

Stage IA Ovarian Cancers

Comparison of Sonographic Findings and Histopathologic Types Between Patients With Normal and Elevated Serum Cancer Antigen 125 Levels

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Objectives—The purpose of this study was to compare sonographic findings and histopathologic types of stage IA ovarian cancers between groups with normal and elevated cancer antigen 125 (CA-125) levels.

Methods—Between 2000 and 2009, 146 stage IA ovarian cancers were treated surgically (85 invasive and 61 borderline, 73 self-referred with tumor-related symptoms, 20 self-referred with nonspecific symptoms, 52 identified through screening, and 1 other). Of these, 87 cases (60%) had normal serum CA-125 levels (<35 U/mL). Their preoperative sonographic findings and histopathologic types were compared to those of cases with elevated CA-125 levels.

Results—Statistically significant differences were found between the proportions of patients with elevated CA-125 levels in groups having tumors with maximal diameters of less than 20 cm and at least 20 cm ($P = .03$) and groups having tumors with less than 50% and 50% to 80% solid components ($P = .02$). In the group with normal CA-125 levels, we found predominantly mucinous adenocarcinoma in multilocular cysts with less than 50% solid components (25 cases), and clear cell adenocarcinoma in unilocular cysts with less than 50% solid components (12 cases), whereas in the group with elevated CA-125 levels, mucinous adenocarcinoma in multilocular cysts with less than 50% solid components (19 cases) and endometrioid adenocarcinoma in solid tumors ($\geq 80\%$ solid components) were predominant (5 cases).

Conclusions—Stage IA ovarian cancers with normal CA-125 levels tend to be smaller, have less solid components, and have a slightly different distribution of histopathologic types than cancers with elevated CA-125 levels.

Key Words—cancer antigen 125; sonography; stage IA ovarian cancers

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Abbreviations

CA-125, cancer antigen 125

Ovarian cancer is an important disease in gynecology because of its high mortality rate compared to other gynecologic malignancies. Given its relatively low prevalence, effective screening methods are problematic because of the low positive predictive value of ovarian screening with sonography and cancer antigen 125 (CA-125) measurement. Early recognition and treatment of ovarian cancer improve survival, so the primary aim of ovarian cancer screening is to find the disease at an early stage. If it can be diagnosed during stage IA, when the disease is limited to a single ovary, the survival rate will be best.

Safe and convenient screening methods for ovarian cancer include sonography and tumor marker testing, especially CA-125. Many studies of ovarian cancer screening have been published; most involved sonographic screening only,^{1–3} or sonographic screening combined with CA-125 measurement (simultaneously⁴ or separately⁵), or 2-level (sequential) screening with CA-125 testing followed by sonography or sequential sonography alone.⁶

These studies suggest that sonography is an important diagnostic tool in ovarian cancers with normal serum CA-125 levels, because these levels are elevated in about 80% of all epithelial ovarian cancers⁷ but are less elevated in stage I ovarian cancers.⁸ Although sonographic screening may increase the possibility of unnecessary surgery and its associated risks, it shows many asymptomatic early-stage ovarian cancers^{1,2} and helps improve survival.³ To emphasize the role of sonography in the screening of ovarian cancers with normal CA-125 levels, the sonographic features of the tumors (size and morphologic characteristics) and the histopathologic types were reviewed and compared to those of cancers with elevated CA-125 levels. For the purpose of early detection, our study focused on surgically proven stage IA tumors. Borderline tumors have a good clinical prognosis and are often regarded as separate entities,^{9,10} but they are similar morphologically to stage IA invasive tumors, and their survival rates differ from those of benign ovarian tumors. Therefore, we also included borderline tumors in this study.

Materials and Methods

Our study was undertaken after approval was received from the Institutional Review Board of the Cancer Institute Hospital of the Japanese Foundation for Cancer Research. From April 2000 to December 2009, 151 patients referred to our hospital with suspected gynecologic malignancies who underwent surgery were proven histopathologically to have stage IA ovarian cancers, including 61 borderline cancers. Of these patients, 6 had microscopic cancers, which were found histopathologically to coexist with uterine endometrial cancers, and they were not included in this study. One patient had two different types of ovarian cancer (one in each ovary) and a normal CA-125 level, and was included as 2 cases. These patients were referred to our institution for the following reasons: 73 self-referred with symptoms related to ovarian tumors (eg, abdominal distention, masses, pain, and discomfort), 20 self-referred with nonspecific symptoms (eg, abnormal bleeding and irregular cycles), 49 referred through screening at other institutes, 3 referred through screening at our

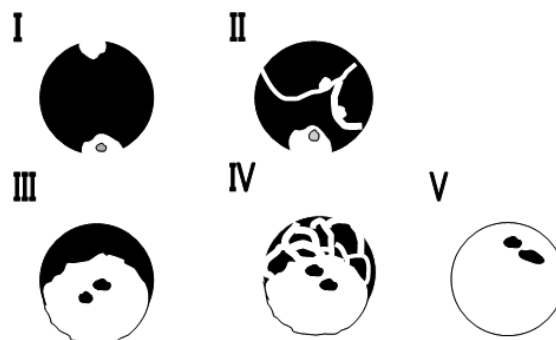
cancer screening center, and 1 referred for other reasons. Preoperative sonographic findings, preoperative serum CA-125 levels, and other clinical information on the resulting 146 cases were taken from medical records.

Sonographic Findings

Transvaginal sonography was performed in most cases with a Sonovista C-3000 system (Mochida Siemens Medical Systems Co, Ltd, Tokyo, Japan) and a transvaginal mechanical sector 5-frequency probe (5, 6, 7.5, 8.3, and 9) with 3 scan angles (100°, 180°, and 220°). Transabdominal scans were also performed as needed. The resulting images were recorded on a Synapse picture archiving and communication system (Fujifilm Medical Co, Ltd, Tokyo, Japan). The sonographic features and maximal tumor diameter were noted from the records. When a tumor appeared too large to measure accurately by transvaginal or transabdominal sonography, other sources of information, such as magnetic resonance imaging and pathologic reports, were examined.

Our terms, definitions and measurements were consistent with the consensus opinion of the International Ovarian Tumor Analysis group.¹¹ When evaluating the stage IA ovarian cancers, tumors were classified into 5 types. These comprised 4 cystic tumor types according to the locular type (unilocular or multilocular) and sonographically estimated solid component amount (including papillary projections), and 1 solid tumor type as follows (Figure 1): I, unilocular cysts with less than 50% solid components; II, multilocular cysts with less than 50% solid components; III, unilocular cysts with 50% to 80% solid components; IV, multilocular cysts with 50% to 80% solid components; V, solid tumors with at least 80% solid components.

Figure 1. Our 5 tumor types classified by sonography as follows: I, unilocular cysts with less than 50% solid components; II, multilocular cysts with less than 50% solid components; III, unilocular cysts with 50% to 80% solid components; IV, multilocular cysts with 50% to 80% solid components; and V, solid tumors with at least 80% solid components.



components; and V, solid tumors, characterized as having at least 80% solid components.

Serum CA-125 Measurement

Cancer antigen 125 levels were measured with an automated microparticle enzyme immunoassay (Abbot Diagnostics, Chicago, IL). From serial measurements of CA-125 for each patient, we logged the value just before surgery; the median interval was 18 days, the mean 20 days, and the range 1 to 83 days. We regarded a cutoff value of less than 35 U/mL as normal.

Histopathologic Analysis

The histopathologic results were categorized into 5 groups. To clarify the characteristics of each histopathologic type, borderline and invasive tumors were evaluated together and separately. The 5 groups were as follows: I, mucinous adenocarcinoma; II, serous adenocarcinoma; III, clear cell adenocarcinoma; IV, endometrioid adenocarcinoma; and V, other.

Statistical Analysis

Data were analyzed with JMP 8 software (SAS Institute Inc, Cary, NC). Stage IA ovarian cancers with elevated CA-125 levels were compared to those having normal CA-125

levels. Analyses were performed with borderline and invasive tumors grouped together and separately. Proportions were compared using χ^2 and Fisher exact tests. $P < .05$ was considered statistically significant.

Results

Patients

The median age of the patients at the time of diagnosis was 52 years (range, 14–82 years).

Serum CA-125 Levels and Histopathologic Types

Of the 146 cases evaluated, 59 (40%) had elevated CA-125 levels, and 87 (60%) had normal CA-125 levels. Normal CA-125 levels were found in 67% of borderline cases (41 of 61) and 54% of invasive cases (46 of 85). The difference was not statistically significant. Of the invasive tumors, 70% of clear cell carcinomas (19 of 27) had normal CA-125 levels. Table 1 summarizes the results.

Cancer Antigen 125 Levels and Tumor Size

The median maximal diameter was 12 cm (range, 3.3–35 cm). A statistically significant difference was found in the ratio of elevated to normal CA-125 levels between tumors of 20 cm or larger and those smaller than 20 cm ($P = .03$; Table 2).

Table 1. Histopathologic Types and Cancer Antigen-125 Levels for Borderline and Invasive Tumors

Tumor Type	Total, n	Elevated CA-125, n (%)	Normal CA-125, n (%)	P
All	146	59 (40)	87 (60)	
Borderline	61	20 (33)	41 (67)	NS
Invasive	85	39 (46)	46 (54)	
All (borderline and invasive)	146	59 (40)	87 (60)	
Mucinous adenocarcinoma	62	26 (40)	36 (60)	Ref
Serous adenocarcinoma	20	8 (40)	12 (60)	NS
Clear cell adenocarcinoma	27	8 (30)	19 (70)	NS
Endometrioid adenocarcinoma	16	9 (56)	7 (44)	NS
Other	21	8 (38)	13 (62)	NS
Borderline	61	20 (33)	41 (67)	
Mucinous adenocarcinoma	44	17 (38)	27 (62)	Ref
Serous adenocarcinoma	10	3 (30)	7 (70)	NS
Clear cell adenocarcinoma	0	0	0	NS
Endometrioid adenocarcinoma	1	0	1 (100)	NS
Other	6	0 (0)	6 (100)	NS
Invasive	85	39 (46)	46 (54)	
Mucinous adenocarcinoma	18	9 (50)	9 (50)	Ref
Serous adenocarcinoma	10	5 (50)	5 (50)	NS
Clear cell adenocarcinoma	27	8 (30)	19 (70)	NS
Endometrioid adenocarcinoma	15	9 (60)	6 (40)	NS
Other	15	8 (53)	7 (47)	NS

CA-125 indicates cancer antigen 125; NS, not significant ($P > .05$); and Ref, reference value ($P < .05$).

Table 2. Tumor Sizes and Cancer Antigen 125 Levels for Borderline and Invasive Tumors

Tumor Size	Total, n	Elevated CA-125, n (%)	Normal CA-125, n (%)	P
All (borderline and invasive)	146	59 (40)	87 (60)	
Maximal diameter <20 cm	120	42 (35)	78 (65)	.03
Maximal diameter ≥20 cm	26	17 (65)	9 (35)	
All (borderline and invasive)	146	59 (40)	87 (60)	
<10 cm	53	19 (36)	34 (64)	Ref
10–19 cm	67	23 (34)	44 (66)	NS
≥20 cm	26	17 (65)	9 (35)	.08 ^a
Borderline	61	20 (33)	41 (67)	
<10 cm	20	2 (10)	18 (90)	Ref
10–19 cm	26	7 (27)	19 (73)	NS
≥20 cm	15	11 (73)	4 (27)	.003 ^b
Invasive	85	39 (46)	46 (54)	
<10 cm	33	17 (51)	16 (49)	Ref
10–19 cm	41	16 (39)	25 (61)	NS
≥20 cm	9	6 (67)	3 (33)	.03 ^c

CA-125 indicates cancer antigen 125; NS, not significant ($P > .05$); and Ref, reference value ($P < .05$).

^a≥20 cm compared with <10 cm in all tumors.

^b≥20 cm compared with <10 cm in borderline tumors.

^c≥20 cm compared with <10 cm in invasive tumors.

Table 3. Sonographic Types and Cancer Antigen 125 Levels for Borderline and Invasive Tumors

Sonographic Type	Total, n	Elevated CA-125, n (%)	Normal CA-125, n (%)	P
All (borderline and invasive)	146	59 (40)	87 (60)	
<50% solid (I, II)	106	35 (33)	71 (67)	.02
≥50% solid (III, IV, V)	40	24 (60)	16 (40)	
All (borderline and invasive)	146	59 (40)	87 (60)	
Unilocular <50% solid (I)	48	14 (29)	34 (71)	Ref
Multilocular <50% solid (II)	58	21 (36)	37 (64)	NS
Unilocular 50%–80% solid (III)	4	4 (100)	0 (0)	.005 ^a
Multilocular 50%–80% solid (IV)	16	7 (44)	9 (56)	NS
Solid ≥80% solid (V)	20	13 (65)	7 (35)	.03 ^b
Borderline	61	20 (33)	41 (67)	
Unilocular <50% solid (I)	16	4 (25)	12 (75)	Ref
Multilocular <50% solid (II)	33	13 (39)	20 (61)	NS
Unilocular 50%–80% solid (III)	0	0	0	NA
Multilocular 50%–80% solid (IV)	7	1 (14)	6 (86)	NS
≥80% solid (V)	5	2 (40)	3 (60)	NS
Invasive	85	39 (46)	46 (54)	
Unilocular <50% solid (I)	32	10 (31)	22 (69)	Ref
Multilocular <50% solid (II)	25	8 (35)	17 (65)	NS
Unilocular 50%–80% solid (III)	4	4 (100)	0 (0)	.03 ^c
Multilocular 50%–80% solid (IV)	9	6 (67)	3 (33)	NS
≥80% solid (V)	15	11 (73)	4 (27)	.04 ^d

CA-125 indicates cancer antigen 125; NA, not applicable; NS, not significant ($P > .05$); and Ref, reference value ($P < .05$).

^aUnilocular 50%–80% solid compared with unilocular <50% solid in all tumors.

^b≥80% solid compared with unilocular <50% solid in all tumors.

^cUnilocular 50%–80% solid compared with unilocular <50% solid in invasive tumors.

^d≥80% solid compared with unilocular <50% solid in invasive tumors.

Serum CA-125 Levels and Sonographic Tumor Types

Table 3 summarizes the sonographic types and serum CA-125 levels. Overall, the most frequently seen type was multilocular cysts with less than 50% solid components (58 of 146 [40%]), followed by unilocular cysts with less than 50% solid components (48 of 146 [33%]). Serum CA-125 levels were normal in 64% and 71% of these types, respectively. The ratio of elevated to normal serum CA-125 levels was highest in unilocular cysts with 50% to 80% solid components (4 of 4 [100%]), but this type was rare; the next highest type was solid tumors ($\geq 80\%$ solid components; 13 of 20 [65%]). Overall, there was a statistically significant difference in the ratio of elevated to normal CA-125 levels between tumors with less than 50% solid components (35 of 106 [33%]) and those with 50% or more solid components (24 of 40 [60%]; $P = .02$).

Sonographic and Histopathologic Tumor Types

Table 4 summarizes the sonographic and histopathologic types. Mucinous adenocarcinoma made up the predominant histopathologic type, especially in multilocular cysts with less than 50% solid components, both with elevated CA-125 levels (19 of 21 [90%]; $P < .001$) and without (25 of 37 [68%]; $P < .001$). However, in unilocular cysts with less than 50% solid components and normal CA-125 levels, clear cell adenocarcinoma predominated (12 of 34 [35%]; $P = .04$). In solid tumors with elevated CA-125

levels, endometrioid adenocarcinoma predominated (5 of 13 [38%]; $P = .02$); solid tumors with normal CA-125 levels were primarily other types (4 of 7 [57%]; $P = .002$), including 2 granulosa cell tumors, 1 Brenner tumor, and 1 fibrosarcoma.

Figures 2A–4A show unilocular cysts: clear cell carcinoma (normal CA-125 level, $< 50\%$ solid) in Figures 2A and 3A and serous adenocarcinoma (normal CA-125 level, $< 50\%$ solid) in Figure 4A. Figures 5A–7A show multilocular cysts: mucinous borderline adenocarcinoma (normal CA-125 level, $< 50\%$ solid) in Figure 5A, mucinous adenocarcinoma (elevated CA-125 level, $< 50\%$ solid) in Figure 6A, and endometrioid adenocarcinoma (elevated CA-125 level, 50%–80% solid) in Figure 7A. Figures 2B–7B show corresponding photomicrographs from surgical specimens.

Discussion

Reports of ovarian cancer screening have recently showed improvements in survival and mortality. Jacobs et al⁵ reported improved median survival in a group of postmenopausal women who underwent 2-level screening by CA-125 measurement and sonography. On the basis of annual transvaginal sonography, van Nagell et al³ reported improved mortality in asymptomatic women aged 50 years and older and in high risk women aged 25 years and older.

Table 4. Sonographic Histopathologic Types by Cancer Antigen 125 Level

Sonographic Type	Total, n	Most Frequent Histopathologic Type	n (%)	P
Elevated CA-125				
Unilocular $< 50\%$ solid (I)	14	Mucinous adenocarcinoma	4 (29)	NS
Multilocular $< 50\%$ solid (II)	21	Mucinous adenocarcinoma	19 (90)	$< .001^a$
Unilocular 50%–80% solid (III)	4	Clear cell adenocarcinoma	3 (75)	$< .001^b$
Multilocular 50%–80% solid (IV)	7	Mucinous adenocarcinoma	2 (29)	NS
$\geq 80\%$ solid (V)	13	Endometrioid adenocarcinoma	5 (38)	.02 ^c
Normal CA-125				
Unilocular $< 50\%$ solid (I)	34	Clear cell adenocarcinoma	12 (35)	.04 ^d
Multilocular $< 50\%$ solid (II)	37	Mucinous adenocarcinoma	25 (68)	$< .001^e$
Unilocular 50%–80% solid (III)	0	NA	0	NA
Multilocular 50%–80% solid (IV)	9	Mucinous adenocarcinoma	4 (44)	NS
$\geq 80\%$ solid (V)	7	Other	4 (57)	.002 ^f

CA-125 indicates cancer antigen 125; NA, not applicable; and NS, not significant ($P > .05$).

^aMucinous adenocarcinoma compared with other multilocular $< 50\%$ solid tumors with elevated CA-125 levels.

^bClear cell adenocarcinoma compared with other unilocular 50%–80% solid tumors with elevated CA-125 levels.

^cEndometrioid adenocarcinoma compared with other $\geq 80\%$ solid tumors with elevated CA-125 levels.

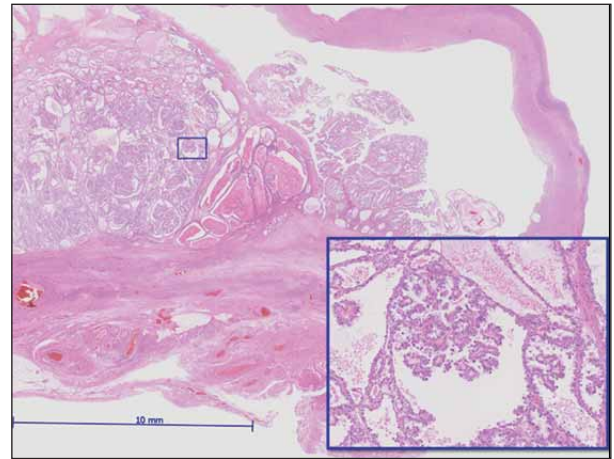
^dClear cell adenocarcinoma compared with other unilocular $< 50\%$ solid tumors with normal CA-125 levels.

^eMucinous adenocarcinoma compared with other multilocular $< 50\%$ solid tumors with normal CA-125 levels.

^fOther compared with other $\geq 80\%$ solid tumors with normal CA-125 levels.



A
Figure 2. A. Clear cell carcinoma: unilocular cyst with less than 50% solid components and a normal cancer antigen 125 level showing a papillary projection from a cyst wall. The solid component is about 2 cm in diameter with irregular margins, an inhomogeneous texture, and a rather broad base.
B. Photomicrograph of a surgical specimen showing cystic spaces lined by hobnail cells, consistent with clear cell adenocarcinoma.

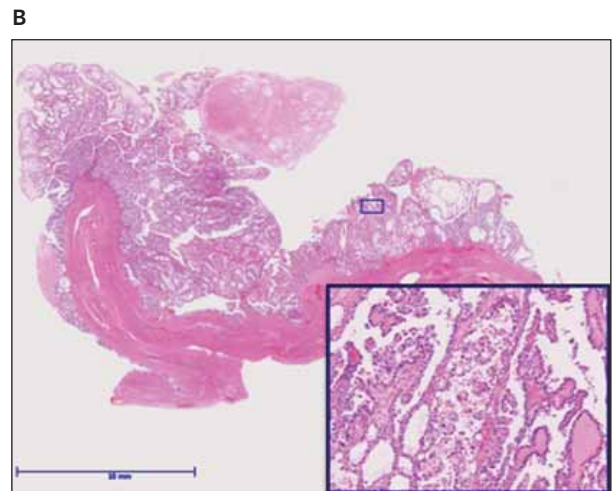


A recent 2-arm prospective randomized trial by the UK Collaborative Trial of Ovarian Cancer Screening⁶ found equal sensitivity for 2-level methods using a combination of CA-125 measurement and sonography and sequential sonography alone. On the other hand, Taylor et al¹ found that the use of serum CA-125 measurement as a first-stage test reduced sensitivity. In our study group of stage IA ovarian cancers, only 40% had elevated serum CA-125 levels, and only 46% of invasive cancers did. It is estimated that more than half of stage IA tumors would have been missed by initial CA-125 screening, and there is no guarantee that

they would have been found subsequently at the same stage or by the same CA-125 status.

The goal of ovarian cancer screening is to improve survival and mortality. All ovarian cancers should therefore be detected as early as possible, including ovarian cancers with normal CA-125 levels. In ovarian cancer screening, stage I disease is likely to be found.² Conversely, finding ovarian cancers with normal CA-125 levels but without ascites is difficult, and further investigation of this group would provide valuable insight.

Figure 3. A. Clear cell carcinoma: unilocular cyst with less than 50% solid components and a normal cancer antigen 125 level showing several papillary projections from a cyst wall. The solid components are 1 to 3 cm in diameter with irregular margins and an inhomogeneous texture.
B. Photomicrograph of a surgical specimen showing cystic spaces lined by hobnail cells, consistent with clear cell adenocarcinoma.



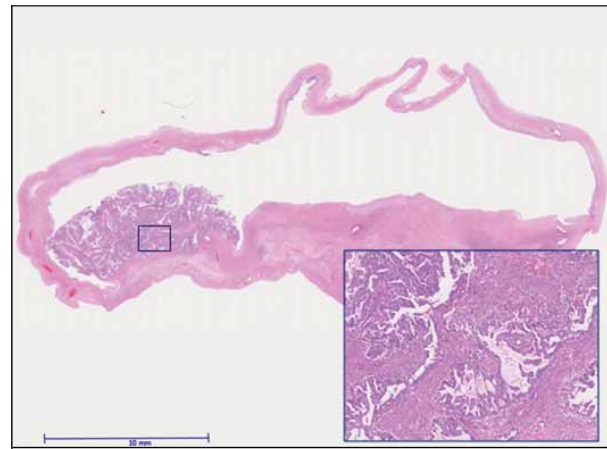
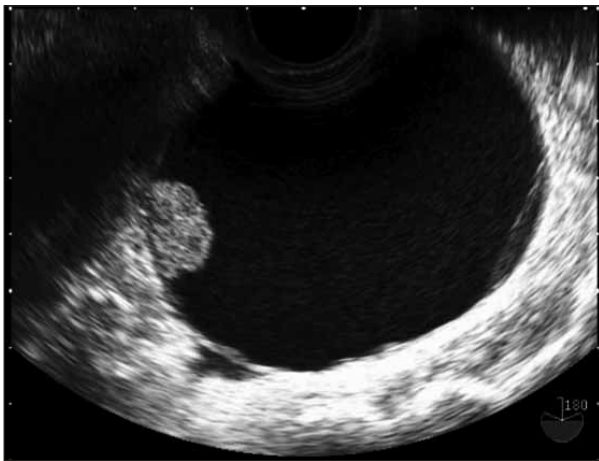


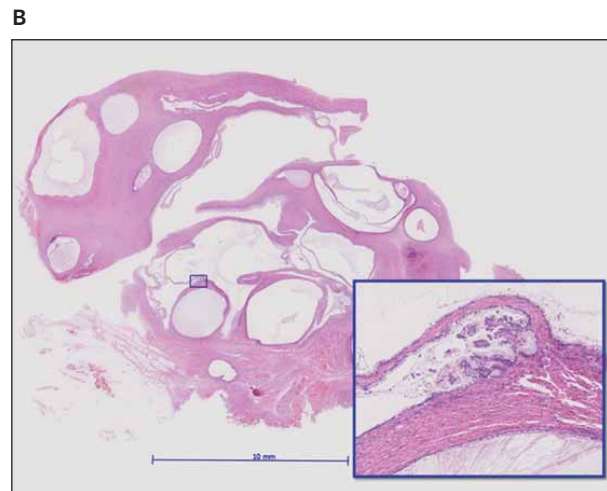
Figure 4. A, Serous adenocarcinoma: unilocular cyst with less than 50% solid components and a normal cancer antigen 125 level showing a solid nodule with a fuzzy margin and an inhomogeneous texture. The cyst wall at the bottom is somewhat irregular and thick in places. **B,** Photomicrograph of a surgical specimen showing tall sharp papillary structures, consistent with serous adenocarcinoma.

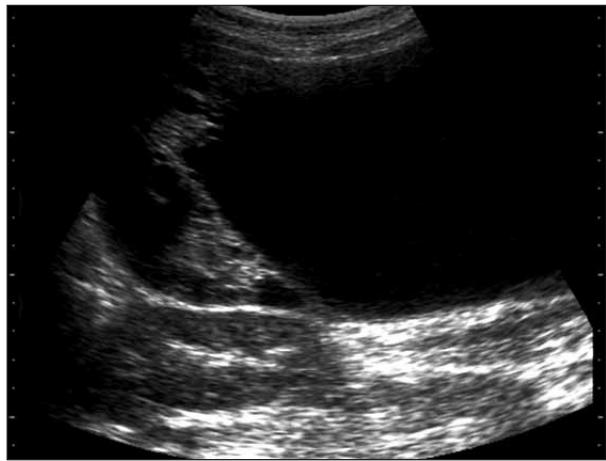
Histopathologic Types of Ovarian Cancers With Normal and Elevated CA-125 Levels

Certain histopathologic types, such as mucinous and clear cell adenocarcinoma, are found more commonly during their early stages¹²; our results are consistent with that report. Also, differences have been reported for elevated CA-125 levels between stages and between histopathologic types. Kolwijck et al¹³ investigated 123 borderline ovarian tumors and found that CA-125 levels were elevated more often in patients with serous adenocarcinoma (67%) than in patients with mucinous adenocarcinoma

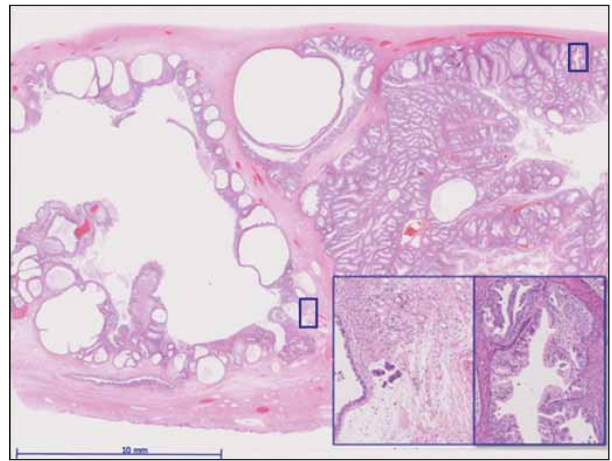
(39%; $P < .001$) and in patients with advanced stage disease (83%) than in patients with stage I disease (47%; $P < .001$). We found that the ratio of elevated to normal serum CA-125 levels was lowest in clear cell adenocarcinoma (8 of 27 [30%]). The ratios were also low for other histopathologic types (38%–56%) in stage IA tumors, but the differences were not statistically significant. A similar tendency was found in other studies. In the UK Collaborative Trial of Ovarian Cancer Screening, for instance, 5 clear cell adenocarcinomas were found in the sonography–sonography group, but no clear cell adenocarcinomas were

Figure 5. A, Borderline mucinous adenocarcinoma: multilocular cyst with less than 50% solid components and a normal cancer antigen 125 level showing a solid nodule with an inhomogeneous texture and focally irregular cyst walls. **B,** Photomicrograph of a surgical specimen showing tufting and papillary structures of an atypical proliferating mucinous tumor, consistent with borderline mucinous adenocarcinoma.





A



B

Figure 6. **A**, Mucinous adenocarcinoma: large multilocular cyst (33.0 cm) with less than 50% solid components and an elevated cancer antigen 125 level (51.9 U/mL) showing an irregular septum with focally thick nodules and an inhomogeneous texture on transabdominal sonography. **B**, Photomicrograph of a surgical specimen showing an infiltrative invasive focus (left) and irregular glands lined by atypical cells with mucin (right), consistent with mucinous adenocarcinoma.

found in the CA-125–sonography group.⁶ Approximately half of patients with clear cell adenocarcinoma present in stage I,^{14,15} and this type is more common in Asian women.¹⁴ There were 27 such cases (18%) among 146 cases in our study group. Relative to other ovarian cancers, the stage-adjusted prognosis is poor.¹⁴ Takano et al¹⁶ reported that survival in stage IC [including IC(a), IC(1), and IC(2)] was significantly worse than in stage IA [including IC(b)]. According to the prognosis and the CA-125 status, early recognition of these diseases on sonography is called for.

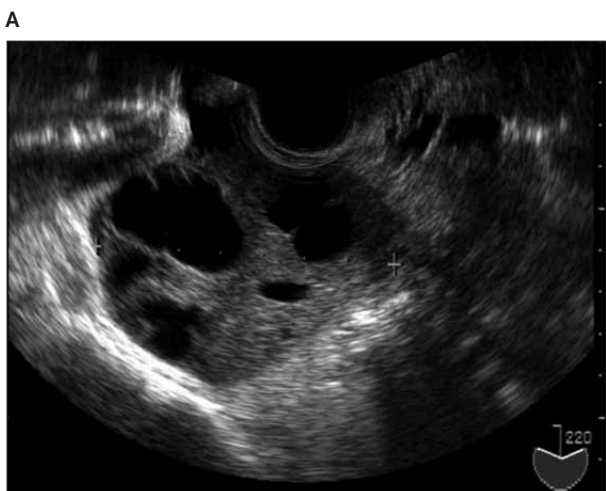
Sonographic Features of Ovarian Cancers With Normal and Elevated CA-125 Levels

Stage IA ovarian tumors with normal CA-125 levels were smaller (<20 cm) or had less solid components (<50%), either unilocular or multilocular, than those with elevated CA-125 levels.

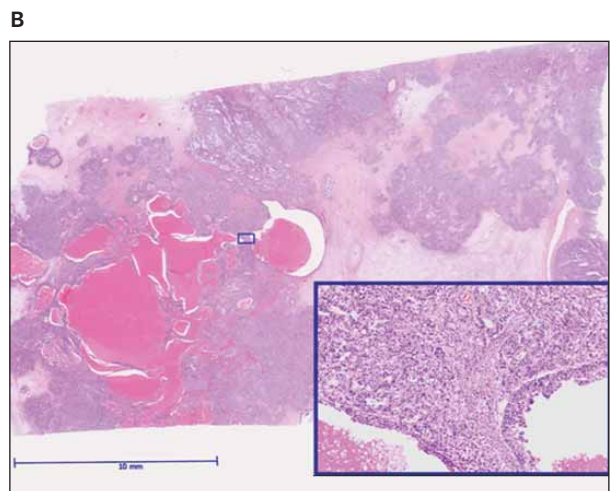
Locular Cysts and Histopathologic Types

In our study group, mucinous adenocarcinoma was the predominant histopathologic type (62 of 146 [42%]) and was often found sonographically as multilocular cysts with

Figure 7. **A**, Grade 3 endometrioid adenocarcinoma: multilocular cyst with 50% to 80% solid components and an elevated cancer antigen 125 level (231.3 U/mL) showing several irregular cystic lesions with a dense, rather homogeneous solid texture. **B**, Photomicrograph of a surgical specimen showing irregular glands in a mainly solid pattern, consistent with grade 3 endometrioid adenocarcinoma.



A



B

less than 50% solid components, whereas clear cell carcinoma was found as unilocular cysts with less than 50% solid components. Only 3 cases of clear cell carcinoma were unilocular cysts with 50% to 80% solid components, however, and all 3 had elevated CA-125 levels. Timmerman et al¹⁷ reported that “unilocular cysts” are found more often in benign tumors, and any morphologic appearance other than that of a unilocular cyst is associated with an increased risk of malignancy. Truly, the important factors are the presence of solid components and the size of these components.

Solid Components

We found that cystic tumors with less than 50% solid components, either unilocular or multilocular, were statistically significantly associated with normal CA-125 levels (67%; Figures 2A–5A). Only one-third of these cases were expected to have elevated CA-125 levels (Figures 6A and 7A). To our knowledge, a study of the sonographic tumor morphologic characteristics and CA-125 status of stage IA ovarian cancers has not been reported previously. Figure 2A shows a papillary projection from a unilocular cyst wall. The solid component, about 2 cm in diameter, has irregular margins and an inhomogeneous texture with a rather broad base, suggesting malignancy.

A further concern is the possibility of ovarian cancer in unilocular cysts without solid components (sonographically simple cysts). These are included in our category unilocular, less than 50% solid. Several reports indicate that there is a low possibility of ovarian cancers among simple cysts smaller than 10 cm in postmenopausal women.¹⁸ In our study, we found 1 case of a simple cyst mimicking ovarian cancer in a 66-year-old postmenopausal woman who had a 10-cm simple cyst diagnosed by both sonography and magnetic resonance imaging and a normal serum CA-125 level. In view of the size of the tumor and her age, she underwent surgery. Histopathologic analysis revealed mucinous adenocarcinoma.

Role of Sonography

In this study, we investigated the sonographic features and histopathologic types of stage IA ovarian cancers with normal and elevated serum CA-125 levels. We wish to emphasize the role of sonography. Our patients with normal CA-125 levels were suspected of having ovarian malignancies mostly on the basis of sonography, either for cancer screening or as a routine examination, and underwent surgical treatment at our institution. As of this writing, they were all alive without disease. There is a high-false positive rate for sonography in ovarian cancer screening¹²;

however, the sensitivity is important for improving survival and mortality, which justifies screening.

Conclusions

Sonographic findings and histopathologic types of stage IA ovarian cancers were compared between patients with normal and elevated CA-125 levels. We found statistically significant differences in the CA-125 status between smaller and larger tumors (<20 and ≥20cm) and between tumors with less and more solid components (<50% and ≥50%). We also found statistical tendencies for the CA-125 status in the differing histopathologic types based on stage IA diseases with normal and elevated CA-125 levels.

We believe that an understanding of the sonographic findings of stage IA diseases, taken together with the CA-125 status and histopathologic types, enables improved recognition of early disease and leads to improved survival. We also emphasize the role of sonography in detecting stage IA ovarian cancers when CA-125 levels are normal.

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