Testicular and prostatic tumors

Dr. Nisreen Abu Shahin

Department of Pathology

Faculty of Medicine, University of Jordan
Testicular Neoplasms:

- Peak incidence at 15-34 yr
- most common tumors in men (15-34 yr)
- 10% of cancer deaths
- include:
  
  I. Germ cell tumors: (95%); all are malignant in postpubertal males

  II. Sex cord-stromal tumors: generally benign.
RISK FACTORS:

1. whites > blacks
2. Cryptorchidism: (risk of cancer in undescended testis, and even contralateral descended testis).
3. Intersex syndromes (Androgen insensitivity syndrome; Gonadal dysgenesis)
4. Family history: (4 to 10 X in their fathers and brothers of affected men).
5. cancer in one testis (↑risk of ca in contralateral testis).

6. isochromosome of short arm of chromosome 12, i(12p): (in virtually all germ cell tumors, regardless of their histologic type).

7. intratubular germ cell neoplasia (in situ lesion): Most testicular tumors in postpubertal males arise from it.
Testicular germ cell tumors are sub-classified into:

I. Seminomas

II. Non-seminomatous germ cell tumors (NSGCT)

The histologic appearances may be:

1. **Pure** (i.e., composed of a single histologic type 40% of cases)

2. **Mixed** (60% of cases).
Seminomas:

- Make up to 50% of all testicular tumors

**Classic seminoma:**

- 40-50 years old
- Rare in prepubertal children
- Painless enlargement of testis
- Histologically identical to ovarian dysgerminomas and to germinomas occurring in the CNS and other extragonadal sites.
Grossly:
- soft, well-demarcated tumors, usually **without hemorrhage or necrosis**.

Histologically:
- large, uniform cells with distinct cell borders, clear, glycogen-rich cytoplasm, round large nuclei, and 1-2 conspicuous nucleoli
- The cells arrayed in small lobules with intervening delicate fibrous septa.
- A lymphocytic infiltrate usually is present
Seminoma: circumscribed, pale, fleshy, homogeneous mass

Microscopic examination reveals large cells with distinct cell borders, pale nuclei, prominent nucleoli, and lymphocytic infiltrate.
2. Embryonal carcinomas:

- 20-30 years old
- More aggressive than seminoma
- Grossly:
  - Are ill-defined masses containing foci of hemorrhage and necrosis
- Microscopically:
  - Large and primitive-looking tumor cells; basophilic cytoplasm, indistinct cell borders, large nuclei, prominent nucleoli, pleomorphic, and increased mitotic activity
Embryonal carcinoma

The tumor is hemorrhagic

Sheets of undifferentiated cells & primitive gland-like structures. The nuclei are large and hyperchromatic
3. Yolk sac tumors

- most common primary testicular neoplasm in children <3 yr
- good prognosis in kids
- In adults: rare and worse prognosis

Grossly:
- large and may be well demarcated.

Histologically:
- A distinctive feature is the presence of structures resembling primitive glomeruli, called **Schiller-Duvall bodies**.
- **AFP** can also be detected in the serum.
Schiller-Duvall bodies.
4. Choriocarcinoma

- 20-30 years old
- highly malignant
- Rare <1% of all germ cell tumors
- can also arise in the female genital tract
- ↑ serum level of HCG.

Grossly:
- necrosis and hemorrhage are extremely common

Microscopic examination:
- Syncytiotrophoblasts: large multinucleated cells; containing HCG.
- Cytotrophoblasts: single, fairly uniform nucleus.
4. Choriocarcinoma
5. Teratomas

- Neoplastic germ cells differentiate along somatic cell lines.
- Reminiscent of the normal derivatives of more than one germ layer.
- All ages.
- Common in infants and children; 2nd to yolk sac tumors.
- In adults: pure is rare (3%). However, the frequency of mixed teratomas with other germ cell tumors \(\approx 45\%\).
In prepubertal males, mature teratomas usually follow a benign course.

In postpubertal males, all teratomas are malignant, being capable of metastasis regardless of whether they are composed of mature or immature elements.
Clinical Features of testicular germ cell neoplasms:

- present with **painless testicular mass**
- Some tumors, especially NSGCT, may have **metastasized widely** by time of diagnosis
- Biopsy of a testicular neoplasm is **contraindicated**, because it’s associated with a risk of tumor spillage
- The standard management of a solid testicular mass is **radical orchiectomy**, based on the presumption of malignancy.
Seminomas and nonseminomatous tumors differ in their behavior and clinical course:

I. Seminomas:
- remain confined to the testis for long periods
- Metastases to iliac and paraaortic lymph nodes
- Hematogenous metastases occur late

II. Nonseminomatous germ cell neoplasms:
- metastasize earlier, by lymphatic & hematogenous routes (liver and lung mainly)
Assay of tumor markers secreted by germ cell tumors:

- helpful in diagnosis and follow up
  - HCG is always elevated in choriocarcinoma
  - AFP is increased in yolk sac tumor
  - lactate dehydrogenase (LDH) level correlate with tumor burden (tumor size or load), regardless of type
TREATMENT:

Seminoma:
- extremely radiosensitive
- tends to remain localized for long periods
- best prognosis.

>95% of patients with early-stage disease can be cured.

Nonseminomatous germ cell tumors:
- Aggressive tumors; chemotherapy.
- choriocarcinoma, which is associated with a poorer prognosis.
Prostate gland pathology
Benign Prostatic Hyperplasia (Nodular Hyperplasia)

- extremely common in men $\geq 40$; frequency rises with age.
  - androgen-dependent proliferation of both stromal and epithelial elements
  - does not occur in in males with genetic diseases that block androgen activity.
  - **Pathogenesis:** Dihydrotestosterone (DHT) is synthesized in the prostate from circulating testosterone by 5α-reductase, type 2.
  - DHT $\rightarrow$ support growth and survival of prostatic epithelium and stromal cells by binding to androgen receptors
  - DHT is 10 times more potent
Morphology:

- **BPH always occurs in** inner transition zone of prostate.

- **Grossly:**
  - Prostatic enlargement by many well circumscribed nodules bulging from the cut surface
  - Compressed urethra

- **Microscopically:**
  - composed of proliferating glands and fibromuscular stroma.
  - The hyperplastic glands are lined by 2 cell layers: tall, columnar epithelial cells and a peripheral layer of flattened basal cells.
Clinical features:

Because BPH preferentially involves the inner portions of the prostate, the most common manifestations are:

- **lower urinary tract obstruction**
  - difficulty in starting stream of urine (hesitancy)
  - intermittent interruption of urinary stream
  - urinary urgency, frequency, and nocturia (bladder irritation)

- ↑ risk of urinary tract infections
Carcinoma of the Prostate

most common form of cancer in men > 40

↓ prostate cancer mortality, due to increased early detection through screening

PATHOGENESIS

1. Androgens.

Prostate cancer does not develop in males castrated before puberty.

Cancers regress in response to surgical or chemical castration
2. **Heredity:** ↑risk among first-degree relatives of patients with prostate cancer.

3. **Environment:**
   - Geographical variations diet: westernized dietary habits

4. **Acquired somatic mutations**
   The most common gene rearrangements in prostate cancer → fusion genes consisting of the androgen regulated promoter of the **TMPRSS2** gene and the coding sequence of **ETS** family transcription factors.

   → **TMPRSS2-ETS** fusion genes

**Clinical Features**
- 70% - 80% arise in peripheral glands → palpable as irregular hard nodules on digital rectal examination.
- Elevated serum prostate-specific antigen (PSA) level screening tests.
- Bone metastases (axial skeleton) → osteoblastic (bone-producing) lesions on bone scans.