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Original article

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



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ABSTRACT

Objective: Laparoscopic surgery is currently the gold standard for benign ovarian tumors because of its overall improved quality of life. 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, at present there are no referential prognostic data on malignancies that were excised laparoscopically. This study retrospectively reviewed cases in our hospital that underwent surgery based on the preoperative diagnosis of benignancy but postoperatively proved to be borderline or malignant to evaluate clinical and histological factors as well as prognosis.

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

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

Discussion: Some cases diagnosed preoperatively as benign proved postoperatively to be malignant. Appropriate postoperative treatment was effective in improving the prognosis. Particular attention should be paid to a possible occult malignancy that may manifest postoperatively, especially in cases of 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 one of the most common gynecological tumors. Currently, laparoscopic surgery is the gold standard for benign ovarian tumors because of its overall improved quality of life.¹ It has been reported that 70% of ovarian tumors preoperatively diagnosed as benign are laparoscopically excised in Japan.²

However, 0.4% of tumors diagnosed preoperatively as benign are proven postoperatively to be malignant. In these cases, intraoperative cyst rupture can be a great risk with laparoscopic surgery. Intraoperative cyst rupture may cause upstaging, and some cases 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 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

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attempted to obtain concrete prognostic data as well as clinical and histological findings.

Patients and methods

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

The rate of borderline malignant and malignant cases among them was based on postoperative pathology. The following data were reviewed: patient age, tumor size, surgical procedure, histological type, incidence of cyst rupture, and postoperative treatment. The patients were classified into three groups based on the postoperative pathological diagnosis: benign, borderline malignant, and malignant. Preoperative mean patient age and mean largest tumor diameter were compared among the groups.

The preoperative diagnosis in our institution was based on ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI) images. 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.) On the basis of the preoperative diagnosis, we selected laparoscopy for benignancy and open surgery for malignancy and cases for which malignancy could not be ruled out.

In our department, laparoscopy is performed by first attaining pneumoperitoneum through the umbilicus using a closed method. Three 5-mm trocars are inserted at: 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 carefully dissected to avoid cyst rupture. After aspirating the contents into the pouch of an Endo Catch Gold, which is inserted through the 12-mm trocar, the tumor is then transferred out of the abdomen.

For statistical analysis, the Mann–Whitney *U*-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 cases, the number of cases postoperatively diagnosed as borderline malignancy was 15 (1.1%). There were four cases postoperatively diagnosed as malignant (0.3%). Table 1 summarizes the patient age, tumor size, surgical procedure, histological type, incidence of cyst rupture, and postoperative treatment regarding the cases 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; laparoscopic ovarian tumorectomy was performed for the other 13 women who were premenopausal. Cyst rupture occurred in 10 of 15 cases. Histological types were serous cystadenoma (4 cases), mucinous cystadenoma (4 cases), immature teratoma G1 (1 case), granulosa cell tumor (2 cases), and endometrial cyst (1 case). A subsequent adnexectomy was performed in four cases. To date, recurrence has been confirmed in only one case. This patient developed ipsilateral ovarian tumor a year and 8 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 regarding the cases postoperatively diagnosed as malignant. 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 the cases. Cyst rupture occurred in one case and the cyst had already naturally ruptured preoperatively (voluntary rupture) in two of the four cases. Histological types were one case each of serous cystadenocarcinoma, mucinous cystadenocarcinoma, yolk sac tumor, and squamous cell carcinoma (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 cases required emergency surgery. Therefore, in these cases, only a CT scan was performed preoperatively; MRI was omitted to save time. The yolk sac tumor case was first diagnosed as a mature cystic teratoma due to the imaging of fat within the tumor by MRI; however, the final

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	8	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 (y)	Tumor diameter (cm)	Procedure	Cyst rupture	Histology	Postoperative treatment
1	36	8	LC	Voluntary	Serous cyst adenocarcinoma	Standard surgery for ovarian cancer ^a /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				

BEP = bleomycin, etoposide, and a platinum agent (e.g., cisplatin); LC = laparoscopic cystectomy; TC = taxotere and cyclophosphamide.

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

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

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

Data are presented as mean ± SD (range).

SD = standard deviation.

* A significant difference was confirmed in the mean largest tumor diameter between the malignant tumors and the other two groups, $p < 0.05$.

diagnosis was a yolk sac tumor. All the cases underwent additional surgery and chemotherapy with no recurrences to date.

On the basis of the postoperative pathology, the cases 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 benignity (36.5 years; 1303 cases), borderline malignancy (38.3 years; 15 cases), and malignancy (33.8 years; 4 cases). 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; borderline, 6.0 cm.

Discussion

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

Regarding borderline malignancy, 10-year survival rate for stage I is 97%, indicating a better prognosis compared with malignant cases. Some investigators have reported that the prognosis was the same in stage IC even if the standard open surgery for ovarian cancer was not subsequently performed.^{9–11} The prognoses of our cases were good even without additional surgery or chemotherapy.

In view of the foregoing, to first differentiate malignancy from benignity by preoperative MRI, we also employ the utmost effort to avoid intraoperative cyst rupture in all cases. However, this study revealed that 1.1% of the preoperatively diagnosed benign cases were in fact borderline and 0.3% malignant. Two malignant cases required emergency surgery, which means preoperative ultrasound or CT was not sufficient to detect the solid portion of the tumor because of their inferior imaging quality compared to a MRI.⁴ Even a small solid area can possibly be malignant.⁴ Therefore, in emergency surgery, particular attention should be paid to a possible occult malignancy that may be revealed postoperatively.

Regarding cyst rupture during ovarian tumorectomy, Shiota et al³ reported that the rate was significantly higher in laparoscopy than in laparotomy. Conversely, cyst rupture rate during adnexectomy is comparable between laparoscopy and laparotomy for tumor < 10 cm; however, for tumors ≥ 10 cm laparoscopy was reported to have 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 case characteristics. All malignant tumors in this study were < 10 cm and the mean largest diameter was significantly larger than that of the benign masses. Increased risk of malignancy is reported for larger tumors, especially those ≥ 10 cm in diameter.¹² If any suspicion of malignancy exists and laparoscopy is selected, adnexectomy should be performed rather than tumorectomy. Alternatively, laparotomy should 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 benignity and malignancy; however, in emergency cases where the most reliable modality cannot be used for evaluation due to time constraints, it is important to keep in mind the possibility of an occult malignancy and employ meticulous technique during surgery to reduce the risk of cyst rupture.

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