Session 17
Male Reproductive Disorders
Bioscience Department
Session Learning Outcomes

At the end of the session, you should be able to:

- Review the normal structure and functioning of male genital system.
- Describe and discuss the clinical presentation, in male reproductive system.
- Discuss the aetiology, clinical features, investigations and management of various prostatic disorders prostatitis, BPH and prostate cancer.
- Outline and discuss various penile and testicular disorders.
Session Plan

- Overview of the male reproductive system
- Presenting problems in male reproductive disease:
  - Hypogonadism
  - Gynaecomastia
  - Klinefelter’s syndrome
- Prostate disorders:
  - Prostatitis
  - Benign prostatic hyperplasia
  - Carcinoma
Session Plan

- Penile and testicular disorders:
  - Congenital and acquired penile disorders
  - Penile Infections and Inflammations
  - Penile carcinoma
  - Erectile dysfunction
  - Testicular swellings
  - Inguinal Hernia
  - Cryptorchidism
  - Testicular tumours
Overview of the Male Reproductive System
Presenting Problems in Male Reproductive Disease
## Male Reproductive System

### ORGANS

<table>
<thead>
<tr>
<th><strong>GONADS</strong></th>
<th><strong>MALE REPRODUCTIVE SYSTEM</strong></th>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Testes</td>
<td>Produce sperm and the male sex hormone testosterone</td>
<td></td>
</tr>
</tbody>
</table>

### DUCTS

<table>
<thead>
<tr>
<th><strong>Epididymis, Ductus Deference, Ejaculatory Duct, Urethra</strong></th>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturation of gametes, Storage of gametes, Delivery of gametes</td>
<td></td>
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</tbody>
</table>

### ACCESSORY SEX GLANDS

<table>
<thead>
<tr>
<th><strong>Seminal Vesicles, Prostate, Bulbourethral Glands</strong></th>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Producing Semen</td>
<td></td>
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</table>

### SUPPORTING STRUCTURES

<table>
<thead>
<tr>
<th><strong>Scrotum, Spermatic Cord, Penis</strong></th>
<th><strong>FUNCTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrotum supports and protects the testes as well as regulates the temperature of the testes.</td>
<td></td>
</tr>
</tbody>
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Tortora, GJ & Derrickson, B 2014, Principles of anatomy and physiology, 14th edn, John Wiley & Sons, Hoboken, NJ.
Presenting Problems in Male Reproductive Disease

- Hypogonadism
- Gynaecomastia
- Klinefelter’s syndrome
- Male menopause
- Prostatitis
- Benign Prostatic Hypertrophy
- Prostate cancer
- Penile disorders
- Infertility
Hypogonadism

- **Definition:** Decreased function of the gonads.

- **Aetiology:**
  - Hypogonadotrophic hypogonadism
    - Structural pituitary/hypothalamic disease
    - Functional gonadotrophin deficiency
    - Isolated gonadotrophin deficiency
  - Hypergonadotrophic hypogonadism
    - Developmental/congenital gonadal disorders
    - Acquired gonadal damage
Hypogonadism

- Clinical features:
  - Loss of libido
  - Lethargy with muscle weakness
  - Decreased frequency of shaving
  - Gynaecomastia
  - Infertility
  - Delayed puberty
  - Osteoporosis
  - Anaemia of chronic disease
Hypogonadism

- **Diagnosis:**
  - Serum testosterone level
  - Random LH and FSH, GnRH
  - Investigations for pituitary disease
  - Testicular examination
  - Karyotype analysis

- **Management:**
  - Testosterone replacement
  - Regular measuring and monitoring prostate-specific antigen (PSA) and haemoglobin concentration
  - Treatment for fertility
Gynaecomastia

- **Definition:** It is the presence of glandular breast tissue in males resulting from an imbalance between androgen and oestrogen activity, which may reflect androgen deficiency or oestrogen excess.

- **Aetiology:**
  - Idiopathic
  - Physiological
  - Drug-induced
  - Hypogonadism
  - Androgen resistance syndromes
  - Oestrogen excess
Gynaecomastia

○ Diagnosis:
  • Clinical history
  • Breast and testes examination
  • Ultrasonography or mammography
  • Random serum Testosterone, LH, FSH, oestradiol, Prolactin and hCG

○ Management:
  • Self resolving in pubertal boys
  • Androgen replacement
  • Anti-oestrogen therapy
  • Surgical excision for cosmetic reasons
Klinefelter’s Syndrome

Definition: It is a genetic abnormality with mainly 47XXY karyotype, characterised by dysgenesis of the seminiferous tubules and impairment of Leydig cell function resulting in hypogonadism.

Clinical features:

- Gynaecomastia
- Failure to progress normally through puberty
- Infertility
- Small, firm testes.
- Tall stature
- Increased risk of breast cancer and type 2 diabetes
Klinefelter’s Syndrome

- **Diagnosis:**
  - Clinical presentation
  - Karyotype analysis

- **Management:**
  - Androgen replacement


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Male Menopause

- **Definition**: A progressive decline in gonadal functions in male around age of 40 years but not complete cessation.

- **Aetiology**:
  - Decrease in testosterone
  - Alcohol excess
  - Malnutrition
  - Stress
  - Lack of sleep
  - Certain medications

- **Clinical features**:
  - Erectile dysfunction,
  - Depression, anxiety, fatigue
  - Reduced libido
  - Reduced cognitive functions and memory

- **Management**: Androgen replacement
Prostate Disorders
Prostatitis

- Definition: It is an infection or inflammation of the prostate gland.

- Aetiology:
  - Acute bacterial: E. coli, Gram-negative bacteria (Proteus, Klebsiella, Pseudomonas) and enterococci
  - Chronic Bacterial Prostatitis: Gram-negative enterobacteria
  - Chronic non-bacterial (Chronic Pelvic Pain Syndrome): Autoimmune. functional obstruction of the bladder neck, Prolonged tension of the pelvic floor muscles
Prostatitis

- Clinical features:
  - Frequent urination, dysuria, difficulty passing urine
  - Painful ejaculation, perineal or groin pain
  - Systemic disturbance (in acute disease)

- Diagnosis:
  - Digital rectal examination
  - Microbial culture of urine or urethral discharge

- Management:
  - Antibiotics
  - Combination of α-blockers, NSAIDs and amitriptyline
Benign Prostatic Hyperplasia

- **Definition:** It is an age-related, non-malignant enlargement of the prostate gland that occurs due to increase in cell number of both the glandular and stromal components giving rise to large nodules.

- **Aetiology:** unknown

- **Risk factors:**
  - Age
  - Family history
  - Race, ethnicity
  - Dietary fat and meat consumption

- **Hormonal factors:**
  - Testosterone and dihydrotestosterone
  - Oestrogens
Benign Prostatic Hyperplasia

**SIZE (mm)**

- **NEWBORN**: 1 gram
- 20: 8 gram
- 40: 15 gram
- 60: Marked enlargement 80 gram
- Moderate enlargement 25 gram

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Benign Prostatic Hyperplasia

○ Clinical features:
  • Difficulty in voiding urine: Hesitancy, poor urinary flow and a sensation of incomplete emptying
  • Urinary frequency, urgency of micturition and urge incontinence
  • Acute urinary retention with a painful distended bladder

○ Complications:
  • Bladder hypertrophy and hyperplasia
  • Bladder calculi
  • Bladder diverticulum
  • Increased predisposition to UTI’s and prostatitis
  • Hydroureter
  • Hydronephrosis
  • Renal damage
Benign Prostatic Hyperplasia

Complications:
- Hydronephrosis
- Infection
- Hydroureter
- Trabeculation formation
- Calculus formation
- Diverticulum formation
- Compression of urethra, obstruction
- Bladder wall hypertrophy and hyperplasia

Vardaxis, N A, 2010, a Textbook of Pathology, 2nd edn, Elsevier, Australia
Benign Prostatic Hyperplasia

Diagnosis:
- Digital rectal examination
- Urinalysis
- Test for urine flow rate
- Blood tests for prostate-specific antigen (PSA)

Management:
- Medical
  - Prostate < 30 g: α-adrenoceptor blockers
  - Prostate > 30 g: 5α-reductase inhibitors +/- α-adrenoceptor blockers
- Surgical
  - Transurethral resection of prostate (TURP)
  - Holmium laser enucleation
  - Open prostatectomy
Prostate Carcinoma

- **Definition:** Carcinoma of the prostate that predominately affect peripheral zones of the gland.

- **Aetiology:** Unknown
- **Risk factors:**
  - Age
  - Race
  - Heredity
  - A high-fat diet
  - Male hormone

- **Clinical features:**
  - Asymptomatic
  - Lower urinary tract symptoms as BPH
  - Metastases S/S:
    - Back pain, weight loss, anaemia and obstruction of the ureters.
Prostate Carcinoma

- Diagnosis:
  - Digital rectal examination
  - Blood tests for prostate-specific antigen (PSA)
  - Transrectal ultrasound-guided prostate biopsies

- Management:
  - Surgery
  - Androgen-suppressing drugs
  - Androgen receptor blockers
  - Gonadotrophin-releasing hormone (GnRH) analogues
Penile and Testicular Disorders
Congenital and Acquired Penile Disorders

- **Micropenis**: Very small penis usually due to ↓ prenatal androgen production, defective testosterone synthesis or pituitary gonadotrophin defect.

- **Epispadiasis**: Urethra opens on dorsal aspect of penis.

- **Hypospadiasis**: Urethra opens on ventral aspect of penis.
Micropenis

Normal testes, fertile man

Epispadias

Urethra opens on dorsal aspect (upper surface) of penis

Hypospadias

Urethra opens on ventral aspect (under surface) of penis

Image courtesy of Prof. Vardaxis. Endeavour College.
Congenital and Acquired Penile Disorders

○ Phimosis: It refers to a tightening of the prepuce or penile foreskin that prevents its retraction over the glans (congenital or acquired)

○ Paraphimosis: The foreskin is so tight and constricted that it cannot cover the glans. A tight foreskin can constrict the blood supply to the glans and lead to ischemia and necrosis.

Penile Infections and Inflammations

- **Balanitis**: It is an acute or chronic inflammation of the glans penis. Men with poor hygiene, immunosuppression, or diabetes are more prone to balanitis.

- **Balanoposthitis**: It refers to inflammation of the glans and prepuce. It is usually encountered in men with phimosis or a large, redundant prepuce that interferes with cleanliness and predisposes to bacterial growth.
Penile Carcinoma

- Aetiology: Unknown
- Risk factors:
  - Increasing age
  - Poor hygiene
  - Smoking
  - HPV types 16 and 18 infections
  - Ultraviolet
  - Radiation exposure
  - Immunodeficiency states

- Clinical features:
  - Small lump or ulcer
  - Painful swelling
  - Purulent drainage
  - Difficulty urinating
  - Palpable lymph nodes in the inguinal region

- Management:
  - Surgery
  - 5-year survival >95%
Erectile Dysfunction

- **Definition:** It is defined as the inability to achieve and maintain an erection sufficient to permit satisfactory sexual intercourse.

- **Aetiology:**
  - **Psychogenic:**
    - Performance anxiety,
    - A strained relationship with a sexual partner,
    - Depression
  - Overt psychotic disorders.
  - **Organic:**
    - Neurogenic disorders
    - Hormonal disorders
    - Vascular disorders
    - Drug-induced
    - Penile-related aetiologies
Erectile Dysfunction

Diagnosis:
- Careful history (medical, sexual, and psychosocial),
- Physical examination
- Investigations for underlying organic causes

Management:
- Psychosexual counseling,
- Androgen replacement therapy,
- Oral and intracavernous drug therapy,
- Vacuum constriction devices, and
- Surgical implants
Testicular Swellings

- **Hydrocele**: A collection of excessive fluid between the layers of the tunica vaginalis.

- **Hematocele**: It is an accumulation of blood in the tunica vaginalis, which causes the scrotal skin to become dark red or purple.

- **Varicocele**: It is characterized by varicosities of the pampiniform plexus, a network of veins supplying the testes.

- **Spermatocele**: It is a painless, sperm-containing cyst that forms at the end of the epididymis.
Testicular Swellings
Testicular Swellings

Hydrocele

Varicocoele


Image courtesy of Prof. Vardaxis. Endeavour College
Inguinal Hernia

- Definition: It is a protrusion of the parietal peritoneum and part of the intestine through an abnormal opening from the abdominal cavity.

- Aetiology:
  - Congenital: Patent vaginal process (≈1% of paediatric disorders)
  - Acquired: When obliterated vaginal process opens due to excessive stress being placed upon it

- Management: Immediate Surgery

- Complications: Intestinal obstruction, compression of veins, infarction and gangrene due to strangulated hernia
Inguinal Hernia

Vardaxis, N A, 2010, a Textbook of Pathology, 2nd edn, Elsevier, Australia
Cryptorchidism

- Definition: It occurs when one or both of the testicles fail to move down into the scrotal sac (undescended testes). The undescended testes may remain in the lower abdomen, at a point of descent in the inguinal canal, or in the upper scrotum.

- Clinical features:
  - Absence of one or both testes from the scrotum
  - Increased risk of
    - Infertility,
    - Malignancy,
    - Testicular torsion
Cryptorchidism

- Management:
  - Spontaneous descent
  - Hormone therapy
  - Orchiopexy
  - Lifelong follow-up
  - Testicular self-examination

Possible locations of undescended testes.

Orchitis and Epididymo-Orchitis

- **Definition:** It is an infection or inflammation of the testis or of testis and epididymis.

- **Aetiology:**
  - Associated with other infections of the genitourinary tract such as cystitis, prostatitis and urethritis
  - Chlamydia trachomatis and Neisseria gonorrhoeae
  - Mumps (Mumps orchitis)

- **Clinical features:**
  - Unilateral pain and swelling
  - Erythema and oedema of the overlying scrotal skin
  - Scarring, atrophy, infertility or sterility
Torsion of the Testis

- **Definition:** It is a condition in which there is twisting of the testis on itself.

- **Aetiology:**
  - Violent movements, trauma (sportsmen)
  - Abnormalities of situation or attachment of the epididymis, a long spermatic cord or testicular atrophy

- **Clinical features:**
  - Distress within hours of onset and often have nausea, vomiting, and tachycardia.
  - Affected testis is large and tender, with pain radiating to the inguinal area

- **Management:** Immediate Surgery
Testicular Tumours

- **Aetiology:** Unknown
- **Risk factors:**
  - Genetic predisposition
  - Disorders of testicular development: Klinefelter syndrome and testicular feminization, Cryptorchidism
  - HIV

- **Clinical features:**
  - scrotal mass painless or mild dull pain

- **Diagnosis:**
  - Biopsy, USG, CT scan for metastasis

- **Management:** Orchidectomy, Radiotherapy, chemotherapy
Testicular Self-Examination (TSE)

- 12% of cancer deaths between 16 and 36 years due to testicular tumours
- Monthly, three minute testicular self-examination after a shower or bath
- Discovery of changes in size, consistency of the testis, presence of hard lumps, pain or tenderness should be followed by a doctor’s examination
Reading and Resources

- Crowley LV, 2012, *An Introduction to Human Diseases – Pathology and Pathophysiology Correlations*, 9th edn, Jones and Bartlett Learning
Reading and Resources

- Mosby’s dictionary of medicine, nursing and health professions 2013, 9th edn, Elsevier, St. Louis, MO.
- VanMeter, KC & Hubert, RJ 2014, *Gould's pathophysiology for the health professions*, 5th edn, Elsevier, St Louis, MO.
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