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Original article

Ovarian tumor cases that were preoperatively diagnosed as benign but postoperatively confirmed as borderline or malignant after laparoscopic surgery



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ABSTRACT

Objective: Laparoscopic surgery is the gold standard for benign ovarian tumors because of its overall improved quality of life (QOL). However, some tumors diagnosed preoperatively as benign may be proven to be malignant by postoperative studies. The standard approach for the removal of a malignant ovarian tumor in our hospital is via laparotomy; however, there is no referential prognostic data on malignancies that are excised laparoscopically. To evaluate clinical and histological factors and prognosis, this study retrospectively reviewed patients who underwent surgery in our hospital, based on a preoperative diagnosis of benignancy, but later postoperative testing proved their tumors to be borderline or malignant.

Participants and methods: The study group comprised 1322 women who underwent a laparoscopic procedure in our hospital on the basis of a preoperative diagnosis of a benign ovarian tumor. The procedures were performed between 1995 and 2011. The rate of borderline and malignant cases, histology, and postoperative treatment were investigated.

Results: Of the 1322 patients, 15 (1.1%) patients were postoperatively diagnosed as having a borderline malignancy with various histological types and all of these patients had a good prognosis; four (0.3%) patients were postoperatively diagnosed as having a malignant tumor with various histological types; of these patients, two patients required emergency surgery. All four patients underwent additional surgery and chemotherapy with no recurrence to date.

Conclusion: Some tumors diagnosed preoperatively as benign proved postoperatively to be malignant. Appropriate postoperative treatment effectively improved the prognosis. Particular attention should be paid to a possible occult malignancy that may manifest postoperatively, especially in patients who underwent emergency surgery. We recommend preoperative magnetic resonance imaging, even for emergency cases, to improve preoperative diagnosis.

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Introduction

An ovarian tumor is a very common gynecological tumor. Laparoscopic surgery is the gold standard for benign ovarian tumors because of its overall improved quality of life (QOL).¹ It has been reported in Japan that 70.1% of ovarian tumors preoperatively diagnosed as benign are laparoscopically excised.² However, 0.4% of tumors diagnosed preoperatively as benign are proven postoperatively to be malignant. In these patients, intraoperative cyst

rupture can be a great risk with laparoscopic surgery. Intraoperative cyst rupture may cause upstaging, and some patients require additional treatment or chemotherapy postoperatively. Laparoscopic surgery is more likely to cause cyst rupture than open surgery.³ These malignant cases essentially undergo a standard laparotomy; however, at present there is no referential data regarding either the prognosis or the consensus to indicate laparoscopy unconditionally for early-stage ovarian cancer.

This study retrospectively reviewed ovarian cancer cases involving women in our hospital who underwent surgery based on a preoperative diagnosis of a benign tumor that postoperatively proved to be borderline malignant or malignant. By investigating these cases, we attempted to obtain concrete prognostic data and clinical and histological findings.

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Participants and methods

The study group comprised 1322 women who underwent a laparoscopic procedure in our hospital for an ovarian tumor that was preoperatively diagnosed as benign. The procedures took place between January 1995 and December 2011 and involved 1089 cases of ovarian tumorectomy and 233 cases of adnexectomy.

Among these cases, the rate of borderline malignant and malignant cases was based on postoperative pathology. The following data were furthermore reviewed: patient age, tumor size, surgical procedure, histological type, incidence of cyst rupture, and postoperative treatment. Based on the postoperative pathologic diagnosis, the patients were classified in three groups: “benign”, “borderline malignant”, and “malignant”. The preoperative mean patient age and mean largest tumor diameter were compared among the groups.

The preoperative diagnosis in our institution was based on ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI). The solid portion of the tumor and the wall thickness were evaluated to differentiate between benignancy and malignancy.⁴ (However, some emergent cases underwent surgery after CT and/or ultrasound examination only.) Based on the preoperative diagnosis, we selected laparoscopy for benignancy and open surgery for malignancy and tumors for which malignancy could not be ruled out.

In our department, laparoscopy is performed by first attaining pneumoperitoneum through the umbilicus by using a closed method. Three 5-mm trocars are inserted at the following locations: the umbilicus, the midline of the lower abdomen, and the right side of the lower abdomen. One 12-mm trocar is inserted in the left lower abdomen. Adnexectomy is performed by doubly ligating the suspensory ovarian ligament, followed by the coagulation and dissection of the fallopian tube and ovarian ligament; the adnexa is then excised. Ovarian tumorectomy is performed by making an incision halfway around the tumor along the equatorial line, starting from the opposite side of the ovarian hilum. The tumor is then carefully dissected to avoid cyst rupture. After aspirating the contents into the pouch of an Endo Catch Gold (Ethicon, Tokyo, Japan), which is inserted through the 12 mm trocar. The tumor is then transferred out of the abdomen.

For statistical analysis, the Mann-Whitney *t* test was used to compare the mean values between the two groups. A *p* value < 0.05 was considered statistically significant.

Results

Of the 1322 women, 15 (1.1%) women were postoperatively diagnosed as having borderline malignancy and four (0.3%) women were postoperatively diagnosed as having a malignancy. Table 1 summarizes the patient age, tumor size, surgical procedure, histological type, incidence of cyst rupture, and postoperative treatment in regard to the patients postoperatively diagnosed as borderline malignant. The mean patient age was 38.3 years and the mean largest tumor size was 6.0 cm. Laparoscopic adnexectomy was performed for two menopausal women, and laparoscopic ovarian tumorectomy was performed for the other 13 women who were premenopausal. Cyst rupture occurred in 10 of 15 patients. Histological types of tumors were serous cystadenoma (four patients), mucinous cystadenoma (four patients), immature teratoma G1 (four patients), granulosa cell tumor (two patients), and endometrial cyst (one patient). A subsequent adnexectomy was performed in four patients. To date, recurrence has been confirmed in only one patient. This patient developed ipsilateral ovarian tumors at 1 year and at 3 years postoperatively. She was undergoing infertility treatment and an ovarian tumorectomy was performed for both recurrences. The conservative procedures were performed in accordance with her desire to preserve her fertility. She gave informed consent. The histological type was the same for all the three surgeries: mucinous cystadenoma, which is a borderline malignancy. At present, 3 years after her last surgery, she has not experienced a recurrence.

Table 2 summarizes the preoperative patient age, tumor size, surgical procedure, histological type, incidence of cyst rupture, and postoperative treatment in regard to patients postoperatively diagnosed as having a malignancy. The mean patient age was 33.8 years and the mean largest tumor size was 8.5 cm (Table 3). Laparoscopic ovarian tumorectomy was performed for all of these patients. Cyst rupture occurred in one patient. In two of four patients, the cyst had already naturally ruptured preoperatively (i.e., voluntary rupture). Histological types were one case each of serous cystadenocarcinoma, mucinous cystadenocarcinoma, yolk sac tumor, and squamous cell carcinoma (i.e., malignant transformation from a mature cystic teratoma). The serous cystadenocarcinoma case was complicated by tumor torsion and cyst rupture. The squamous cell carcinoma case was complicated by cyst rupture. Both patients required emergency surgery. Therefore, in these patients, only a CT scan was performed preoperatively; MRI was omitted to save time. The yolk sac tumor case was first diagnosed as

Table 1
Patient age, tumor size, procedure, result, and follow-up of the postoperative borderline cases.

Case no.	Age at surgery (years)	Tumor diameter (cm)	Procedure	Cyst rupture	Histology	Postoperative treatment
1	30	4.5	LC	Present	Serous cyst adenoma (BM)	
2	30	7	LC	Present	Granulosa cell tumor	LA
3	47	5	LC	None	Immature teratoma G1	
4	28	8	LC	Present	Immature teratoma G1	
5	36	4	LC	Present	Granulosa cell tumor	
6	43	6	LC	Present	Mucinous cyst adenoma (BM)	LA
7	30	8	LC	Present	Mucinous cyst adenoma (BM)	LC at 2 recurrences
8	35	6	LC	Present	Endometrial cyst (BM)	
9	26	8	LC	None	Immature teratoma G1	LA
10	79	6	LA	None	Serous cyst adenoma (BM)	
11	51	5	LA	None	Mucinous cyst adenoma (BM)	
12	34	7	LC	Present	Serous cyst adenoma (BM)	
13	32	8	LC	Present	Mucinous cyst adenoma (BM)	LA
14	36	2	LC	None	Immature teratoma G1	
15	38	5	LC	Present	Serous cyst adenoma (BM)	
Mean	38.3	6.0				

BM = borderline malignancy; LA = laparoscopic adnexectomy; LC = laparoscopic cystectomy.

Table 2
Patient age, tumor size, procedure, result, and follow-up of the postoperative malignancy cases.

Case no.	Age at surgery (years)	Tumor diameter (cm)	Procedure	Cyst rupture	Histology	Postoperative treatment ^a
1	36	8	LC	Voluntary	Serous cyst adenocarcinoma	Standard surgery for ovarian cancer*/TC
2	19	10	LC	None	Yolk sac tumor	Adnexectomy/biopsy of the healthy side/omentectomy/BEP
3	42	9	LC	Present	Mucinous cyst adenocarcinoma	Standard surgery for ovarian cancer/TC
4	38	7	LC	Voluntary	Squamous cell carcinoma	Standard surgery for ovarian cancer/TC
Mean	33.8	8.5				

LC = laparoscopic cystectomy; TC = paclitaxel and carboplatin; BEP = bleomycin, etoposide, and cisplatin.

^a Standard surgery for ovarian cancer include abdominal total hysterectomy, bilateral adnexectomy, retroperitoneal lymph node dissection, and omentectomy.

a mature cystic teratoma because of the imaging of fat within the tumor by MRI; however, the final diagnosis was a yolk sac tumor. All patients underwent additional surgery and chemotherapy with no recurrence to date.

On the basis of the postoperative pathology, the patients were classified into three groups: benign, borderline malignancy, and malignancy. The mean patient age and mean largest tumor diameter were compared among the groups. No significant difference was found in the mean preoperative age between benignancy (36.5 years, based on 1303 patients), borderline malignancy (38.3 years, 15 patients), and malignancy (33.8 years, four patients). A significant difference was confirmed in the mean largest tumor diameter between the malignant tumors and the other two groups: malignant, 8.5 cm; benign, 6.2 cm; and borderline, 6.0 cm.

Discussion

Various factors should be considered when laparoscopic surgery is performed for a preoperatively diagnosed benign ovarian tumor, which postoperatively proves to be malignant or borderline: (1) upstaging by intraoperative cyst rupture; (2) challenge in obtaining accurate staging because of an insufficient sample collected; (3) possible delay in primary treatment; (4) metastases or recurrence at the trocar insertion site; and (5) growth or development of tumor cells triggered by pneumonia. Canis et al⁵ stated that intraoperative cyst rupture is an important prognostic factor for stage I ovarian cancer. Furthermore, the laparoscopic puncture of malignant ovarian tumors confined to the ovaries is uncommon and should be avoided whenever possible.⁵ Vergote et al⁶ report that cyst rupture prior to or during surgery decreases disease-free survival and should be avoided in patients with a possible diagnosis of ovarian carcinoma that is confined to the ovaries. However, Ahmed et al⁷ report that intraoperative rupture is not a prognostic factor. The possible negative impact of intraoperative cyst rupture on the prognosis of early-stage ovarian cancer is controversial.⁸

In regard to borderline malignancy, the 10-year survival rate for stage I is 97%, which indicates a better prognosis in comparison to malignant cases. Some investigators have reported that the prognosis was the same in Stage IC even if the standard open surgery for

ovarian cancer is not subsequently performed.^{9–11} The prognoses for our patients were good, even without additional surgery or chemotherapy.

In view of the foregoing, we first differentiated malignancy from benignancy by preoperative MRI. We also employed the utmost effort to avoid intraoperative cyst rupture in all patients. However, this study revealed that, of the preoperatively diagnosed benign cases, 1.1% of the cases were in fact borderline and 0.3% of the cases were malignant. Two malignant cases required emergency surgery, which means preoperative ultrasonography and CT are insufficient in detecting the solid portion of the tumor because of the inferior imaging quality of these techniques in comparison to MRI.⁴ Even a small solid area can be malignant.⁴ Therefore, in emergency surgery, particular attention should be paid to a possible occult malignancy that may be revealed postoperatively.

Shiota et al³ report that the rate of cyst rupture during ovarian tumorectomy was significantly higher in laparoscopy than in laparotomy. However, cyst rupture rate during adnexectomy is comparable between laparoscopy and laparotomy for tumors <10 cm. For tumors ≥10 cm, laparoscopy reportedly has a significantly higher cyst rupture rate than laparotomy.³ In our hospital, although we try our best to avoid cyst rupture, it cannot always be circumvented because of individual patient characteristics. All malignant tumors in this study were <10 cm and the mean largest diameter was significantly larger than the size of benign masses. Increased risk of malignancy is reported for larger tumors, especially tumors that are >10 cm in diameter.¹² If any suspicion of malignancy exists and laparoscopy is selected, adnexectomy should be performed rather than tumorectomy. Laparotomy should alternatively be selected to minimize potential cyst rupture.

In conclusion, this study found that appropriate postoperative treatment resulted in a favorable prognosis for postoperatively diagnosed borderline and malignant tumors in our hospital. Of most importance is the accurate preoperative differentiation between benignancy and malignancy. However, in emergency cases in which the most reliable modality cannot be used for evaluation because of time constraints, it is important to consider the possibility of an occult malignancy and employ meticulous technique during surgery to reduce the risk of cyst rupture.

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Table 3
Mean patient age and mean largest tumor diameter by group.

	Benignancy n = 1303	Borderline n = 15	Malignancy n = 4
Age (years) (range)	36.5 ± 12.9 (7–93)	38.3 ± 13.3 (26–79)	33.8 ± 10.1 (19–42)
Tumor diameter (cm) (range)	6.2 ± 2.6 (1–20)	6.0 ± 1.8 (2–8)	8.5 ± 1.3* (7–10)

Data are presented as mean ± standard deviation and range.

* In the largest mean tumor diameter, a significant difference was confirmed between the malignant group and each of the other two groups; $p < 0.05$.

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