

# TESTICULAR PATHOLOGY

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# OBJECTIVES

A. Have a working knowledge of the normal histology of the testis and epididymis.

B. Know the predisposing factors and pathology of epididymitis.

## **Epididymitis and orchitis**

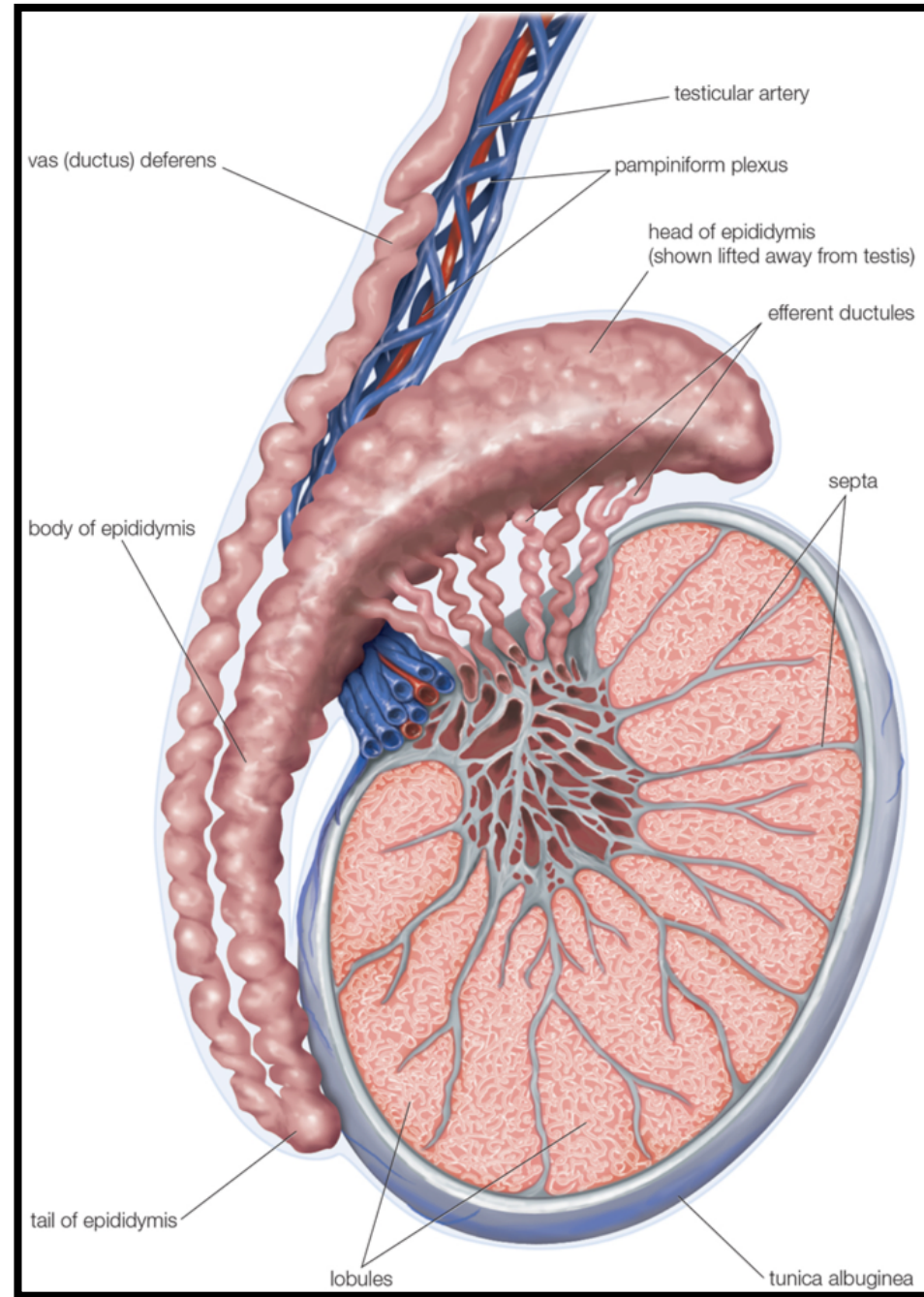
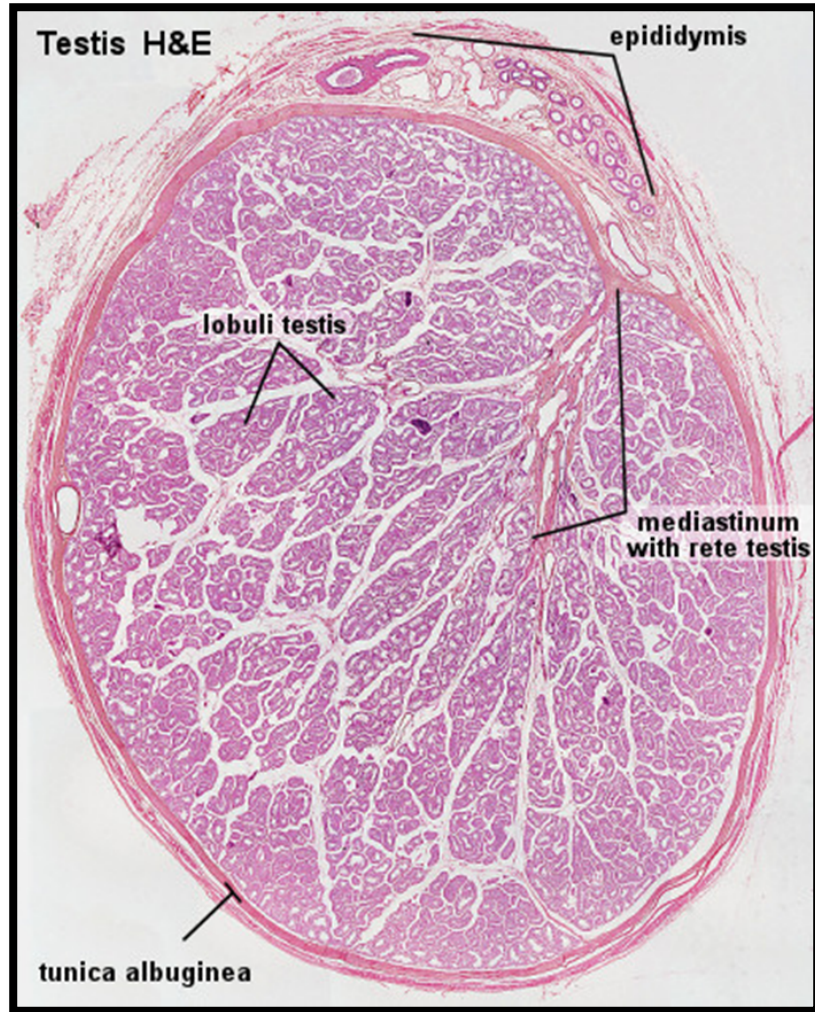
- Non specific epididymitis and orchitis
- Granulomatous/Autoimmune orchitis
- Gonorrhoea
- Tuberculosis

C. Be familiar with the basic classification and pathology of testicular tumors.

## **Testicular tumors**

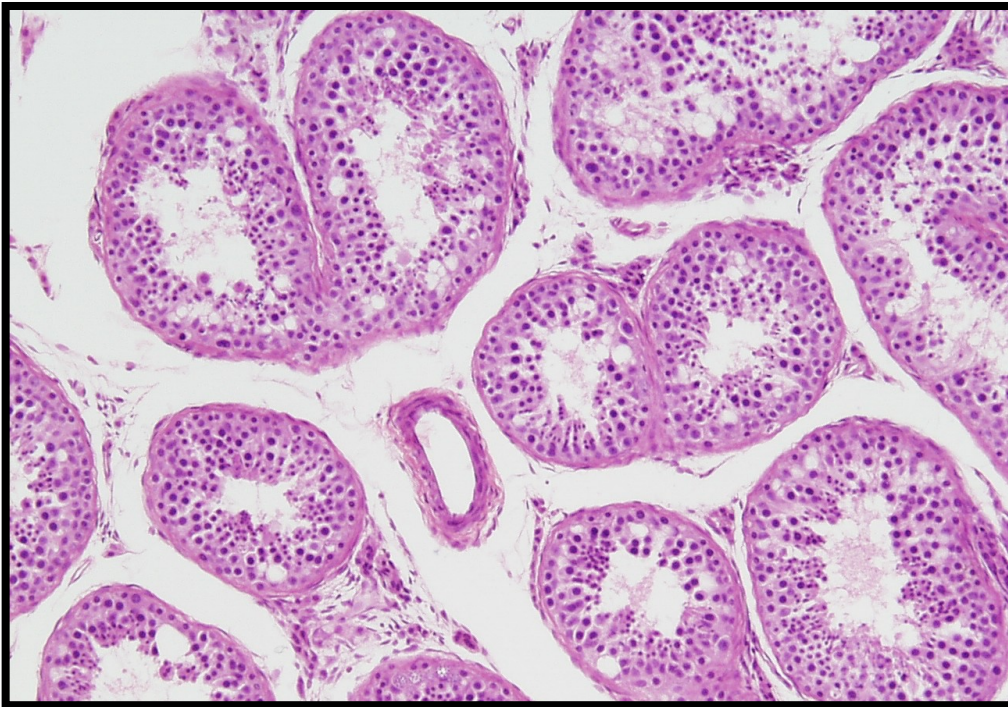
- Seminoma
- Yolk sac tumor
- Embryonal carcinoma
- Teratoma
- Choriocarcinoma

# INTRODUCTION

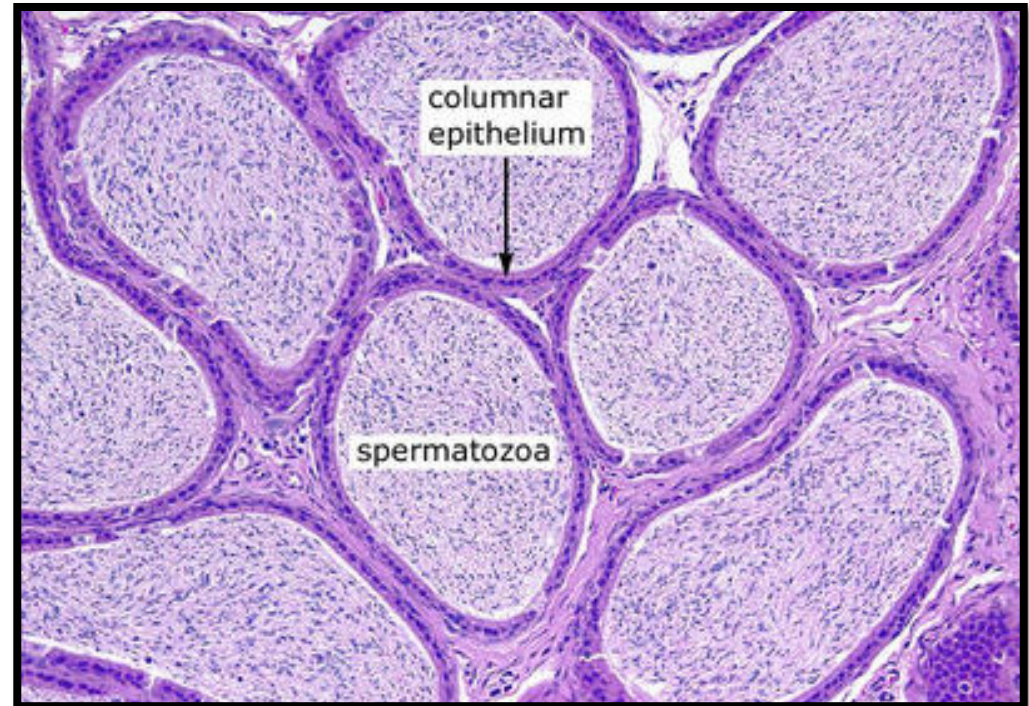


# INTRODUCTION

## Testis



## Epididymis



# EPIDIDYMITIS AND ORCHITIS

- Epididymitis: inflammation of epididymis.
- Orchitis: inflammation of testis.
  
- Inflammatory conditions are generally more common in the epididymis than in the testis.
  
- However, some infections, notably syphilis, may begin in the testis with secondary involvement of the epididymis.

# EPIDIDYMITIS AND ORCHITIS

## **A. Non specific epididymitis and orchitis:**

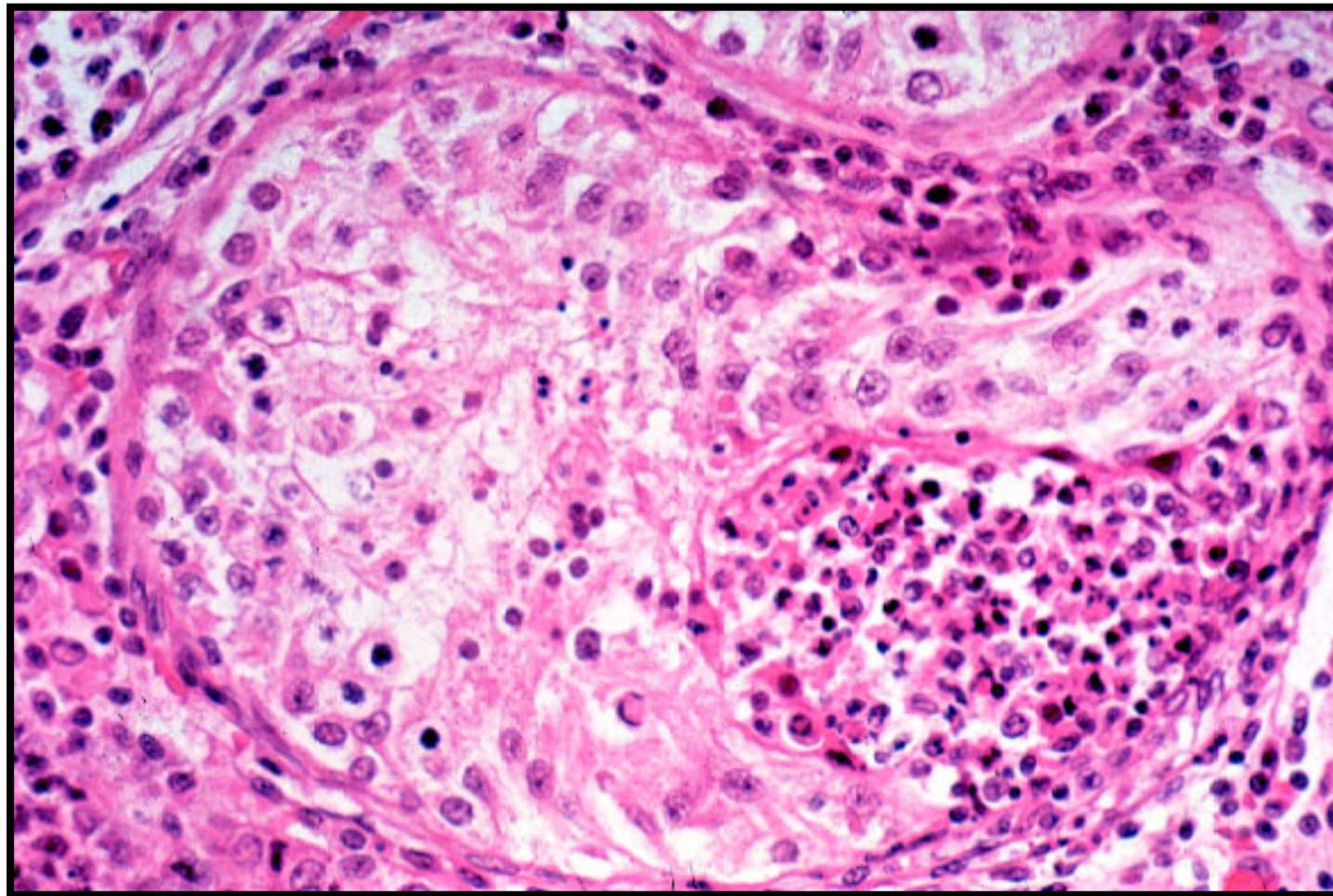
- They are commonly related to infections in the urinary tract (cystitis, urethritis and genitoprostatitis).
- Infections reach the epididymis/testis through the vas deference or the lymphatics of the spermatic cord.
- Causative organisms vary with age:
  - In children: it is uncommon and associated with a congenital genitourinary abnormality and infection with Gram –ve rods.
  - In men younger than 35 years: Chlamydia trachomatis and Neisseria
  - In men older than 35 years: E.Coli and Pseudomonas.

# EPIDIDYMITIS AND ORCHITIS

## A. Non specific epididymitis and orchitis:

- Microscopic findings:
  - Congestion, edema and infiltration by neutrophils, macrophages and lymphocytes.
  - It initially involves the interstitium but later involves the seminiferous tubules.
  - They may progress to a frank abscess.
  - The infections heal by fibrous scarring.
  - Leydig cells are not usually destroyed.

# ORCHITIS





# EPIDIDYMITIS AND ORCHITIS

## **B. Gonorrhea:**

- Gonococcal infection can spread from the urethra to the prostate, the seminal vesicles and then to the epididymis and testis leading to suppurative orchitis and even abscess formation.

## **C. Tuberculosis:**

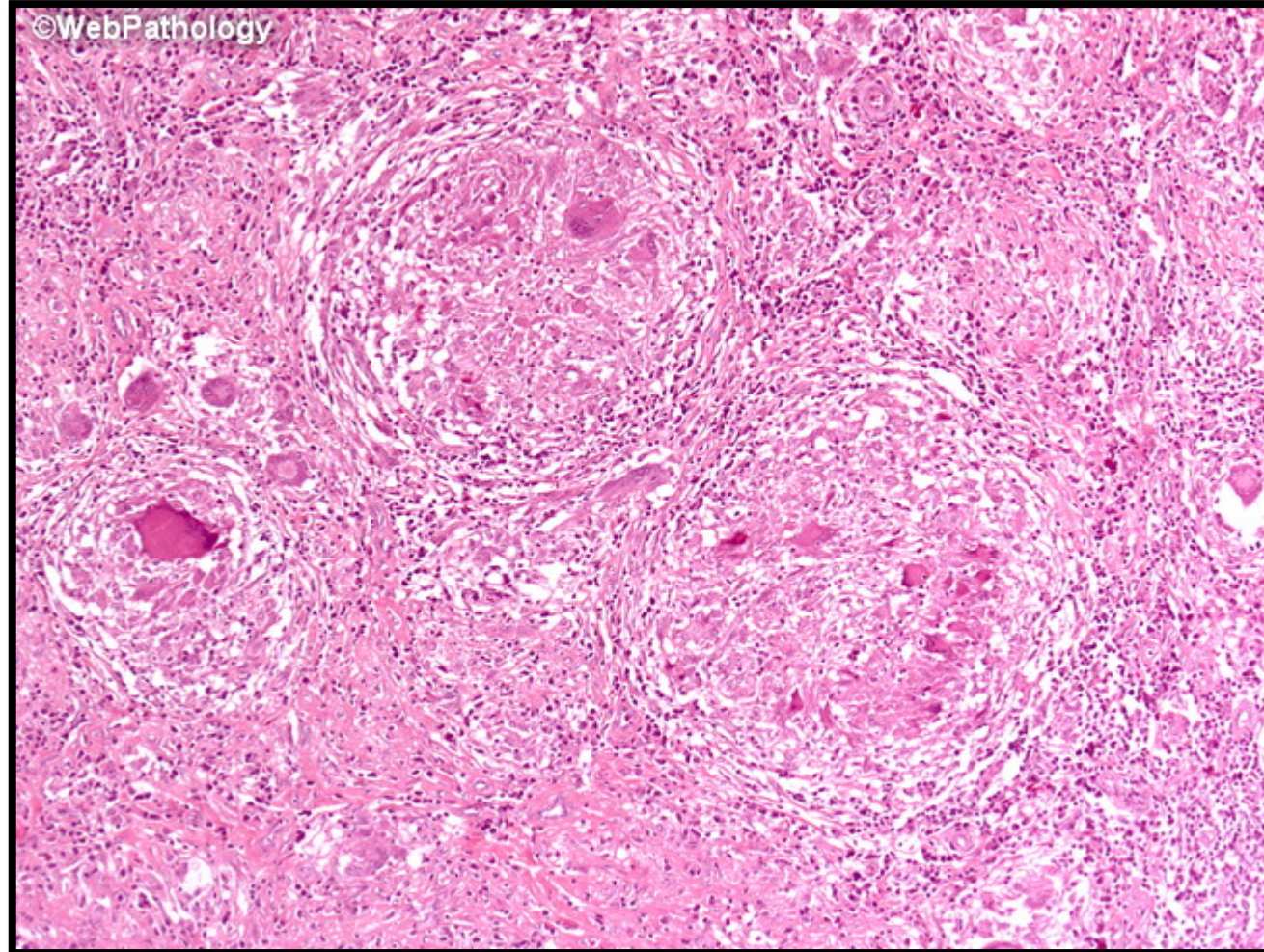
- It begins in the epididymis and spreads to the testis.
- There is usually an associated tuberculous prostatitis and seminal vesiculitis.
- Microscopy: caseating granulomas.

# EPIDIDYMITIS AND ORCHITIS

## **D. Granulomatous (autoimmune) epididymitis & orchitis:**

- It affects middle-aged men and presents with a unilateral testicular mass.
- It mimics a testicular tumor.
- Microscopy: granulomatous inflammation with plasma cells and lymphocytes.
- It may be in response to disintegrated sperms, post-infectious, due to trauma or sarcoidosis.

# GRANULOMATOUS ORCHITIS



# TESTICULAR TUMORS

- Testicular tumors are the most important cause of a firm, painless enlargement of a testis.
- The peak incidence is between the ages of 15 and 34 years.

# CLASSIFICATION OF TESTICULAR TUMORS

Testicular tumors are divided into germ cell tumors and sex cord stromal tumors:

## 1) GERM CELL TUMORS (95% of testicular tumors)

### A. Tumors with one histologic pattern (pure form)

- **Seminomatous germ cell tumors:**
  - Seminoma
  - Spermatocytic tumor (formerly known as spermatocytic seminoma)
- **Non-Seminomatous germ cell tumors (NSGCT):**
  - Embryonal carcinoma
  - Yolk sac (endodermal Sinus) tumor
  - Choriocarcinoma
  - Teratoma: they can be mature, immature or with malignant transformation

### B. Tumors with more than one histologic pattern: mixed germ cell tumor (mixed form)

## 2) SEX CORD STROMAL TUMORS.

- Leydig cell tumor
  - Sertoli cell tumor
- 
- In adults, 95% of testicular tumors are germ cell tumors, and all are malignant.
  - Sertoli or Leydig cells (sex cord/stromal) tumors are uncommon and are usually benign.

# GERM CELL TUMOR

- They occur between 15-34 years of age.
- Most germ cell tumors are highly aggressive cancers, capable of extensive dissemination.
- Germ cell tumors may have
  - a single component
  - or as in 40% of cases a mixture of components e.g. mixtures of seminomatous and non-seminomatous components.
- Most germ cell tumors originate from precursor lesions called intratubular germ cell neoplasia (it is like carcinoma-in-situ).

# GERM CELL TUMOR

- Risk factors:
  - Cryptorchidism: there is a 3 to 5 fold increase in the risk of cancer in the undescended testis and in the contralateral descended testis. About 10% cases of testicular cancer have cryptorchidism.
  - Testicular dysgenesis.
  - Genetic factors.
  - Strong family predisposition: brothers, fathers and sons of testicular cancer patients are at risk.
  - There is a high risk of developing cancer in one testis if the contralateral testis has cancer.
  - Race: testicular tumors are more common in whites than in blacks.

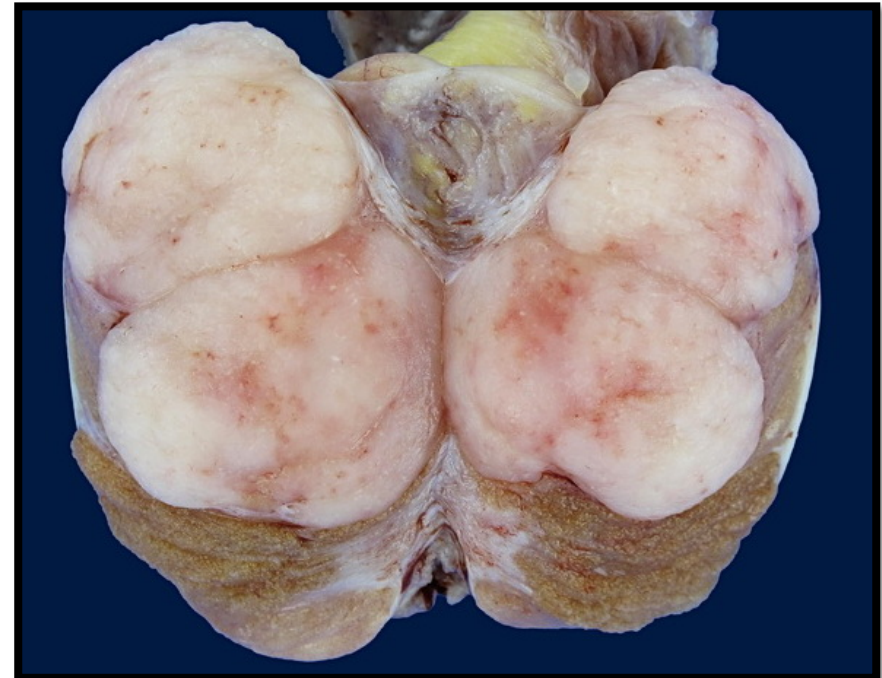
# SEMINOMA

- It is the most common type of testicular tumors.
- It is also the most common type of testicular GCT (50%).
- It almost never occurs in infants.
- The peak incidence is between 40–50 years of age.
- An identical tumor occurs in the ovary (called dysgerminoma).
- Classic seminoma is highly sensitive to radiation therapy, and the overall 5-year survival is 90 to 95%.



# GROSS MORPHOLOGY

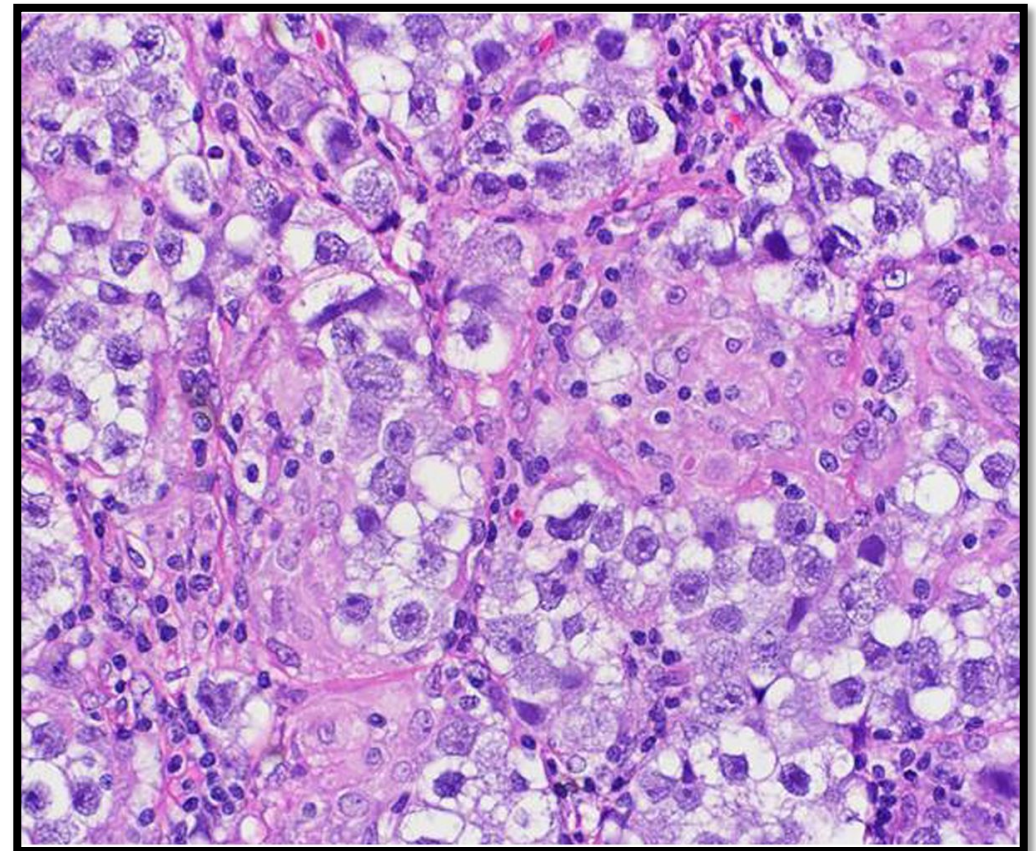
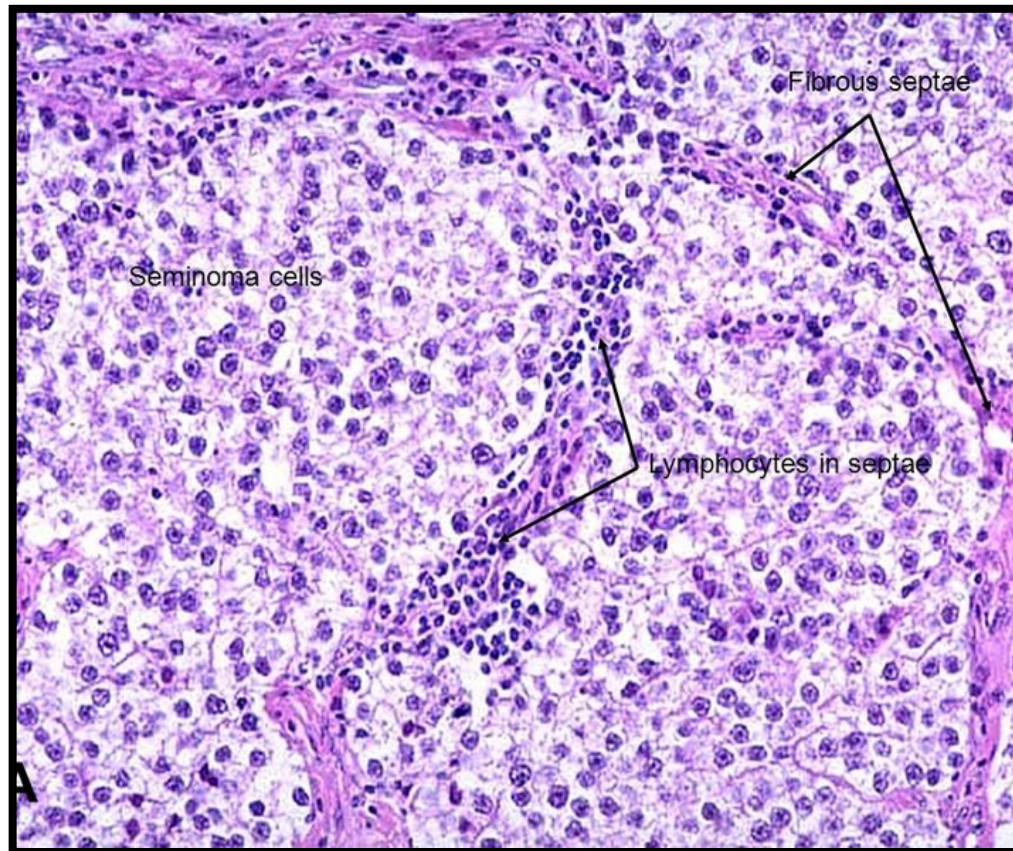
- Bulky masses, sometimes very large
- Homogenous, gray-white, lobulated cut surface
- Large tumors may contain foci of coagulative necrosis, usually without hemorrhage.



# MORPHOLOGIC FEATURES

- Sheets of uniform cells divided into lobules by delicate fibrous septa containing lymphocytes.
- Cells are large and round with large nucleus and prominent nucleoli.
- The cytoplasm of tumor cell contains glycogen.
- Tumor cells are positive for PLAP, OCT4 and c-kit (CD117).

# MORPHOLOGIC FEATURES



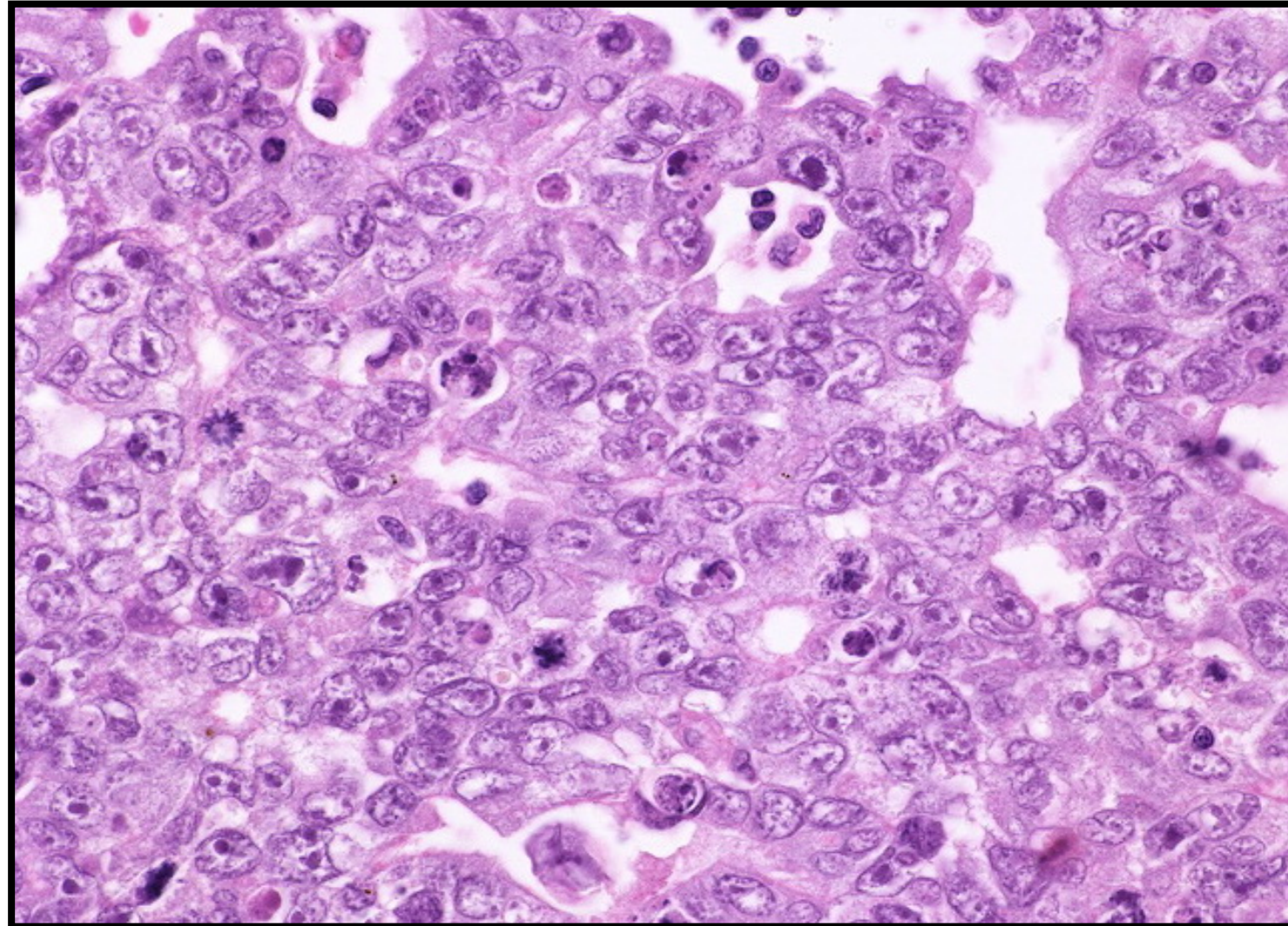
# SPERMATOCYTYC TUMOR

- It was called previously spermatocytic seminoma.
- It is uncommon and accounts for 1-2 % of testicular GCTs
- It affects men over the age of 65 years.
- It is not associated with intratubular germ cell neoplasia.
- It is a slowly growing tumor that does not metastasize.
- The prognosis is excellent.

# EMBRYONAL CARCINOMA

- They account for about 15 to 35% of testicular GCTs.
- The age group: 20 to 30 years.
- They are more aggressive than seminomas.
- They metastasizes early *via* both lymphatic and hematogenous routes.
- They are not radiosensitive but they are chemosensitive. New chemotherapeutic agents are very effective and improved prognosis.
- They are smaller than seminomas and poorly demarcated.
- They have variegated surfaces with foci of necrosis and hemorrhage.
- They can be seen combined with other GCTs (in mixed GCTs).
- Tumor cells are positive for cytokeratin (CK) and CD30 stain.

# EMBRYONAL CARCINOMA



# YOLK SAC TUMOR

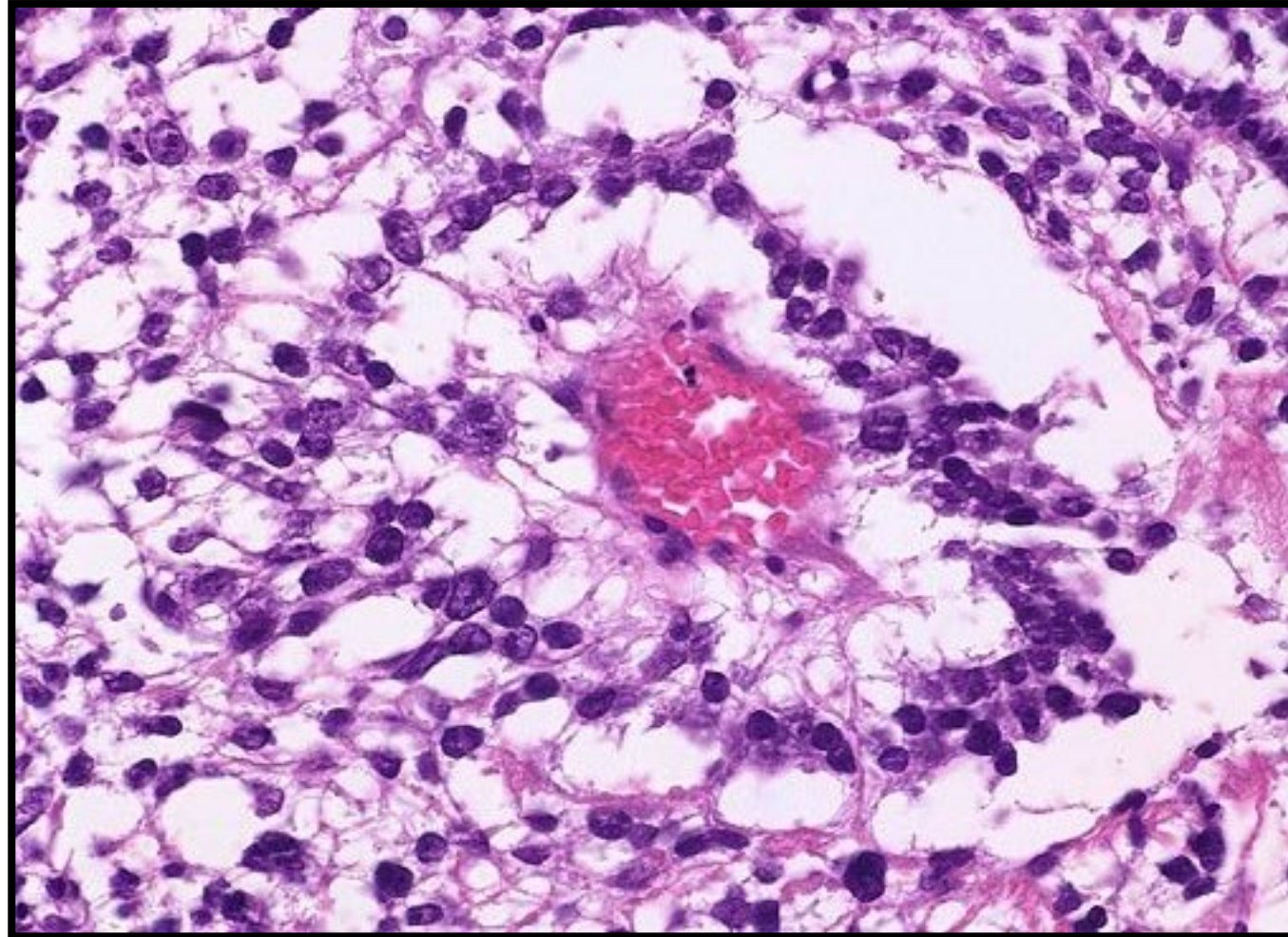
- Yolk sac tumor is also called endodermal sinus tumor.
- Testicular yolk sac tumors occur in two forms:
  - a pure form seen in young children (pure YST of the adult testis is rare)
  - in combination with other NSGCTs seen in adults.
- It is the most common primary testicular neoplasm in children younger than 3 years of age; in this age group, it has a very good prognosis.
- In adults it occurs as a part of a mixed GCT (commonly mixed with embryonal carcinoma)
- Patients have elevated serum alpha fetoprotein (AFP). AFP may be used to confirm the diagnosis and as a marker of disease progression or recurrence.
- The biologic behavior of YST is similar to that of embryonal carcinoma.

# YOLK SAC TUMOR

- **Gross morphology:**
  - Non encapsulated, homogenous, yellow white or mucinous.
- **Microscopic features:**
  - Tumor shows structures resembling endodermal sinuses called as Schiller-Duval bodies.
  - Hyaline–pink globules.
  - Tumor cell are positive for AFP and alpha-1-antitrypsin stain.



# MORPHOLOGIC FEATURES



# CHORIOCARCINOMA

- It is a highly malignant tumor.
- Patients have elevated serum human chorionic gonadotropin (HCG).
- They are small sized lesions.
- They are made up of malignant trophoblastic (placental) tissue (cytotrophoblastic and syncytiotrophoblastic cells) with prominent hemorrhage and necrosis.
- Tumor cells are positive for HCG stain.
- Pure choriocarcinoma of the testis is extremely rare, and the tumor is much more common as a component of a mixed GCT.

# TERATOMA

- It is a tumor composed of various types of cells or organ components.
- They can occur at any age (from infancy to adult life).
- In its pure form, it is common in infants and children second to yolk sac tumors.
- In adults, the pure form is rare. It occurs usually as part of a mixed GCT.

# GROSS MORPHOLOGY

- It is usually large (5 -10 cm) with a heterogenous appearance i.e. solid and cystic areas. It can show bone, cartilage and teeth grossly.
- It is composed of bizarrely distributed collection of different type of cells or organ tissues.

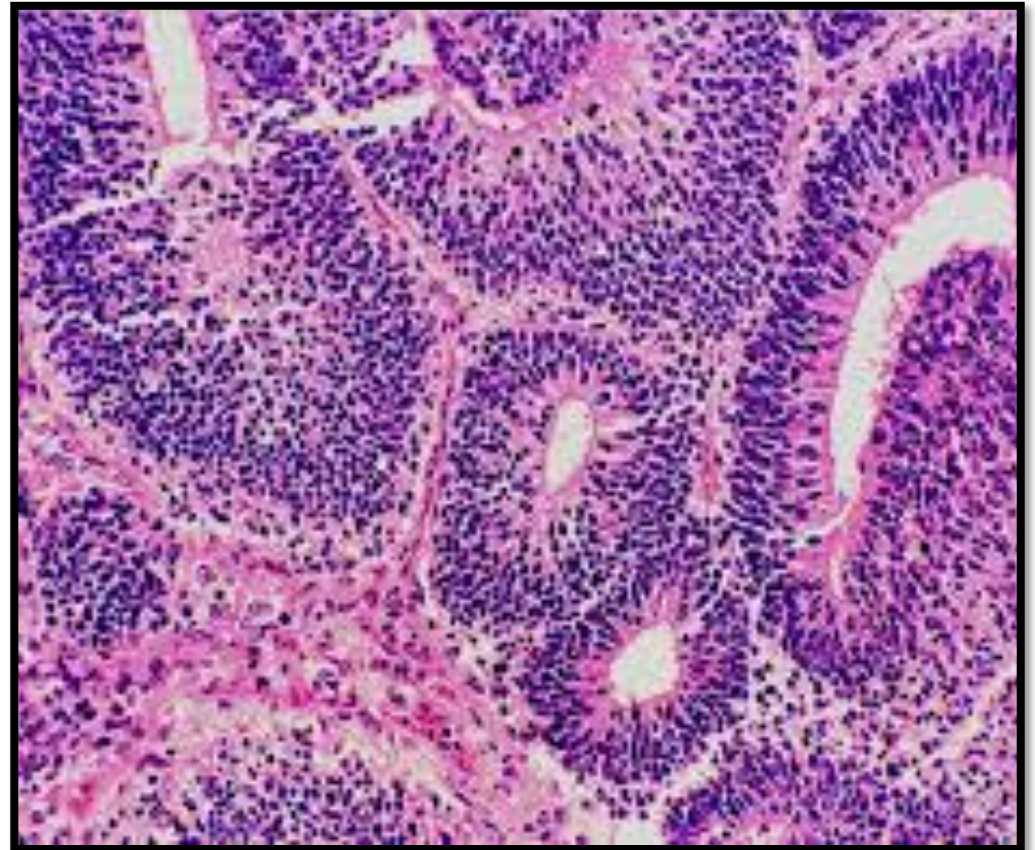
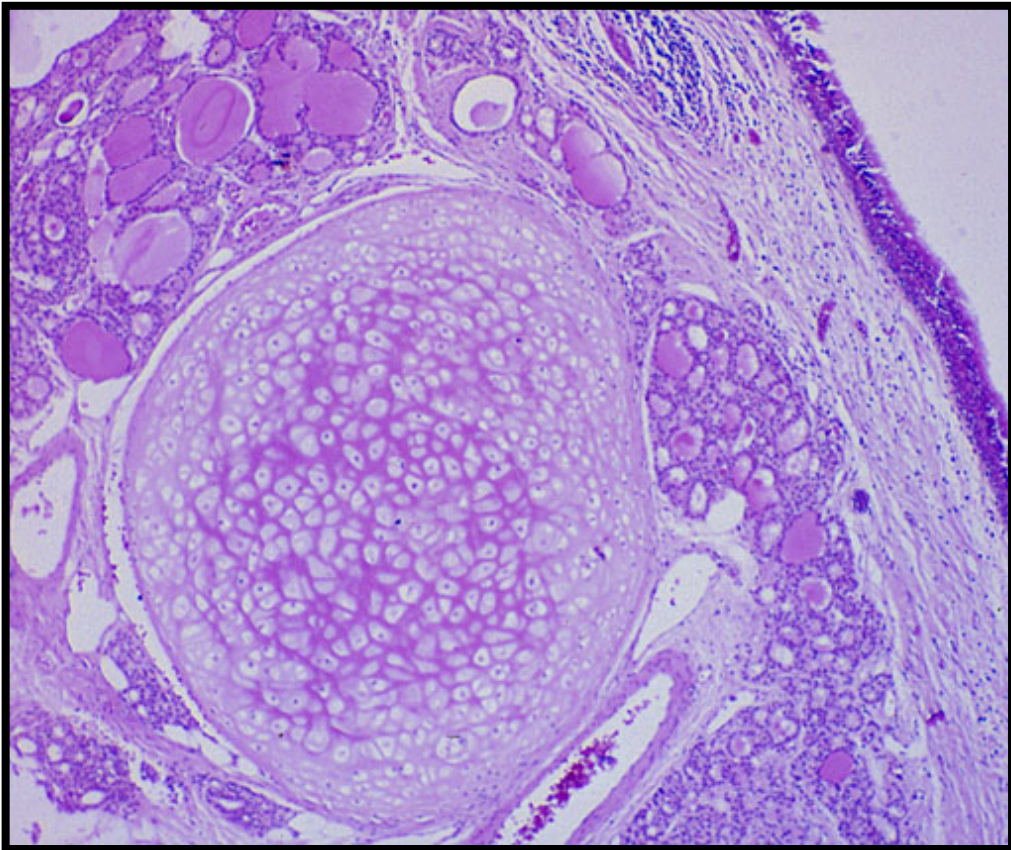
# TERATOMA



# MORPHOLOGIC FEATURES

- Any cell type or tissue can be present: neural/brain, cartilage, bone, squamous epithelium, hair, glandular cells, smooth muscle, thyroid tissue, bronchial epithelium of lung, pancreatic tissue etc.
- If the cells/tissues are mature looking; it is called a *mature teratoma*.
- If some cells/tissues are immature; it is called an *immature teratoma*.
- If any of the cells/tissues undergo a non germ cell type of malignant transformation, it is called a teratoma with malignant transformation (rare) e.g. squamous cells developing squamous cell carcinoma or the glandular cells developing adenocarcinoma.

# TERATOMA



# PROGNOSIS

- In prepubertal males, teratomas are benign, whereas the majority of teratomas in postpubertal males are malignant, being capable of metastasis regardless of whether they are composed of mature or immature elements.



# MIXED GCTS

- Mixed germ cell tumors are quite common.
- About half of testicular tumors are composed of a mixture of GCTs.
- The common combinations are:
  - Teratoma + embryonal carcinoma +/- yolk sac tumor
  - Seminoma + embryonal carcinoma

# CLINICAL FEATURES OF GCTS

- A painless enlarging mass in the testis. Generally any solid testicular mass should be considered neoplastic.
- They secrete hormones and enzymes that can be detected in blood (HCG, AFP, and lactate dehydrogenase)
- GCTs can spread by direct extension to the epididymis, spermatic cord, or scrotal sac.
- Lymphatic spread is common. Retroperitoneal and para-aortic nodes are first to be involved.
- Hematogenous spread is usually to the lung, liver, brain, and bones.

# CLINICAL FEATURES OF GCTS

- A biopsy of a testicular tumor is associated with a risk of tumor spillage therefore it is not recommended.
- The standard management of solid testicular tumors is radical orchiectomy.
- Seminomatous tumors are radiosensitive.
- Non-seminomatous tumors are chemosensitive and respond very well to chemotherapy.

# PROGNOSIS OF GCT

- More than 95% of patients with seminoma can be cured.
- 90% of patients with non-seminomatous tumors can achieve complete remission with aggressive chemotherapy, and most can be cured.
- The rare pure choriocarcinoma is the most aggressive non-seminomatous tumor. Pure choriocarcinomas have a poor prognosis.

# REFERENCES

- Kumar V, Abbas AK, Aster JC. Robbins Basic Pathology. 10<sup>th</sup> ed. Elsevier; 2018. Philadelphia, PA.



# THANK YOU

End of Lecture