Comparison of endometriotic cysts and ovarian cancer in association with endometriotic cysts

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A B S T R A C T

Objective: The aim of this study was to clarify the clinical, laboratory, and imaging findings of ovarian cancer in association with endometriotic cysts by detailed comparison of the findings of benign and malignant tumors.
Methods and materials: This was a retrospective study of 138 women who had an operation for ovarian tumors at the Department of Obstetrics and Gynecology of Kochi Health Sciences Center between September 1, 2011, and July 30, 2015. The ovarian tumors were divided into two groups: the benign group (endometriotic cysts) and the malignant group (ovarian cancer in association with endometriotic cysts).
Results: Of the 138 patients, 28 had malignant disease, and 110 had benign endometriotic cysts. Patients in the malignant group were significantly older than patients in the benign group. The mean maximum tumor diameter was also significantly larger for the malignant tumors. Unilocular-solid and multilocular-solid type tumors were present in 25.0% and 75.0% of malignant tumors, and in 9.1% and 19.1% of benign tumors, respectively. The mean maximum solid component diameter and height were significantly larger in the malignant tumors than in the benign tumors. The solid components were present on the abdominal side of the cyst wall in 12.5% of benign tumors and in 51.9% of malignant tumors.
Conclusion: In elderly patients, the presence of large solid components in large endometriotic cysts, especially the abdominal side of the cyst wall, might suggest malignancy.
Micro abstract: The aim of this study was to clarify the findings of ovarian cancer in association with endometriotic cysts by detailed comparison of the findings of benign and malignant tumors. The presence of solid components in large endometriotic cysts, especially the abdominal side of the cyst wall, might suggest malignancy.

Introduction

Endometriosis is a common gynecological condition estimated to affect 5–15% of women of reproductive age [1]. On the other hand, endometriotic cysts have drawn attention as a potential source of ovarian carcinomas. Recently, endometriosis has been reported to be associated with an increased risk of epithelial ovarian cancer, especially clear cell carcinoma and endometrioid carcinoma. There is molecular, biological, and epidemiological evidence to suggest an association between endometriosis and ovarian cancer, which has an estimated prevalence of 0.3–0.8% [2–14]. Several clinical and imaging risk factors have been reported, such as age greater than 45 years, large cyst size, lack of shading on MRI, and so on [15–17]. Of these findings, enhancement of mural nodules seems to be the most valuable imaging finding, but benign conditions with this finding have also been reported

[18–21].

The purpose of this study was to clarify the clinical, laboratory, and imaging findings of ovarian cancer in association with endometriotic cysts by comparing the findings in benign and malignant tumors in detail.

Methods and materials

This was a retrospective study. The clinical data were obtained from 138 women who had an operation for endometriotic cysts or ovarian cancer in association with endometriotic cysts at the Department of Obstetrics and Gynecology of Kochi Health Sciences Center between September 1, 2011, and July 30, 2015. The ovarian tumors were divided into two groups: the benign group and the malignant group. The benign group had endometriotic cysts. The malignant group was

composed of borderline tumor and carcinoma (ovarian cancer in association with endometriotic cysts). Preoperative serum CA125 levels, imaging findings, and menopausal status were noted. All patients were required to have a pelvic ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI), or any combination of imaging modalities for documentation of an ovarian tumor or pelvic mass. Postmenopausal status was defined as more than one year of amenorrhea or age greater than 50 years in women who had undergone hysterectomy. All other women were considered premenopausal.

The histopathologic diagnosis was regarded as the definite outcome. When a gynecological cancer was found, it was staged according to the International Federation of Gynecology and Obstetrics classification. The χ^2 test was used to test differences in age, menopausal status, and CA125 level. The Mann-Whitney U test was used to test differences in age, tumor size, and imaging characteristics between women with benign and those with malignant tumors. $P = 0.05$ was chosen as the significance level.

Results

Of the 138 patients, 28 had malignant disease, and 110 had benign endometriotic cysts as controls. The patients' characteristics are summarized in Table 1. The malignant diseases are summarized in Table 2. Patients with ovarian cancer were significantly older than patients with benign endometriomas, with an increased number of patients that were postmenopausal compared to premenopausal. Tumor characteristics are summarized in Table 3. The mean maximum tumor diameter was 6.5 cm for benign tumors and 12.1 cm for malignant tumors; malignant tumors were significantly larger. Unilocular-solid and multilocular-solid type tumors were present in 25.0% and 75.0% of malignant tumors and in 9.1% and 19.1% of benign tumors, respectively. The echogenicity of the cyst fluid was ground glass in 29.6% of malignant tumors and 82.9% of benign tumors. The T1-weighted imaging intensity of the cyst fluid was high intensity in 29.6% of malignant tumors and 87.2% of benign tumors.

The solid component characteristics on imaging are summarized in Table 4. All malignant tumors vs. 28.2% of benign tumors were characterized by the presence of a solid component. The mean maximum solid component diameter and thickness (Fig. 1) were significantly larger in the malignant tumors than in the benign tumors. All malignant tumors had enhancing solid components, but there were two benign tumors with enhancing solid components. We classified position of solid component into two types: abdominal side and back side of cyst wall

Table 1
Patient characteristics by group.

Variables	Benign n = 110	Malignant n = 28	P
Age (years)			
Mean (SD)	38.5 (7.4)	53.1 (14.5)	< 0.0001
< 45	86 (78.2%)	7 (25.0%)	< 0.0001
≧45	24 (21.8%)	21 (75.0%)	< 0.0001
BMI			
Mean (SD)	22.6 (4.2)	22.0 (6.0)	NS
Menopausal status			
Premenopausal	107 (97.3%)	12 (42.9%)	< 0.0001
Postmenopausal	3 (2.7%)	16 (57.1%)	
Parity (number of full-term pregnancies)			
0	72 (65.5%)	17 (60.7%)	NS
1	12 (10.9%)	5 (17.9%)	
≧2	26 (23.6%)	6 (21.4%)	
CA125 (U/ml)			
Mean (SD)	70.9 (87.5)	196.8 (295.5)	NS
Current or previous			NS
smoking history	22 (20.4%)	6 (21.4%)	
missing	2		

Table 2
Malignant disease case characteristics.

Variable	Case
Total	28
Clear cell carcinoma	13
Stage I	9
Stage II	2
Stage III	2
Endometrioid carcinoma	10
Stage I	9
Stage II	1
Mucinous borderline tumor, endocervical-like	4
Stage I	4
Endometrioid borderline tumor	1
Stage I	1

Table 3
Tumor characteristics by group.

Variables	Benign n = 110	Malignant n = 28	P
Maximum tumor size (cm)			
mean (SD)	6.5 (48.2)	12.1 (5.7)	< 0.0001
Bilateral tumors	32 (29.1%)	9 (32.1%)	NS
Type of tumor			
Unilocula	44 (40.0%)	0	< 0.0001
Unilocular-solid	10(9.1%)	7 (25.0%)	
Multiocular	35(31.8%)	0	
Multiocular-solid	21 (19.1%)	21 (75.0%)	
Ascites	14 (12.7%)	11 (39.3%)	< 0.01
Echogenicity of cyst fluid			
Anechoic or Low level	18/105 (17.1%)	19/27 (70.4%)	< 0.0001
Ground glass	87/105 (82.9%)	8/27 (29.6%)	
Signal intensity of cyst fluid T1-weighted imaging			
High	82/94(87.2%)	8/27(29.6%)	< 0.0001
Intermediate	8/94(8.5%)	3/27(11.1%)	
Low	4/94(4.3%)	16/27(59.3%)	

Table 4
Solid component characteristics by group.

Variables	Benign n = 110	Malignant n = 28	P
Solid component	31 (28.2%)	28 (100%)	< 0.0001
Position of solid component[a]			
abdominal side of cyst wall	4 (12.5%)	28 (51.9%)	< 0.001
back side of cyst wall	28 (87.5%)	26 (48.1%)	
Maximum solid component size (mm)			
mean (SD)	16.5 (8.2)	45.5 (21.4)	< 0.0001
Solid component thickness (mm)			
mean (SD)	8.6 (3.7)	32.1 (12.5)	< 0.0001
Enhancement of solid component present	2/22(9.1%)	23/23(100%)	< 0.0001

[a] 13 patients had more than one solid component.

(Fig. 1). The solid components were present on the back side of the cyst wall in 87.5% of benign tumors and on the abdominal side of the cyst wall in 51.9% of malignant tumors.

Discussion

Endometriosis is defined as the presence of endometrial tissue outside the endometrium and myometrium. Ovaries are among the most common sites affected by endometriosis. In endometriosis, there are many biological characteristics in common with cancer, such as self-