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Surgical Manual

Surgical manual of the Korean Gynecologic Oncology Group: ovarian, tubal, and peritoneal cancers

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ABSTRACT

The Surgery Treatment Modality Committee of the Korean Gynecologic Oncology Group has determined to develop a surgical manual to facilitate clinical trials and to improve communication between investigators by standardizing and precisely describing operating procedures. The literature on anatomic terminology, identification of surgical components, and surgical techniques were reviewed and discussed in depth to develop a surgical manual for gynecologic oncology. The surgical procedures provided here represent the minimum requirements for participating in a clinical trial. These procedures should be described in the operation record form, and the pathologic findings obtained from the procedures should be recorded in the pathologic report form. Here, we describe surgical procedure for ovarian, fallopian tubal, and peritoneal cancers.

Keywords: Manuals as Topic; Gynecologic Surgical Procedures; Ovarian Neoplasms

INTRODUCTION

This surgical manual is for all cases of suspicious ovarian, tubal, and peritoneal cancers. It is organized into five sections including surgical procedures in ovarian, tubal, and peritoneal cancers, perioperative preparation, operation record form (ORF), pathologic report form (PRF), and tumor burden index (TBI).

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Conflict of Interest
No potential conflict of interest relevant to this article was reported.

We emphasize that surgical procedures in this manual represent the minimum requirements for clinical trials. This manual is the first version and will be updated to accommodate various clinical trials.

SURGICAL PROCEDURES IN OVARIAN, TUBAL, AND PERITONEAL CANCERS

In cases of suspected early stage diseases, the primary objective of surgical staging of ovarian, tubal, and peritoneal cancers is to establish adjuvant treatment strategies and in cases of suspected advanced stage diseases, optimal debulking surgery of ovarian, tubal, and peritoneal cancers should be achieved with acceptable morbidity.

1. Contents of surgical procedure

Midline vertical abdominal incision from the pubic symphysis to the xiphoid process is recommended for adequate exposure and evaluation of the whole abdomen. Minimally invasive surgical techniques (laparoscopy or robotic surgery) may be performed to accomplish surgical staging for selected patients based on preoperative imaging, such as computed tomography (CT), magnetic resonance imaging, or positron emission tomography/CT [1-7].

Prior to systemic exploration, free peritoneal fluid should be aspirated for cytology. Washing cytology with at least 20 to 50 mL of saline should be obtained in case of no free fluid in abdominal cavity. Patients with stage III or IV disease do not require cytologic assessment [1,6,8].

A systematic exploration is recommended to check the tumor involvement in the pelvic and abdominal organs, and peritoneal surface; clockwise or counterclockwise examination is usually performed from the cecum cephalad along the right paracolic gutter. The followings are investigated sequentially: ascending colon, liver, right diaphragm, stomach, lesser sac, porta hepatis, transverse colon, left diaphragm, spleen, distal pancreas, descending colon, left paracolic gutter, rectosigmoid colon, uterus, ovary, and bladder [1,6].

Biopsy should be performed at any suspicious site with tumor involvement if the suspected disease affects the surgical staging or adjuvant treatment. Multiple intraperitoneal biopsies from the cul-de-sac, vesical peritoneum, both pelvic sidewalls, and both paracolic gutters should be conducted in case of no evidence of disease [1,6].

Ovarian tumor should be removed intact, and frozen biopsy is strongly recommended during operation, if possible. Hysterectomy with bilateral salpingo-oophorectomy is recommended. Tumors throughout the abdomen should be removed as much as possible. Omentectomy should be fulfilled during surgical staging [9].

All visible and palpable tumor volume should be minimized as much as possible with debulking operations, such as visceral and parietal peritonectomy: peritoneal stripping, diaphragmatic resection, cholecystectomy, hepatic resection, splenectomy, distal pancreatectomy, appendectomy, bowel resection, urinary tract resection, partial cystectomy, and lymph node dissection [7,10-15].

Retroperitoneal inspection should be carried out to check for metastasis to pelvic and para-aortic lymph nodes. Pelvic and para-aortic lymph node should be systematically

evaluated in case of stage I or II, and the extent of retroperitoneal lymph node dissection could be modified based on the degree of the intraperitoneal residual tumor and the status of the lymph node on the preoperative image (see the description of lymphadenectomy in ORF) [16-18]. Unilateral salpingo-oophorectomy with preservation of the uterus may be considered to preserve fertility for selected patients [19,20].

Before the neoadjuvant chemotherapy (NAC), the methods for pathologic diagnosis of ovarian, tubal, and peritoneal cancers are recommended as follows: laparoscopic biopsy, image-guided gun biopsy or aspiration, or cell block from the aspiration of ascites. In case of interval debulking surgery, the traced lesion after NAC should be evaluated carefully and its management should be recorded clearly [21,22].

Medical record of surgery is recommended to describe the extent of initial tumors before surgery at pelvis, mid-abdomen, or upper abdomen. Demonstration of the status of residual tumors after surgery, complete or incomplete, is recommended to identify the size and number of remaining lesions. Photograph or video recording is one of the methods used to describe the preoperative and postoperative tumor, and surgical procedures. We provide schematic overview of this surgical manual (**Table 1**).

Table 1. Schematic overview of surgical procedure in ovarian, tubal, and peritoneal cancers

Recommendation for surgical technique in ovarian, tubal, and peritoneal cancer
Preparation
Preoperative intravenous antibiotics injection with adequate bowel preparation is recommended
Assessment
· A midline vertical incision is recommended. Minimally invasive techniques (laparoscopy, robotic) may be performed for selected patients
· Systematic exploration for tumor involvement on the pelvic and abdomen organs, and peritoneum
· Aspiration of peritoneal fluid or washing cytology in case of no free peritoneal fluid (pelvis, paracolic gutters and infradiaphragmatic area)
· Inspection and palpation of all peritoneal surfaces including diaphragms, serosa, and mesentery of the entire gastrointestinal tract
· Random biopsies in the absence of any suspicious area
· Intraoperative frozen biopsy (recommended)
Surgery
· Bilateral salpingo-oophorectomy, but unilateral salpingo-oophorectomy may be considered in case of preserving fertility
· Hysterectomy
· Omentectomy
· Pelvic and para-aortic lymph node dissection
The following procedures can be considered for the optimal cytoreduction
· Bowel resection
· Stripping and/or resection of the diaphragm or other peritoneal surfaces
· Splenectomy
· Appendectomy
· Partial cystectomy, uretero-neoureterostomy, or ureteroneocystotomy
· Partial hepatectomy
· Partial gastrectomy
· Cholecystectomy
· Distal pancreatectomy
· Suprarenal, porta hepatis, cardiophrenic, internal mammary, axillary, or supraclavicular lymph node dissection
*All visible and palpable tumor should be tried to be resected by experienced gynecologic oncologists or multidisciplinary surgical team if surgical procedure is feasible with acceptable morbidity
Special circumstances
· Before the neoadjuvant chemotherapy (NAC), the method for microscopic diagnosis of ovarian, tubal, and peritoneal cancer is suggested as follows: laparoscopic biopsy, image-guided gun biopsy or aspiration, and cell block from the aspiration of ascites
· In case of interval debulking surgery, the traced lesion after NAC is suggested to be explored surgically

PERIOPERATIVE PREPARATION

We provide perioperative preparation that includes antibiotic prophylaxis, prevention of thromboembolic disease, and patient's position.

1. Antibiotic prophylaxis

The use of prophylactic antibiotics before surgery is suggested for the prevention of postoperative gynecological infections. Antibiotics are recommended to be given immediately before skin incision. Antibiotic regimen can be selected according to the types of surgery or surgeon's preference. Additional use of prophylactic antibiotics is recommended to maintain effective levels of intravascular antibiotics in certain clinical situations, like massive bleeding or prolonged operative time [23,24].

2. Prevention of thromboembolic disease

Prophylaxis with anti-coagulants can be selectively suggested to cancer patients with high risk of deep-vein thrombosis and thromboembolic disease (**Table 2**) [25-29].

3. Patient position

If concomitant bowel resection is expected during operation, lithotomy position is recommended for patients who undergo laparotomy, and gel pads can be used for prevention of pressure sores [12].

OPERATION RECORD FORM

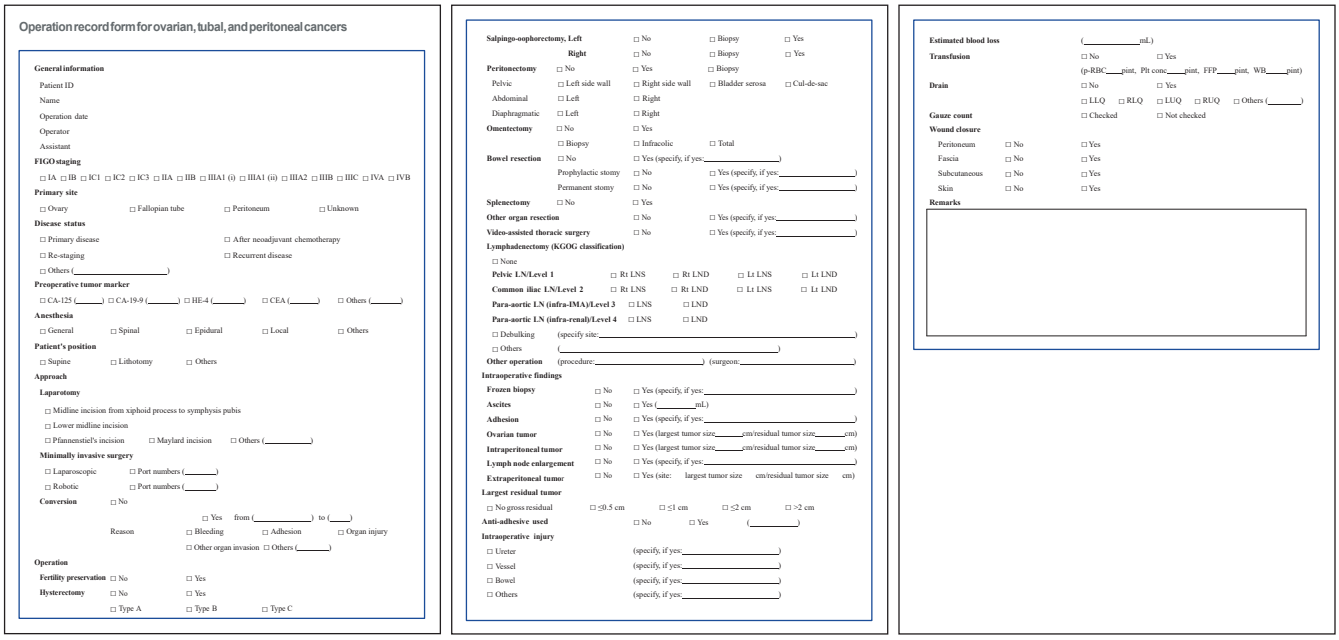
In the debulking surgery for the advanced stage disease, multidisciplinary surgical teams including gynecologic oncologic surgeons, colorectal surgeons, hepatobiliary surgeons, and even thoracic surgeons usually perform a lot of surgical procedures to minimize residual lesion and these surgical procedures should be described systematically and properly in the operation record. ORF for ovarian tubal and peritoneal cancers has been established on the basis of the Synoptic Operative Template for Ovarian Cancer of National Cancer Center of Korea. Standardized ORF may encourage to record all required information and surgical procedures and can save time. In the clinical trial setting, by looking at ORF, investigators can identify all procedures. ORF includes the following information (**Fig. 1, Supplementary Fig. 1**).

TUMOR BURDEN INDEX

To estimate perioperative tumor burden, Korean Gynecologic Oncology Group (KGOG) developed TBI by modifying the peritoneal carcinomatosis index of Korean National Cancer Center. The peritoneal cavity is divided into nine well defined regions (**Fig. 2, Supplementary Fig. 2**). Investigators should describe pre- and post-operative largest tumor diameter, operative finding, operation name in each region, and the largest residual tumor at the end of the operation.

Table 2. The methods for the prevention of thromboembolic events [25-29]

Class	Example
Pharmacologic	Unfractionated heparin, low-molecular weight heparin, fondaparinux, warfarin, dextran
Mechanical	External pneumatic compression, elastic stocking
Behavioral	Short preoperative hospitalization, early postoperative mobilization, feet elevation above heart level



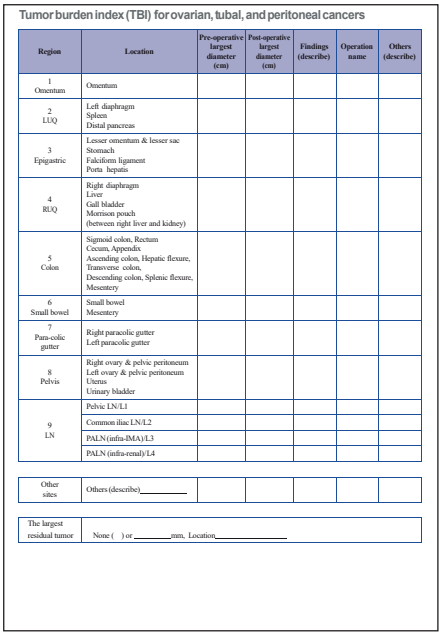
Operation record form for ovarian, tubal, and peritoneal cancers

General information
Patient ID
Name
Operation date
Operator
Assistant
FIGO staging
□ IA □ IB □ IC1 □ IC2 □ IC3 □ IIA □ IIB □ IIIA1 (i) □ IIIA1 (ii) □ IIIA2 □ IIIB □ IIIC □ IVA □ IVB
Primary site
□ Ovary □ Fallopian tube □ Peritoneum □ Unknown
Disease status
□ Primary disease □ After neoadjuvant chemotherapy
□ Re-staging □ Recurrent disease
□ Others (_____)
Preoperative tumor marker
□ CA-125 (_____) □ CA-19-9 (_____) □ HE-4 (_____) □ CEA (_____) □ Others (_____)
Anesthesia
□ General □ Spinal □ Epidural □ Local □ Others
Patient's position
□ Supine □ Lithotomy □ Others
Approach
Laparotomy
□ Midline incision from xiphoid process to symphysis pubis
□ Lower midline incision
□ Pfannenstiel's incision □ Maylard incision □ Others (_____)
Minimally invasive surgery
□ Laparoscopic □ Port numbers (_____)
□ Robotic □ Port numbers (_____)
Conversion □ No
□ Yes from (_____) to (_____)
Reason □ Bleeding □ Adhesion □ Organ injury
□ Other organ invasion □ Others (_____)
Operation
Fertility preservation □ No □ Yes
Hysterectomy □ No □ Yes
□ Type A □ Type B □ Type C

Salpingo-oophorectomy, Left □ No □ Biopsy □ Yes
Right □ No □ Biopsy □ Yes
Peritonectomy □ No □ Yes □ Biopsy
Pelvic □ Left side wall □ Right side wall □ Bladder serosa □ Cul-de-sac
Abdominal □ Left □ Right
Diaphragmatic □ Left □ Right
Omentectomy □ No □ Yes
□ Biopsy □ Infracolic □ Total
Bowel resection □ No □ Yes (specify, if yes:_____)
Prophylactic stomy □ No □ Yes (specify, if yes:_____)
Permanent stomy □ No □ Yes (specify, if yes:_____)
Splenectomy □ No □ Yes
Other organ resection □ No □ Yes (specify, if yes:_____)
Video-assisted thoracic surgery □ No □ Yes (specify, if yes:_____)
Lymphadenectomy (KGOG classification)
□ None
Pelvic LN/Level 1 □ Rt LNS □ Rt LND □ Lt LNS □ Lt LND
Common iliac LN/Level 2 □ Rt LNS □ Rt LND □ Lt LNS □ Lt LND
Para-aortic LN (infra-IMA)/Level 3 □ LNS □ LND
Para-aortic LN (infra-renal)/Level 4 □ LNS □ LND
□ Debulking (specify site:_____)
□ Others (_____)
Other operation (procedure:_____) (surgeon:_____)
Intraoperative findings
Frozen biopsy □ No □ Yes (specify, if yes:_____)
Ascites □ No □ Yes (_____mL)
Adhesion □ No □ Yes (specify, if yes:_____)
Ovarian tumor □ No □ Yes (largest tumor size_____cm/residual tumor size_____cm)
Intraperitoneal tumor □ No □ Yes (largest tumor size_____cm/residual tumor size_____cm)
Lymph node enlargement □ No □ Yes (specify, if yes:_____)
Extraperitoneal tumor □ No □ Yes (site: largest tumor size cm/residual tumor size cm)
Largest residual tumor
□ No gross residual □ ≤0.5 cm □ ≤1 cm □ ≤2 cm □ >2 cm
Anti-adhesive used □ No □ Yes (_____)
Intraoperative injury
□ Ureter (specify, if yes:_____)
□ Vessel (specify, if yes:_____)
□ Bowel (specify, if yes:_____)
□ Others (specify, if yes:_____)

Estimated blood loss (_____mL)
Transfusion □ No □ Yes
(p-RBC____pint, Plt conc____pint, FFP____pint, WB____pint)
Drain □ No □ Yes
□ LLQ □ RLQ □ LUQ □ RUQ □ Others (_____)
Gauze count □ Checked □ Not checked
Wound closure
Peritoneum □ No □ Yes
Fascia □ No □ Yes
Subcutaneous □ No □ Yes
Skin □ No □ Yes
Remarks

Fig. 1. Operation record form for ovarian, tubal, and peritoneal cancers. CA-125, cancer antigen 125; CA-19-9, cancer antigen 19-9; CEA, carcinoembryonic antigen; FFP, fresh frozen plasma; FIGO, International Federation of Gynecology and Obstetrics; HE-4, human epididymis protein 4; KGOG, Korean Gynecologic Oncology Group; LN, lymph node; LND, lymph node dissection; LNS, lymph node sampling; LLQ, left lower quadrant; Lt, left; LUQ, left upper quadrant; Plt conc, platelet concentration; p-RBC, packed red blood cells; RLQ, right lower quadrant; Rt, right; RUQ, right upper quadrant; WB, whole blood.



Tumor burden index (TBI) for ovarian, tubal, and peritoneal cancers

Region	Location	Pre-operative largest diameter (cm)	Post-operative largest diameter (cm)	Findings (describe)	Operation name	Others (describe)
1 Omentum	Omentum					
2 LUQ	Left diaphragm Spleen Distal pancreas					
3 Epigastric	Lesser omentum & lesser sac Stomach Falciform ligament Porta hepatis					
4 RUQ	Right diaphragm Liver Gall bladder Morrison pouch (between right liver and kidney)					
5 Colon	Sigmoid colon, Rectum Cecum, Appendix Ascending colon, Hepatic flexure, Transverse colon, Descending colon, Splenic flexure, Mesentery					
6 Small bowel	Small bowel Mesentery					
7 Para-colic gutter	Right paracolic gutter Left paracolic gutter					
8 Pelvis	Right ovary & pelvic peritoneum Left ovary & pelvic peritoneum Uterus Urinary bladder					
9 LN	Pelvic LN/L1					
	Common iliac LN/L2					
	PALN(infra-IMA)/L3					
	PALN (infra-renal)/L4					
Other sites	Others (describe)_____					
The largest residual tumor	None ( ) or _____mm, Location_____					

Fig. 2. Korean Gynecologic Oncology Group tumor burden index (TBI) for ovarian, tubal, and peritoneal cancers. IMA, inferior mesenteric artery; LN, lymph node; LUQ, left upper quadrant; PALN, paraaortic lymph node; RUQ, right upper quadrant.

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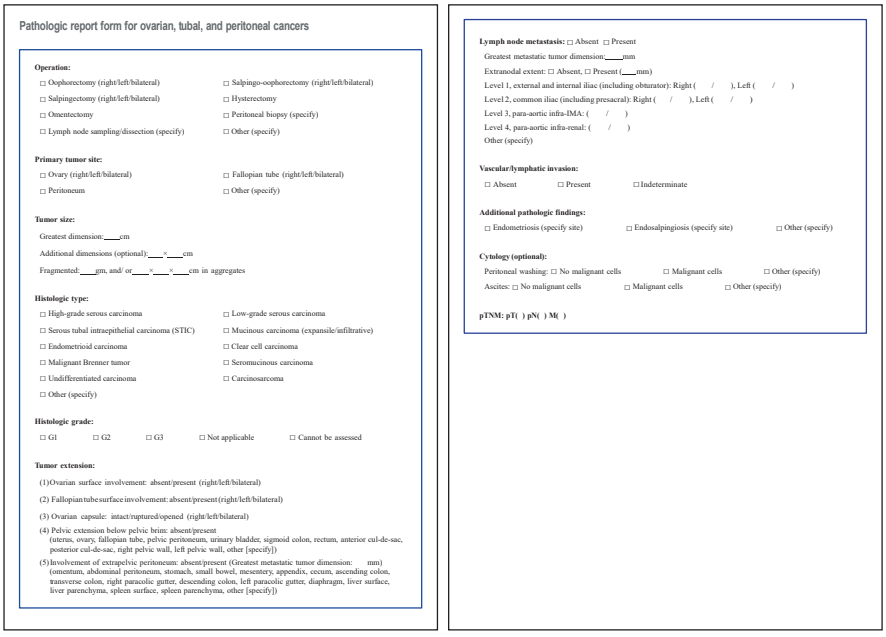
PATHOLOGIC REPORT FORM

Surgery Treatment Modality Committee of KGOG collected and analyzed several ovarian cancer PRFs from committee members' hospitals and decided that PRF should be made with Gynecologic Pathology Study Group. There were in-depth discussions with the Gynecologic Pathology Study Group about how to develop the PRF for ovarian, tubal and peritoneal cancer. PRF includes the following information (**Fig. 3, Supplementary Fig. 3**).


Pathologic report form for ovarian, tubal, and peritoneal cancers

Operation:

□ Oophorectomy (right/left/bilateral) □ Salpingo-oophorectomy (right/left/bilateral)
□ Salpingectomy (right/left/bilateral) □ Hysterectomy
□ Omentectomy □ Peritoneal biopsy (specify)
□ Lymph node sampling/dissection (specify) □ Other (specify)

Primary tumor site:

□ Ovary (right/left/bilateral) □ Fallopian tube (right/left/bilateral)
□ Peritoneum □ Other (specify)

Tumor size:

Greatest dimension: ____cm
Additional dimensions (optional): ____×____cm
Fragmented: ____gm, and/ or ____×____×____cm in aggregates

Histologic type:

□ High-grade serous carcinoma □ Low-grade serous carcinoma
□ Serous tubal intraepithelial carcinoma (STIC) □ Mucinous carcinoma (expansile/infiltrative)
□ Endometrioid carcinoma □ Clear cell carcinoma
□ Malignant Brenner tumor □ Seromucinous carcinoma
□ Undifferentiated carcinoma □ Carcinosarcoma
□ Other (specify)

Histologic grade:

□ G1 □ G2 □ G3 □ Not applicable □ Cannot be assessed

Tumor extension:

(1) Ovarian surface involvement: absent/present (right/left/bilateral)
(2) Fallopian tube surface involvement: absent/present (right/left/bilateral)
(3) Ovarian capsule: intact/ruptured/opened (right/left/bilateral)
(4) Pelvic extension below pelvic brim: absent/present
(uterus, ovary, fallopian tube, pelvic peritoneum, urinary bladder, sigmoid colon, rectum, anterior cul-de-sac, posterior cul-de-sac, right pelvic wall, left pelvic wall, other [specify])
(5) Involvement of extrapelvic peritoneum: absent/present (Greatest metastatic tumor dimension: mm)
(omentum, abdominal peritoneum, stomach, small bowel, mesentery, appendix, cecum, ascending colon, transverse colon, right paracolic gutter, descending colon, left paracolic gutter, diaphragm, liver surface, liver parenchyma, spleen surface, spleen parenchyma, other [specify])

Lymph node metastasis: □ Absent □ Present
Greatest metastatic tumor dimension: ____mm
Extranodal extent: □ Absent, □ Present (____mm)
Level 1, external and internal iliac (including obturator): Right (/), Left (/)
Level 2, common iliac (including presacral): Right (/), Left (/)
Level 3, para-aortic infra-IMA: (/)
Level 4, para-aortic infra-renal: (/)
Other (specify)

Vascular/lymphatic invasion:

□ Absent □ Present □ Indeterminate

Additional pathologic findings:

□ Endometriosis (specify site) □ Endosalpingiosis (specify site) □ Other (specify)

Cytology (optional):

Peritoneal washing: □ No malignant cells □ Malignant cells □ Other (specify)
Ascites: □ No malignant cells □ Malignant cells □ Other (specify)

pTNM: pT( ) pN( ) M( )

Fig. 3. Pathologic report form for ovarian, tubal, and peritoneal cancers. pTNM, pathological tumor node metastasis.

SUPPLEMENTARY MATERIALS

Supplementary Fig. 1

Operation record form for ovarian, tubal, and peritoneal cancers

Click here to view

Supplementary Fig. 2

Tumor burden index (TBI) for ovarian, tubal, and peritoneal cancers

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Supplementary Fig. 3

Pathologic report form for ovarian, tubal, and peritoneal cancers

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