SPECIAL REVIEW SERIES: Up-to-date basic science of epithelial ovarian cancer

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Histological classification of ovarian cancer

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Abstract The histology of ovarian tumors exhibits a wide variety of histological features. The histological classification of ovarian tumors by the World Health Organization (WHO) is based on histogenetic principles, and this classification categorizes ovarian tumors with regard to their derivation from coelomic surface epithelial cells, germ cells, and mesenchyme (the stroma and the sex cord). Epithelial ovarian tumors, which are the majority of malignant ovarian tumors, are further grouped into histological types as follows: serous, mucinous, endometrioid, clear cell, transitional cell tumors (Brenner tumors), carcinosarcoma, mixed epithelial tumor, undifferentiated carcinoma, and others. Clear cell and endometrioid carcinomas are highly associated with endometriosis. In stage distribution, serous carcinoma is found predominantly in stage III or IV. In contrast, clear cell and endometrioid carcinomas tend to remain confined to the ovary. Clear cell and endometrioid carcinomas may be unique histological types compared with serous carcinomas with respect to stage distribution and association with endometriosis.

Key words Ovarian cancer · Histological classification · Surgical stage · Clear cell carcinoma · Endometriosis

Introduction

Ovarian tumors display histological heterogeneity. The histological classification of ovarian tumors by the World Health Organization (WHO) is based on the histogenesis of the normal ovary. The histogenetic classification categorizes ovarian neoplasms with regard to their derivation from coelomic surface epithelium, germ cells, and mesenchyme (the stroma and the sex cord).

The majority of malignant ovarian tumors are epithelial. They can be further grouped into histological types as follows: serous, mucinous, endometrioid, clear cell, transitional cell tumors (Brenner tumors), mixed epithelial tumor, and others. In this review, we describe the histological features of the various types and discuss the stage distribution of each type and the relation between endometriosis and the histological types of epithelial tumors.

Epithelial tumors

Tumors of surface epithelial origin constitute about two-thirds of all ovarian neoplasms and an even greater proportion of ovarian malignant neoplasms. They occur predominantly in adults, with the malignant forms generally appearing later in life. Epithelial tumors are classified according to the predominant pattern of differentiation of the tumor cells (Table 1).

Serous tumors

Serous neoplasms are the most common neoplasms. Macroscopically, serous cystadenoma is often a unilocular cyst, with a smooth surface and filled with serous fluid, and sometimes consists of multilocular cysts. Adenofibroma is a predominantly solid fibrous tumor.

A serous borderline tumor is frequently large and bilateral, with areas of cystic and papillary growth. A tumor is often present on the external surface. A serous borderline tumor rarely has solid areas or foci of hemorrhage and necrosis. Serous carcinoma is usually large and is often bilateral. It exhibits a mixture of cystic, papillary, and solid growth...
Table 1. World Health Organization histological classification of ovarian tumors: surface epithelial-stromal tumors

1. Serous tumors
   (1) Benign
   1. Cystadenoma and papillary cystadenoma
   2. Surface papilloma
   3. Adenofibroma and cystadenofibroma
   (2) Of borderline malignancy (of low malignant potential)
   1. Cystic tumor and papillary cystic tumor
   2. Surface papillary tumor
   3. Adenofibroma and cystadenofibroma
   (3) Malignant
   1. Adenocarcinoma, papillary adenocarcinoma, and papillary cystadenocarcinoma
   2. Surface papillary adenocarcinoma
   3. Adenocarcinofibroma and cystadenocarcinofibroma (malignant adenofibroma and cystadenofibroma)

2. Mucinous tumors, endocervical-like and intestinal types
   (1) Benign
   1. Cystadenoma
   2. Adenofibroma and cystadenofibroma
   (2) Of borderline malignancy (of low malignant potential)
   1. Cystic tumor
   2. Adenofibroma and cystadenofibroma
   (3) Malignant
   1. Adenocarcinoma and cystadenocarcinoma
   2. Adenocarcinofibroma and cystadenocarcinofibroma (malignant adenofibroma and cystadenofibroma)

3. Endometrioid tumors
   (1) Benign
   1. Cystadenoma
   2. Cystadenoma with squamous differentiation
   3. Adenofibroma and cystadenofibroma
   4. Adenofibroma and cystadenofibroma with squamous differentiation
   (2) Of borderline malignancy (of low malignant potential)
   1. Cystic tumor
   2. Cystic tumor with squamous differentiation
   3. Adenofibroma and cystadenofibroma
   4. Adenofibroma and cystadenofibroma with squamous differentiation
   (3) Malignant
   1. Adenocarcinoma and cystadenocarcinoma
   2. Adenocarcinoma and cystadenocarcinoma with squamous differentiation
   3. Adenocarcinofibroma and cystadenocarcinofibroma (malignant adenofibroma and cystadenofibroma
   4. Adenocarcinofibroma and cystadenocarcinofibroma with squamous differentiation (malignant adenofibroma and cystadenofibroma
   with squamous differentiation)
   (4) Epithelial-stromal and stromal
   1. Adenosarcoma, homologous and heterologous
   2. Mesodermal (mullerian) mixed tumor (carcinosarcoma), homologous and heterologous
   3. Stromal sarcoma

4. Clear cell tumors
   (1) Benign
   1. Cystadenoma
   2. Adenofibroma and cystadenofibroma
   (2) Of borderline malignancy (of low malignant potential)
   1. Cystic tumor
   2. Adenofibroma and cystadenofibroma
   (3) Malignant
   1. Adenocarcinoma
   2. Adenocarcinofibroma and cystadenocarcinofibroma (malignant adenofibroma and cystadenofibroma)

5. Transitional cell tumors
   (1) Brenner tumor
   (2) Brenner tumor of borderline malignancy (proliferating)
   (3) Malignant Brenner tumor
   (4) Transitional cell carcinoma (non-Brenner type)

6. Squamous cell tumors
7. Mixed epithelial tumors (specific types)
   (1) Benign
   (2) Of borderline malignancy (of low malignant potential)
   (3) Malignancy

8. Undifferentiated carcinoma