

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# Anatomy Review File

اللهم لا سهل إلا ما جعلته سهلا وأنت تجعل الحزن إذا شئت سهلا

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*If any topics are unclear we highly recommend visiting:*



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Making Anatomy Simple

# Female Breast

	Base	Apex (Nipple)	Areola
Parts	<ul style="list-style-type: none"> <li>From 2<sup>nd</sup> to 6<sup>th</sup> rib</li> <li>From sternum (<i>medially</i>) to midaxillary line (<i>laterally</i>)</li> <li>Lies on:                             <ol style="list-style-type: none"> <li>pectoralis major (mainly)</li> <li>serratus anterior</li> <li>external oblique muscle</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Lies opposite 4<sup>th</sup> intercostal space.</li> <li>Carries 15 – 20 narrow pores of lactiferous duct.</li> </ul>	<ul style="list-style-type: none"> <li>The subcutaneous tissues of nipple &amp; areola are devoid of fat.</li> </ul>
Mammary Gland	<ul style="list-style-type: none"> <li>Non-capsulated &amp; embedded in subcutaneous fatty tissue of superficial fascia.</li> <li>The lobes and lobules are separated by <b>ligaments of cooper</b> that run radially and attach the skin of the breast to the deep fascia of <b>pectoralis major</b> muscle.</li> <li>The glands are separated from the deep fascia by <b>retromammary space</b>.</li> </ul>		
Arterial Supply	<ol style="list-style-type: none"> <li>Internal thoracic artery (internal mammary) → perforating &amp; mammary branches</li> <li>Lateral thoracic artery → mammary branches</li> <li>Intercostal arteries → mammary branches</li> </ol>		
Venous Drainage	Circular venous plexus → internal thoracic & axillary		
Lymphatic Drainage	Subareolar and deep lymphatic plexus → drain into different lymphatics		
	Central & lateral parts	Pectoral group	Axillary (75%)
	Upper part	Apical group	
	Medial part	<ol style="list-style-type: none"> <li>Internal thoracic</li> <li>Anastomose with opposite side</li> </ol>	Other (25%)
Infero-medial part	<ol style="list-style-type: none"> <li>Lymphatic of rectus sheath and linea alba</li> <li>Sub diaphragmatic lymphatics</li> </ol>		
Clinical Points	<ul style="list-style-type: none"> <li>60% of breast carcinoma occurs <b>in upper lateral quadrant</b>.</li> <li>Cancer can spread from one side to the other through anastomosing lymphatics.</li> <li>Localized breast cancer is treated by simple mastectomy (+ radio/chemotherapy to lymph). Note that incision should be made <b>radially</b>.</li> <li>Infiltration of ligaments of cooper gives <b>peau d'orange</b>.</li> </ul>		

Axillary lymph nodes	Drains (part of breast)	Related vessel	Location
Pectoral (anterior)	Central & lateral part of breast	Lateral thoracic vessels	On pectoralis minor
Subscapular (posterior)	-	Subscapular vessel	Posterior wall of axilla (lower border of subscapularis)
Brachial (lateral)	-	3 <sup>rd</sup> part of axillary vessels	Lateral wall of axilla
Central	-	-	Base of axilla
Apical	Upper part	-	Apex of axilla
Subclavian	Drains the 5 previous nodes then opens into → subclavian vein (right) & thoracic duct (left)		

# Perineum

Boundaries		Surface	Bony
<i>Anteriorly</i>		Mons pubis	Symphysis pubis
<i>Posteriorly</i>		Intergluteal folds	Coccyx
<i>Laterally</i>		Medial surfaces of the thighs	1. Ischiopubic rami, 2. ischial tuberosities 3. sacrotuberous ligaments
Contents		1. Lower ends of urethra, vagina & anal canal 2. External genitalia 3. Perineal body (between vaginal vestibule & anal canal) 4. Anococcygeal body (between coccyx & anorectal canal)	
Divisions		Urogenital Triangle (anterior)	Anal Triangle (posterior)
Boundaries	<i>Anterior</i>	Symphysis pubis	Transverse line passing through the 2 ischial tuberosities
	<i>Posterior</i>	Transverse line passing through the 2 ischial tuberosities	Coccyx
	<i>Lateral</i>	Ischiopubic rami & ischial tuberosities	ischial tuberosity & sacrotuberous ligament
Content		1. Lower part of urethra & vagina. 2. External genitalia (vulva).	1. Lower part of Anal canal 2. Ano-coccygeal body 3. Ischioanal fossa on each side

## Urogenital Diaphragm

Composed of:	1. <b>Sphincter urethrae</b> 2. <b>Deep transverse perineal muscle</b> 3. Superior layers of fascia of the urogenital diaphragm 4. inferior layers of fascia of the urogenital diaphragm (perineal membrane)
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## Perineal fascia

Layers	Superficial fascia → superficial fatty (camper) & deep membranous (colle's)
	Deep fascia(surrounds muscles in superficial perineal pouch)

## Pouches

Location		Superficial	Deep
Boundaries	<i>Superior</i>	Perineal membrane	Superior fascia of the urogenital diaphragm
	<i>Inferior</i>	Membranous layer of superficial fascia	Inferior fascia of the urogenital diaphragm (perineal membrane)
	<i>Lateral</i>	Ischiopubic rami	Inferior portion of obturator internus fascia
Content		1. Bulbs of vestibule 2. Crura of clitoris 3. <b>Superficial perineal muscle (Bulbospongiosus, Ischiocavernosus, Superficial transverse perineal muscles)</b> 4. Greater vestibular glands 5. <b>Perineal branch of pudendal nerve</b>	1. Part of urethra 2. Part of vagina 3. <b>Sphincter urethrae &amp; Sphincter vaginae muscles</b> 4. <b>Deep transverse perineal muscles</b> 5. <b>Internal pudendal vessels</b> 6. <b>Dorsal nerve of clitoris</b>

## External Genitalia (Vulva)

Composed of:

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Mons pubis</li> <li>3. Labia minora.</li> <li>5. Vestibule of vagina</li> </ol> | <ol style="list-style-type: none"> <li>2. Labia majora</li> <li>4. Clitoris</li> <li>6. Vagina &amp; urethra openings</li> </ol> |
|---|--|

## Anal Canal

Relations	<i>Anterior</i>	Perineal body, urogenital diaphragm, lower part of vagina
	<i>Posterior</i>	Anococcygeal body
	<i>Lateral</i>	Ischiorectal fossae

Divisions

Upper half (**endoderm**)

Lower half (**ectoderm**)

Arterial

Superior rectal (inferior mesenteric)

Inferior rectal (internal pudendal)

Venous

Superior rectal (inferior mesenteric)

Inferior rectal (internal pudendal)

Lymphatic

Para-rectal nodes

Superficial inguinal nodes

Innervation

Inferior hypogastric → visceral

Inferior rectal (pudendal) → somatic

## Ischiorectal Fossaa

Boundaries	<i>Base</i>	Skin of the perineum.
	<i>Medial</i>	Levator ani & anal canal.
	<i>Lateral</i>	Obturator internus, covered with fascia.

Contents:

1. Dense fat.
2. Pudendal canal (**Pudendal nerve** & **internal pudendal** vessels)
3. Inferior rectal nerve & vessels.

# Pelvis

4 bones

- 2 hip bones → anterior & lateral walls
- Sacrum } posterior wall
- Coccyx }

4 joints

- Symphysis pubis → anterior
- 2 Sacroiliac → posterior-lateral
- Sacrococcygeal → posterior

Division

- Divided into false and true pelvis by pelvic brim (inlet)
- True pelvis is divided into pelvic cavity and perineum by outlet.

False Pelvis

True pelvis (Inlet)

True Pelvis (Outlet)

Relations

*Anteriorly*

Lower part of the anterior abdominal wall.

Symphysis pubis

Symphysis pubis

*Posteriorly*

Lumbar vertebrae

Promontory of sacrum, ala of sacrum.

Coccyx

*Lateral*

Iliac fossae and the **iliacus muscle**

Ileopectineal (arcuate) lines

Anterolaterally:  
ischiopubic ramus.  
Posterolaterally:  
Sacrotuberous ligament

Pelvic Walls	Anterior	Posterior	Lateral	Inferior (floor)
	<ul style="list-style-type: none"> <li>bodies of the <b>pubic bones</b>,</li> <li><b>2 pubic rami</b>,</li> <li><b>symphysis pubis</b></li> </ul>	<ul style="list-style-type: none"> <li><b>sacrum</b>,</li> <li><b>coccyx</b></li> <li><b>piriformis</b> muscles</li> <li>covering of parietal pelvic fascia</li> </ul>	<ul style="list-style-type: none"> <li>Part of the <b>hip bone</b> below the pelvic inlet</li> <li><b>Obturator internus</b> and covering fascia,</li> <li><b>Sacrospinous</b> ligament.</li> <li><b>Sacrospinous</b> ligament.</li> </ul>	<ul style="list-style-type: none"> <li><b>pelvic diaphragm: levator ani and coccygeus</b> (divides it into main pelvis and perineum)</li> </ul>

**Pelvic Diaphragm**

Muscle		Origin	Insertion	Action	Innervation
Levator ani	Pubococcygeus	1. Back of the body of the pubis 2. Tendinous arch of the obturator fascia 3. Spine of the ischium.	1. Perineal body 2. Ano-coccygeal body 3. Coccyx	1. Support and maintain the pelvic viscera. 2. They resist the rise in intra pelvic pressure 3. Maintaining fecal continence. 4. Vaginal sphincter.	1. <b>perineal</b> branch of <b>S4</b> 2. <b>perineal</b> branch of the <b>puddental nerve</b> .
	Puborectalis				
	Iliococcygeus				
Coccygeus		Ischial spine	Lower end of sacrum and coccyx	Assist the levator ani in supporting the pelvic viscera	S4 & S5

**Arterial Supply: Internal Iliac Artery**

Division	Anterior Division	Posterior Division
Parietal Branches	1. <b>Obturator artery.</b> 2. <b>Inferior Gluteal artery.</b>	1. <b>Iliolumbar artery.</b> 2. <b>Lateral sacral arteries</b> (2 branches.) 3. <b>Superior gluteal artery.</b>
Visceral Branches	1. <b>Umbilical artery</b> → <b>superior vesical artery</b> + Medial Umbilical Ligament. 2. <b>Inferior Vesical (male) / vaginal (female) artery</b> 3. <b>Middle rectal artery</b> 4. <b>Internal pudendal artery</b> (to perineum) 5. <b>Uterine artery</b> (female) 6. <b>Ovarian artery</b> ( <b>from abdominal aorta In female</b> )	1. <b>NO</b> visceral branches
Supply	(1) Posterior abdominal wall (2) Posterior pelvic wall (3) Gluteal region (4) Perineum (5) Pelvic viscera (6) Medial region of thigh (7) Fetus	
Venous Drainage	1. <b>Internal iliac vein</b> (join <b>external iliac</b> ) → <b>common iliac vein</b> 2. <b>Ovarian vein</b> (right → <b>IVC</b> / left → <b>left renal</b> )	
Lymphatic Drainage	External iliac nodes, internal iliac nodes, and common iliac nodes → lateral (paraortic) lymph nodes	
Innervation	<b>Somatic:</b> <b>Sacral plexus</b> (L4. L5. S1. S2. S3 . most of S4) Gives <b>puddental nerve</b> to perineum	<b>Autonomic:</b> <b>Sympathetic:</b> <b>Ganglion Impar, Superior &amp; Inferior Hypogastric plexuses</b> <b>Parasympathetic:</b> <b>Pelvic splanchnic (S2, S3, S4) to pelvic viscera and hind gut .</b>

# Female Reproductive System

## Ovaries

Notes		<ul style="list-style-type: none"> <li>Primary sex organ</li> <li>It is attached to the back of the broad ligament by a peritoneal fold (mesovarium).</li> </ul>
Relations	Medial End	attached to uterus by ligament of ovary.
	Lateral End	attached to fimbriae of the uterine tube.
Arterial Supply		Ovarian (abdominal aorta)
Venous Drainage		Ovarian (right → inferior vena cava / left → left renal vein)
Lymphatic Drainage		Paraortic lymph nodes
Innervation		Ovarian plexus

## Fallopian Tube

Notes		Enclosed in the broad ligament of uterus
Parts	Intramural	opening into the uterine wall.
	Isthmus	narrowest part.
	Ampulla	widest part ( <b>site of fertilization</b> )
	Infundibulum	Has finger-like processes (fimbriae) & related to ovary
Arterial Supply		Ovarian & uterine arteries
Venous Drainage		Ovarian & uterine veins
Lymphatic Drainage		Paraortic & internal iliac lymph nodes
Innervation		Ovarian & inferior hypogastric plexuses

## Vagina

Notes		Extend from external os (along pelvis & perineum) to the vulva Function: birth canal & copulatory organ	
Relations	<b>Location</b>	<b>Pelvis</b>	<b>Perineum</b>
	<i>Anterior</i>	urinary bladder	urethra
	<i>Posterior</i>	Rectum	anal canal
	<i>Lateral</i>	Ureters	-
Arterial Supply		<ol style="list-style-type: none"> <li>Vaginal artery (internal iliac)</li> <li>Vaginal branch of the uterine artery</li> </ol>	
Venous Drainage		Vaginal plexus → internal iliac veins.	
Lymphatic Drainage		Internal iliac lymph nodes	
Innervation		Inferior hypogastric plexus	

# Uterus

Parts		Fundus (above uterine tubes level)	Body (from uterine tube level → isthmus of uterus)	Cervix (below isthmus)	
				Supravaginal	Vaginal
Relations	Anterior	Superior surface of urinary bladder		Anterior fornix	
	Posterior	Sigmoid colon		Posterior fornix	
	Lateral	Uterine artery		Lateral fornices	
Position		<ul style="list-style-type: none"> <li>• <u>Anteverted</u>: whole uterus bent <b>forward</b> on <b>vagina</b></li> <li>• <u>Anteflexed</u>: body of uterus bent <b>forward</b> on <b>cervix</b></li> <li>• <u>Retroverted</u>: fundus &amp; body bent <b>backward</b> on <b>vagina</b></li> <li>• <u>Retroflexed</u>: body of uterus bent <b>backward</b> on <b>cervix</b></li> </ul>		Ante → Forward Retro → Backward <u>V</u> erted → <u>V</u> agina <u>F</u> lexed → <u>C</u> ervix	
Ligament		Level of uterine tube:		Ligament of cervix:	
		1. <b>Round ligament of uterus*</b> 2. Ligament of ovary		1. Pubocervical 2. <b>Transverse cervical/cardinal*</b> 3. Uterosacral/sacrocardinal	
		*Support of uterus: 1. round ligament of uterus 2. cardinal ligament 3. levator ani Damage = uterine prolapse			
Arterial Supply		Uterine artery (internal iliac)			
Venous Drainage		Uterine plexus → internal iliac veins.			
Lymphatic Drainage		Internal iliac lymph nodes			
Innervation		Inferior hypogastric plexus			

# Pelvic Peritoneum

Rectouterine (Douglas) pouch	Reflection of peritoneum from <b>rectum</b> to <b>upper part of posterior surface of vagina</b> .
Uterovesical (vesicouterine) pouch	Reflection of peritoneum from <b>uterus</b> to <b>upper surface of urinary bladder</b> .
Broad ligament of uterus	Extension of peritoneum from lateral wall of <b>uterus</b> to lateral wall of <b>pelvis</b> . ( <b>encloses the uterine tubes</b> )

# Male Reproductive System

## Scrotum

Function	<ul style="list-style-type: none"> <li>• Houses and protects the testis.</li> <li>• <b>Regulates testicular temperature (no superficial fat)</b>.</li> <li>• It has thin skin with sparse hairs and sweat glands.</li> <li>• The <b>Dartos</b> muscle lies within the <b>superficial</b> fascia and replaces Scarpa's fascia of the anterior abdominal wall.</li> </ul>
Lymphatic Drainage	Superficial inguinal nodes

# Testis

Notes	Paired almond-shape gonads that suspended in the scrotum by the spermatic cord.	
Function	<ul style="list-style-type: none"> <li>Spermatogenesis (primary sex organ).</li> <li>Hormone production: (Androgens--testosterone).</li> </ul>	
Structure	Coverings	Internal
	<ol style="list-style-type: none"> <li><b>Tunica vaginalis</b> Peritoneal covering (parietal and visceral layers) that allows free movement of testes in scrotum</li> <li><b>Tunica albuginea</b> White fibrous capsule</li> </ol>	Divided by fibrous septa into lobules containing seminiferous tubules: <ul style="list-style-type: none"> <li>Site of <b>spermatogenesis</b> &amp; form the <b>bulk</b> of testicular tissue.</li> <li>Seminiferous tubules merge to give <b>rete testis</b></li> </ul>
Arterial Supply	Testicular artery from abdominal aorta.	
Venous Drainage	Pampiniform plexus → (at inguinal canal) testicular vein → IVC (right) / Left renal (left)	
Lymphatic Drainage	Lumbar (par aortic) nodes.	
Cremasteric reflex	<p><u>When to do it?</u> Evaluate testicular pain</p> <p><u>How?</u> Pinch or stroke the skin in the upper medial thigh</p> <p><u>Finding?</u> Contraction of cremasteric muscle &amp; rise of testis on <b>same</b> side</p> <p><u>What does it mean?</u> If present = normal or epididymitis. If absent = Testicular torsion (99% sensitivity)</p> <p><u>Limitation?</u> Not used on patient under 30 month</p> <p><u>Nerve involved?</u> Genitofemoral nerve (L1 &amp; 2): Motor (genital branch) Sensory (femoral branch + ilioinguinal nerve)</p>	

# Epididymis

Parts	Single coiled tube located at superior-posterior margin of testis and has 3 parts: <ol style="list-style-type: none"> <li>Head: receives efferent ductules</li> <li>Body</li> <li>Tail: continuous with vas deferens</li> </ol>
Function	<ol style="list-style-type: none"> <li>Secretes and absorbs the nourishing fluid.</li> <li>Recycles damaged spermatozoa.</li> <li>Stores spermatozoa up to 2 weeks to allow for physiological maturation of sperms</li> </ol>

# Vas Deferens

Course	Carries sperms from the epididymis to the pelvis: <ul style="list-style-type: none"> <li>Passes through the inguinal canal ( in spermatic cord)</li> <li>It crosses the lower end of the <b>ureter</b>.</li> <li>Terminal part is dilated to form the ampulla of the vas deferens on the base of the urinary bladder.</li> <li>It joins the duct of the seminal vesicle to form <b>ejaculatory duct</b> which opens into the <b>prostatic urethra</b>.</li> </ul>
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# Accessory Glands

Gland	Seminal Vesicle	Bulbourethral Gland
Location	posterior & inferior to the urinary bladder.	At the base of the penis
Function	Secrete 60% of seminal fluid.	Secrete alkaline mucus

## Prostate

Relations	Anterior	Posterior	Superior (base)	Inferior (apex)	Lateral
	Symphysis pubis.	Rectum (PR exam)	Neck of the bladder	Urogenital diaphragm	levator ani muscles
Function	It secretes enzymes (acid phosphatase) which has the following functions: <ul style="list-style-type: none"> <li>Aid in activating sperm motility, mucus degradation, &amp; Antibiotic.</li> <li>Neutralize the acidity of urine &amp; female reproductive tract (Alkaline fluid).</li> </ul>				
Capsule	<ul style="list-style-type: none"> <li>Internal prostatic fibrous capsule</li> <li>External prostatic fibrous sheath (continuous with levator prostate)</li> <li>In between them there is prostatic venous plexus.</li> </ul>				
Lobes	Anatomically		Radiology & urology		
	<b>5 lobes:</b> anterior (isthmus), posterior, 2 lateral, and middle (median). The median lobe is closely related to neck of urinary bladder & elevates fold of mucous membrane ( <b>uvulae vesicae</b> )		Central and peripheral zone. Central is represented by middle lobe.		
Hypertrophy	Benign		Malignant		
	Common: middle lobe often enlarges and obstructs the internal urethral orifice and causes symptoms		Felt during PR exam as hard & irregular. May metastasize via lymph (to internal iliac & sacral lymph nodes) or venous to bone & brain through (IVVP)		
Prostatic Urethra	Urethral crest	Prostatic sinus		Prostatic utricle	
	elevated ridge	prostatic gland opens		ejaculatory ducts open	
Arterial Supply	Inferior vesical artery (Internal Iliac Artery)				
Venous Drainage	Prostatic venous plexus → internal iliac veins <u>Note:</u> continuous with vesical venous plexus & internal vertebral plexus				
Lymphatic Drainage	Internal iliac lymph nodes				

## Penis

Notes	Copulatory & excretory organ composed of 3 cylindrical masses of erectile tissue.	
Division	Two Corpora Cavernosa	One Corpus spongiosum
	<ul style="list-style-type: none"> <li>Primary erectile tissue</li> <li>Posterior expansions forms the 2 Crurae</li> </ul>	<ul style="list-style-type: none"> <li>Secondary erectile tissue</li> <li>It is traversed by the penile urethra.</li> <li>Anterior → glans penis</li> <li>Posterior → bulb of penis</li> </ul>
Lymphatic Drainage	Superficial inguinal nodes	

Structures/ Organs	Arterial Supply	Venous Drainage	Lymphatic Drainage	Nerve Supply
Ovaries	Ovarian artery (abdominal aorta)	Ovarian (right → inferior vena cava / left → left renal vein)	Para-aortic lymph nodes	Ovarian plexus
Uterine Duct	Ovarian & uterine arteries	Ovarian & uterine veins	Para-aortic & internal iliac lymph nodes	Ovarian & Inferior hypogastric
Uterus	Uterine artery (internal iliac)	Uterine plexus → internal iliac veins.	Internal iliac lymph nodes	Inferior hypogastric plexus
Vagina	1. Vaginal artery (internal iliac) 2. Vaginal branch of the uterine artery	Vaginal plexus → internal iliac veins.	Internal iliac lymph nodes	Inferior hypogastric plexus
Scrotum Penis Prepuce	-	-	Superficial inguinal nodes	-
Testis	Testicular artery (abdominal aorta)	Pampiniform plexus → (at inguinal canal) testicular vein → IVC (right) / Left renal (left)	Lumbar (para-aortic) nodes.	-
Prostate	Inferior vesical artery (Internal Iliac Artery)	Prostatic venous plexus → internal iliac veins	Internal iliac lymph nodes	-
Anal Canal	Upper	Superior rectal (inferior mesenteric)	Para-rectal nodes	Inferior hypogastric → visceral
	Lower	Inferior rectal (internal pudendal)	Superficial inguinal nodes	Inferior rectal (pudendal) → somatic

Lymph Node	Female	Male
<i>Para-aortic</i>	1. Ovaries 2. Uterine duct	1. Testis
<i>Internal Iliac</i>	1. Uterine duct 2. Uterus 3. Vagina	1. Prostate
<i>Superficial inguinal</i>	1. Lower anal canal	1. Lower anal canal 2. Scrotum 3. Penis 4. Prepuce
<i>Pararectal</i>	Upper anal canal	

*Good Luck!*