Ovarian Mucinous Tumors: Borderline or Malignant? Primary or Metastatic?
Mucinous Borderline Ovarian Tumors: Major diagnostic issues

- Frozen section diagnosis of mucinous tumors
- Endocervical-like vs intestinal type
- Significance of and criteria for intraepithelial carcinoma
- Clinicopathologic features of primary ovarian mucinous carcinomas
- Distinction of mucinous borderline tumors from metastatic mucinous carcinoma
Mucinous Borderline Tumors

- % BLTs: ~35-40% (U.S.)
  ~70% (Japan)
- >95% - Stage 1
Examination MBTs

Examine every locule

2 section/cm tumor diameter:
  Solid areas
  Papillae
Frozen Sections of Mucinous Tumors

- Don’t over diagnose benign as borderline or borderline as carcinoma, esp. in a young woman
- Warn surgeon more extensive sampling may reveal a more malignant tumor
- Rule out metastatic carcinoma
Mucinous Carcinomas-Simple Rules for Distinguishing Primary from Metastatic Tumors Intraoperatively

J. Seidman

**Metastatic**
- Bilateral
- Unilateral <10cm diameter

**Primary**
- Unilateral ≥10 cm diameter

Correctly classified >90% of tumors

*Stewart et al IJGP 10/05. Khunamornpong et al Gyn Oncol 4/06*
Classification of Borderline Mucinous Tumors

- Endocervical-like (5-20%)  
- Intestinal type (80-95%)
Endocervical-like Mucinous Borderline Tumors

Age: Mean 20-39 years
Symptoms: Asymptomatic mass
          Abdominal pain
### Endocervical-like Mucinous Borderline Tumors

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Bilateral</td>
<td>20-40%</td>
</tr>
<tr>
<td>Stage I</td>
<td>77-100%</td>
</tr>
<tr>
<td>Stage II+</td>
<td>0-33%</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>30%</td>
</tr>
<tr>
<td>Endosalpingiosis</td>
<td>35%</td>
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Endocervical-like Mucinous Borderline Tumors

Survival: 100%
## Contrasting Clinicopathologic Features

### EMBTs vs IMBTs

<table>
<thead>
<tr>
<th>Feature</th>
<th>EMBTs</th>
<th>IMBTs</th>
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</thead>
<tbody>
<tr>
<td>Bilaterality</td>
<td>40%</td>
<td>6%</td>
</tr>
<tr>
<td>&lt;3 locules</td>
<td>80%</td>
<td>28%</td>
</tr>
<tr>
<td>Papillae</td>
<td>87%</td>
<td>17%</td>
</tr>
<tr>
<td>Acute infl, stroma</td>
<td>100%</td>
<td>22%</td>
</tr>
<tr>
<td>Endometriosis, ipsil ov</td>
<td>20%</td>
<td>0</td>
</tr>
<tr>
<td>Impl or LN mets</td>
<td>20%</td>
<td>0</td>
</tr>
<tr>
<td>Pseudomyx perit</td>
<td>0</td>
<td>17%</td>
</tr>
<tr>
<td>Death, tumor</td>
<td>0</td>
<td>14%</td>
</tr>
</tbody>
</table>
Endocervical-like Mucinous Borderline Tumors

Summary

– The term “seromucinous” is synonymous with the endocervical/Mullerian type of mucinous borderline tumor.

– Distinctive and differ from the GI type; in many ways are similar to serous borderline tumors.

– Data are limited but overwhelming benign behavior observed so far
Endocervical-like Mucinous Borderline Tumors (Shappell, Dube)

- **Intraepithelial carcinoma**
  - Confluent cribriform surface proliferation
  - Micropapillary architecture
  - Marked cytologic atypia
    - Nuclei >3x stromal nuclei
    - Hyperchromatic or vesicular
    - Coarsely clumped chromatin and prominent nucleoli
Endocervical-like Mucinous Borderline Tumors (Shappell, Dube)

Intraepithelial carcinoma

Mean age: 35 years
Bilateral: 20%
Stage I: 80%
Stage II+: 20%
Survival: 100% (Stage I)
Endocervical-like Mucinous Borderline Tumors (Shappell, Dube)

*With stromal microinvasion*

≤ 5mm in any focus

2 patterns:

- Confluent glandular pattern
- Small clusters and individual eosinophilic cells in stroma
Endocervical-like Mucinous Borderline Tumors (Shappell, Dube)

With stromal microinvasion

Mean age: 44 years
Bilateral: 25%
Stage I: 100%
Survival: 100%
Endocervical-like Mucinous BLTs (Shappell and Kurman)

- Since all had ciliated cells-rename seromucinous
- Neither intraepithelial carcinoma as defined, nor stromal microinvasion (<5 mm) had an adverse impact on outcome
Intestinal Type Mucinous Borderline Tumors

• Age: Fourth and fifth decade
• Symptoms: Asymptomatic mass
  Abdominal pain
• Stage I: 100%
Intestinal Type Mucinous
Gross Pathology

Frequently > 3 locules
Papillae – 15%

Bilateral < 10%
Intestinal Type Mucinous Borderline Tumors

- Stage I: 100%
- Survival: 100%
Intestinal-type Mucinous Tumors of the Ovary

Do features of excessive cell proliferation or intraepithelial carcinoma:

- Cell stratification
- Marked atypia
- Cribriform nests

Confer a worse prognosis in the absence of stromal invasion?
# Intestinal Mucinous Tumors

**Stage 1- Survival %**

<table>
<thead>
<tr>
<th>Author</th>
<th>IMBT</th>
<th>NIMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lee</td>
<td>100</td>
<td>97</td>
</tr>
<tr>
<td>Hoerl</td>
<td>NA</td>
<td>100</td>
</tr>
<tr>
<td>Riopel</td>
<td>100</td>
<td>100</td>
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</tbody>
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*intraepithelial carcinoma, marker of possible invasion, perform more extensive sampling*
Mucinous Borderline Tumors: Conclusions

The most important criteria for the diagnosis of intraepithelial carcinoma:
- the presence of severe cytologic atypia.
- association with an increased frequency of stromal invasion.

Mucinous borderline tumors of gastrointestinal type, when well sampled and when metastatic tumors have been excluded, virtually always have a benign follow-up.
Pseudomyxoma Peritonei Syndrome
Pseudomyxoma Peritonei Syndrome

- Mucinous ascites involving the peritoneal surfaces and associated with fibrosis
- Women more frequent than men (55%- 45%)
- Seen in women with ovarian tumors, women without ovarian tumors and men
Pseudomyxoma Peritonei Syndrome

- Dissecting mucin & mucinous epithelium with fibrosis
- Usually originates in appendix
- Almost never due to ovarian tumor
- Associated ovarian tumors generally are secondary to PMP
Pseudomyxoma Peritonei
Ovarian Tumors Associated with Pseudomyxoma Peritonei and Appendiceal Tumor

- Survival based on the degree of differentiation of the mucinous epithelium

Benign or borderline or well differentiated epithelium - indolent course
- peritoneal adenomucinosis (Johns Hopkins)
- low grade mucinous neoplasm (MGH)
- carcinoma peritonei, low grade (WSNC)

Malignant epithelium - aggressive course
- peritoneal mucinous carcinomatosis
- mucinous adenocarcinoma
- carcinoma peritonei, high grade
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Pseudomyxoma Peritonei: Conclusions

Ovarian tumors associated with pseudomyxoma peritonei are almost always derived from carcinomas of the gastrointestinal tract, usually the appendix.

Survival is based on the degree of differentiation of the epithelium.
Primary Ovarian Mucinous Carcinoma

Does this entity exist?
Primary Ovarian Mucinous Carcinoma

Rare: <3% of Ov Cas

Age: 47-50 yrs

S/S: Pelvic mass
Primary Ovarian Mucinous Carcinoma

Bilateral: ≤21% of cases

Micro: Large areas of invasion
Coexisting benign +/or BL mucinous tumor
Primary Ovarian Mucinous Carcinoma

Two patterns of invasion
Expansile
Infiltrative
MUCINOUS CARCINOMA
Types of Stromal Invasion

1. **Expansile**: orderly pattern of glands lined by high-grade epithelium with little or no intervening stroma > 3 to 5 mm in maximal dimension

2. **Infiltrative** ("destructive"): irregular glands, cords or small nests usually in a reactive stroma
Primary Ovarian Mucinous Carcinoma

Survival

Two patterns of invasion - Survival
- Expansile - 100%
- Infiltrative - Poor prognosis