

# Adenocarcinoma Represents the Most Frequent Pathological Type among Giant Ovarian Tumors Weighing More than 5,000 g

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## Abstract

**Objectives:** The aim of this study was to evaluate the relation between pathology, operative complications and giant ovarian tumor weighing more than 5,000 g.

**Materials and Methods:** We assessed eleven factors of 18 patients with giant ovarian tumors after surgery, including age, Performance Status (PS), total weight of the tumor, fluid weight of the tumor, pathology, side, preoperative serum D-dimer, rate of Deep Venous Thrombosis (DVT), intraoperative complications (rate of intra-abdominal adhesion and blood loss weight), and rate of postoperative ICU management. The subjects were divided into two groups: tumor weight  $\geq 10,000$  g (group  $\geq 10,000$  g) and tumor weight  $< 10,000$  g (group  $< 10,000$  g), and the same factors were compared between two groups.

**Results:** The most frequent pathology of giant ovarian tumors weighing more than 5,000 g was found to be adenocarcinoma. Compared with eleven patients of group  $< 10,000$  g, seven patients out of group  $\geq 10,000$  g had significantly higher PS (median: 3 vs. 1,  $p < 0.05$ ), rate of intra-abdominal adhesion (85.7% vs. 9.0%,  $p < 0.05$ ), fluid weight (15,000 g vs. 4,400 g,  $p < 0.05$ ), blood loss weight (890 g vs. 130 g,  $p < 0.05$ ), and rate of postoperative ICU management (85.7% vs. 18.2%,  $p < 0.05$ ), respectively.

**Conclusions:** Much attention should be paid to patients with giant ovarian tumors who confined to bed more than 50% of waking hours (PS 3 or 4), and aggressive surgery is recommended due to a frequent incidence of cancer.

**Keywords:** Adenocarcinoma; Giant ovarian tumors

## Introduction

The definition of giant ovarian tumors has not been established. The size of giant ovarian tumors can be diagnosed by transverse and vertical diameter by Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) before surgery. One author defined giant ovarian tumors as those measuring more than 10 cm with preoperative scans (1), whereas another author defined giant ovarian tumors as those reaching above the umbilicus (2). In contrast, there are few reports evaluating giant ovarian tumors by their weight after surgery. However, it is unknown whether the most frequent pathology of giant ovarian tumors is benign or not. Because almost reports on giant ovarian tumors were published as a case report, there is no information concerning the comprehensive data about the pathology and operative complications of giant ovarian tumors.

In this study, we assessed 18 patients with giant ovarian tumors weighing more than 5,000 g to clarify the pathology and surgical complications of giant ovarian tumors.

## Methods

We assessed 18 patients with giant ovarian tumors who had undergone surgery and obtained pathological diagnosis in Kobe University Hospital between January 2011 and March 2014. In this study, we defined ovarian tumors weighing more than 5,000 g as giant ovarian tumors. Age, Performance Status (PS), total weight of the tumor, fluid weight of the tumor, pathology, side, preoperative serum D-dimer, rate of Deep Venous Thrombosis (DVT), intraoperative complications (rate of intra-abdominal adhesion and blood loss weight) and rate of postoperative ICU management were evaluated.

We divided the patients into two groups: tumor weight  $\geq 10,000$  g (group  $\geq 10,000$  g) and tumor weight  $< 10,000$  g (group  $< 10,000$  g) because we considered that the tumors weighing more than 10,000 g would be accompanied by several risks during the study. The group

$\geq 10,000$  g included 7 patients and the group  $< 10,000$  g consisted of 11 patients. Age, PS, serum D-dimer, rate of DVT, rate of intra-abdominal adhesion, fluid weight of the tumor, blood loss weight, and rate of postoperative ICU management were compared between two groups. The grade of Performance Status (PS) was assessed based on Eastern Cooperative Oncology Group PS. PS 4 means "Completely disabled, cannot carry on any selfcare, totally confined to bed or chair". We defined tumor with more than 1/2 surface being adherent to the peritoneum as positive for intra-abdominal adhesion.

The authors obtained the approval of submission by written consent from all patients. The institutional ethical boards of Kobe University Hospital approved this study. Mann-Whitney *U*-test and Fisher's exact test were used to analyze the differences between two groups. Statistical significance was defined as *P* less than 0.05.

## Results

Table 1 shows the clinical characteristics and complications of all 18 patients, and data are summarized in Table 2. The median total weight of the tumor was 8,750 g (range; 5,000 to 33,100 g), and the median fluid weight of the tumor was 5,250 g (range; 450 to 32,600 g). Pathological

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	Age	Total weight (g)	Fluid weight (g)	Side	Operation	Pathology	D-dimer (µg/ml)	PS	DVT	Adhesion	Blood loss weight (g)	ICU management
1	45	5.000	450	R	RSO	Mucinous adenocarcinoma	1.7	2	-	-	350	-
2	20	5.050	4.400	L	LSO	Mucinous border line	0.5	1	-	-	30	-
3	64	5.500	4.200	R	RSO	Mucinous border line	2.5	1	-	-	160	-
4	59	6.100	4.600	L	LSO	Mucinous border line	1.1	1	-	-	490	-
5	86	6.900	5.000	L	LSO	Mucinous border line	2.4	2	-	-	115	-
6	21	6.980	5.500	L	LSO	Mucinous adenocarcinoma	3.9	2	-	-	130	-
7	70	7.300	6.800	L	LSO	Serous adenocarcinoma	1.7	1	-	-	50	-
8	16	7.500	2.000	L	LSO	Mucinous border line	2.3	1	-	-	120	-
9	43	8.500	7.000	L	LSO	Mature cystic teratoma	4	2	-	-	50	-
10	61	9.000	650	L	LSO	Mucinous adenocarcinoma	2.8	1	-	-	980	+
11	67	9.500	1.200	L	ATH+BSO	Mucinous adenocarcinoma	1.5	2	+	+	450	+
12	62	10.700	5.700	L	ATH+BSO	Clear cell adenocarcinoma	2.4	3	-	+	1.730	+
13	78	11.500	6.500	L	LSO	Fibroma	5.6	3	+	-	130	-
14	40	18.500	5.000	R	RSO	Mucinous border line	7	3	-	+	890	+
15	55	20.000	15.000	L	ATH+BSO	Endometriotic tumor	1.7	4	-	+	3.210	+
16	67	21.950	18.450	R	BSO	Mucinous adenocarcinoma	3.6	4	-	+	155	+
17	26	25.170	24.100	L	LSO	Mucinous adenoma	1.6	3	-	+	560	+
18	33	33.100	32.600	L	ATH+BSO	Mucinous adenocarcinoma	10.9	4	+	+	1.415	+

R: Right, L: Left, RSO: Right salpingo Oophorectomy, LSO: Left Salping Oophorectomy, ATH: Abdominal Total Hysterectomy, BSO: Bilateral Salpingo Oophorectomy, PS: Performance Status, DVT: Deep Venous Thrombosis, ICU: Intensive Care Unit

**Table 1:** Clinical backgrounds and complications.

	Median ( range )		n (%)
Age (years)	57(16-86)	DVT	3 (16.7)
PS	2 (1-4)	Adhesion	7 (38.9)
D-dimmer (µg/ml)	2.4 (0.5-10.9)	Left side tumor	14 (77.8)
Fluid weight (g)	5.250 (450-32.600)	ICU management	8 (44.4)
Total weight (g)	8.750 (5.000-33.100)		
Blood loss weight (g)	255 (30-3.210)		

**Table 2:** Summary of Table 1 (n=18).

examinations revealed six cases of mucinous adenocarcinoma, one case of clear cell carcinoma, one case of serous cyst adenocarcinoma, six cases of mucinous borderline malignancy, and four cases of benign tumors. Preoperative median serum D-dimer was elevated at 2.4 µg/ml ranging from 0.5 to 10.9 µg/ml (normal range: <1.0 µg/ml), but DVT was observed only in 3 cases (16.7%). Out of 18 cases with giant ovarian tumors, 14 cases (77.8%) were noted to be originated from the left ovary (Table 2).

Compared with 11 patients of group <10,000 g, 7 patients of group ≥10,000 g had significantly higher PS (median: 3 vs. 1, p<0.05), rate of intra-abdominal adhesion (85.7% vs. 9.0%, p<0.05), fluid weight (15.000 g vs. 4.400 g, p<0.05), blood loss weight (890 g vs. 130 g, p<0.05), and rate of postoperative ICU management (85.7% vs. 18.2%, p<0.05), respectively (Table 3). All 18 patients were discharged home without major complications.

## Discussion

To our knowledge, this report appears to be the first description about the pathology and operative complications of 18 patients with giant ovarian tumors which were evaluated by tumor weight. In our study, we confirmed two important clinical observations. First, the most frequent pathology of giant ovarian tumors weighing more than 5.000 g was shown to be adenocarcinoma. Second, patients of group ≥10,000 g had more intra- and post-operative complications than those of group <10,000 g.

First, the most frequent pathology of giant ovarian tumors weighing more than 5,000 g was denocarcinoma. Unlike many articles reporting giant ovarian benign tumors, we found 3 case of giant ovarian cancer [1-5] and 2 cases of giant ovarian borderline tumor [6,7]. Kobayashi et

	Tumors $\geq 10.000\text{g}$ (n=7)	Tumors $< 10.000\text{g}$ (n=11)	p
Age (years)	55 (26-78) *	59 (16-86)*	NS#
PS	3 (3-4)*	1 (1-2)*	$< 0.05\#$
D-dimmer ( $\mu\text{g/ml}$ )	3.6 (1.6-10.9)*	2.3 (0.5-4.0)*	NS*
DVT (%)	28.6	9	NS##
Adhesion (%)	85.7	9	$< 0.05\#\#$
Fluid weight (g)	15.000 (5.000-32.600)*	4.400 (0-7.000)*	$< 0.05\#$
Blood loss weight (g)	890 (130-3210)*	130 (30-980)*	$< 0.05\#$
ICU management (%)	85.7	18.2	$< 0.05\#\#$
*Median (range). #Mann-Whitney U test. ##Fisher's exact test			

**Table 3:** Comparison of parameters between two groups.

al. reported that postmenopausal women with ovarian endometriomas measuring 9 cm or greater in diameter had a highest prevalence rate of ovarian cancer [8]. In contrast, Ottesen et al. reported that 76.2% of ovarian tumors weighing more than 20 Kg were benign cysts and that the majority of malignant cases were borderline tumors [9]. However, they did not analyze the data about the pathology, patient's backgrounds, and treatments [9]. Despite diverse reports about the pathology of giant ovarian tumors, the results of our study and previous reports suggest that at least, benign tumors do not predominate in giant ovarian tumors. Furthermore, pathological type of most giant ovarian tumors was shown to be mucinous tumor [3-7,10,11]. This fact is in agreement with the results of our study.

Second, patients of group  $\geq 10,000$  g had more intra- and post-operative complications than those of group  $< 10,000$  g. In patients of group  $\geq 10,000$  g, body movement was limited remarkably, and they could not walk by their own strength, and patient's PS was worsened by the burden of tumor weight. The reason for the necessity for postoperative careful ICU management in patients of group  $\geq 10,000$  g may be due to the persistent worsening of circulatory and respiratory conditions caused by the bleeding at the adhenolysis of tumor from the surrounding tissues, compared with group  $< 10,000$  g. This result was in accord with those of previous reports [3,5,6,12]. Therefore, we should be careful for the potential risk of adhesion in giant ovarian tumors.

We, for the first time provided detailed data regarding serum D-dimer and DVT of 18 patients with giant ovarian tumors. Unexpectedly, DVT developed only in 3 cases (16.7%). Considering that the group  $\geq 10,000$  g had more incidence of DVT than group  $< 10,000$  g, we should pay more attention to the risk of DVT when tumors increase in the weight.

In case 18, we could not insert the filter for the prevention of DVT before surgery because of the closure of inferior vena cava by tumor pressure, but we inserted it under general anesthesia. Thus, the collaboration with cardiologists and anesthesiologists is indispensable for the management of patients before surgery.

Out of 18 cases of giant ovarian tumors, 14 cases (77.8%) originated from the left ovary. We could not determine the statistical significance about the site of tumor location due to the paucity of cases. If a collaborative study about the site of tumors is conducted with other institutes, and giant ovarian tumors are found to be more frequently originated from the left site, this information would be useful at surgery because the identification and ligation of left ovarian arteries and veins after adhenolysis proceeded from the left side may reduce blood loss weight during surgery. Further study is necessary to elucidate the pathology and intra- and post-operative complications.

Previous case reports about giant ovarian tumors showed the difficulties in the management of intra- and post-operative complications such as cardiac failure, respiratory failure, and bleeding. Our results demonstrated the importance of the careful preoperative preparations for patients with giant ovarian tumors and the possibility for the preoperative selection of high risk patients. We conclude that much attention should be paid to patients with giant ovarian tumors who confined to bed more than 50% of waking hours (PS 3 or 4) and that aggressive surgery is recommended due to a frequent incidence of cancer.

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