the velocity of blood flow in tumor vessels was analyzed and the

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following features were examined: location of the vessels, pulsation index (PI), resistance index (RI) and systolic-diastolic indexes (S/D). On the basis of the results the patients were divided into three groups: I – no suspicion that the detected ovarian tumor might be of a malignant character, II – doubtful results, did not determine unambiguously the character of the change, III – the tumor had features of a malignant neoplasm. Women were placed in particular groups depending on how many examinations of four types (gynecological examination, US, Doppler, and CA-125 marker) indicated the malignant character of the tumor. In case of more than two indications – a patient was placed in group III, and in case of fewer than two – in group I. Finally, these results were compared with the results of histopathological examinations. On this basis, after determining prognostic indicators: sensitivity, specificity, negative predictive value (NPV) and positive predictive value (PPV), as well as accuracy the usefulness of a simultaneous appliance of the above-mentioned methods in the diagnostic process of the tumor were assessed. Histopathological examinations were carried out in the Gynecological-Obstetrics Clinical Hospital Histopathological Laboratory of Poznan University of Medical Sciences.

Results

On the basis of the preoperative examinations, out of 250 examined patients, 152 met the criteria for group I, 12 for group II and 86 patients for group III. The following results were obtained after comparing the preoperative diagnosis with the results of the histopathological examinations: in 145 patients from group I (benign tumors) the preoperative diagnosis was confirmed with the histopathological result and in seven women of this group ovarian carcinoma was diagnosed in the final examination, mainly in low clinical stage. In group III, 64 patients were diagnosed with a malignant ovarian neoplasm in the histopathological examination, including one case of metastatic neoplasm from gastric carcinoma, and in 22 women carcinoma was not confirmed with the results of the histopathological examination. However in group II, ten patients had benign tumors and two were diagnosed with malignant changes (Table 1).

Table 1. — Comparison of the histopathological examination results with the preoperative diagnosis.

Histopathological diagnosis	Group		
	I (N 152)	II (N 12)	III (N 86)
Benign neoplasm	145 (95.4%)	10 (83.3%)	22 (25.6%)
Malignant neoplasm	7 (4.6%)	2 (16.7%)	64 (74.4%)

The most frequent diagnosis among benign changes in group I included serous cystadenoma of the ovary (37), simple cyst (35) and endometrial cyst (27). Among false-negative diagnoses in this group, it was primary ovarian carcinomas of low clinical stage that were predominant (FIGO Ia, Ib). In such cases the suspicion of a malignant change emerged only either by US TVS or the color Doppler examination.

In group III the most frequently diagnosed carcinoma was primary ovarian carcinoma. However, tumors in this group that were false-positive in the preoperative exami-

nations turned out to be mainly teratomas (15) and inflammatory ovarian-tubal tumors (5). In these cases the gynecological examination, the US examination and most often Doppler examination were incorrect, more rarely for CA-125 marker levels.

In group II, in which the preoperative diagnoses were most doubtful and generated difficulties, the majority of tumors constituted endometrial tumors (8) – malignant neoplasms included granuloma cell tumor and borderline serous adenocarcinoma. In cases of endometrial tumors the suspicion of malignant changes emerged during the gynecological and US examinations or US examination and the increased level of CA-125 marker.

Prognostic indicators were as follows: sensitivity of the methods used together amounted to 90.14%, specificity – 86.83%, PPV – 74.42%, NPV – 95.39%, accuracy in the prediction of the tumor character – 87.81%.

These indicators were calculated on the basis of groups I and III in which the preoperative diagnoses were unambiguous.

On the basis of group II it was found that the probability of occurrence of ovarian carcinoma in women in reproductive age whose results of the preoperative examinations were doubtful was 16.66% which means that 1.7 in ten of these patients would have malignant ovarian carcinoma. However the simultaneous use of the gynecological, US-TVS, color Doppler and CA-125 examinations in the preoperative diagnostic process indicated that doubtful diagnoses amounted to 4.8% of all diagnoses and ovarian carcinoma in this group would constitute 0.8% of all examined tumors.

Discussion

The lack of unambiguous diagnostic screening methods for ovarian carcinoma has brought about the search for new methods with higher sensitivity. At the same time researches in which sensitivity and specificity obtained through the conjunction of contemporarily known diagnostic methods are determined are being carried out in an attempt to find an appropriate research panel which would make it possible to diagnose ovarian carcinoma before surgery [4, 5].

In our study after combining four basic diagnostic methods (gynecological examination, US-TVS examination, Doppler examination and CA-125 level) high sensitivity (90.14%), specificity (86.83%), NPV (95.39%), as well as accuracy of the method (87.81%) were obtained, which means that the conjunction of these methods gives good results as far as the assessment of tumor character is concerned.

Similar results were obtained by Varras [6] and Marret [2]. They found higher sensitivity and specificity when combining several diagnostic methods (the gynecological examination, the US-TVS examination, the Doppler examination and CA-125 examination) than when using each method separately. Varras [6] drew attention to the possibility of a diagnostic mistake during color Doppler examination of changes in the ovaries in women in pre-

menopausal age due to the presence of corpus luteum and a rich flow visible within it.

Antonić *et al.* [7] examined the usefulness of the simultaneous application of assessment of blood flow in ovarian tumors by means of color Doppler and power Doppler as well as CA-125 marker levels in the process of differentiating ovarian benign changes from malignant ones in women above 34 years old. The results showed that lack of blood flow during the color Doppler examination and CA-125 level under 35 U/ml could exclude the malignant character of the tumor in a reliable way.

In their papers Sawicki *et al.* [8, 9] proved that US examination of ovarian tumors with a TVS probe should be carried out together with assessment of blood flow because the evaluation of RI and intensification of vascularization improve the accuracy of the methods used in determining the character of a tumor in a significant way.

Assessing the usefulness of time-averaged maximum velocity of blood flow (TAMXV), peak systolic velocity of blood flow (PSV), RI and PI in differentiating benign changes from malignant ones, Tailor *et al.* [10] came to the conclusion that the highest diagnostic sensitivity and specificity can be obtained by examining the parameters of resistance and flow capacity simultaneously rather than only resistance indicators. However, Szpurek *et al.* [11] proved that PI and maximum end-diastolic velocity of blood flow (MEDV) are the best prediction indicators in women in premenopausal age and RI and MEDV in women after menopause.

Moszyński *et al.* [12] proved limited usefulness of the US index itself in assessing the character of ovarian tumors and found that it was always necessary to consider combining this diagnostic method with blood flow assessment by means of color Doppler and the examination of biochemical markers.

Conclusions

1. The combination the four diagnostic methods (the gynecological examination, US-TVS examination, Doppler examination, CA-125 marker) is a useful research panel in the preoperative diagnostic assessment of ovarian tumors. This panel has high sensitivity, specificity, accuracy and NPV, which proves its advantage in assessing the character of ovarian tumors over each of these methods used separately.

2. Determining the preoperative diagnosis on the basis of the four above-mentioned diagnostic methods makes it possible to select an appropriate procedure and opera-

tional treatment and the high NPV of the panel allows unnecessary surgical treatment to be avoided or the use of less invasive procedures (laparoscopy instead of laparotomy).

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