

## Prostate gland pathology

### Anatomically:

- Composed of 5 lobes; anterior, posterior, middle and two lateral.
- Weighs 20 grams in normal adult.

### Histologically:

It composed of glands in fibromuscular stroma.

- ❖ The glands composed of two layers of cells:

1. Basal: (flattened or cuboidal).

2. Apical: (tall or columnar).

- ❖ Stromal tissue (muscles & fibrous tissue).

### The most important categories of prostate diseases are.

1. Prostatitis.
2. Nodular hyperplasia.
3. prostatic carcinoma.

### Prostatitis

- May be acute or chronic.

### Acute bacterial prostatitis

- Mainly due to **E. coli**, staphylococci.
- **Routes of infection:** either **ascending** from urethra (commonest) or **hematogenous** route.
- **Predisposing factors:** reflux disease, following surgical manipulation of prostate (e.g., catheterization, cystoscopy or urethral dilation).
- **Clinically:** acute bacterial prostatitis is associated with fever, chills, and dysuria.
- **On rectal examination** the prostate is tender.
- The diagnosis can be established by urine culture and clinical features.
- Biopsy of a gland in which acute prostatitis is suspected is contraindicated, as this may lead to sepsis.

### Chronic prostatitis

- **Sources:**
  1. Follow episodes of acute prostatitis.
  2. Develop insidiously, without previous attacks of acute prostatitis.
- **Types:**
  1. **Chronic bacterial prostatitis:** (positive bacterial culture).
  2. **Chronic a bacterial prostatitis:** commonest, negative bacterial culture, just increase WBC in prostate secretion.

- **Mic:** lymphoid infiltrate & glandular injury.
- A special variant of chronic prostatitis, **granulomatous prostatitis**, this type of inflammation in the prostate is either a part of systemic granulomatous inflammation (e.g. tuberculosis, sarcoidosis, syphilis, fungal ...etc) or it may be occurring as a nonspecific reaction to inspissated prostatic secretion & after resection a part of prostate.

### **Nodular hyperplasia of the prostate. (Benign prostatic hyperplasia .BPH).**

- **Hyperplasia of glands and stroma results in large nodular enlargement in the periurethral region of the prostate.**
- **Age:** BPH frequency rises with age, reaching 90% by the eight decade of life.
- **Site:** Most of **BPH** lesions arise in the **transitional & central zones (periurethral)**, While most prostatic adenocarcinoma arises in the peripheral zone (mainly posterior lobe).
- **It is not a premalignant lesion.**

### **Pathogenesis of nodular prostatic hyperplasia:**

- The precise molecular etiology of this hyperplastic process is **uncertain**.
- The pathogenesis is related to the action of **androgen**, so not occur in males castrated before the onset of puberty nor in men with genetic disease that block androgen.
- **Dihydrotestosterone DHT** derived from testosterone by the action of 5 alpha reductase stimulate glandular & stromal proliferation so 5 alpha reductase inhibitor is used for the treatment of BPH.

### **Clinical features:**

- Features are divided into:

I. **Obstructive symptoms** (hesitancy or difficulty initiating the stream, straining to void, a reduced flow, an intermittent stream or a sensation of incomplete emptying).

II. **Irritative symptoms** (frequency, urgency, nocturia and urge incontinence)

### **Morphology of Nodular Prostatic Hyperplasia.**

#### **Gross.**

- The prostate is **enlarged** (60 to 100 g) and even greater in severe cases.
- Cut section shows: **multiple well circumscribed nodules** with milky fluid secretion and cystic changes.

#### **Mic:**

- In BPH both glandular & fibromuscular stromal tissues are proliferated within hyperplastic nodules.

- Hyperplastic nodules contain small to large cystically dilated glands that are lined by two layers of cells, an inner columnar secretory cell layer and an outer layer of cuboidal or flattened basal epithelium & contain inspissated, proteinaceous material called Corpora amylacea in their lumina.

### ***Carcinoma of prostate***

- **Adenocarcinoma of the prostate is the most common** carcinoma in male & second most common cause of cancer related deaths in men older than 50 years of age, after carcinoma of the lung.

#### **Etiology:**

- Unknown, but predisposing factors are:
  - Increasing age.
  - Race (Black).
  - Family history.
  - Hormonal level (not develop in male castrated before puberty & the growth of carcinoma can be inhibited by orchiectomy).
  - Environmental (increased with certain industries (Cadmium)).

#### **Clinical features:**

1. During early stages/ mainly silent/ diagnosed incidentally on routine digital rectal examination, because most of cancers are aroused **at peripheral area of gland classically in a posterior lobe.**
2. More extensive disease may produce local discomfort & evidence of lower urinary tract obstruction like BPH.
3. More aggressive carcinoma/ discovered due to metastases (bone metastases, which are commonly to axial bones).

#### **Screening tests:**

- Screening tests for diagnosis of prostatic carcinomas are.
  1. Increase PSA (prostatic specific antigen) serum level (4 ng/ml is the upper limit of normal).
  2. Digital rectal examination (prostatic carcinomas arise in the outer (peripheral) glands & hence may be palpable as **irregular hard nodules** by rectal digital examination).
  3. Transrectal sonography & needle biopsy.
    - **All these tests should be used in combination in diagnosis of prostatic carcinomas.**

#### **Morphology of prostatic carcinoma:**

##### **Gross:**

Irregular gray white – yellow hard nodules.

## Mic:

- Most cases are **adenocarcinoma** with variable degrees of differentiation, ranging from well differentiated (small glands with irregular infiltration of stroma) to anaplastic carcinoma (irregular shaped glands).
- **The malignant glands are lined by a single layer of cuboidal cells with large nuclei and prominent nucleoli, with absence of the basal cell layer seen in normal or hyperplastic glands.**
- Perineural invasion is common.

## Metastasis:

1. Direct (local organs).
2. Blood stream (bone, lung/pleura, liver).
  - Bone metastases (**commonly to axial bones**), which are either:  
**Osteoblastic** (bone producing) lesion, COMMONEST one & indicate advanced cancer or **osteolytic** (destructive) lesion.
3. Lymph nodes (obturator).

## Grading of prostatic carcinoma.

Gleason grading system is consisting of five grades depends on glandular differentiation and growth pattern of the tumor.

- Grade I: well differentiated.
- Grade V: scattered poorly differentiated, cords and sheets.

## Staging:

- A: no palpable mass (incidental finding)  
B: tumor confined to prostate  
C: extends beyond the prostate (no metastasis)  
D: metastatic disease (bone, lung, liver)

## Testes pathology

### **Normal testicular tissue:**

- 250 lobules.
- 4 tubules in each lobule.
- Each tubule is composed of:
  - Basement membrane, sertoli cells and germ cells.
  - The interstitial cells are (Leydig cells).

## Congenital Anomalies (Cryptorchidism):

is a complete or partial failure of the intra-abdominal testes to descend into the scrotal sac and is associated with testicular dysfunction and an increased risk of testicular cancer.

- It is found in approximately 1% of 1-year-old boys.
- Cryptorchidism is usually unilateral, being bilateral in 25% of patients.
- The cause is unknown but may be due to **(Predisposing factors):**

1. Hormonal abnormalities. Mainly androgen abnormalities (androgen is important for descending of testes from the pelvis to scrotum).
2. Intrinsic testicular abnormalities.
3. Mechanical problems (obstruction of the inguinal canal).

#### **Complications of cryptorchidism:**

1. Testicular atrophy.
2. Infertility.
2. Inguinal hernia.
5. **Development of malignancy;** there is increases risk of testicular malignancy by four folds & also there is increases risk of malignancy in contralateral testis.

#### **Gross**

- Small, firm, and pale white.

#### **Mic**

1. There is marked hyalinization & thickening of basement membrane of seminiferous tubules.
2. There are prominent leydig cells, hyperplastic sertoli cells & atrophy of germ cells.

#### **Regressive Changes (Testicular Atrophy):**

##### **Causes:**

1. Atherosclerosis.
2. Orchitis (inflammation of testes) mainly mumps.
3. Cryptorchidism.
4. Hypopituitarism.
5. Radiation.
6. Liver cirrhosis.
7. Prolonged administration of antiandrogens.
8. primary failure of genetic origin, such as in Klinefelter syndrome.

### **Testicular Neoplasms**

- Less than 1% of all male malignancies.
- Peak age of incidence 15 & 34 years.
- More in whites than in blacks.

- 95% Of these tumors arise from germ cells (aggressive but curable tumors) & 5% of testicular tumors sex cord- stromal tumors (usually benign tumors but associated with hormonal syndromes).

### **Causes of testicular neoplasia.**

1. Cryptorchidism.
2. Testicular dysgenesis. Many syndromes are associated testicular dysgenesis & also associated with increased frequency of testicular malignancies.
3. Chromosomal abnormalities mainly chromosome NO. 12
4. Unknown causes

### **Classification of testicular neoplasia:**

1. **Intratubular germ cell neoplasia.** It is mean that the malignant changes are limited to the lining of seminiferous tubules & it is now widely believed that most testicular tumors arise from intratubular germ cells tumors.
2. **Seminoma.**
3. **Spermatocytic seminoma.**
4. **Non seminomatous germ cell tumors.**
  - Embryonal carcinoma
  - Yolk sac tumor
  - Teratomas (mature, immature, with malignant transformation)
  - Choriocarcinoma
  - Mixed
5. **Sex Cord–Stromal Tumors**
  - Leydig cell tumor and Sertoli cell tumor.

### **Seminoma.**

- 50% of testicular germ cell neoplasms.
- Most commonly between the 3rd- 5th decades of life.
- Usually sensitive to radiation and chemotherapy, with a good prognosis.

### **Gross.**

- Large, soft, well demarcated, usually homogenous. Gray-white, lobulated cut surface. Usually there is no hemorrhage.

### **Mic.**

- Seminoma are composed of:
  - Lobules of malignant cells (which are large, round to polyhedral have distinct cell borders with clear, glycogen- rich cytoplasm, round nuclei & prominent nucleoli.
- These lobules are separated by fibrous septa with lymphocytic infiltration.
- Seminoma is +ve for placental alkaline phosphatase.
- Seminoma is +ve for HCG in 10-25% &-ve for alpha feto-protein.

### **Spermatocytic Seminoma.**

- Older patients; usual more than 65 years old.

- This slow-growing tumor does not metastasize, and when treated by surgical resection it has an excellent prognosis.
- Contain a mixture of small, medium sized cells and multinucleated tumor cells.

### **Embryonal carcinoma**

- The peak incidence: 20- 30 years-old age group.
- Ill-defined invasive masses containing foci of hemorrhage & necrosis.
- Sheets of large cells with indistinct cell borders, large nuclei & prominent nucleoli.

### **Yolk sac tumors.**

- Most common primary testicular neoplasm **in children** younger than 3 years of age.
- In adults, often seen admixed with embryonal carcinoma.
- **Microscopically:**
  1. low cuboidal to columnar epithelial cells forming sheets, glands, papillae & microcysts.
  2. presence of Schiller-Duvall bodies (primitive glomeruli like structure).
    - The tumor cells produce Alfa fetoprotein (AFP), which can be detected in the serum as a tumor marker.

### **Choriocarcinoma.**

- These tumors are usually mixed with other germ cell tumors.
- Arise in placenta, ovary, mediastinum or abdomen.
- Choriocarcinoma usually small, but almost presented with metastases (mainly to the lungs, liver, CNS).
- **Microscopically:** sheets of small cuboidal cells (cytotrophoblastic cell) mixed with large, multinucleated syncytial cells (syncytiotrophoblastic cells).

### **Teratoma.**

- Most second germ cell tumor in children under 3 years, following the yolk sac tumors.
- They are usually pure, & almost never show metastases, & are associated with many Down's syndrome, klinefelter's syndrome, spina bifida..etc.
- **Microscopically,** three major variants of pure teratoma are recognized:
  - I. Mature Teratoma.** Contain fully differentiated tissues from one or more germ cell layers (e.g neural tissue, cartilage, adipose tissue, bone, and epithelium).
  - II. Immature Teratoma.** Usually are seen in adults, & they are contain immature tissue resemble to fetal tissue (primitive neural tissue, immature cartilage tissue....etc).
  - III. Teratoma with malignant transformation.** Characterized by:
    - Presence of malignant growth in teratoma.
    - Mainly squamous cell carcinoma, adenocarcinoma.