جامعة الملك سعود
King Saud University

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Summary file

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Pathology

Ovarian Cysts and Tumors

439

Revised & Approved

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" اللهم لا سهل الا ماجعلته سهلا و انت تجعل الحزن إذا شئت سهلا "

Objective

01 The pathology of the major types of ovarian cysts: follicular and luteal

02 The classification and pathology of common ovarian tumors including surface epithelial, germ cell, stromal and metastatic neoplasms

Overview

Lecture content

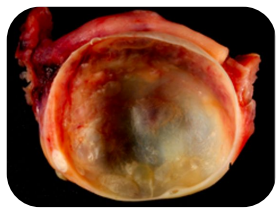
- Non-neoplastic ovarian cysts
  - Follicular cyst
  - Corpus luteum cyst
  - Theca lutein cyst or hyperreactio luteinalis
  - Chocolate4 cyst or Endometriotic cyst
- Epithelial tumors
  - Serous
  - Mucinous
  - Endometrioid
  - brunner
- Germ cell tumor “Oocyte”
  - Teratoma
  - Dysgerminoma
  - Yolk sac tumor
  - Embryonal Carcinoma
  - Choriocarcinoma
- Sex cord- Stromal cells
  - Thecoma & fibroma
  - Granulosa
  - sertoli-leydig
- Metastasis

Ovarian Cysts & Tumors

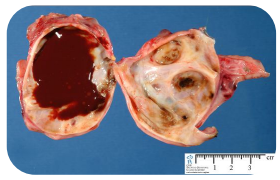
- Non neoplastic cysts are common but they are not serious problems.
- Inflammation of ovaries is rare. It is usually associated with salpingitis of fallopian tubes (salpingo-oophoritis: inflammation of a fallopian tube and an ovary)
- Frequently, the ovaries are affected by **endometriosis** (the presence of endometrial tissue outside the endomyometrium)
- The most important medical problems in ovaries are the neoplasms.
- Death from ovarian cancers is more common than that of cervix and uterus together because ovarian tumors grow silently and are usually diagnosed late, which make them so dangerous.

Non-Neoplastic Cysts of ovary

- **More common than neoplastic** and usually cause no problems.
- Rarely can rupture and cause acute pain and intra abdominal hemorrhage.



Follicular cyst	Arise **from the ovarian follicles** due to distension of **unruptured Graafian follicle.**
Corpus luteum cyst	Results from **hemorrhage** into a persistent **mature corpus luteum.**
Theca lutein cyst or hyperreactio luteinalis	• Thin walled cysts lined by **luteinized theca cells.** • Associated with high levels of circulating gonadotropins[1] (e.g. **pregnancy**, hydatidiform mole[2], etc).
Chocolate[4] cyst or Endometriotic cyst	• Ovary is the most frequent site of endometriosis. • **Chocolate cyst is a blood filled** (thick brown fluid) cyst of the ovary **due to endometriosis** with hemorrhage.



(female slides)

Polycystic ovarian syndrome (PCOS)

(formerly called Stein-Leventhal syndrome) is a complex endocrine disorder

Characteristics	Characterized by hyperandrogenism, menstrual abnormalities, polycystic ovaries, chronic anovulation, and decreased fertility.
Classic presentation	It usually comes to attention after menarche in teenage girls or young adults who present with oligomenorrhea, hirsutism, infertility, and sometimes with obesity.
Morphology	❖ Gross: • The ovaries are usually twice the normal size, graywhite with a smooth outer cortex, and studded with subcortical cysts 0.5 to 1.5 cm in diameter. ❖ Microscopic: • Thickened, fibrotic ovarian capsule overlying innumerable cystic follicles lined by granulosa cells with a hyperplastic luteinized theca interna. • There is a conspicuous absence of corpora lutea in the ovary because patients with PCOS have chronic anovulation (there's no ovulation, thus the corpus luteum is not formed.

1. Especially progesterone since it causes luteinization.
2. Growth of an abnormal fertilized egg or an overgrowth of tissue from the placenta causes uterus enlargement.
3. The first occurrence of menstruation.
4. PCOS is not diagnosed by histology.

Ovarian Tumors

- One of the leading cause of cancer death in women
- Ovarian cancers grow silently and go undetected in the early stage when it is still curable.
- Most of the patients already have metastasis at the time of diagnosis.
- The WHO Histological Classification for ovarian tumors divides ovarian neoplasms into **primary & metastatic (secondary).**

Primary tumors There are three main primary types of ovarian tumors based on the origin of the tumor cell. They are:	
Surface epithelial ovarian tumors (65%)	Derived from the cells on the surface of the ovary. This is the **most common** form of primary ovarian cancer and occurs in **adults (+20 years))** .
Germ cell tumors (15%)	Derived from the from the ovarian follicles. This occurs mainly in **children, teens and young women**. They are less common as compared to epithelial ovarian tumors.
Sex cord stromal tumors (10%)	Derived from the ovarian stroma. Uncommon and this class of tumors often produces steroid hormones
Metastatic/Secondary tumors (5%)	
Cancers from other organs can also spread to the ovaries	

Simplified classification of primary ovarian tumors:

Surface epithelial tumors (most common type of ovarian tumor)
Serous tumors: small columnar to cuboidal epithelial cell , prominent nuclei (hyperchromatic) , bilateral
- Benign (cystadenoma) most common , cyst filled with watery fluid - Borderline tumors (serous borderline tumor). - Malignant (serous adenocarcinoma).
Mucinous tumors: columnar epithelial cell with clear cytoplasm , unilateral
- Benign (cystadenoma) , cyst filled with mucus - Borderline tumors (mucinous borderline tumor). - Malignant (mucinous adenocarcinoma).
Endometrioid tumors:
- Benign (cystadenoma). - Borderline tumors (endometrioid borderline tumor). - Malignant (endometrioid adenocarcinoma).
Clear cell tumors: (large epithelial cell with clear cytoplasm)
- Benign - Borderline tumors - Malignant (clear cell adenocarcinoma)
Transitional cell tumors: (resembles bladder epithelium)
- Brenner tumor - Brenner tumor of borderline malignancy - Malignant Brenner tumor. - Transitional cell carcinoma (non-Brenner type).
Others

Sex cord stromal tumors
Almost always Benign: - Fibromas/ Fibrothecomas /Thecomas.
With Malignant Potential: - Granulosa cell tumors. - Sertoli-Leydig cell tumors.
Others

Germ cell tumors
Teratoma:
- Immature (malignant) or - Mature (benign) • Solid • Cystic (dermoid cyst) - Monodermal (e.g., struma ovarii, carcinoid).
Dysgerminoma
Yolk sac tumor (endodermal sinus tumor)
Choriocarcinoma most aggressive type of germ cell tumors
Embryonal carcinoma
Mixed germ cell tumors

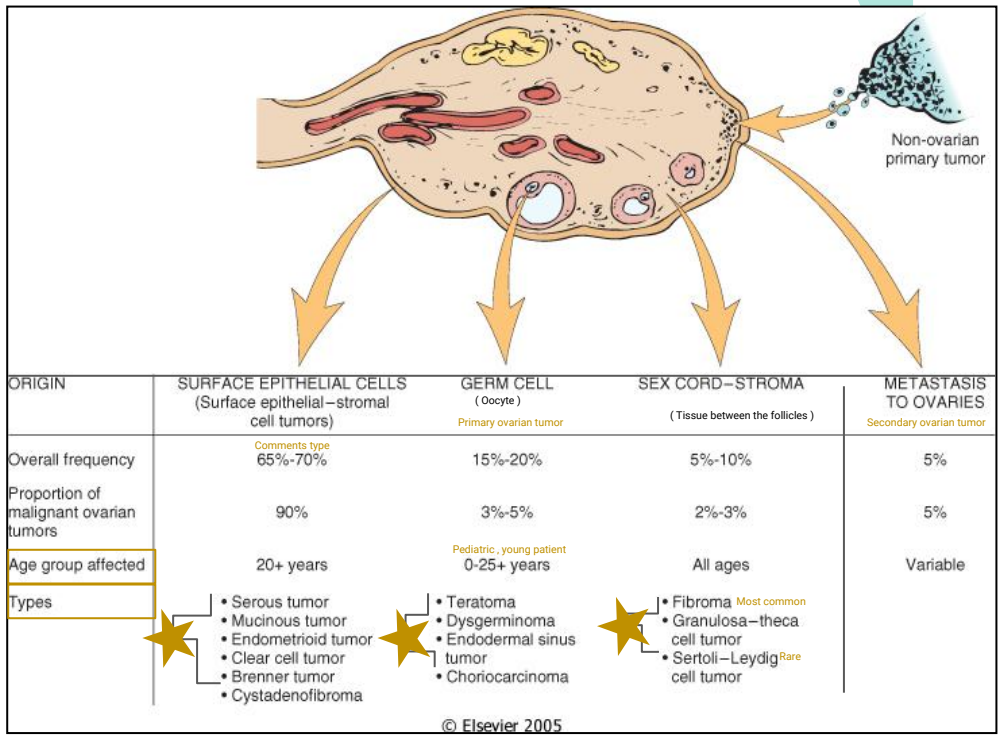
Female Dr: You should know the type of tumor and its subtypes

Ovarian Tumors

Male Dr: memorize it very well

Extra :

- Surface: "My Sister Began Experiencing Cancer":
  - -Mucinous
  - -Serous
  - -Brenner
  - -Endometrioid
  - -Clear
- Germ cell: "Doctor Examined The Ovaries":
  - -Dysgerminoma
  - -Endometrial sinus
  - -Teratoma
  - -Ovarian choriocarcinoma
- Sex cord: "She Felt Grim":
  - -Sertoli-Leydig
  - -Fibroma
  - -Granulosa-theca



Surface Epithelial Ovarian Tumors

- Neoplasms derived from the **cells on the surface of the ovary.**
- Account for **majority of all primary ovarian tumors**:
- **65–70%** of overall tumors.
- **90%** of primary ovarian cancer.
- Occurs in **adults >20**

Pathogenesis:

- The majority of ovarian tumors arise from the fallopian tube or epithelial cysts in the cortex of the ovary.
- Studies have shown that many of the tumors thought to arise from the coelomic epithelium that covers the surface of the ovary are now thought to arise from the fimbriated end of the fallopian tube.
- The epithelium lining the cortical cysts may be derived from displaced ovarian surface epithelium or the lining of fallopian tube. These can become metaplastic or undergo neoplastic transformation to give rise to a number of different epithelial tumors.

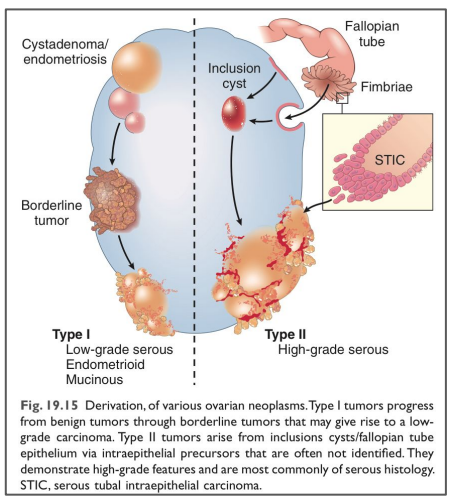


Fig. 19.15 Derivation, of various ovarian neoplasms. Type I tumors progress from benign tumors through borderline tumors that may give rise to a low-grade carcinoma. Type II tumors arise from inclusions cysts/fallopian tube epithelium via intraepithelial precursors that are often not identified. They demonstrate high-grade features and are most commonly of serous histology. STIC, serous tubal intraepithelial carcinoma.

Risk factors:

- Nulliparity, family history, and germline mutations in certain tumor suppressor genes.
- Of interest, prolonged use of oral contraceptives reduces the risk.
- Around 5% to 10% of ovarian cancers are **familial** and associated with Around 5% to 10% of ovarian cancers are familial, and most of these are associated with mutations in the **BRCA1** or **BRCA2** tumor suppressor genes. mutations in BRCA1 and BRCA2 also are associated with hereditary breast cancer.
- The average lifetime risk for ovarian cancer is approximately 30% in BRCA1 carriers; the risk in BRCA2 carriers is somewhat lower.

Surface Epithelial Ovarian Tumors

- The subtypes of the surface epithelial tumors are:
  - Serous Tumors
  - Mucinous Tumors
  - Endometrioid Tumors
  - Clear cell Tumors
  - Transitional/Brenner cell Tumors
  - Others
- All surface epithelial tumors are further divided into:

  1. **Benign:** They do not spread and invade other tissues. (no metastasis)
  2. **Malignant:** are carcinomas and have potential to **metastasize** beyond the ovary.
  3. **Borderline**/ intermediate/ tumors of low malignant potential: this is a gray zone. intermediate between benign and malignant They are 'semi-malignant'. These appear to be low grade cancers with limited invasive potential. They have **better prognosis** than malignant. These tumors may seed or implant into the peritoneum.

Serous tumors

Characteristics

- Serous ovarian tumors are the most common type ovarian tumor, they are also the most common group of epithelial tumors, and they make up the greatest fraction of malignant ovarian tumors.
- Usually cystic filled with clear serous fluid and **often bilateral.**
- Psammoma bodies are commonly seen.
- Benign lesions are usually encountered in patients between 30 and 40 years of age, and malignant serous tumors are more commonly seen between 45 and 65 years of age.
- Treatment: surgery alone is enough

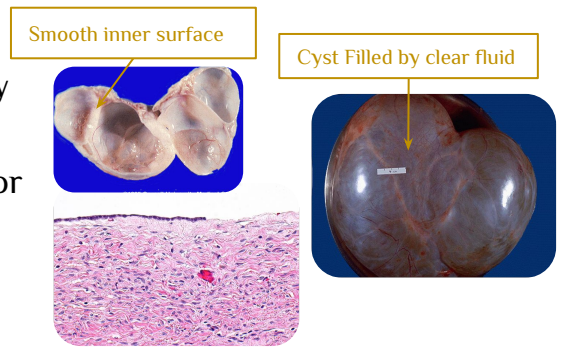
Morphology: gross (female slides)

- Most serous tumors are large, spherical to ovoid, cystic structures up to 30 to 40 cm in diameter.
- About 25% of the benign tumors are bilateral.
- In the **benign tumors**, the serosal covering is **smooth and glistening**. By contrast, the surface of **adenocarcinomas** often has **nodular irregularities** representing areas in which the tumor has **invaded** the serosa.
- On cut section, small cystic tumors may have a single cavity, but larger ones frequently are divided by multiple septa into multiloculated masses. The cystic spaces usually are filled with a clear serous fluid. Protruding into the cystic cavities are papillary projections, which are more prominent in malignant tumors

The tumors are subdivided into

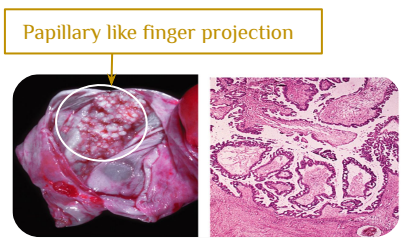
1. Benign serous tumors (serous cystadenomas) (60%):

- Gross: are commonly large, cystic and thin-walled, and unilocular. They are **lined by serous cells and contain thin, clear yellow fluid.**
- Microscopic: single layer of columnar epithelial cells that line the cyst or cysts. The cells often are ciliated (like the epithelium of fallopian tube). Psammoma bodies: classified body (concentrically laminated calcified concretions) are common.



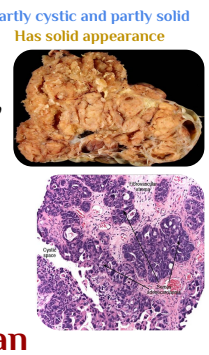
2. Borderline serous tumors (15%):

- Gross: cystic with thin wall and smooth surface, but often have multiple **papillary excrescences** (grape-like clusters) finger like projection, protruding into the lumen in places.
- Microscopic: borderline tumors, which exhibit cytologic atypia and typically no stromal invasion. so it not malignancy



3. Malignant serous tumors (serous cystadenocarcinoma) (25%):

- Is the commonest malignant ovarian tumor, forming about a third of all cancers of the ovary.
- Gross: The tumors are partly cystic and partly solid with prominent excrescences (projections), often with **necrosis** and **hemorrhage**.
- These tumors usually present with ascites due to abdominal metastases.
- Treatment: surgery, chemotherapy and radiotherapy. Prognosis; poor.
- In high-grade carcinoma the cells are markedly atypical, the papillary formations are usually complex and multilayered, and by definition nests or sheets of malignant cells **invade the ovarian stroma.**



Types and gene associations	❖ There are two types of serous carcinomas, low-grade and high-grade. The former arise from benign or borderline lesions and progress slowly in a stepwise manner to become invasive carcinoma. ❖ These **low-grade** tumors are associated with mutations in genes encoding signaling proteins, such as **KRAS**, a member of the RAS gene family. ❖ The **high-grade** serous tumors develop rapidly. many of these high-grade lesions arise in the **fimbriated end of the fallopian tube** via serous tubal intraepithelial carcinoma, rather than ovarian coelomic epithelium. ❖ **TP53** mutations in **high-grade** serous cancers, being present in over 95% of cases. ❖ Other frequently mutated genes include the tumor suppressors NF1 and RB, as well as BRCA1 and BRCA2 in familial ovarian cancers.
Prognosis	❖ In general, malignant serous tumors spread throughout the peritoneal cavity and to regional lymph nodes, including periaortic lymph nodes; distant lymphatic and hematogenous metastases are infrequent. ❖ The prognosis for patients with high-grade serous carcinoma is poor, even after surgery and chemotherapy, and depends heavily on the stage of the disease at diagnosis..

Mucinous tumors

Characteristics	❖ Mucinous tumors form about 25% of all ovarian neoplasms. The tumor cells are **mucin-producing cells** (which are either endocervical type or intestinal type cells). ❖ Less likely to be malignant ❖ 80% are benign ❖ 10% are borderline ❖ 10% malignant ❖ Bilaterality is uncommon. **Usually unilateral** ❖ Mucinous tumors can be very large. ❖ They are typically cystic and multilocular and filled with thick sticky, viscous mucoid fluid.
Morphology (female slides)	❖ Mucin-producing epithelial cells line the cyst ❖ Malignant tumors are characterized by solid areas of growth, piling up (stratification) of lining cells, cytologic atypia, and stromal invasion. ❖ Compared with serous tumors, **mucinous tumors are much less likely to be bilateral**. This feature is sometimes useful in differentiating mucinous tumors of the ovary from metastatic mucinous adenocarcinoma from a gastrointestinal tract primary (the so-called "Krukenberg tumor"), which more often produces bilateral ovarian masses. So if there's a tumor in one ovary (unilateral) it's less likely to be metastatic. However, if two ovaries (bilateral) are involved by mucinous neoplasm, we have to think about metastasis.

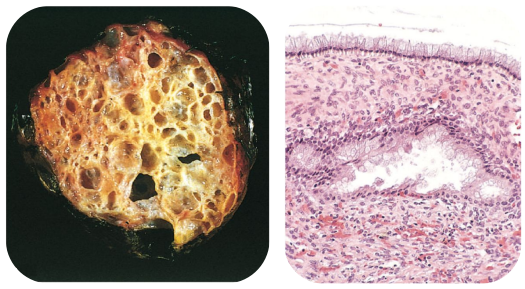


Fig. 19.17 Ovarian mucinous cystadenoma. (A) Mucinous cystadenoma with multicystic appearance and delicate septa. Note the presence of glistening mucin within the cysts. (B) Columnar cell lining of mucinous cystadenoma.

Endometrioid tumors

- They have tubular gland that resemble the endometrium
- Endometrioid tumors form 10 to 20% of all ovarian tumors.
- Most of the endometrioid tumors are **malignant** (carcinomas).
- Some endometrioid tumors are **accompanied** by an endometrial carcinoma in the uterus and / or **endometriosis** in the ovaries

Transitional cell/ brenner tumor

- Tumor cell are transitional cell type resemble the epithelium of urinary bladder.
- Most are benign.

Germ Cell Tumors

- Are Tumors derived from the egg producing cell of the ovaries.
- All Ovarian Germ cell tumors are malignant except for mature teratomas.

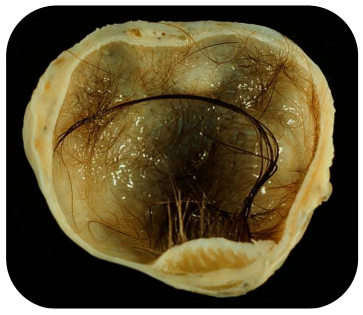
Teratomas

Characteristics

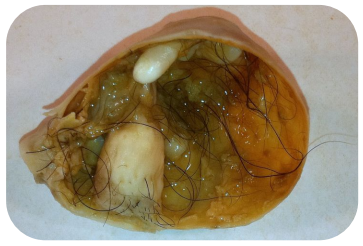
- Teratomas constitute 15% to 20% of ovarian tumors.
- A distressing feature of these germ cell tumors is their predilection to arise in the first 2 decades of life; to make matters worse, the younger the person, the greater the likelihood of malignant behavior.
- More than 90% of these germ cell neoplasms, however, are benign mature cystic teratomas; the immature, malignant variant is rare.

The tumors are subdivided into

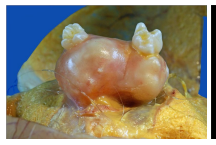
1. Mature cystic teratoma: the most common. They are benign

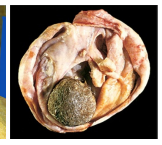


- Is the most common ovarian germ cell tumor and the most common type of ovarian teratoma.
- It is a benign neoplasm that typically occurs during reproductive years derived from all three germ cell layers & composed of **mature elements of the ectoderm, endoderm and mesoderm.**
- About 90% are **unilateral**.
- It is a cystic tumor, filled with sebaceous material and hair and occasionally teeth.
- Usually contain cysts lined by epidermis with adnexal appendages—hence the common designation dermoid cysts.
- On cut section, they often are filled with sebaceous secretion and matted hair that, when removed, reveal a hair-bearing epidermal lining.

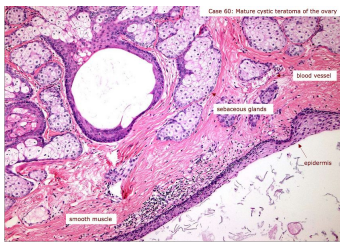


- Sometimes there is a nodular projection from which teeth protrude. Occasionally, foci of bone and cartilage, nests of bronchial or gastrointestinal epithelium, or other tissues are present.

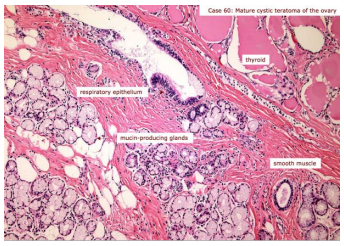




- Histology: skin, hair, sebaceous glands, and mature neural tissue predominate; cartilage, bone, respiratory and intestinal epithelium are common.
- Complications include torsion, rupture, infection etc.
- Most are discovered in young women as ovarian masses or are found incidentally on abdominal radiographs or scans because they contain foci of calcification produced by toothlike structures contained within the tumor.



- For unknown reasons, these neoplasms sometimes produce infertility and are prone to undergo torsion (in 10%–15% of cases), which constitutes an acute surgical emergency. torsion means when the cyst twist over itself leading to interruption of blood supply so the patient usually present with acute abdominal pain & surgical emergency.

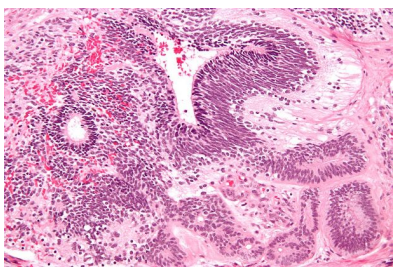


- Malignant transformation, usually to a squamous cell carcinoma, is seen in about 1% of cases.

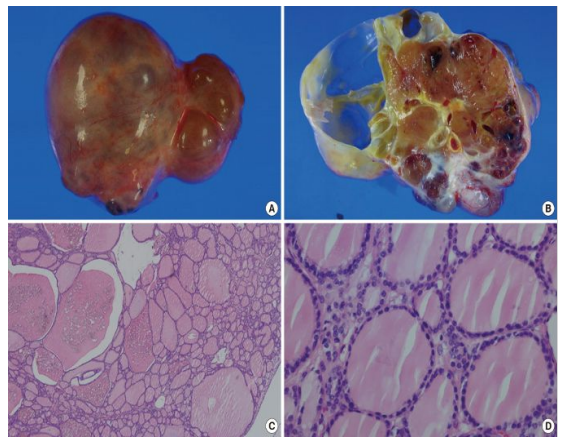
2. Immature teratomas: are malignant & rare.

- Are found early in life, the mean age at clinical detection being 18 years. Occur in children & young adults.
- They typically are unilateral bulky and appear solid on cut section, and they often contain areas of necrosis; uncommonly, cystic foci are present that contain sebaceous secretion, hair, and other features similar to those of mature teratomas.
- On microscopic examination, the distinguishing feature is the presence of immature elements or minimally differentiated cartilage, bone, muscle, nerve, or other tissues.
- Similar to mature teratoma but in addition they contain immature or embryonal tissue especially immature **neuroepithelial cells**.
- As with other tumors, the prognosis depends on grade and stage.

They are graded based on the amount of immature tissue.



The tumors are subdivided into	3. **Monodermal/ Specialized teratoma:** ❖ A rare subtype of teratoma is composed entirely of specialized tissue (one tissue element) ❖ The most common example is **struma ovarii**. which is composed entirely of mature thyroid tissue that may actually produce hyperthyroidism. The thyroid tissue can sometimes become malignant. ❖ These tumors appear as small, solid, unilateral brown ovarian masses. ❖ Other specialized teratomas include ovarian carcinoid, which in rare instances produces carcinoid syndrome.



Dysgerminoma	Endodermal sinus tumor
- Uncommon & malignant. - Occur between 10 to 30 years of age. - Placental-like alkaline phosphatase (**PLAP**) positive. **Morphology:** - **Gross:** unilateral and solid mass. - **Microscopically:** look like its counterpart in testis (Seminoma) and brain (germinoma). - **Highly sensitive to radiation therapy**.	- known as **yolk sac tumor**. - Under 30 years of age. - Can be pure or a component of a mixed germ cell tumor. - Associated with elevated serum **αlpha-fetoprotein** and **αlpha-1-antitrypsin**. - +ve αlpha-fetoprotein immunostain. - **Histopathology**: **Schiller-Duval bodies.** - Radioresistant but responds well to chemotherapy.
Embryonal carcinoma	**Choriocarcinoma**
- Rare, aggressive, highly malignant. - 2nd and 3rd decade (children and young adults). - Similar to that seen in testis, usually a component of a mixed germ cell tumor (GCT). - **CD30** immunostain positive. - **Morphology**: Unilateral, solid, hemorrhagic and necrotic. - Radioresistant but responds to chemotherapy.	- **Rare, aggressive, highly malignant**, metastasizes to the lungs, liver, bone etc. - Similar to that seen in testis, usually a component of a mixed germ cell tumor (GCT). - Elevated serum **beta hCG levels**, +ve HCG immunostain. - **Morphology**: unilateral, solid, hemorrhagic tumor, composed of malignant cytotrophoblast and syncytiotrophoblast. - Radioresistant AND chemoresistant.

Males slides :(

Sex Cord-Stromal tumors

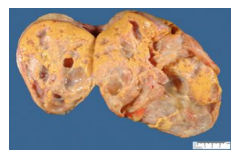
Types:

- ❖ Almost always **Benign**:
  - ➢ Thecoma, Fibroma and Fibrothecoma.
- ❖ Others.
- ❖ With **Malignant** Potential:
  - ➢ Granulosa Cell tumor.
  - ➢ Sertoli-Leydig cell tumor.

Thecoma-Fibroma

Characteristics	❖ Occur at any age. ❖ **Almost always Benign** and unilateral. ❖ They can be pure fibroma, thecoma or mixture of both (fibrothecoma). ❖ **Pure theca cell tumor (thecoma)** produce **estrogen**, while Fibromas do not except when mixed with thecomas. ❖ About 40% cases are **associated with ascites and hydrothorax** and this combination is called as **Meig's Syndrome : (fibroma or fibrothecoma , with ascites and hydrothorax)**
Morphology	❖ Solid tumors (fibroma) ❖ Vary in color from white to yellow (thecoma) ❖ Fibromas are whiter, harder with whorled cut surface

Fibroma benign tumor: (solid surface)



Thecoma that produce estrogen

Granulosa Cell Tumor

- Unilateral, solid and cystic.
- 5 to 25% show malignant behavior.
- **Produce estrogen**
- Can be associated with **endometrial hyperplasia and carcinoma**
- 2 forms: adult & juvenile
  - **The Adult form:** is more common in postmenopausal women & present with abnormal vaginal bleeding
  - **The juvenile form:** first three decades, can present with isosexual precocity

Sertoli-Leydig Cell Tumor

- Rare tumors of low malignant potential.
- All ages.
- Unilateral yellowish solid tumor.
- **Produces androgens** and present with **virilization** in 1/3 of cases (oligomenorrhea, **amenorrhea**, loss of female secondary sex characteristics with hirsutism, clitoromegaly, deepening of voice).

Males slides :(

Metastatic carcinoma in ovary

- Accounts for approximately **5% of ovarian tumors**.
- Older ages, **mostly Bilateral** and **sometimes very large.**
- Primary tumor from **Gastrointestinal tract (Most common), breast and lung.**
- One of the most classic forms of metastatic carcinoma involving the ovaries is **The Krukenberg tumor.**★
  - Composed of **signet ring cells in a fibrous background**
  - The most common sites of **origin is the GIT (stomach, colon and appendix).**

(female slides)

Table 19.4 Salient Features of Ovarian Germ Cell and Sex Cord Neoplasms

Neoplasm	Peak Incidence	Usual Location	Morphologic Features	Behavior
Germ Cell Origin				
Dysgerminoma	Second to third decade of life Occur with gonadal dysgenesis	Unilateral in 80%–90%	Counterpart of testicular seminoma Sheets or cords of large clear cells Stroma may contain lymphocytes and occasional granulomas	All malignant but only one-third metastasize; all radiosensitive; 80% cure rate
★ Choriocarcinoma	First 3 decades of life	Unilateral	Identical to placental tumor Two types of epithelial cells: cytotrophoblast and syncytiotrophoblast	Metastasizes early and widely Primary focus may degenerate, leaving only metastases Resistant to chemotherapy
Sex Cord Tumors				
Granulosa-theca cell	Most postmenopausal, but may occur at any age	Unilateral	Composed of mixture of cuboidal granulosa cells and spindled or plump lipid-laden theca cells Granulosa elements may recapitulate ovarian follicle as Call-Exner bodies	May elaborate large amounts of estrogen Granulosa element may be malignant (5%–25%)
Thecoma-fibroma	Any age	Unilateral	Yellow (lipid-laden) plump thecal cells	Most hormonally inactive About 40% produce ascites and hydrothorax (Meigs syndrome) Rarely malignant
Sertoli-Leydig cell	All ages	Unilateral	Recapitulates development of testis with tubules or cords and plump pink Sertoli cells	Many masculinizing or defeminizing Rarely malignant
Metastases to Ovary				
	Older ages	Mostly bilateral	Anaplastic tumor cells, cords, glands, dispersed through fibrous background Cells may be "signet ring" mucin-secreting	Primaries are gastrointestinal tract (Krukenberg tumors), breast, and lung

Summary

Check the other summary file in the first page

Non-neoplastic ovarian cysts	
Follicular cysts	Due to distension of **unruptured graafian follicle.**
Corpus luteum cyst	Results from hemorrhage into a persistent mature corpus luteum.
Theca lutein cyst or hyperreactio luteinalis	- Thin walled cysts lined by luteinized theca cells. - Associated with high levels of circulating gonadotropins (e.g. **pregnancy**)
Chocolate cyst or Endometriotic cyst	- Due to **endometriosis** in the ovary with hemorrhage.
Polycystic ovarian syndrome	- **Endocrine** disorder characterized by: Hyperandrogenism, menstrual abnormalities, **polycystic** ovaries, chronic anovulation, and decreased fertility.

Neoplastic ovarian tumors			
Surface Epithelial Ovarian Tumors (>20 years)			
Serous tumors	- Most common epithelial ovarian tumor.		
	Low grade: From benign or **borderline** lesions with KRAS mutation. **High grade:** From **fimbriated end of the fallopian tube** via STIC + **TP53** mutation.		
	1- Cystadenoma: Single layer of columnar epithelial with psammoma bodies.	**2- Borderline:** cytologic atypia.	**3- Cystadenocarcinoma:** atypical cells with papillary formations.
Mucinous Tumors	- **Mucin producing** cells within a mucoid filled cysts. - Less likely bilateral.		
Endometrioid Tumors	- Tubular gland that resemble the endometrium, Mostly **malignant**.		
Transitional cell (Brenner Tumor)	- **Benign** transitional cell type.		
Germ cell tumor (0-25 years)			
Mature teratoma	- Most common ovarian germ cell tumor - **Benign** neoplasm of mature ectoderm, endoderm and mesoderm. - Complications: infertility and torsion.		
Immature teratoma	- **Malignant** Immature elements or minimally differentiated cartilage, bone, muscle, nerve, or other tissues.		
Specialized teratoma	- **Struma ovarii**. which is composed entirely of mature **thyroid tissue.**		
Sex cord-stromal tumors: unilateral and occur in any age			
Thecoma & fibroma	**Benign**: Thecoma: produce estrogen, unlike fobroma. Whem both are mixed called **Meig's Syndrome**		
Granulosa cell	5-25% malignant; produce estrogen. **Adult form:** cause bleeding. **Juvenile form:** isosexual precocity associated with endometrial hyperplasia and carcinoma		
Sertoli–Leydig cell tumor	Low malignant potential: produce androgen, therefor cause virilization effect		

MCQs

QUIZ!

01	A 35-year-old woman has had increasing abdominal enlargement for the past 6 months. She states that she feels like she is pregnant, but results of a pregnancy test are negative. On physical examination, there is abdominal distention with a fluid wave. A pelvic ultrasound scan shows bilateral cystic ovarian masses, 10 cm on the right and 7 cm on the left. The masses are surgically removed. On gross examination, the excised masses are unilocular cysts filled with clear fluid, and papillary projections extend into the central lumen of the cyst. Microscopic examination shows that the papillae are covered with atypical cuboidal cells that invade underlying stroma. Psammoma bodies are present. What is the most likely diagnosis?		
A) A- Endometrioid tumor	B) Cystadenocarcinoma	C) Dysgerminoma	D) Metastatic cervical carcinoma
02 | A 54-year-old female has had weight loss accompanied by abdominal enlargement for the past 6 months. She is concerned because there is a family history of ovarian carcinoma. An abdominal ultrasound reveals a 10-cm cystic mass involving the left adnexal region, with scattered 1-cm peritoneal nodules. peritoneal fluid cytology reveals the presence of malignant cells, consistent with a cystadenocarcinoma. Which of the following mutated genes is most likely a factor in the development of this neoplasm?			
A) KRAS	B) BRCA1	C) TP53	D) NF1
03 | A 25 year old female was discovered to have a tumor with high levels of alpha-fetoprotein in the serum. What is most likely the diagnosis?			
A) Dysgerminoma/seminoma	B) Embryonal carcinoma	C) Endodermal sinus tumor	D) Fibrothecoma
04 | 42 year old female was diagnosed with cystic and multilocular and filled with thick sticky viscous mucoid fluid tumor, which type of tumors is that?			
A) Granulosa Cell Tumor	B) Sertoli – Leydig cell tumor	C) Dysgerminoma	D) Mucinous tumor
05 | Which of the following tumors is more common in postmenopausal women?			
A) Granulosa Cell Tumor	B) Fibrothecoma	C) Serous cystadenoma	D)Brenner Tumor
06 | Which of the following tumors progress from fimbriated end of the fallopian tube?			
A) High grade serous tumor	B) Low grade serous tumor	C) Mucinous Tumors	D) The Krukenberg tumor.
07 | A female patient presented to clinic with symptoms of hyperthyroidism, clinical examination reports no goiter. Ultrasound revealed an ovarian mass. What's most likely the diagnosis؟			
A) Mature cystic teratoma	B) Krukenberg tumor	C) Struma ovarii	D) Dysgerminoma
08 | A 19-year-old woman has the sudden onset of abdominal pain. On physical examination, there is pelvic pain on palpation. Her stool is negative for occult blood. The serum and urine pregnancy tests are negative. Transvaginal ultrasound shows no intrauterine gestational sac, and uterus and adnexa are normal in size. Culdocentesis yields a small amount of blood-tinged fluid. Which of the following has most likely led to these findings?			
A) Ectopic pregnancy	B) Endometriosis	C) Follicle cyst	D) Invasive mole

MCQs Answer key	01	02	03	04	05	06	07	08
	B	B	C	D	A	A	C	C

Thank You!

We kept 438 pathology theme in the credits to remind you that this wonderful work was originally done by them

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