

Intraoperative Evaluation of a Hysterectomy for Ovarian Tumors

WHAT TO REPORT INTRAOPERATIVELY

The following variables should be noted and reported in every case, when applicable, because of their ability to predict outcome and guide the type of surgery. The evaluation of ovaries can be very challenging because of the wide spectrum of primary ovarian tumors and the unusual propensity of ovaries to harbor metastatic carcinomas (especially from the GI tract, lung, and breast – beware!). This also makes it difficult to generate general guidelines for frozen section reporting.

Pathology is usually asked to evaluate an adnexal mass for suspected carcinoma. Other times, we receive a more complex specimen (hysterectomy with bilateral adnexa). And sometimes, we just receive a peritoneal/pelvic implant (e.g. omentum). Masses in pediatric or young adult women are much less common. Therefore, the discussion below focuses on primary ovarian carcinomas and borderline tumors since these are the tumors we encounter most often.

- ***Histotype** – primary epithelial, sex cord-stromal, and germ cell tumors; metastases
- ***Grade** – benign/borderline/malignant; histotype of carcinomas
- ***Capsule status** (stage IA vs. IC)
- **Laterality** (stage IA vs. IB)
- **Pelvic involvement** (stage II) – uterine serosa, fallopian tubes, pelvic sidewall
- **Abdominal/extra-pelvic involvement** (stage III) – omentum
- **Presence of concurrent endometrial tumor**

Indicate whether the reported variables are based on microscopic or gross evaluation.

Most intraoperative evaluations will only deal with histotype, grade, and capsule status of an adnexal mass, since the surgeon usually knows the other variables from their operative findings. If the contralateral ovary, pelvis, or abdomen are part of the sample and may have tumor, freeze the sample(s) that will provide the highest possible stage.

EPITHELIAL LESION CATEGORIES

Most commonly encountered frozen sections that fall into 3 main categories.

- **Benign** – simple cysts or complex cysts with bland lining, usually serous or mucinous
 - o No staging
- **Borderline** – usually serous or mucinous
 - o Extent of staging depends on histotype (serous more likely to be advanced stage)
- **Malignant/carcinoma** – either primary or metastasis (see below)
 - o Full staging, port placement for IP chemo if HGSC

OVARIAN CARCINOMA HISTOTYPES

5 major histotypes: High-grade serous carcinoma (HGSC, 70%), endometrioid and clear cell CA (each 10-25%), low-grade serous carcinoma (LGSC, 5%), mucinous CA (<5%)

Specify histotype because of staging and other immediate surgical implications.

HGSC: port placement for intraperitoneal (IP) chemotherapy. Usually stage III with bilateral ovarian involvement (bad cancer). Papillary/micropapillary, slit-like glands, solid, transitional patterns. G2-G3 nuclei. High mitotic activity (>12/10 HPF), often atypical mitotic figures.

Endometrioid carcinoma (EC) and clear cell carcinomas (CCC): Commonly discussed together because of similar risk factors (endometriosis) and genetics. Usually unilateral (stage IA). EC looks like its endometrial counterpart (glandular, solid, often squamous differentiation. CCC has papillary, tubulocystic, solid patterns, hobnail growth, hyalinized pink stroma, cytoplasmic hyaline globules.) High incidence of concurrent endometrial carcinoma, so **open the uterus!**

LGSC: Hierarchical branching of serous borderline tumor precursor, destructive stromal invasion, broad expanses of papillary and micropapillary buds, cribriform growth, often abundant psammoma bodies (not specific but helpful). G1-G2 nuclei. Low mitotic activity (<12/10 HPF), normal mitotic figures.

Mucinous CA: CAN REPRESENT METASTASES. Gross features can help.

- **Favoring primary:** larger (>10-13 cm), unilateral, smooth capsule, multiloculated cut surface
- **Favoring metastasis:** smaller (<10-13 cm), bilateral, tumor on capsule, lobular cut surface, signet ring cells, extensive destructive stromal invasion

Two patterns of stromal invasion define mucinous carcinoma (vs. mucinous borderline tumor)

- Expansile (confluent) invasion
 - o Complex glands with minimal intervening stroma, circumscribed periphery
 - o ~4x field (variable size criteria: 3 mm, 5 mm, 10 cm²)
- Destructive stromal invasion / infiltrative invasion
 - o Looks like it sounds (infiltrative pattern, desmoplasia), worse prognosis
 - o Also observed in metastases to the ovary

BORDERLINE TUMORS

Serous borderline tumor (SBT): Hierarchical, tree-like, arborizing, multilevel (>3) branching. Stubby, less complex branching (1-2 branches of the tree) = serous cystadenofibroma. More likely than other borderline tumors to have extraovarian disease – staging implications.

Mucinous borderline tumor (MBT): Cytological atypia and architectural complexity (vs. mucinous cystadenoma). Usually intestinal type (endocervical type much less common).

Endometrioid borderline tumor (EMBT): Looks like EIN/complex atypical hyperplasia (crowded endometrioid glands).

Clear cell borderline tumor (CCBT): Very rare as pure tumor, usually coexists with clear cell carcinoma

GERM CELL TUMORS

Age helps – usually young women/teens, though yolk sac tumor can occur in older age group

Usually dysgerminoma (similar to seminoma), yolk sac tumor, embryonal carcinoma.

Ovarian choriocarcinoma is very rare. Sufficient to tell surgeon “germ cell tumor, favor X.”

GYN Oncologists will usually take lymph nodes regardless of which type. Pediatric surgeons tend to be more conservative. Mixed germ cell tumours (dysgerminoma + X) tend to be more aggressive, so they will be more extensive in their sampling.

SEX CORD-STROMAL TUMORS

Most common benign = **fibroma/fibrothecoma**

- White or white/yellow, firm, whorled, sometimes gritty/calcified
- Bland spindle cells (fibroma), occasional plump spindle cells (theca-like)

Most common malignant/LMP = **adult granulosa cell tumor (AGCT)**

- Microfollicular, corded, diffuse/solid, insular/nested, other patterns (often combined)
- Intermediate grade, monomorphic, coffee bean nuclei (nuclear grooves) typical
- Surgical implication – staging performed

CAPSULE STATUS: intact vs. disrupted, smooth vs. tumor on surface.

Our main role is to determine whether there is *tumor on the surface* (stage IC2, freeze to confirm if this would be the most advanced stage of the tumor).

For capsules received disrupted in pathology, we must know when it happened. This is not important for us to know for intraoperative evaluation (the surgeon knows what happened) but it is a common clinical issue attendings have to chase down to stage the patient.

- **intraop** rupture into the surgical field (surgical spill, stage IC1)
- **preop** rupture (stage IC2)
- **deflated by surgeon**, e.g. in a capture bag or *ex vivo* (staged as capsule intact).

Therefore, if you receive a tumor with a disrupted capsule, **record** the size of the disruption, **ask the surgeon** when the disruption happened, **and record the source** on the frozen section grossing sheet and in the gross description. Sample gross descriptions include:

“The tumor capsule was received disrupted prior to receipt in Pathology. According to Dr. X, the tumor was removed intact, and the tumor capsule was incised on the counter after removal from the patient.” (inconsequential)

Or “...the tumor was decompressed in the Endocatch bag without spillage.” (inconsequential)

Or “...the tumor capsule was disrupted during removal from the patient.” (stage IC1)

Or “...tumor spillage was noted upon entering the abdomen.” (stage IC2)

CONCURRENT ENDOMETRIAL TUMOR – often endometrioid carcinoma

Up to half of **ovarian endometrioid carcinomas** have a concurrent *endometrial* counterpart. **Adult granulosa cell tumor (AGCT)** sometimes presents with bleeding from a low grade endometrial endometrioid carcinoma by virtue of the ability of AGCT to express aromatase and synthesize estradiol.