



MED437  
KING SAUD UNIVERSITY



# Male reproductive system

Lecture (4)

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هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة والتدقيق وإضافة الملاحظات ولا يغني عن المصدر الأساسي للمذاكرة

- **Important**
- **Doctors Notes**
- Notes/Extra explanation

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

# ■ Objectives

**At the end of the lecture, students should be able to:**

- ✓ List the **different components** of the **male reproductive system**.
- ✓ Describe the anatomy of the **primary** and the **secondary sex organs** regarding: (**location**, **function**, **structure**, **blood supply** & **lymphatic drainage**).
- ✓ Describe the anatomy of the **male external genital organs**

Great videos by AnatomyZone that give overview of the lecture →



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# Components of male reproductive system:

## 1. Primary Sex Organ:

- Testis.

## 2. Reproductive Tract:

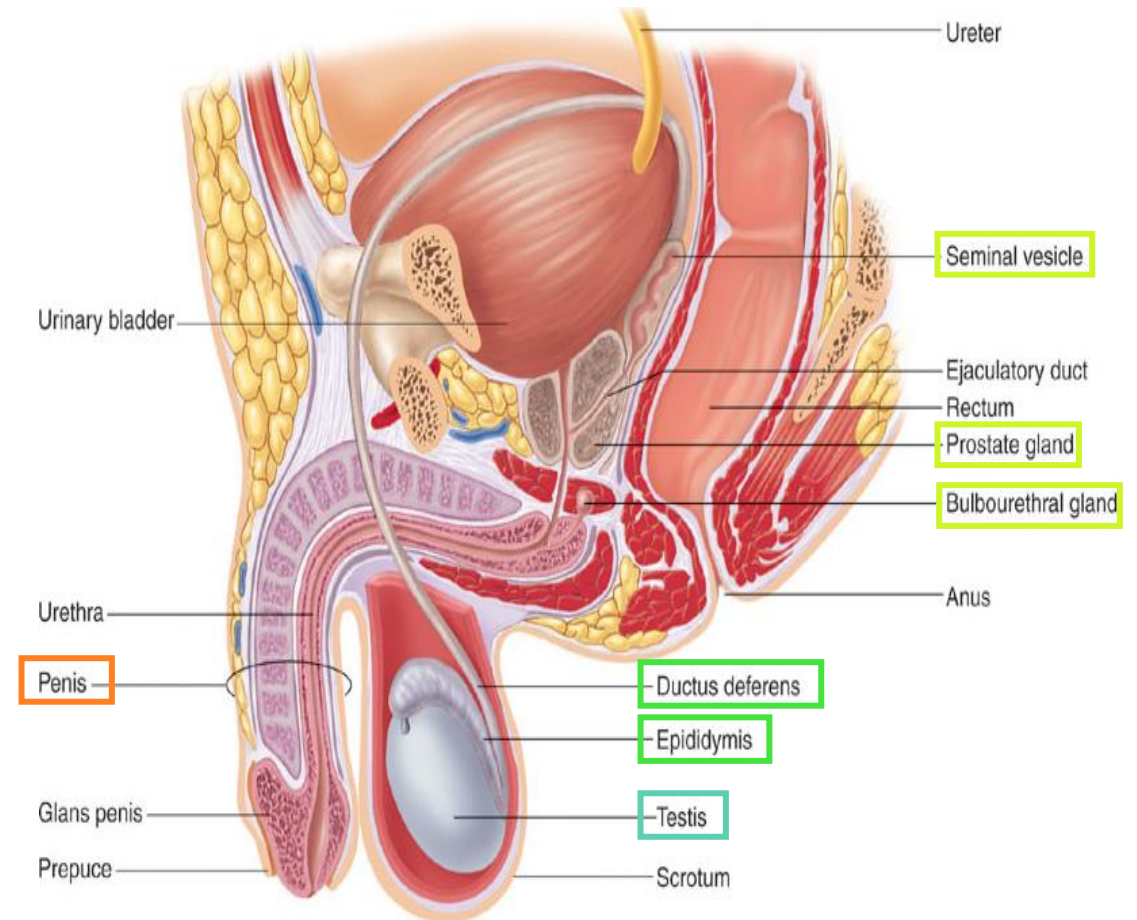
- Epididymis.
- Vas Deferens also called Ductus Deferens.
- Spermatic cord (vas deferens passes through it).
- Urethra

## 3. Accessory Sex Glands:

- Seminal vesicles.
- Prostate gland. **biggest**
- Bulbourethral glands (cowper's glands).

## 4. External Genitalia:

- Penis



You should know that:

- Ejaculation is stimulated by the sympathetic
- Erection is stimulated by the parasympathetic branch of the sacral plexus

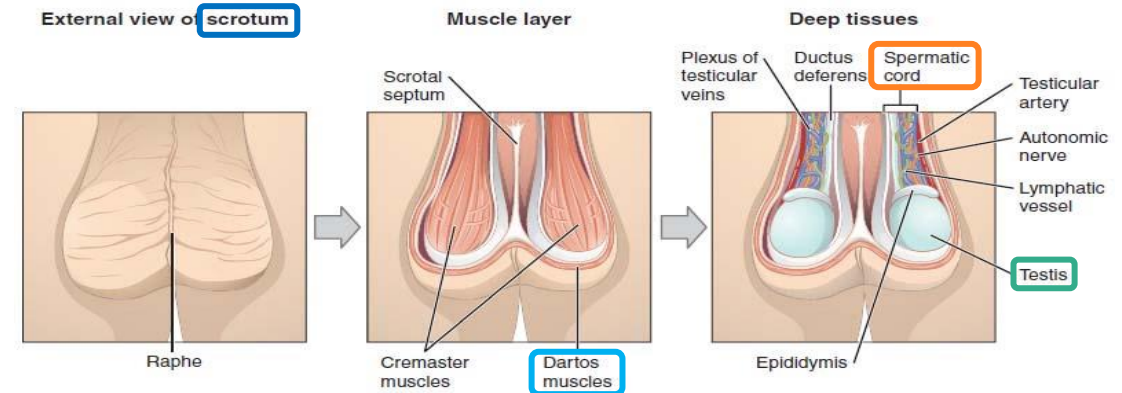
# Scrotum

- An **out pouching** of loose skin & superficial fascia.
- The **left** scrotum is **slightly lower than** the right\*.
- **Function:**
  - **Houses and protects the testis.**
  - **Regulates testicular temperature (no superficial fat)** → so the heat loss is fast.
  - It has thin skin with sparse hairs and sweat glands.
  - The **Dartos muscle** (regulates temperature of sperms) lies within the **superficial** fascia and replaces Scarp's fascia of the anterior abdominal wall.

- \*Two reasons why the left testis is lower than the right one:
- Because veins of left testicle drain into the left renal vein (which is small) and this will lead to engorgement, while veins of the right testicle drain into IVC ( which is big) and this will make the drainage much easier.
  - Sigmoid colon is located in the left side ( it contains feces) and therefore this disturbs the venous drainage.

# Testes

- Testis or Testicle (singular), Testes (plural).
- **Paired almond-shape gonads** that suspended in the scrotum by the spermatic cord.
- Volume: about 20-25 ml / Length: 4 - 5 cm long / Weigh (10.5 – 14 g.).
- **Function:** **exocrine & endocrine**
  - Spermatogenesis (primary sex organ).
  - Hormone production: (Androgens “testosterone”).



## Contents of spermatic cord:

- Vas deferens
- Genital branch of genitofemoral nerve
- 3 arteries (testicular artery, cremasteric artery and artery of the vas)
- Vein ( pampiniform plexus)
- Sympathetic fibers
- lymphatics
- Cremasteric muscle
- vestige of process vaginalis

# Testes

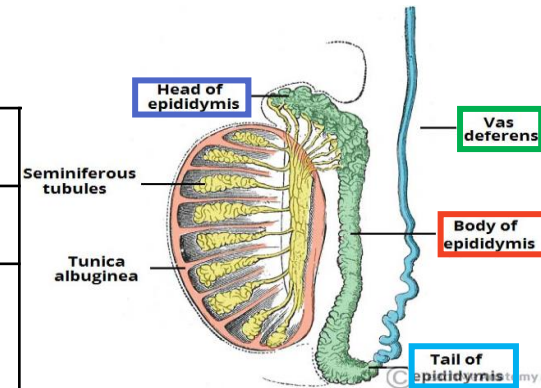
Factors that allow the testes to descend:

- The upper half of the body grows faster than the lower half, which will help with the descending
- The growing viscera ( liver, intestine) increases the abdominal pressure and helps with the descending
- Fibrous band connecting the skin of the scrotum and the lower pool of the testis ( it shrinks, and the shrinkage pulls the testis downward (gubernaculum)
- tunica vaginalis

Covering	1. Tunica Vaginalis	<b>Peritoneal covering</b> , formed of parietal and visceral layers. It surrounds testis & epididymis. It allows free movement of testis within the scrotum.	2. Tunica albuginea:	It is a whitish fibrous capsule.
	Internal structure	<p>-Fibrous septae <u>extend from</u> the capsule, <u>dividing</u> the testis into (200-300) lobules (average 250).            -Each lobule contains, (1-3) seminiferous tubules.            -Seminiferous tubules: (Each is a 60 cm coiled tubule).            -They are the <b>site of spermatogenesis</b>.            -They form the <b>bulk</b> of testicular tissue.            -In <b>between</b> the seminiferous tubules lies the <b>Interstitial cells of Leydig</b> which <b>secret Testosterone</b>.            -<b>Rete testis</b>: A network of tubules. It is the <b>site of merging</b> of the <b>Seminiferous tubules</b>.</p>		
SUPPLY	Arterial supply	<b>Testicular artery</b> (arises from the <b>abdominal aorta</b> at the level of L3)		
	Venous drainage	<b>Pampiniform plexus of veins</b> : About dozen veins which forms a network within the spermatic cord. They become larger as they approached the <b>inguinal canal</b> and converge (join) to form the <b>Testicular vein</b> : <b>Right</b> Vein drains into <b>IVC</b>   <b>Left</b> Vein drains into <b>left renal vein</b> .		
	Lymphatic drainage	<b>Testicular Lymphatics</b> : follow arteries and veins of the testis, End in <b>Lumbar (par aortic) nodes</b> . <b>Scrotum, Penis and Prepuce</b> الجلد الذي يقطعونها في الختان : Terminate in <b>Superficial inguinal nodes</b> .		

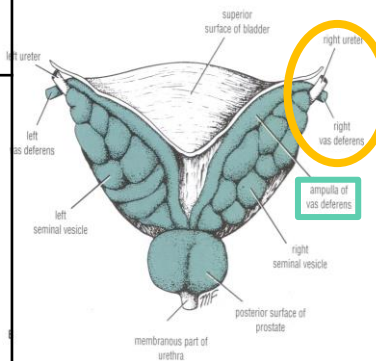
# Epididymis

<b>Shape</b>	It is a <b>single coiled tubule</b> (6 Meters long)
<b>Location</b>	<b>superior</b> and <b>posterior</b> margins of the testis
<b>Parts</b>	<ul style="list-style-type: none"> <li>• <b>Head</b> receives efferent ductules from the testis (<b>rete testis</b>)</li> <li>• <b>Body</b> (It's posterior with respect to Testis)   <b>Tail</b> is continuous with <b>Vas Deferens</b></li> </ul>
<b>Functions</b>	<ul style="list-style-type: none"> <li>• <b>Secretes</b> and <b>absorbs</b> the <b>nourishing fluid</b></li> <li>• <b>Recycles</b> damaged spermatozoa</li> <li>• <b>Stores spermatozoa up to 2 weeks</b> <u>to allow</u> for <b>physiological maturation of sperms</b></li> </ul>



# Vas Deferens

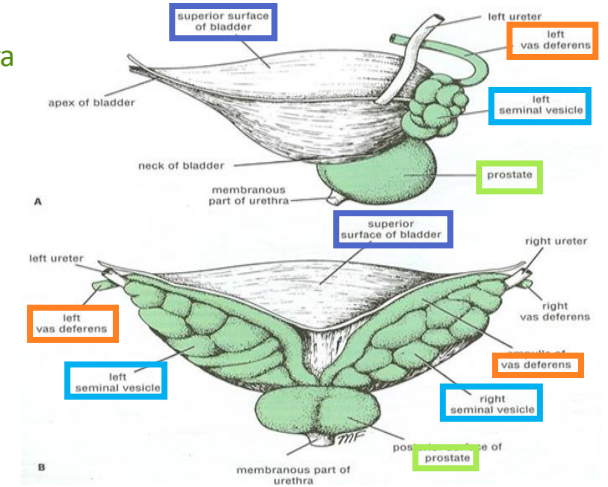
<b>Shape</b>	It is a <b>muscular tube</b> (45 cm long)
<b>Function</b>	<b>Carries sperms</b> from the <b>epididymis</b> to the <b>pelvis</b> ( <b>ejaculatory duct</b> )
<b>Course</b>	<ul style="list-style-type: none"> <li>• Passes <u>through</u> the <b>inguinal canal</b> as one of the contents of the spermatic cord</li> <li>• It <u>crosses</u> the <b>lower end of the ureter</b></li> <li>• Its <b>terminal part</b> is <b>dilated</b> to form the <b>Ampulla</b> of the <b>vas deferens</b> on the <b>base of the urinary bladder</b>.</li> <li>• It <b>joins</b> the <b>duct of the seminal vesicle</b> to form <b>ejaculatory duct</b> which <u>opens into</u> the <b>prostatic urethra</b>. (the posterior aspect)</li> </ul>



# Ejaculatory Duct

- **Formed by the union** of the **lower end** of the **vas deferens** and the **duct of the seminal vesicle**.
- Its length is about 2.5cm.
- The **2 ejaculatory ducts** open into the **prostatic urethra** on both sides of the **seminal colliculus**.
- They drain the **seminal fluid** into the **prostatic urethra**.

Remember: parts of male urethra  
 Prostatic → 3cm  
 Membranous → 1cm  
 Penile (spongy) → 16cm



# Accessory Glands

- Seminal vesicle | Bulbourethral or Cooper's glands | Prostate
- Function:
  - Secretion of the **seminal fluid**.
  - **Nourishing, activation & Protection** of the **sperms**.

	Seminal Vesicles	Bulbourethral or Cooper's glands
Shape	Paired elongated glands (SV).	Small paired glands
Location	<ul style="list-style-type: none"> <li>• <b>posterior &amp; inferior</b> to the <b>urinary bladder</b></li> <li>• Lies <b>lateral</b> to the <u>vas deference</u></li> </ul>	At the <b>base</b> of the <b>penis</b>
Functions	Secrete (60% of seminal fluid)	Secrete <b>alkaline mucus</b> <u>for</u> <b>Neutralization</b> of <b>urinary acids</b> & <b>Lubrication</b>

# Accessory Glands

Prostate Gland	
<b>Definition</b>	The <b>Largest male accessory gland</b> , fibromuscular glandular tissue & <b>walnut</b> (عين الجمل) size
<b>Shape</b> <u>CONICAL</u>	Base (superior): <u>Attached to</u> neck of urinary bladder
	Apex (Inferior): <u>rests on</u> the <b>Urogenital diaphragm</b>
	Surfaces Anterior, posterior and 2 lateral (right & left)
<b>Location</b>	Located <b>at the neck</b> of bladder Houses prostatic urethra
<b>Functions</b>	<ul style="list-style-type: none"> <li>○ It <b>secretes (20-30% of seminal fluid)</b> remember Seminal Vesicles Secrete (60% of seminal fluid)</li> <li>○ It <b>secretes enzymes (acid phosphatase)</b> which has the following functions:               <ul style="list-style-type: none"> <li>• Aid in <b>activating sperm motility</b></li> <li>• <b>Mucus degradation</b></li> <li>• <b>Antibiotic</b></li> <li>• <b>Neutralize the acidity of urine &amp; female reproductive tract (Alkaline fluid)</b></li> </ul> </li> </ul>
<b>Capsule</b>	<ul style="list-style-type: none"> <li>○ Internally → it has a <b>dense fibrous capsule (prostatic capsule)</b></li> <li>○ Externally → surrounded by a <b>fibrous prostatic sheath</b></li> <li>○ The <b>later (sheath)</b> is <u>continuous</u> with the <b>puboprostatic part</b> of the <b>levator ani muscle</b>, (<b>levator prostate</b>).</li> <li>○ In <b>between the prostatic capsule</b> and the <b>prostatic facial sheath</b> lies the <b>prostatic venous plexus</b> (goes to internal vertebral venous plexus, cancers of prostate may metastasize to vertebrae, spinal cord and brain)</li> </ul>

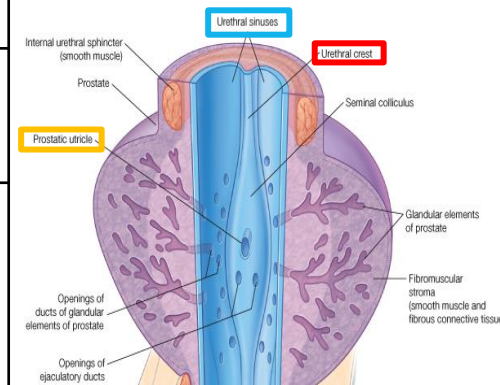


# Accessory Glands

	Prostate Gland
Relations	<p><b>Anterior</b> → Symphysis pubis</p> <p><b>Posterior</b> → Rectum (important for per rectal examination)</p> <p><b>Superior</b> → Neck of the bladder</p> <p><b>Inferior</b> → Urogenital diaphragm</p> <p><b>Lateral</b> → Medial margins of levator ani muscles (levator prostate)</p>
Lobes (related to urethra)	<p><b>Anterior lobe</b> <i>without secretion (isthmus)</i> → Lies <u>anterior</u> to the urethra (fibromuscular)</p> <p><b>Posterior lobe</b> → <u>Posterior</u> to the urethra and <u>inferior</u> to the ejaculatory ducts</p> <p><b>Lateral lobes (2)</b> → On <u>each side</u> of the urethra</p> <p><b>Middle (median)</b> → <u>Between</u> the urethra and ejaculatory ducts &amp; <b>closely related to neck of urinary bladder</b>. Usually it <u>projects into lumen</u> of the <b>bladder</b> it <u>elevates</u> <b>fold of mucous membrane</b> (uvulae vesicae) distorting the internal urethral sphincter, after the age of <b>40</b> years.</p> <p>*The <b>median</b> &amp; the <b>2 lateral lobes</b> are <b>rich</b> in <b>glandular tissue</b>.</p>
Urologists & Sonographers	<ul style="list-style-type: none"> <li>• They <u>divide</u> the <b>prostate</b> into <b>Peripheral</b> and <b>Central</b> (Internal) <b>zones</b>.</li> <li>• The <b>Central zone</b> is <b>represented</b> by the <b>Middle lobe</b>.</li> <li>• Within each lobe are four lobules, which are defined by the ducts and connective tissue</li> </ul>

# Accessory Glands

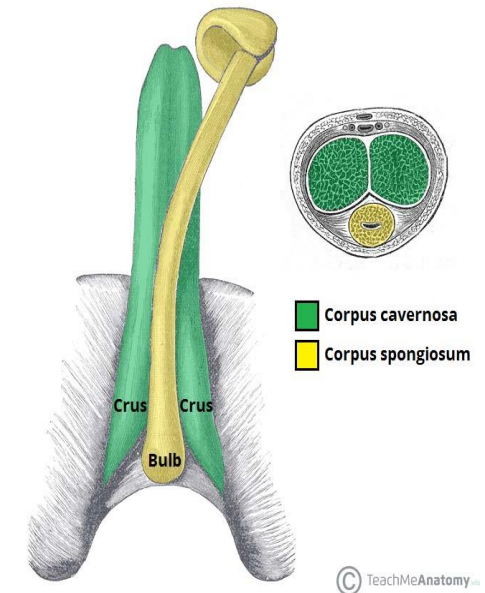
Prostate Gland		
SUPPLY	Arterial supply	Inferior vesical artery from Internal Iliac Artery
	Venous plexus	<ul style="list-style-type: none"> <li>Lies <b>between</b> the <b>prostatic fibrous capsule</b> and the <b>prostatic sheath</b>.</li> <li>It <u>drains into</u> the <b>internal iliac veins</b>.</li> <li>It is <u>continuous superiorly</u> with the <b>vesical venous plexus (VVS)</b> of the <b>urinary bladder</b> and <b>posteriorly</b> to the <b>internal vertebral venous plexus (IVVP)</b>.</li> </ul>
	Lymphatic drainage	Internal iliac lymph nodes
Prostatic Urethra*	<u>Urethral crest</u>	longitudinal elevated ridge
	<u>Prostatic sinus</u> (Urethral sinus)	<ul style="list-style-type: none"> <li><b>Groove</b> on <u>each side</u> of the <b>crest</b></li> <li>The <b>prostatic gland opens into</b> the <b>prostatic sinus</b></li> </ul>
	<u>Prostatic utricle</u>	<ul style="list-style-type: none"> <li>A <b>depression</b> on the <b>summit</b> of the <b>urethral crest</b></li> <li>The <b>ejaculatory ducts open on</b> the <b>sides</b> of the <b>utricle</b></li> <li><b>Seminal colliculus:</b> <b>rounded eminence</b> that <u>opens into</u> the <b>prostatic utricle</b></li> </ul>



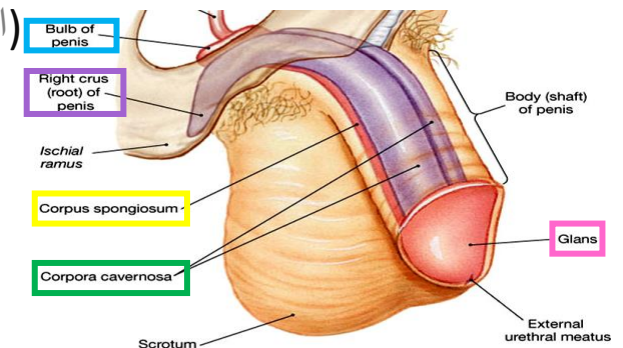
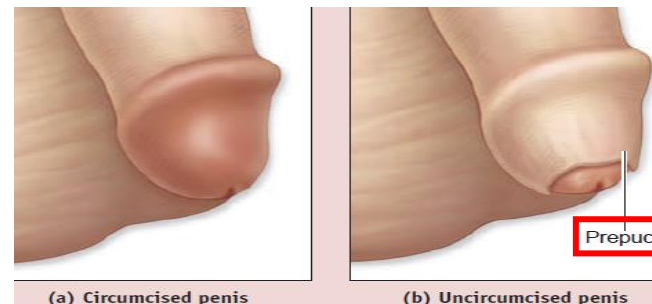
\*Structures seen on the **posterior wall** of the **prostatic urethra**

# Penis

<b>Copulatory</b>		Has (3) <b>cylindrical masses</b> of <b>erectile tissue</b> <ul style="list-style-type: none"> <li>• Two <u>Corpora Caverosa</u></li> <li>• One <u>Corpus spongiosum</u></li> </ul>
<b>Excretory</b>		Penile urethra <b>transmits urine &amp; seminal fluid</b>
<b>Erectile tissue</b>	<u>Corpora cavernosua</u>	<ul style="list-style-type: none"> <li>• Two <u>superior</u> (right &amp; left) masses of <b>(Primary erectile tissue)</b></li> <li>• They <u>Provide</u> the <b>majority of rigidity &amp; length of penis</b></li> <li>• Their <u>posterior expansions</u>, forms the <b>2 Crurae</b> (anchor tissue) <b>against pelvic bone</b></li> </ul>
	<u>Corpus spongiosum</u>	<ul style="list-style-type: none"> <li>• The single <u>inferior</u> mass <b>(Secondary erectile tissue)</b></li> <li>• It is <u>traversed by the penile urethra</u></li> <li>• Its <u>Anterior expansion</u> forms the <b>Glans penis</b></li> <li>• Its <u>posterior expansion</u> forms the <b>bulb of the penis</b></li> </ul>

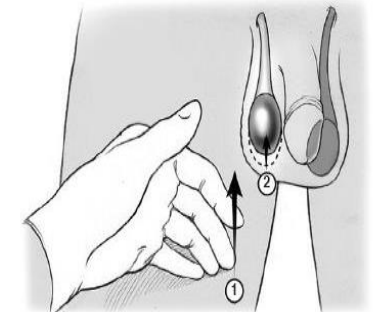
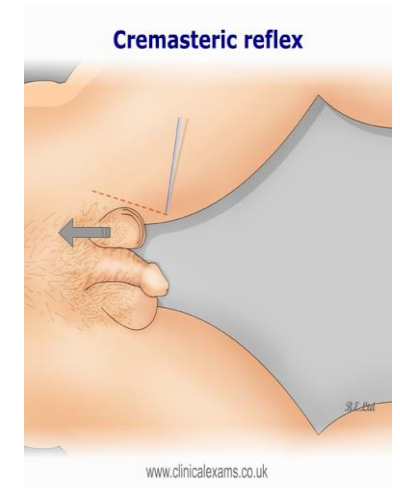


- **Prepuce** or **foreskin**: **Fold of skin covering glans penis** (before circumcision=**الختان**)

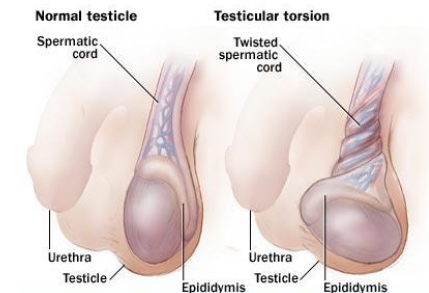


# Cremasteric reflex

<b>Indication</b>	<b>Evaluation of testicular pain in case of (Testicular Torsion).</b>	
<b>Technique</b>	<b>Examiner strokes OR pinches the skin in the upper medial thigh. It <u>causes</u> contraction of the cremasteric muscle</b>	
<b>Observation</b>	<b>Rise of the Testicle on same side (normal)</b>	
<b>Interpretation</b>	NORMAL: It is <b>present</b> with <b>Epididymitis</b> .	
	<b>ABSENT:</b> (no Testicle rise), Is Suggestive of <b>TESTICULAR TORSION</b> . (Also <b>ABSENT</b> in <b>50%</b> of <b>boys under age 30 months</b> )	
<b>Efficacy</b>	<b>Test Sensitivity for Testicular Torsion: 99%</b> <b>Assumes age over 30 months</b>	
<b>Nerve involved</b>	<b>Genitofemoral (GFN), ( L 1, 2)</b>	
	<b>Sensory:</b> Femoral branch of (GFN) & Ilioinguinal	<b>Motor:</b> Genital branch of (GFN).



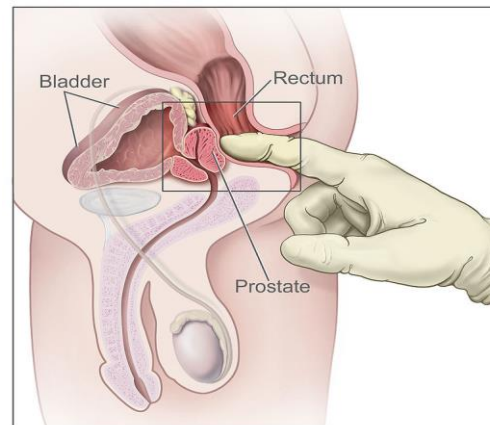
The reflex is elicited by (1) stroking the ipsilateral inner thigh with a tongue depressor or gloved hand, resulting in (2) the elevation of the testicle through contraction of the cremasteric muscle.



**\*Do not use this test under age of 30 months (as the muscle has not fully developed yet).**

# Hypertrophy of the Prostate

	Benign	Malignant (prostatic carcinoma)
Age	Common after middle age	common after the age of 55
Metastasis	Does not metastasize	<ul style="list-style-type: none"> <li>• <b>Lymphatic</b> spread: metastasize <b>first to internal iliac &amp; sacral lymph nodes</b></li> <li>• <b>Venous</b> spread: <b>Later to distant nodes</b>, bone &amp; brain through (IVVP)</li> </ul>
Relation to urethra	An <b>enlarged prostate projects into the urinary bladder</b> and <b>distorts the prostatic urethra</b>	It can cause <b>obstruction to urine flow</b> because of its close relationship to the prostatic urethra
Notes	The <b>middle lobe often enlarges and obstructs the internal urethral orifice</b> , this <b>leads to Nocturia, Dysuria, Frequency and Urgency</b>	The <b>malignant prostate is felt hard &amp; irregular</b> in <b>Per- rectal examination (PR)</b>



# MCQs

**1. The lymphatic drainage of the scrotum is?**

- A- Superficial inguinal nodes
- B- Deep inguinal nodes
- C- Paraaortic nodes
- D- Testicular nodes

**2. What is the male primary sex organ?**

- A- Vas deference
- B- Penis
- C- Testes
- D- Prostate

**3. \_\_\_\_\_ Of the epididymis receives efferent ductules from the testis?**

- A- Head
- B- Body
- C- Tail
- D- Vas deferens

**4. Which of the following lies lateral to the vas deferens?**

- A- Cowper's glands
- B- Prostate
- C- Seminal vesicle
- D- Rectum

**5. Which of the following related anteriorly to the prostate gland?**

- A- Neck of the bladder
- B- Symphysis pubis (sp).
- C- Urogenital diaphragm
- D- Rectum

**6. The ejaculatory duct drained into which of the following?**

- A- Prostatic utricle
- B- Prostatic cleft
- C- Prostatic sinus
- D- Urethral cleft

**7. Testicular artery arises from?**

- A- Ascending aorta
- B- Arch of aorta
- C- Abdominal aorta at the level of L3
- D- Abdominal aorta at the level of L5

**8. Cremasteric reflex is used to diagnose?**

- A- Testicular torsion
- B- Seminoma
- C- Prostatitis
- D- Benign prostatic hyperplasia



Good luck  
Special thank for team436 ❤️

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- References:
  1. Girls' & Boys' Slides
  2. Greys Anatomy for Students
  3. TeachMeAnatomy.com

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